May 3, 2022

Town of Palm Beach
Attn: Ryan Canterbury, Senior Buyer
rcanterbury@townofpalmbeach.com
(561) 227-7002

Intent Letter – RFQ No. 2022-16 Coastal Resiliency Consultant for Town of Palm Beach

Dear Mr. Canterbury:

Woods Hole Group is pleased to offer this response to the subject RFQ. It is our purposeful intent to present sufficient information to be awarded a contract. We also made every effort to present a uniquely qualified full-service team lead by Woods Hole Group, and with support of exclusive partners GHD, Coastal Protection Engineering, SCAPE Landscape Architecture, and Sobis, that can address all aspects of the Scope of Work. In this regard, we request consideration of making a single award to our team, which we firmly believe is in the best interest of the Town from a quality, consistency, efficiency, timeliness, and budgetary combined perspective. We acknowledge the RFQ, fully understand the scope, and other RFP requirements, and acknowledge receipt of Amendments.

We hope the review committee find our response to be thorough and information, and we certainly welcome any questions or points of clarification. Many thanks for this opportunity.

Sincerely,

The Woods Hole Group, Inc.

Robert (Bob) P. Hamilton, Jr.
President / Coastal Engineer

TOWN OF PALM BEACH

Contact Information Form

Purchasing Division
951 Okeechobee Rd.
West Palm Beach, FL 33401
Phone: 561-838-5406
Fax: 561-835-4688
Web: www.townofpalmbeach.com

Please Take a Moment to Provide the following Company Information

Part 1 | Company Information

Company Name: Woods Hole Group, Inc.

DBA Name (If Applicable):

Physical Address (No P.O. Boxes): 107 Waterhouse Road

Mailing Address (If Different than Above):

City: Bourne State: MA Zip: 02532

Owner's Name(s): CLS

Part 2 | Contact Information

Main Office Phone: 508-540-8080 Office Fax: 508-540-1001 Web Site: www.whgrp.com

Primary Contact: Robert P. Hamilton, Jr.

Primary Contact Phone: 508-495-6229

Primary Contact Cell Phone: 508-564-0446

Primary Contact Email: bhamilton@woodsholegroup.com

Emergency After Hours Contact: Bob Hamilton

Emergency After Hours Phone: 508-564-0446

Alternate Contact: Nasser Brahim

Alternate Phone: 508-495-6237

Alternate Contact Cell Phone:

Alternate Email : nbrahim@woodsholegroup.com

Emergency After Hours Email: bhamilton@woodsholegroup.com

Part 3 | Purchase Orders

Contact for Issuing Purchase Orders: Nadine Sweeney

Contact Phone: 508-495-6207

Contact Email: nsweeney@woodsholegroup.com

Part 4 | Accounts Receivable

Accounts Receivable Contact: Seema Owen

Contact Phone: 301-925-4411

Contact Email: dcs@woodsholegroup.com

TOWN OF PALM BEACH

Bidder's Qualification Form

The Vendor, as a result of this bid proposal, must hold a County and/or Municipal Tax Receipt (Occupational License) in the area of their fixed business location. Each proposer must complete the following information and submit with their proposal in order to be considered:

1. Legal Name and Address:

   Name: Woods Hole Group, Inc.

   Address: 107 Waterhouse Road

   Email: bhamilton@woodsholegroup.com

   City, State, Zip: Bourne, MA 02532

   Phone/Fax: 508-540-8080/508-540-1001

2. Check One: Corporation (X) Partnership ( ) Individual ( )
3. If Corporation, state: MA

   Date of Incorporation: Aubrey Consulting, Inc. 5/1/1986; Woods Hole Group, Inc. 2/5/1998

   State in which Incorporated: MA
4. If an out-of-state Corporation, currently authorized to do business in Florida, give date of such authorization: 11/14/2013
5. Name and Title of Principal Officers: Date Elected:

Name and Title of Principal Officers	Date Elected
Christophe Vassal - Chairman of the Board	11/30/2021
Robert P. Hamilton, Jr., - President	11/30/2021
Carine Foulquier - Secretary/Treasurer	11/30/2021

6. The Vendor's length of time in business: 36 years
7. The Vendor's length of time (continuous) in business as a service organization in Florida: 9 years
8. All bidders must disclose with their bid the name of any officer, director or agent who is also an employee of the Town. Further, all bidders must disclose the name of any Town employee who owns, directly or indirectly, an interest in the bidder's firm or any of its branches.

   Name: N/A

   Percentage of Interest: _____ %

Note: *Information requested herein and submitted by the proposers will be analyzed by the Town of Palm Beach and will be a factor considered in awarding any resulting contract. The purpose is to ensure that the Proposers, in the sole opinion of the Town of Palm Beach, can sufficiently and efficiently perform all the required services in a timely and satisfactory manner as will be required by the subject contract. If there are any terms and/or conditions that are in conflict, the most stringent requirement shall apply.*

1.3.2 Technical Abilities and Approach to Scope of Work (25%)

This section directly addresses the areas identified under Section 1.3.2 of the Solicitation Package, with a dedicated subsection for each bullet.

1.3.2.1 Quality and quantity of company resources

It is our intention through Section 1.3.1.1 to demonstrate the quality of the companies proposed for the Woods Hole Group team. Further, we trust that the demonstrated relevant experience of the team in Sections 1.3.1.2 through 1.3.1.4 for current and past clients provides the Town of Palm Beach confidence in our corporate resources to deliver the work needed by the Town to implement Level-Up Palm Beach. When it comes to the resources required for this work, the greatest asset are the actual people who will perform the work. Section 1.3.3 is intended to demonstrate the depth and breadth of people Woods Hole Group and our teaming partners can offer the Town on this contract. Because of the depth of our qualified bench, including many people who know and have supported the Town well in the past, we believe our team is unparalleled in terms of quality and quantity of relevant company resources – people are the assets of these consulting companies - to deliver on this contract. For this reason, we encourage the Town to consider a single award to the Woods Hole Group team, mainly to ensure high quality, consistent, and efficient work so we can all focus together with the Town to advance the objectives.

As for the quality and quantity of resources available at Woods Hole Group, consider that Woods Hole Group is a corporation of 83 people. 35 of these people comprise the Environment & Climate Business Unit that will primarily support the Town of Palm Beach, and 12 of these people are featured in this proposal. A key point here is Woods Hole Group is focusing a specialized subset of our qualified people to support Palm Beach. Should there be a need to access more resources within the company, we can do so. Of course, this is the reason we also brought onboard our specialized teaming partners. Hopefully this inspires confidence in the Town in both our quality and quantity of personnel. Furthermore, our President Bob Hamilton has been involved with the Town since 1997 and continues actively involved to this day. He reserves only a small selection of projects and clients to lead, and Palm Beach is one of them where his expertise is meaningful. This also ensures the Town will have priority to the resources of Woods Hole Group.

Aside from personnel, Woods Hole Group has a full range of facilities and equipment to support the program ranging from physical buildings and equipment, and to highly specialized IT infrastructure, including supercomputing equipment in-house to support the type of high technology modeling applications potentially needed by the Town. Financially, the company is strong with revenue growth, positive cash flow, and demonstrated ability to run a business for more than 30 consecutive years. We also have access to the full complement of resources from parent organization CLS if needed. Investment for capital improvements, hiring staff, and generally funding the business is not a concern.

More details an any particular aspect of the company or its resources can certainly be provided upon request.

1.3.2.2 Understanding of Scope of Work

Woods Hole Group has unique understanding of the scope of work and requirements for follow-up, based on our integral role with developing the Level-Up Palm Beach Implementation Plan. All elements of the scope are consistent with Level-Up, and we have assembled a team prepared to follow-through on these recommendations, including planning and policy development work, technical work required to refine definition of assets and areas at risk and critical elevations, and through engineering and permitting. Our fundamental approach to the scope of work is based on assembling the team capable of providing the range of services needed by the Town to implement the plan. Furthermore, we prioritized a team of people who know the Town well, so we can be nimble and cooperative, recognizing things will change along the way and we'll need to adapt.

We believe the best demonstration of our understanding of the scope of work is to define relative roles and responsibilities of the team by scope item requested by the Town. The Table breaks down the scope elements indicating which firm will lead (L) and support (S) each item, as well as potential for partnering (P) with Town policy developers. By design, we have a team capable of leading each area of expertise, and we have some level of redundancy on the team to ensure there is adequate breadth of capability and capacity to deliver. This will ensure the Town can obtain what is needed on one single Woods Hole Group turnkey team. Woods Hole Group as prime consultant will lead most tasks for consistency and will unselfishly utilize team resources to ensure the right people and expertise are applied to each assignment. We will work with the Town proactively to ensure the Town gains the highest quality work at most efficient pricing, and on-schedule.

Scope Elements with Firm Responsibilities (L – Lead, S = Support, P = Partner)

Scope Item	WHG	GHD	CPE	Scape	SOBIS	Policy Partner
General Experience						
• Coastal Impacts from Sea Level Rise, Flooding and Changing Climate	L					
• Flood Vulnerability Assessments	L					
• Implementation Strategies	L					
• Presenting to Officials, Staff, Regulators, Public	L					
Specific Tasks						
• Adapt Town Assets to Mitigate Risk of Damage and Failure from Future Coastal Flooding	L	S	S			
• Mitigate neighborhood and Town-wide exposure to future coastal flooding, emanating primarily from the Lake Worth shoreline	L	S	S	S		P
○ Develop bulkhead specifications/standards and corresponding ordinance revisions to enhance flood protection	L					
○ Establish maintenance and certification standards for existing bulkheads and seawalls, to reflect condition surveys and corrective actions needed and corresponding ordinance revisions to enhance flood protection	S	L	S			
○ Develop scope, priorities and cost estimates for neighborhood-scale floodcontrol systems and projects and corresponding ordinance revisions or Comprehensive Plan updates to enhance flood protection	L	S	S	S	S	
○ Identify process, costs and timeline for developing large-scale flood-control barrier (Lake Worth Inlet) feasibility study to enhance regional flood protection	L	S	S		S	
• Improve the safety of buildings and their occupants from future coastal flooding through floodplain development process	S	L				P
○ Develop revised definitions of substantial improvement/damage (time & value) to identify compliance thresholds, and corresponding ordinance revisions to enhance flood protection	L					
○ Provide recommendations for elevation standards for residential and nonresidential structures, and corresponding ordinance revisions to enhance flood protection	L					
○ Provide recommendations for building height definitions and minimum flood elevations, and corresponding ordinance revisions to enhance flood protection	L	S				
○ Identify revisions/expansions of flood hazard areas, and corresponding ordinance revisions to enhance flood protection	L					
• Integrate future coastal flood risk mitigation with other Town planning, policy and infrastructure funding priorities	L	S	S		S	P
○ Provide recommendations for amending Future Land Use Element and other portions of the Comprehensive Plan, to enhance flood protection	L					
○ Provide recommendations for amending Transportation Element and other portions of the Comprehensive Plan, to enhance flood protection	L					
○ Provide recommendations for amending Infrastructure Element and other portions of the Comprehensive Plan, to enhance flood protection	L					
○ Provide recommendations for amending Coastal Management/Conservation Element and other portions of the Comprehensive Plan, to enhance flood protection	L					
○ Provide recommendations for amending Intergovernmental Coordination Element and other portions of the comprehensive Plan, to enhance flood protection	L					
○ Provide recommendations for amending Capital Improvements Element and other portions of the Comprehensive Plan, to enhance flood protection	L	S			S	
• Other tasks as needed to implement a Coastal Resiliency Plan for the Town of Palm Beach	L	S	S	S	S	
Suggested Other Tasks						
• Landscape Architecture - Conceptual Resiilency Designs and Visualizations	S			L		
• Stormwater and Drainage Engineering	S	L				
• Local Structural Inspections / Assessments		S	L			
• Beach Program Design Refinements to Boost Resiliency	S	S	L			
• Natural Resource IDs/Assessments		S	L			
• Engineering Design for Resiliency Adaptations	S	L	S	S		
• Permitting/Regulatory Approvals and Compliance	S	S	L			
• Economic and cost/benefit assessments and estimates	S				L	
• Computer/Numerical Modeling of Coastal and Flood Processes	L	S	S			
• Grant ID and pursuit	L					
• Refining Vulnerability Assessment to Comply with Resilient FL Requirements	L					
• USACE/Stakeholder Coordination re Inlet Surge Barrier	L	S	S			

L = Lead; S = Support; P = Partner

On this Table under the last item for the "Other Tasks Needed to Implement a Coastal Resilience Plan for the Town of Palm Beach" as defined by the RFQ, we further demonstrate understanding of the scope by adding specific items likely or possibly to be required and demonstrating that we have the team in place to deliver. Some key areas here are:

- Landscape Architecture – to ensure the flood protection and resiliency components recommended in Level-Up come to life in a way that best meets the varying needs of the community by way of private property interests, public use, ecology, etc. Having quality Landscape Architecture services also will ensure vivid visualization and conceptual communication to the community to gather essential public input and support. In our experience, there is no better partner than Scape.
- Civil Infrastructure Engineering / Stormwater Management / Drainage Engineering – to address possible needs that arise with stormwater systems and drainage engineering, structural engineering, etc. it is important to have these items specifically covered on the team. GHD, with its local and global experience and proven long history serving the Town is an ideal choice to lead these areas.
    - On this same topic, it is worth emphasizing that Woods Hole Group has the capability to use the Town's existing data to model the performance of the stormwater drainage system under the full suite of present and future flooding scenarios, including rainstorms of different intensity/quantity/duration, rainstorms with sea level rise, and rainstorms combined with coastal flooding and sea level rise. We are doing this exact work for Town of Salem, MA (see project brief in Section 1.3.1.4 above. This modeling would be useful to identify the areas of Town and specific critical assets at risk from future stormwater-related flooding. It would also be useful for developing and testing solutions for highly vulnerable areas, such as changes in inlet capacity, pipe size, pumping, and onsite storage, and infiltration requirements for private development. It could also be used to evaluate the localized impacts of raising grades as part of private property elevation actions. Woods Hole Group's modeling capabilities and knowledge of the Town's infrastructure, combined with GHD's stormwater engineering expertise, together form a powerful resource for the Town as it works to deepen its understanding of stormwater-related risks and identify sustainable and resilient solutions to issues both proactively and as they arise.
    - Woods Hole Group also gained detailed information about the Town's stormwater management infrastructure through the process of ranking assets at risk. We then submitted detailed grant applications for D-8 (raise proposed air-cooled radiators and pump control panel), D-12 (floodproof with deployable barriers, seal conduits, floor drain backflow valve), and D-17 (raise proposed electrical controls), all of which were successful and will provide the Town supplemental funding to improve resilience of these specific assets.

- Local inspections, surveying, ecological resource assessments – will be critical to effective implementation, and we are pleased that Coastal Protection Engineering is exclusively committed to our team to bolster these areas.
- Economic considerations – given the investment involved with implementing asset-specific and potentially larger regional solutions to promote coastal resiliency in Palm Beach, it is important to consider overall value. For this, SOBIS brings valued experience to the team.
- Supplemental technical work and grant support – although not specifically called for in the scope issued by the Town, Woods Hole Group has these strengths essential to the program, and we feel specifically identifying these scope elements and understanding is important to the selection process.
- Policy Development – While Woods Hole Group is prepared to support these areas and has made specific suggestions for policy, ordinance, and comprehensive plan changes in Level-Up Palm Beach, we recognize the Town may work with other policy developers. We acknowledge while perhaps not directly on our team (though could be if preferred by the Town), we need to acknowledge this potential partnership as part of understanding the scope of work.

In addition to the understanding of the scope of work demonstrated in this subsection, we also provide further individualization of the scope in the following subsection, which specifically also addresses a RFQ response evaluation item.

1.3.2.3 Individualization of Proposal to Town of Palm Beach Needs

Based on the Woods Hole Group team's in-depth familiarity with the development and status of Palm Beach's resiliency program and projects, the most effective way to communicate an individual approach to address Palm Beach needs is to suggest a specific action plan forward. Below reflects our suggested path forward based on best available knowledge at this time. If awarded this contract, we suggest early engagement with the Town and related stakeholders as part of the kick-off process to help formulate and refine a path forward. As a starting point, we recommend consideration of the following next steps, of course depending on Town priorities, anticipated schedules, and available resources. Some of the next steps also depend on timing and award of matching grant funds from the Resilient FL state program as indicated below.

<u>Policy Refinements</u>: Work with the team to advance the policy refinements recommended in Level-Up Palm Beach as related to Code of Ordinances pertaining to bulkheads, building standards in flood plains, flood plain extent and design flood elevations, and other specifics in Level-Up Palm Beach, as well as refining the comprehensive plan for consistency.

<u>Project Advancement:</u>

- Resiliency Improvements to Specific Assets: With support from Woods Hole Group, Palm Beach was awarded grant support for four (4) specific asset upgrades related to D-17, D-12, D-8/E-5, and A-5 assets. These are all in the capital program for action, and

the refinements to be funded by the state are intended to boost resiliency. We recommend taking action to implement these changes.

- Advance Conceptual Designs for Regional Resiliency Projects: Recommended longer-term regional projects in Level-Up can proceed to the conceptual design phase by working with the community to refine priorities and interests, and then working with the combined Woods Hole Group resiliency, coastal/civil engineering, landscape architecture, and economic valuation team proposed herein. The next step can be taken with some combination of: Lake Worth shoreline; Lake Trail; Inlet Surge Barrier; Representative Neighborhood solutions; Representative building/residence/road elevations; and Representative town critical assets. For starters, we recommend some public workshops to identify and refine priorities, and then Woods Hole Group's engineering and architecture team can advance the concepts including high-quality visualizations as basis for next steps of planning, conceptual engineering, budgeting, etc. The inlet surge barrier also will require direct engagement with USACE and related stakeholders.

Supplemental Data Collection:

- Water Level Monitoring: Proceed with three (3) locations as outlined in Level-Up Palm Beach, including two to be deployed in Lake Worth by the Town (one at south and one at mid-Town) perhaps in collaboration with FSBPA to reduce cost (Woods Hole Group can support this grant application), and also advancing possibility for more robust system near the inlet with NOAA.
- Surveying: Three (3) survey items can proceed related to obtaining critical elevations for specific assets, ground-truthing bulkhead elevations at certain key locations, and performing a high-resolution swath survey of the Lake Worth shoreline with Terraquatic partner (perhaps with Resilient FL grant funding pending from Woods Hole Group application on behalf of Town).

Resilient FL Compliance and Next Pursuits: Palm Beach has been progressive in developing its flood risk management and climate change planning plans. In parallel the state of Florida has evolved its policies (e.g., Resilient FL), and there is a grant application pending prepared by Woods Hole Group on behalf of the Town to refine the vulnerability assessment and related work to comply with latest Resilient FL requirements and further position the Town for additional future grant funding. This application includes the high-resolution surveying identified above for the Lake Worth shoreline and critical assets, as well as activities to update the coastal flood hazard data, Palm Beach Flood Risk Model (PB-FRM) developed by Woods Hole Group, asset rankings and GIS flood risk map integration into Town systems. The grant also includes initial surge barrier conceptual performance evaluation. In addition to the pending grant, the Resilient FL program has extensive annual funding opportunities, so we recommend an ongoing item to identify and pursue grant opportunities to advance projects.

Ongoing Services:

- Progress monitoring/suggestions
- Level-Up updates/refinements
- Policy change reviews
- Review capital plans to ID assets for resilience refinements
- Resiliency project cost/benefit analysis and budget estimating
- Public engagement/meetings
- Continued Resilient FL grant pursuits (per above)

We look forward to prospects of refining these recommendations with the Town should our team be successful in securing this contract.

1.3.2.4 Licenses

Our collective firms have extensive business licenses, and the individuals earned distinguished professional licenses as well, such as Professional Engineering, Diplomate in Coastal Engineering, Professional Wetland Scientist, Professional Geologist, Professional Landscape Architect, and Certified Floodplain Manager (CFM), among others. Licenses held by specific individuals featured in this proposal are noted within the biosketches for managers and project personnel in Sections 1.3.3.1 and 1.3.3.2 below, the more detailed resumes in Attachment C, and copies of a subset of license documents are copied in Attachment F. Suffice to say the team is well credentialed. More information can be provided upon request.

1.3.2.5 Overall Completeness, clarity, and quality of proposal

We trust the review committee will assess the overall completeness, clarity and quality of this proposal. We admit it is a challenge to communicate such a wide range of information, and we hope our choice to present comprehensive information in a format that follows exactly the organization of the RFQ will facilitate review. There was an added challenge of producing materials that can be uploaded in Mercell, while preparing materials for a hard copy submittal. We made the choice to create an all-inclusive document that can stand-alone for the hardcopy submittal, but that can be saved in different PDF sections for direct importation to Mercell. Again, we hope this facilitates committee review and produces a favorable score for our team. We further intend in a small way to demonstrate our ability to work with the Town efficiently, and to produce high-quality on-time deliverables.

1.3.3 Experience/Ability of Personnel (25%)

This section directly addresses the areas identified under Section 1.3.3 of the Solicitation Package, with a dedicated subsection for each bullet. To facilitate committee review, as with other sections of this proposal, we present information in layers. For instance, to demonstrate the personnel the Town will have access to under this contract, we first provide a list of personnel, then we provide brief biosketeches on the key managers (Section 1.3.3.1) and project personnel (Section 1.3.3.2), and we also provide resumes in Attachment C. We did try to limit many of resumes to under 3 pages each; however, full *curricula vitae* can be provided upon request.

For the Management Team, we propose:

- Bob Hamilton of Woods Hole Group as overall Contract and Program Manager, as well as Principal in Charge
- Nasser Brahim of Woods Hole Group as Deputy Program Manager and Senior Climate Resiliency Specialist
- A lead Contract and Project Manager at each exclusive partnering firm, namely:
    - Mike Barnett at GHD
    - Tom Pierro at Coastal Protection Engineering
    - Pippa Brashear at SCAPE
    - Bill Bohn at Sobis

For the Project Team, we are proud to offer the Town a subset of our collective high quality staff members.

- From Woods Hole Group
    - Kirk Bosma – Senior Coastal Engineer, Modeler, and Resilience Specialist
    - Joe Famely – Climate and Sustainability Lead
    - Leslie Fields – Senior Coastal Geologist and Environmental Scientist
    - Adam Finkle – Coastal Scientist and Restoration Specialist
    - Brittany Hoffnagle – Coastal Scientist and GIS Specialist
    - Grace Medley – Coastal Scientist and Modeler
    - Alex Shaw – Coastal Engineer and Modeler
    - Matt Shultz – Senior Coastal Engineer and Modeling Lead
    - Nadine Sweeney – Publications and Contracts Specialist
    - Dave Walsh – Coastal Measurements and Sediments Lead
    - Dan Weirauch – Marine Technician and Surveyor
- From GHD
    - Jon Brent – Marine Structural Engineer
    - Melissa Burns – Structural Engineer
    - Craig Kruempel – Senior Coastal Scientist
    - Pradeep Nagarajan – Technical Director

  - Matt Trzcinski – Senior Project/Design Manager
- From Coastal Protection Engineering
  - Tara Brenner – Senior Coastal Engineer
  - Lindino Benedet – Principal Scientist
  - Stacy Buck – Senior Marine Biologist
  - Quin Robertson – Senior Scientist
- From SCAPE
  - Chris Barnes – Studio Director, New Orleans
  - Liz Camuti – Senior Designer
  - John Donnelly – Technical Principal
  - Anna Hochhalter – Associate Landscape Architect
  - Kate Orff – Founder and Principal
- For Sobis
  - Tim Brink – Senior Water Resources Engineer
  - Zack Baccala – Senior Geographic Systems Analysis
  - Zak Brohinsky - Planner

1.3.3.1 Management's Credentials

Bob Hamilton – Senior Coastal Engineer / Program Manager

Bob Hamilton is a Civil/Coastal Engineer and President of the Woods Hole Group. With Woods Hole Group since 1994, he previously served as Coastal Engineer/Modeler, Business Unit Director, V.P. for Scientific Operations, and V.P. for Business Development. He earned a B.S. in Civil Engineering from Lehigh University, and a M.S.C.E. from the University of Delaware Center for Applied Coastal Research. He has experience managing large and small contracts, including working with Town of Palm Beach in various capacities since 1998. He also had corporate leadership responsibilities for 5-year $15M USACE New England District IDIQ that included several task orders in support of EPA Region I, most notably related to the New Bedford Superfund Site. He supports the team on a 10-year IDIQ Environmental Field Services contract with NOAA CO-OPS. He is focused on development of business relationships and multi-disciplinary project and client management. His market and contracting experience includes government agencies, architectural/engineering partners, offshore oil and gas producers, private owners/developers, power utilities, and manufacturing industries. He has strong technical, analytical, and problem-solving skills combined with an effective leadership, communication, negotiation, and personnel management approach.

His technical expertise focuses on short- and long-term solutions, including community-wide climate change planning. He helps solve problems related to shoreline erosion, coastal

structures, water quality, environmental impact assessments/permitting, and the transport and dilution of thermal discharges and contaminants released into the marine environment. He also has multi-jurisdictional regulatory experience, including preparing EIS documents under NEPA, and has served as an expert witness. Mr. Hamilton's technical knowledge spans numerical modeling, field data collection, and technical writing/editing. He is responsible for developing technical approaches to complex projects, and for ensuring the technical teams within Woods Hole Group proceed in a logical manner aimed at producing high quality work products on-time and within prescribed budgets. Recent types of projects in which Mr. Hamilton has participated are related to community climate change planning, ocean and coastal observations and analysis, salt marsh and wetland habitat restoration, environmental sampling and testing, dredged material management, shore protection, and environmental resource impact assessment and management planning.

Nasser Brahim – Senior Climate Resiliency Specialist / Deputy Program Manager

Nasser Brahim is a Senior Climate Resiliency Specialist at Woods Hole Group. His expertise lies in helping communities plan and implement strategies to address their high priority climate risks. Nasser is highly skilled and experienced in climate change resiliency planning, building and infrastructure hardening, nature-based solutions, emergency operations, and land use regulations. He has a very strong track record of helping communities convert their plans into on-the-ground resiliency improvements. Nasser led the development of the Town of Palm Beach Coastal Resilience Implementation Plan, Level-Up Palm Beach, providing a comprehensive and feasible set of recommendations for action. When the plan was complete, he immediately helped the Town obtain grant funding to implement priority resiliency upgrades to critical infrastructure. He has provided similar resiliency planning and implementation support to numerous municipalities, transportation agencies, wastewater utilities, non-profit land conservancies, higher education institutions, and real estate property managers.

Michael Barnett, PE, D.CE – Senior Coastal Engineer

Mr. Barnett has over 36 years of experience in coastal engineering. He has led the feasibility, planning, engineering design, permitting and construction/contract document preparation for beach restoration and nourishment projects, seawalls, living shoreline and muck removal projects in the southeastern US. He has led offshore sand source investigations for restoration and nourishment projects in Florida and managed the construction of a mitigative artificial reef as an element of the Miami Harbor Deepening Project. Mr. Barnett served as the former Chief of the Florida Department of Environmental Protection's Bureau of Beaches and Coastal Systems for nearly eight years.

Thomas Pierro, PE, D.CE - Principal Engineer

Tom Pierro is a registered Professional Engineer in the State of Florida with over 20 years of coastal engineering experience, including over 15 years supporting the Town of Palm Beach coastal program. As a Managing Member of CPE, he is authorized and responsible to act on behalf of CPE with respect to contracting, directing, coordinating, and administering all aspects of the services to be provided and performed. Since 2001, he has designed, permitted, and supervised construction of numerous shore protection projects throughout Florida. He excels at representing the local sponsor and coordinating with state and federal agencies for construction of both non-federal and federal projects. He directs complex analyses of beach/inlet processes, designs programs that restore beaches, and promotes forward thinking throughout his team to support sustainable coastal programs. Mr. Pierro is a Board Certified Professional by the American Society of Civil Engineers as an ACOPNE Diplomate of Coastal Engineering and recipient of the distinguished FSBPA Engineering Award for outstanding contributions to coastal engineering in the State of Florida.

Pippa Brashear, RLA

Pippa Brashear is Resilience Principal at SCAPE. Pippa's experience is focused on climate ready waterfront and coastal design. Using her fifteen years of professional experience, Pippa leads the profession in building physical, ecological, and social resilience. She leads multi-disciplinary teams that design and build regenerative living infrastructure through informed thinking and an understanding of nature-based systems. Most notably, she serves as project manager for SCAPE's award-winning Living Breakwaters, nature-based infrastructure designed to provide a layered approach to risk reduction and currently under construction in New York Harbor.

Bill Bohn, RLA

Bill Bohn is a climate risk assessment specialist at Sobis with 20 years experience and has supported communities and projects around the world with hazard and climate change risk assessments. He has supported more than fifty hazard mitigation plans in the U.S. including the Central Virginia PDC's HMP. In the U.S., he has supported the States of Hawaii and Rhode Island with their Climate Adaptation Plans and supported a climate risk assessment for the Nature Conservancy in New York City. He has supported climate change risk assessments and adaptation plans in Africa, Asia, Caribbean, Middle East, North America, and South America. He is on the Board of Directors for Resilient Virginia and is the Chief Operating Officer of Sobis, Inc. a small woman- and minority-owned company headquartered in Virginia.

1.3.3.2 Project Personnel Credentials

Kirk F. Bosma, PE, M.C.E., Senior Coastal Engineer/Innovation Director

Kirk F. Bosma, PE, is a Senior Coastal Engineer and Innovation Director at Woods Hole Group. His areas of expertise include numerical modeling of coastal and estuarine processes, coastal engineering design for shore protection, wave propagation and transformation, sediment transport and littoral processes, hydraulics for marsh restoration, climate change vulnerability assessments and engineering adaptations, and data collection and implementation of coastal engineering projects. Kirk earned his Master's in Coastal Engineering from the University of Delaware in 1996 and his B.S. in Civil Engineering in 1994. Kirk has more than 25 years of experience in the fields of coastal sciences and engineering as well as climate change and resilient design, specializing in the areas of developing gray, green, and hybrid coastal engineering adaptations for fostering urban and rural resiliency in a cost-effective approach. He has completed comprehensive coastal flood risk assessments that incorporate storm surge risk coupled with increased precipitation and sea level rise. Kirk's work on the MassDOT-FHWA Central Artery in Boston is a model for vulnerability assessment of coastal infrastructure. He has extensive experience in habitat restoration, shoreline protection, analysis of nearshore wave conditions, evaluating hydrodynamics of estuarine systems, and climate change planning projects for a diverse client base. He specializes in applying numerical models to optimize engineering designs and reduce overall project life cycle costs. This includes developing and employing numerical models for marsh restoration, sediment transport, nearshore spectral wave transformation, particle transport, bathymetric evolution, two- and three-dimensional hydrodynamic processes. Kirk has been the project manager for both large coastal restoration and marsh restoration projects that have included implementation of a comprehensive data collection, physical processes modeling programs, evaluation of a variety of restoration alternatives, and engineering design.

Kirk has worked on the Town of Palm Beach Climate Change Flood Risk Vulnerability Assessment and Implementation Plan, which was a Town-wide assessment of flood risk vulnerability in a changing climate. This included a ranking of all Town assets at risk and development of an implementation plan to guide the Town for public works investments, reduce short- and long-term flood risk, and enhance coastal resiliency. Additional work in Florida included expert peer review of the Florida Bay Hydrodynamic and Salinity Model for the South Florida Water Management District and assessment of the reverse osmosis concentrate dilution and ambient water characterization in Melbourne, FL. Most recently, Kirk has been assessing the flood

reduction impact of resilience restoration projects funded by the National Coastal Resilience Fund and the Emergency Coastal Resilience Fund across the US. Modeling is conducted to provide inputs for socio-economic analysis. This programmatic project has a nationwide scope to produce lessons learned to help improve future project efficacy, prioritization of projects, and return on investment.

Joseph Famely, M.E.M., Senior Environmental Scientist

Mr. Joseph Famely leads the Climate & Sustainability Team at Woods Hole Group. Focused on environmental and sustainability planning, he has expertise in assessing climate change vulnerability and risk for infrastructure and natural resources, and developing adaptation and resiliency plans for communities and organizations. Joe holds a B.A. from Bowdoin College, and a M.E.M. in Urban Ecology and Environmental Design from the Yale School of the Environment.

Joe has over 20 years' experience analyzing environmental challenges and developing sustainable solutions. He has led coastal climate change resiliency projects with municipalities, regional planning organizations, transportation agencies, non-profit land conservancies, higher education institutions, and building/landscape design teams. In addition to developing risk-based prioritization and climate change adaptation phasing strategies for coastal assets, Joe has let led strategic land use planning projects and created customized greenhouse gas assessment tools to help organizations benchmark and track their carbon footprints and prepare sustainability reports.

Joe is a certified provider in the MA EOEEA Municipal Vulnerability Preparedness (MVP) Program, and a certified Waterfront Edge Design Guidelines (WEDG) Associate. His background in ecological risk assessment, urban ecology, and environmental design brings a systems-thinking approach to projects and facilitates collaboration with engineering and design professionals, as well as with clients and stakeholders. Joe also contributed to the Town of Palm Beach Coastal Flood Risk Vulnerability Assessment, particularly as related to identifying and mapping Town assets at potential risk.

M. Leslie Fields, CFM, M.S., Coastal Geologist/Marine Environmental Analyst

Ms. M. Leslie Fields is a coastal geologist with experience in climate change resiliency planning, floodplain management, geomorphic evolution of coastal systems, coastal hazard evaluation and mitigation, dredge materials management, coastal wetland delineation, environmental impact assessments and permitting at the local, state, and federal levels. Ms. Fields earned a Master's in Coastal Geology from

Rutgers University where she studied tidal inlet dynamics and beach evolution, evaluating beneficial reuse opportunities for dredged material as a mechanism for building shoreline resiliency. She is a Certified Floodplain Manager and has over 33 years' experience in multi-jurisdictional environmental studies for coastal and marine projects.

While at Woods Hole Group, Ms. Fields has been responsible for managing and conducting a range of projects. She has prepared Multi Hazard Mitigation Plans and led projects to evaluate the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) for communities in Massachusetts, Maine, New Hampshire, Maryland, and Florida (Lee and Monroe Counties). Ms. Fields has worked on coastal vulnerability assessments for a number of Massachusetts municipalities. Using results from the vulnerability assessments, Ms. Fields has advanced the design, permitting, and construction of adaptation projects involving beach and dune nourishment, retreat of municipal infrastructure, roadway and critical infrastructure resiliency, and tidal flow/wetland restoration. Ms. Fields has managed dredge design/permitting and dredge materials management projects requiring assessment of sediments, hydrodynamics, sensitive coastal resources, and impacts associated with dredging and disposal activities. She has managed estuary restoration projects in conjunction with culvert redesigns and prepared planning studies for management of municipal beach resources, often finding ways to enhance resiliency through beneficial reuse of sediment dredged from nearby navigation channels. Ms. Fields been responsible for securing local, state, and federal environmental permits for many of the projects she has worked on. She has a sound working knowledge of the environmental regulations and application procedures that benefits her projects and clients.

Adam J. Finkle, P.W.S., M.S., Coastal Scientist

Mr. Adam Finkle is a Coastal Scientist focused on designing, permitting, and facilitating the implementation of ecological restoration and coastal resiliency projects throughout New England. His work involves identifying key vulnerabilities and developing effective adaptation strategies for coastal communities, non-profit organizations, and private homeowners. He is experienced in managing large-scale ecological restoration projects and implementing coastal bioengineering, bank stabilization, native planting, beach nourishment and dune enhancement projects to increase the resilience of coastal resource areas and adjacent, upland infrastructure. His work also involves managing technical dredging projects and coordinating the beneficial reuse of dredged material in sensitive coastal resource areas. As a Certified Ecological Restoration Practitioner (CERP) and Professional Wetland Scientist (PWS), he has demonstrated experience with field data collection, coastal and freshwater wetland resource area delineations, vegetation assessments, eelgrass surveys, shellfish surveys, and developing and conducting pre- and post-construction monitoring programs.

Brittany L. Hoffnagle, M.S., Environmental Scientist & GIS Specialist

Brittany Hoffnagle is an environmental scientist and climate change and resiliency planner that helps clients assess their impacts from climate change and plan for a more resilient future. At Woods Hole Group, Brittany also coordinates the protocol development and QA/QC procedures of large datasets including the Massachusetts Coast Flood Risk Model, the Palm Beach coastal vulnerability assessment and the large-scale FEMA mapping of Monroe County, Florida. Brittany participates in many aspects of coastal and climate change projects including project management, client communications, completing analyses, the development of cartographic visualizations, and reporting deliverables. Brittany has a passion in creatively communicating science to new audiences which includes the development of innovative educational and outreach platforms like ArcGIS StoryMaps and K-12 STEM climate change curriculum. Ms. Hoffnagle received a B.S. in Biology with concentrations in Marine and Environmental Biology from Millersville University, and a M.S. in Coastal Marine and Wetland Studies from Coastal Carolina University.

Grace Medley, M.S., Coastal Scientist

Ms. Grace Medley is a coastal scientist who analyzes estuarine and continental shelf circulation, sediment transport, storm surge and wave processes to assist in coastal engineering, flood risk assessments, and coastal resiliency projects. She has numerical modeling expertise using ROMS, CMS Wave and Flow, SWAN, ADCIRC, HEC-RAS, XBeach, ACES, EXTRM2, and is experienced with programing in MATLAB and Python. Ms. Medley has been involved in a few different modeling efforts in South Florida. The first was the re-modeling of coastal storms for the FEMA flood re-mapping effort, which involved running ADCIRC probabilistic storms that affected both Monroe and Lee Counties. Her primary role was to perform sensitivity analyses on different representations of coral reefs in the ADCIRC mesh, and to update ocean-side forcing in the FEMA CHAMP transects based on these findings. The second project involved SWAN and ADCIRC modeling for the National Fish and Wildlife granted projects in the Florida Keys. The goal of this work was to estimate the coastal resilience and socio-economic co-benefits of Coral Reef restoration projects spanning from Miami to Key West.

Ms. Medley earned her M.S. in Physical/Geological Oceanography from University of Rhode Island Graduate School of Oceanography in 2019 where her thesis focused on numerical modeling of coastal processes, and her B.A. in Environmental Geosciences from Connecticut College in 2015 where she focused her studies on geomorphology, barrier beach dynamics and coastal sediment processes.

Alex J. Shaw, M.S., Coastal Engineer

Mr. Alex Shaw received a M.S. in Ocean Engineering from the University of Rhode Island in 2016 and a Bachelor of Science with a major in Ocean Engineering from the same institution in 2014. His background includes evaluating hydrodynamics within marine environments, wave mechanics, coastal structure design, data analysis, and coastal numerical modeling. Over the past 6 years Mr. Shaw has worked on many more projects in the coastal modeling field utilizing a variety of modeling platforms such as ADCIRC, SWAN, CHAMP, and Hec-RAS. Mr. Shaw was also involved in many evaluations of FEMA Flood Insurance Rate Maps in Massachusetts, Rhode Island, Florida, and Louisiana. This included the evaluation of Monroe Country and Lee County Florida. He was also heavily involved in the creation of a probabilistic flooding model for Palm Beach Florida. He is skilled in geospatial analysis, and the visualization of model results.

Matthew F. Shultz, PE, D.CE, Environment & Climate Business Unit Manager/Senior Coastal Engineer

Matthew F. Shultz, PE, D.CE, is a Senior Coastal Engineer and serves as Business Unit Manager for Environment & Climate at Woods Hole Group. He has over 15 years of experience in coastal studies involving the evaluation of coastal hazards, shoreline restoration, and the development of flood mitigation solutions for reducing risks and offering increased resilience in a changing climate. His areas of expertise include the design of structural and non-structural shoreline protection and restoration alternatives, as well as the modeling of coastal and estuarine hydrodynamics, waves, and sediment transport processes.

He served as lead engineer on a multi-year project providing a technical review of FEMA's Risk MAP development process for Lee County, FL. He also was the technical lead in review of FEMA's South Florida Coastal RiskMAP study that involved coastal flood hazard analyses for 621 miles of shoreline including unincorporated Monroe County, Key Colony Beach, Key West, Layton, Marathon, and Islamorada.

Matthew has a master's degree in Ocean Engineering from the University of Rhode Island and a bachelor's degree in civil engineering from Tufts University. He is certified as a Diplomate in Coastal Engineering (D.CE) and is currently licensed as a Professional Engineer in MA, CT, DE, and LA.

David R. Walsh, M.S., Senior Project Manager/Coastal Scientist

Mr. David Walsh is Leader of the Coastal Measurements and Sediments Team. As a Coastal Scientist, he uses field and laboratory data to resolve and evaluate the geologic processes within coastal, estuarine, and oceanic environments, which are central to assess resiliency. In concert with coastal engineers, Mr. Walsh oversees a team of scientists and technicians that collect and analyze the oceanographic and geophysical data necessary for the development of hydrodynamic models and the satisfaction of permitting requirements in various coastal environments. Technically, Mr. Walsh's primary specialty is the spatial and temporal quantification of shoreline and bathymetric change using Geographical Information Systems (GIS) and other geospatial software packages to map and define geomorphological processes. In addition, Mr. Walsh has extensive field experience in the acquisition, processing, groundtruthing, and interpretation of bathymetric, side-scan sonar, and sub-bottom sonar surveys in order to investigate subaqueous sedimentary environments on a regional scale. Mr. Walsh received his M.S. in Oceanography in 2004, and a B.S. in Geology in 1999.

Daniel R. Weirauch, M.S., Marine Technician/Oceanographer

Mr. Daniel Weirauch has experience with oceanographic, hydrodynamic, and water quality data collection systems, including equipment configuration and installation, as well as operation and maintenance of real-time monitoring systems in rivers, ports, and offshore environments. He currently serves as Project Manager for the NOAA Southeast Vertical Datum (VDatum) project; a program established by NOAA/NGS to define a more accurate national shoreline relative to tidal and geodetic datums for the Gulf of Mexico and Atlantic coastlines in Florida, Georgia, South Carolina, and North Carolina. He has also served as Project Manager for the Great Lakes VDatum Seasonal Water Level Monitoring project in 2018 and 2019; responsible for the site reconnaissance, permitting, day-to-day management, oversight, planning, client communication, reporting, and overall maintenance and operation of the program. His expertise is focused on the configuration, assembly, and deployment of water level monitoring systems, current profiling systems, meteorological equipment, and data telemetry devices for the NOAA Physical Oceanographic Real-Time Systems (PORTS) program and other environmental studies. His responsibilities include installing, maintaining, and troubleshooting monitoring systems for the Delaware River & Bay, New York/New Jersey Harbor, Chesapeake Bay, and Jacksonville PORTS programs. He is experienced in digital geodetic leveling; including surface and deep rod benchmark installation, field surveying, and data processing. In addition to his field experience, Mr. Weirauch is also

responsible for day-to-day management, preparation of monthly progress reports, and quality control of NOAA real-time oceanographic systems. His academic credentials include a M.S. in Marine Studies from the University of Delaware and a B.A. in Geosciences from the Pennsylvania State University.

Jon A. Brent, PE, SE, Marine Structural Engineer

Jon is a Marine Structural Engineer and Certified Inland Maritime Port Manager with over 10 years of design, management, and construction experience in a variety of infrastructure and private facility projects including ports and waterfront structures, high and heavy load cargo terminals, complex drainage and water resources structures, pipe racks and process towers for oil and gas facilities, and low-rise buildings. He has led the planning, modelling, computation, and detailing of structures for projects subject to a wide range of environmental conditions across North America and contributed as a subject matter expert for asset management initiatives and grant applications. Jon's experience also includes facility planning and site layout, 3D modelling and construction drawing development, project specifications, and discipline coordination for new construction, renovations, structural upgrades, and adaptive reuse projects.

Melissa K. Burns, PE, Structural Engineer

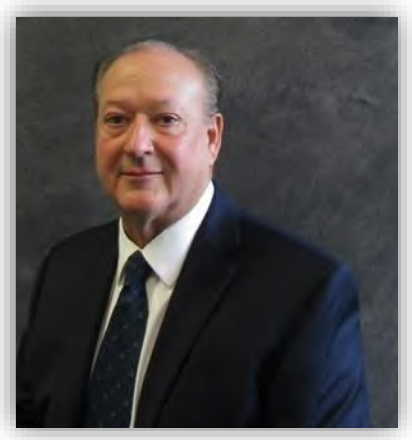
Ms. Burns is a Marine and Linear Infrastructure Structural Engineer and Project Manager with 11 years of design and management experience. Her projects have encompassed a wide range of private and public facilities including feasibility evaluations, design, modelling, and computation of structural elements, and production detailing of plan sets within all phases of design from preliminary engineering pursuit to the final design of structures for both design-build and conventional projects. She is thoroughly experienced in both linear infrastructure and coastal projects ranging in complexity from simple structures to multi-phase projects accounting for future year expansion capacities.

Craig Kruempel, M.S., Senior Coastal Scientist

Mr. Kruempel has more than 36 years of experience providing clients with coastal zone resource planning, documentation, permitting, and monitoring services. His extensive experience includes the development and implementation of comprehensive characterization, monitoring, and restoration program documents with an emphasis on natural hardbottom and artificial marine habitats. Mr. Kruempel has over 30 years of compliance and coordination experience implementing the National Environmental Policy Act (NEPA) regulations for federal agency actions, with a comprehensive understanding of State and Federal coastal resource permitting requirements. Additional areas of specialization include physical and biological assessments and project effect determinations and he has served as team leader and principal scientist since 1988 for numerous field investigations and site assessments. He has served as project manager on numerous linear projects, including offshore energy project proposals. He has extensive experience overseeing shore protection project construction, including beach nourishment, and dune restoration activities throughout Florida. As a consultant to the National Oceanic and Atmospheric Administration, he served as project manager and senior consulting scientist for four (4) large-scale reef restoration projects resulting from ship grounding incidents in Puerto Rico and the Florida Keys.

Pradeep Nagarajan, PE, CFM, Technical Director – Integrated Water Management

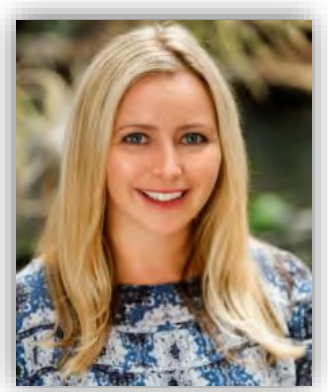
Over 18 years of experience specializing in the field of water resources, stormwater, water and wastewater master planning, modeling, and design projects. He also mentors and supervises several water resource and wastewater engineers on a wide variety of projects. Pradeep has a strong background and extensive experience in utility planning, surface/ground water hydrology, hydraulics, basin-scale water resources studies, flood analysis, stormwater management, preparation of watershed master plans, computer-based mathematical 1D/2D modeling of water resources and environmental systems using INFOWORKS, ICPR, MIKE SHE, MIKE 11, MIKE URBAN, MIKE FLOOD, MIKE 21, MIKE VIEW, PCSWMM, XPSWMM, HEC-HMS, HEC-RAS, ASAD etc., design of stormwater management and treatment structures, pumps, and piping systems, floodplain mapping, and water quality modeling. His experience also includes water distribution and wastewater collection system modeling, design of pipelines, preparation of HMGP/PDM applications through FEMA to obtain federal and state grants for several clients on different projects.



Matthew Trzcinski, PE, Senior Project/Design Manager

Mr. Trzcinski has over 27 years' experience in the water sector serving as an engineer and project manager. He has extensive experience applying membrane technologies to water related applications. He has been involved with more than twenty membrane projects ranging from reuse to ultrapure water. His experience includes managing design activities; supervising engineering efforts; managing sub-consultant and contractor activities; managing project schedules and budgets; performing quality assurance reviews; managing project risk and change; providing construction, commissioning, and startup support services; mentoring engineers; and preparing reports for municipal and industrial projects across North America and Asia, including alternative delivery projects.

In addition to Tom Pierro, highlighted in management section above, CPE staff have extensive project experience working together and collaborating across disciplines to address a variety of project needs. Our professionals have a demonstrated history of successfully completing logistically challenging and technically demanding tasks and have established a reputation of servicing clients throughout Florida with successful and cost-effective coastal program management. The CPE key personnel dedicated to supporting the Town of Palm Beach includes the following key personnel. More detailed resumes are provided in Attachment C.



Tara Brenner, PG, PE - Senior Coastal Engineer

Tara Brenner holds the unique credential of being both a Professional Engineer and Professional Geologist with more than 14 years of experience in diverse coastal engineering projects, including both federal and non-federal beach programs, truck haul projects, and resiliency studies. Ms. Brenner supports clients with coastal project funding and regularly presents at industry conferences, and public meetings. As Project Manager, she works with clients to ensure project objectives and timelines are met, and that work products are of the highest quality. Ms. Brenner currently supports the Town of Palm Beach with their coastal program and prepared the post-construction report for their 2020 Mid-Town Beach Nourishment Project.

Lindino Benedet, Ph.D - Principal Scientist

Lindino Benedet is a coastal scientist specializing in numerical modeling with over 21 years of professional experience. Dr. Benedet was the first coastal scientist to utilize the advanced numerical model Delft3D to support the evaluation and design of coastal projects in the State of Florida and has participated in dozens of numerical modeling studies globally with his unique qualifications. His expertise includes process-based numerical modeling of coastal processes, coastal sediment transport, hydrology and water quality, meteorological and oceanographic measurements, flooding simulations, vulnerability analysis and evaluation of flood mitigation/SLR adaptation strategies, dredging, beach nourishment, and marsh restoration.

Stacy Buck, MS - Senior Marine Biologist

Stacy Buck is a Senior Marine Biologist that specializes in projects on the east coast of Florida and has been working on Town of Palm Beach projects since 2005, including biological monitoring for multiple beach projects and artificial reefs. She led preparation of the Southern Palm Beach Island Comprehensive Shoreline Stabilization Project EIS published in 2016, which included analysis of the Reach 8 project. She also facilitated permitting for the Mid-Town groin constructed in 2018. Ms. Buck assists the Town with environmental permitting, regulatory coordination, NEPA compliance, and the annual biological program under the BMA.

Quin Robertson, Ph.D, PG, GISP, CC-P - Senior Scientist

Quin Robertson is a Certified Climate Change Professional (CC-P) who focuses on using conventional survey and remote sensing data to quantify change in coastal morphology and develop products using geographic information systems (GIS) for coastal analyses. Dr. Robertson specializes in working with multiple topographic and bathymetric data sets to create seamless digital elevation models (DEMs) that are critical for accurate geomorphic change analysis and serve as the basis for scientific conclusions. He will lead tasks involving surveying, mapping, CAD, geodatabase management, and GIS services under this contract.

SCAPE

In addition to management leadership by SCAPE's Resiliency Principal, Pippa Brashear, we are pleased to feature the expertise of the following SCAPE professionals highlighted below. More detailed resumes are provided in Attachment C.

Kate Orff, FASLA, RLA

Kate Orff is the Founding Principal of SCAPE. Her work has been grounded in innovating the design field's response to climate change. She continues to advance how landscapes can enable positive change in communities through the creation of regenerative living infrastructure and public spaces. She is committed to fostering dynamic landscapes that respond to today's climate crisis while reconnecting people to their immediate environment. She was a 2017 McArthur Fellow and she currently sits on the Commission on Accelerating Climate Action for the American Academy of Arts & Sciences.

John Donnelly, RLA

John Donnelly, RLA, is Technical Principal at SCAPE. He leads the management, documentation, and construction of the studio's major built work projects across the U.S. In more than 16 years of professional practice, John's work has included the design, documentation, and construction of award-winning urban parks; streetscapes; cultural and educational campuses; mixed-use developments master plans; recreational trails and a variety of on-structure landscapes. John is a FL licensed landscape architect.

Chris Barnes, RLA

Chris Barnes, RLA, is Studio Director of SCAPE's New Orleans office. With a wide range of experience, Chris brings to each project an ability to integrate regional ecologies, local community interests and resilient design strategies to develop concise solutions for complex sites. Serving as the project director to the Jacksonville, Florida projects: McCoy's Creek Recreation and Restoration Plan and the Museum of Science and History, Chris has rich experience in leading design programs that combat coastal flooding through nature focused solutions.

Anna Hochhalter, RLA

Anna has over a decade of experience working to address water-related challenges through nature-based infrastructure. Her work has entailed designing living shorelines and resilient coastal public realm projects. She has prepared detailed feasibility analysis of integrated flood risk reduction, ecology, and cultural strategies for coastal storms, sea level rise, and inland fluvial flooding. She has planned green infrastructure systems at various watershed-scales to reduce flood risk, improve water quality, and provide community amenities. She has assessed financial mechanisms for municipal and state green infrastructure programs. She has performed wetland delineations and floristic assessments. Her diverse experience makes her a strong asset to the design team.

Liz Camuti, RLA

Liz's work centers on designing responsive forms of infrastructure in rapidly changing environments—with a focus on climate adaptation and resilience planning projects across the U.S. As deputy project manager on the FIDI-Seaport Climate Resilience Plan she played a critical role in ecological design; landscape and open space strategies; and stakeholder and public engagement over an iterative, two-year design process. She has also worked on a variety of projects in Florida, including the Jacksonville Resilience Master Plan as project manager and the Museum of Science and History in Jacksonville as design lead.

In addition to management leadership by SOBIS Climate Risk Specialist and COO, Bill Bohn, we are pleased to feature the expertise of the following SOBIS professionals highlighted below. More detailed resumes are provided in Attachment C.

Tim Brink, PE is a senior water resources engineer and software developer with more than twenty years of experience in information systems, GIS, and water resources engineering and modeling using EPA-SWMM, AdICPR, HEC-1 and HEC-2, HEC-RAS, HEC-HMS, KY-PIPE, and EPA NET. He has been involved in hazard risk assessment, climate risk assessment, watershed analyses, floodplain delineations, runoff method computations, hydraulic and hydrologic modeling and surface water systems design, and watershed and stormwater management plans. Mr. Brink has expertise in mobile application development, C# and ASP.Net programming, Java, C/C++, Objective C, Visual Basic 6, Visual Basic for Applications (VBA), Unified Modeling Language (UML) model development, and geographic information systems (GIS) development software (ArcObjects, ArcMap®, and ArcSDE). He has also developed tools and scripts that customize Hazus to perform automated study region creation and analysis, as well as data extraction and post-processing tools to sync Hazus with FEMA's Risk MAP products.

Zak Brohinsky has ten years experience using GIS to support conservation and risk assessment projects. He recently taught at Plymouth State University developing and teaching undergraduate curriculum in GIS foundations with focus in applied land protection and environmental research projects. Before working for Sobis, he prepared baseline documents, maps and all spatial needs related to land conservation transactions, and maintained the geographic database for the Squam Watershed. For the last three years with Sobis, he has supported climate risk assessment projects for the State of Hawaii and other locales. He has completed FEMA Hazus basic and advanced training.

Zack Baccala is a senior geographic information systems (GIS) analyst with more than 10 years of experience leveraging geospatial technologies to manage and support clients, including the use of desktop, mobile and web applications. Mr. Baccala currently provides program management support for the Federal Emergency Management Agency (FEMA) and Independent Validation and Verification testing of FE MA's Hazus software, an ArcGIS extension used for producing natural hazard risk assessments. Mr. Baccala focuses on continual process improvement and optimization through various s solutions that are designed for increasing efficiency while maintaining high levels of quality. He is an adept collaborator able to work with organizations of all sizes, including public and private agencies.

1.3.3.3 Staff Size of Key Participants

Our approach to this contract is to make it personal and locally-specialized, yet with access to national and global experience as needed. That said, we feel it is important to emphasize participation from the professionals featured in this proposal, as well as their staff-level and administrative colleagues. This team alone encompasses some ~35 people the Town will have access to. Of course, we can bring other personnel along as needed, but we want to be careful not to tout the pure size of our organizations, overwhelm the contract or dilute focus. Nonetheless, to answer the question as posed, Woods Hole Group has 83 people, GHD has more than 10,000, SCAPE has 90 people, and Coastal Protection Engineering and Sobis have under 20 each.

1.3.3.4 Location of Company/Key Participants

Continuing our personalized and locally-driven approach, with wider exposure as needed, the proposed team has substantial local presence and experience, and is also distributed throughout the USA. Woods Hole Group personnel are mostly based in Massachusetts HQ office, but we have two full-time personnel in FL (Naples and Tallahassee). Coastal Protection Engineer personnel are mostly Florida-based (Boca Raton). GHD is a truly global company; however, personnel featured here are based in Alabama, in Florida at West Palm Beach, Jacksonville, and Orlando, and Atlanta, Georgia. SCAPE personnel are distributed between New York and New Orleans, while Sobis personnel are primarily Virginia-based.

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Kirk F. Bosma, P.E.

Senior Coastal Engineer/Innovation Director

EXPERTISE

Kirk F. Bosma, PE, is a Senior Coastal Engineer and Innovation Director at Woods Hole Group. He manages projects and develops engineering solutions related to climate change planning, coastal structure design, beach nourishment, beach management, inlet stabilization, water quality, environmental permitting, impacts of offshore dredging, marsh restoration, and coastal processes data collection. He holds expertise in habitat restoration, shoreline protection, and climate change planning projects for a diverse client base and specializes in applying numerical models to optimize engineering designs and reduce overall project life cycle costs. Has developed and applied the latest data and numerical methods toward capturing current and future flooding risk for climate change vulnerability assessments; developed comprehensive coastal flood risk assessments that incorporate storm surge risk coupled with increased precipitation and sea level rise; developed gray, green, and hybrid coastal engineering adaptations for fostering urban resiliency in a cost-effective approach; and been the project manager for both large coastal restoration and marsh restoration projects that have included evaluation of a variety of restoration alternatives and included the implementation of a comprehensive data collection and physical processes modeling programs.

QUALIFICATION SUMMARY

- More than 20 years of diverse professional experience in the fields of coastal sciences and engineering, specializing in the areas of project management, coastal flood risk modeling, shoreline protection design, marsh restoration, sea level rise and extreme storms, climate change adaptations, sediment transport, and littoral processes
- Leader in coastal flooding risk under a changing climate, including development of storm climatology for probabilistic flooding risk
- Implemented technically advanced storm assessments under a changing climate; sea level rise and extreme storm numerical modeling techniques to assess climate change adaptations
- Managed multi-disciplinary coastal and marine projects requiring team management, scientific analysis, environmental sensitivity, diverse coordination, and cost-effective solutions
- Developed various hydrodynamic and hydraulic models for water quality assessment, marsh restoration projects, discharge and mixing design, bridge scour, dredging impacts, and contaminated sediment fate and transport
- Numerical model experience with FVCOM, REF/DIF S, SWAN, STWAVE, ACES, BOUSS2D, GENESIS, RMA-Series, MIKE 21, CMS-Flow/Wave, EFDC, SED-2D CGWAVE, , CORMIX, WAVAD, XBEACH, ADCIRC and EDUNE

Education

1996– M.C.E.
Civil Engineering
University of Delaware
1994 – B.S.
Civil Engineering
Calvin College

Licenses and Registrations

P.E., Professional Engineer, Massachusetts License #45849

Professional Affiliations

- Member, Association of Coastal Engineers (ACE)
- Member, Coasts, Oceans, Ports, and Rivers Institute (COPRI)
- Associate Member, American Society of Civil Engineers (ASCE)

Publications & Presentations

32

Work Experience

2001-Present Coastal Engineer/Team Leader, Woods Hole Group

1997-2001 Coastal Engineer, Woods Hole Group

1994-1996 University of Delaware (Teaching and Research Asst.)

Kirk F. Bosma. P.E.
Coastal Engineer
kbosma@woodsholegroup.com
(508) 495-6228

KEY PROJECTS

Climate Change and Extreme Weather Vulnerability Assessments and Adaptation Options for the Central Artery, Massachusetts Department of Transportation (MassDOT) – Project Manager/Senior Coastal Engineer
Mr. Bosma helped lead a technically advanced, leading-edge pilot project for MassDOT evaluating the vulnerability of the Central Artery Tunnel system in Boston to sea level rise and extreme weather events. A key product of the project was the Boston Harbor Flood Risk Model - a highly resolved, numerical processes model developed to assess the combined impact of sea level rise, storm events, winds, tides, and waves. Results from the model, including probability of flooding, inundation depth levels, wave parameters, flood pathways, flood volumes, flood duration, and wind speeds, among others, have been used to assess risk and design resilience solutions for various assets and districts throughout Boston. The project won the 2017 FHWA Environmental Excellence Award.

Coastal Resilience Solutions for East Boston and Charlestown, City of Boston, MA – Senior Coastal Engineer
Mr. Bosma led the coastal flood modeling for the City of Boston's district-scale coastal resiliency plan for vulnerable areas of East Boston and Charlestown. Mr. Bosma led the coastal flood risk analysis, flood pathways analysis, and development of design flood elevations for engineering alternatives and advised on district-scale adaptation strategies including nature-based solutions. The project won World Landscape Architect's Conceptual Design Award of Excellence and APA MA Sustainability and Resiliency Award in 2018.

A Holistic Accounting of Ecosystem Services of Green Infrastructure and Natural and Nature-Based Features in an Urbanized Coastal Environment, UMass Boston – Co Principal Investigator/Coastal Engineer
Under a NOAA funding grant, Mr. Bosma led the development and performance modeling of traditional and nature-based coastal resilience design strategies along the East Boston waterfront. Alternative strategies were modeled under present, 2030, and 2070 sea level, storm surge, and wave conditions to evaluate their relative effectiveness at providing flood protection for buildings and infrastructure. Other benefits were also quantified and considered in a comparison of overall benefits (environmental, economic, and social); cost; and feasibility.

Blue Line Climate Change Vulnerability Assessment and Adaptation Plan, Massachusetts Bay Transportation Authority (MBTA), Boston, MA – Senior Coastal Engineer
Mr. Bosma led the coastal flood modeling and provided coastal engineering support for the MBTA's coastal flood resiliency planning initiative for the Blue Line. He led the coastal flood risk analysis, flood pathways analysis, development of resilient design criteria, and conceptual design and performance modeling for engineering strategies to protect critical vulnerable assets. He also advised on regional adaptation strategies, risk-based prioritization, and implementation phasing, to promote cost-effective adaptation.

Moakley Park Vision Plan and Implementation, City of Boston, MA – Senior Coastal Engineer
Mr. Bosma is leading the coastal flood modeling and nature-based coastal engineering design for the City of Boston's Moakley Park Vision Plan and subsequent implementation phases. Mr. Bosma led the coastal flood risk analysis, flood pathways analysis, development of resilient design criteria, design of beach and dune restoration and offshore wave attenuation features, future marsh migration planning, and performance modeling and assessment of proposed design alternatives. The project won the BSLA 2019 Analysis and Planning Merit Award.

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Nasser Brahim

Senior Climate Resiliency Specialist

EXPERTISE

Mr. Brahim helps build climate-resilient coastal communities by developing and implementing vulnerability assessments, resiliency plans, and capital and operational improvements. He has led coastal climate change resiliency projects with municipalities, transportation agencies, wastewater utilities, non-profit land conservancies, higher education institutions, and real estate property managers. He is highly effective at managing projects, coordinating multi-disciplinary teams, communicating climate change risk and resiliency concepts to decision makers and the public, and building consensus and support for implementation. He is highly skilled and experienced in climate change hazard, vulnerability, and risk assessment; and climate resilient building and infrastructure retrofit approaches, nature-based solutions, emergency operations, design standards, and land use regulations.

QUALIFICATION SUMMARY

- More than 15 years of domestic and international experience conducting analyses and designing creative solutions related to climate change, infrastructure, and the environment.
- Leads coastal resiliency projects at multiple scales, including asset, site, district, neighborhood, service area, municipality, region, and state.
- Interprets and applies climate projections and flood hazard model results for risk assessment and engineering design (ADCIRC, SWAN, SLAMM, WHAFIS, XBeach, SLOSH, ICM-2D, HEC-RAS, SWMM).
- Develops and evaluates the cost-effectiveness of coastal resiliency engineering alternatives and provides risk-based prioritization and phasing strategies for capital programming.
- Understands critical functions, interdependencies, failure modes, probabilities, and consequences for a wide variety of systems.
- Plans and executes internal and external stakeholder engagement processes and programming.

WORK EXPERIENCE

2020-Present	Woods Hole Group, Senior Climate Resiliency Specialist
2013-2020	Kleinfelder, Senior Climate Resiliency Planner
2011-2013	World Bank Climate Investment Funds, Operations Analyst
2010-2010	Yale Climate & Energy Institute, Research Fellow
2007-2008	Florida Dept. of Transportation, Environmental Specialist
2005-2007	Global Water for Sustainability Program, Research Intern

Education
2010 – M.E.M.
Climate Change Adaptation & Mitigation
Yale University

2007 – B.A.
Florida International University

Licenses and Registrations
MA EOEEA Municipal Vulnerability Preparedness (MVP) Program Provider

Professional Affiliations
-Environmental Business Council, Climate Change Committee Member
-Massachusetts Climate Adaptation Forum, Steering Committee Member
-Resilient MA Action Team, Technical Advisory Group
-Mystic River Watershed Association, Vice President

Project Awards
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Nasser Brahim
Senior Climate Resiliency Specialist
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KEY PROJECTS

Resilient Together: El Punto, City of Salem, MA – Project Manager, Senior Resiliency Specialist
Mr. Brahim is leading the City of Salem's first neighborhood climate resiliency plan, focused on El Punto (The Point). El Punto is an Environmental Justice neighborhood with the highest building density and concentrations of low income, minority, Hispanic/Latinx, and Spanish speaking populations in Salem. The neighborhood faces high and growing threats from coastal and stormwater flooding and extreme heat. A first-of-kind, integrated, probabilistic flood model is being developed to assess the combined risks from extreme rainfall, sea level rise, and coastal storms, taking hydrodynamics, hydrology, and hydraulics into account. The goal of the project is to develop, in collaboration with key stakeholders and the community, flood and heat mitigation strategies, priorities, and implementation plans. As project manager, Mr. Brahim is leading the vulnerability assessment, development of resiliency strategies, and community engagement.

Long-Term Coastal Resiliency Plan, Town of Marshfield, MA – Project Manager, Senior Resiliency Specialist
Mr. Brahim is supporting the Town of Marshfield in developing recommended policies and zoning to proactively reduce future coastal flooding and erosion vulnerabilities in its coastal neighborhoods. The Long-Term Coastal Resiliency Plan will guide rebuilding in a more resilient way after a future catastrophic event. The project includes estimation of damage and loss under a variety of storm scenarios and time horizons, taking sea level rise into account. Economic impacts under a "business as usual" scenario will be compared to various policy scenarios in which strategies such as acquisition, building elevation, and other mitigation measures are implemented, to inform the public and decision-makers. Stakeholders are being engaged throughout the project to account for their experiences, economic loss thresholds, and mitigation strategy preferences in the development of policy scenarios, risk communication messaging, and recommendations.

Coastal Resilience Designs for Municipal Light Department and Adjoining Public Lands, Town of Marblehead, MA – Project Manager, Senior Resiliency Specialist
Mr. Brahim is working with the Town of Marblehead to develop resilient designs and implementation plans for public waterfront facilities, including the Marblehead Municipal Light Department (MMLD) headquarters. Mr. Brahim conducted a vulnerability assessment of critical infrastructure at the MMLD headquarters and is advising on near-term floodproofing measures to be constructed as part of the project. In addition, alternatives are being developed with public and key stakeholder involvement to adapt a public waterfront park, commercial fishing facilities, and boat yards to future coastal flooding conditions. Alternatives, including structural and nature-based solutions, will be evaluated, and a preferred implementation pathway that balances desired uses, coastal resilience, and feasibility will be charted.

Resilient Fort Point Channel Infrastructure Project Environmental Assessment, Boston Planning & Development Agency (BPDA), Boston, MA – Project Manager, Senior Resiliency Specialist
Mr. Brahim is supporting the City of Boston and BPDA in obtaining a Certificate from the Massachusetts Environmental Policy Act (MEPA) Office for its first large-scale coastal flood resiliency implementation project. The project proposes to construct a $20 million, independently effective flood control system consisting of berms, raised Harborwalk, and deployable flood barrier systems to protect a large and vulnerable area of South Boston along the Fort Point Channel. MEPA approval is required as a precondition of obtaining $10 million in grant funding from FEMA for design and construction. Mr. Brahim helped draft the Environmental Notification Form, leading sections on alternatives analysis, climate change resiliency, and Environmental Justice, among others. He also helped develop public and regulatory agency outreach materials and responses.

KEY PROJECTS (CONTINUED)

Moon Island Infrastructure and Facilities Risk and Vulnerability Assessment, City of Boston, MA – Senior Resiliency Specialist

Mr. Brahim is supporting the Boston Fire Department (BFD) in conducting a comprehensive site survey of Moon Island and assessing risks from coastal climate change hazards. A main focus is on the causeway which serves as the single point of access and egress to BFD Fire Training Academy on Moon Island, a critical facility for the entire region. Mr. Brahim conducted a GIS- and field-based asset inventory, including shoreline and upland infrastructure, structures, and uses. Woods Hole Group modeled future coastal flooding hazards, including sea level rise, storm surge, and wave runup and overtopping, across the island and causeway. Mr. Brahim led a vulnerability assessment examining the risk of damage to revetments, causeway embankments, and the training academy seawall from wave overtopping. He also evaluated the risk of damage and loss of function to existing buildings, roadways, utilities, and operations to all flooding hazards. Mr. Brahim guided the development of a phased, risk-based capital improvement plan to mitigate vulnerabilities over time in response to climate change.

Inner Harbor Coastal Resiliency Improvement Project, Town of Hingham, MA – Project Manager, Senior Resiliency Specialist

Mr. Brahim is supporting the Town of Hingham to evaluate the performance of proposed resiliency improvements to public wharves and waterfront parks and their associated coastal engineering structures with respect to present and future coastal hazards. Woods Hole Group provided updated coastal flood risk maps and water level probability data for the present, 2030, 2050, and 2070 time horizons based on the Massachusetts Coastal Flood Risk Model (MC-FRM). The evaluation includes providing a peer review on permit-level engineering drawings and the basis of design, performing coastal flood and wave hazard modeling and calculations with and without proposed improvements, developing resilient design criteria, and developing long-term alternatives for future phases of improvements. Mr. Brahim also led engagement with Town boards and commissions to explain the methods used to evaluate the performance of proposed improvements and implications of the findings.

Coastal Resilience Prioritization Decision Support System for Delaware Bay, National Fish and Wildlife Foundation – Deputy Project Manager, Senior Resiliency Specialist

Mr. Brahim is supporting the National Fish and Wildlife Foundation (NFWF) with developing a tool to improve business planning and grant selection decision-making to maximize benefits for human and ecological communities from coastal resilience investments as part of its funding programs. The initial pilot phase of the tool development is focused on Delaware Bay and Delaware River estuary. The project includes reviewing existing program objectives, literature, and available data sources and models for potential application in the decision support system. The project team is developing a conceptual model and work plan laying out the methodology for constructing a GIS-based system to estimate the benefits of nature-based projects, including reefs, dune and beach nourishment, living shorelines, wetland restoration, and aquatic connectivity, at different scales and locations throughout the project area. The goal is for this tool to be used by NFWF staff to compare the benefits of projects proposed by applicants for funding through NFWF's coastal resilience grant programs as well as to inform business planning goals and metrics for funding portfolios.

Coastal Flood Resiliency Implementation Plan, Town of Palm Beach, FL – Senior Resiliency Specialist

Mr. Brahim developed an implementation plan for the Town of Palm Beach to set it on a path to achieve high standards of resilience to sea level rise, future storms, and related coastal flooding from climate change. The

KEY PROJECTS (CONTINUED)

plan refines and builds on the Coastal Flood Vulnerability Assessment carried out by Woods Hole Group, including the development of the Palm Beach Flood Risk Model – a hydrodynamic, probabilistic flood model that accounts for sea level rise and storm intensification from climate change. Mr. Brahim refined prior risk assessments of public infrastructure assets based on detailed review of engineering drawings, condition assessments, and geospatial data. He also developed town-wide and asset-, sector-, and area-specific coastal flood resilience strategies to address vulnerabilities identified. These range from physical projects, governance mechanisms, design standards, and building codes. The recommendations are also helping the Town leverage and comply with recently adopted State laws, regulations, and funding programs.

Vulnerability Assessment and Feasibility Study for Beverly Pump Station on Water Street, City of Beverly, MA – Senior Resiliency Specialist

Mr. Brahim supported a vulnerability assessment and resiliency planning study for the City of Beverly, MA and the South Essex Sewer District focused on a critical wastewater pump station located in a low-lying coastal area between maritime industrial and residential zones. Woods Hole Group provided site survey, wetlands delineation, coastal flood mapping and modeling analysis, and design criteria development, taking sea level rise, storm surge, and waves into account, to inform the vulnerability assessment and resiliency strategies. Mr. Brahim led the development and evaluation of long-term conceptual design strategies to reimagine the waterfront, expanding beyond the pump station boundaries, to provide greater benefits to the surrounding community. These included green and nature-based design strategies, flood walls, raised roadways and sites, and beach access improvements. His role also included leading a working group, coordinating with other project team members, and public engagement.

East Beach Corridor Vulnerability Study, Town of Westport, Westport, MA – Senior Climate Resiliency Specialist

Mr. Brahim supported the development, evaluation, and selection of adaptation strategies for the East Beach Road corridor in Westport, MA. East Beach is a narrow barrier beach, fronting a river estuary and saltwater marsh system. It is susceptible to erosion (including breach) and overwash, as well as nuisance and potentially permanent inundation under medium-to-long term sea level rise and storm surge scenarios. East Beach Road serves as the main utility corridor and one of two emergency routes for a DCR beach reservation, marina and commercial area, and residential neighborhood. The corridor also contains seasonal mobile home lots, some permanent elevated structures, and a small Town beach. Mr. Brahim developed and evaluated the feasibility of nature-based and traditional engineering alternatives to maintain the existing functions of the corridor through incremental near-to-medium term actions and long-term planning, regulatory changes, and investments. He was heavily involved in the stakeholder process, including developing outreach materials, leading public and steering committee meetings, and reporting.

North Nantasket Beach Dune Restoration and Accessibility Project, Town of Hull, MA – Deputy Project Manager and Technical Lead

Mr. Brahim advanced the implementation of priority near-term coastal resilience recommendations from concept through design and permitting, including helping the Town of Hull obtain grant funding for the project. Mr. Brahim led a multi-disciplinary team to develop design plans, cost estimates, obtain permits, and construct a large dune restoration project with an accessible crossover pedestrian ramp and emergency vehicle beach access at A Street and Beach Avenue. He supported community engagement including developing outreach

KEY PROJECTS (CONTINUED)

materials and delivering public presentations. These improvements will significantly enhance the system's resilience and storm damage protection and bring the Town's goal of establishing a continuous dune along the entirety of North Nantasket Beach close to fruition.

National Grid Substation Flood Resilience Project, Beverly, MA – Senior Resiliency Specialist
Mr. Brahim conducted a vulnerability assessment and developed resiliency strategies for a critical National Grid substation located in a low-lying coastal area in Beverly, MA. He led a coastal flood risk mapping and flood pathways analysis for the substation, considering present risk and sea level rise and storm surge projections for 2030, 2050, and 2070 based on the Massachusetts Coast Flood Risk Model (MC-FRM). To inform the vulnerability assessment, he reviewed existing conditions drawings to identify critical thresholds at which different infrastructure and operations would be impacted. Mr. Brahim also led the development of design criteria and conceptual design strategies to protect the substation at different scales, including phasing strategies and order-of-magnitude cost estimates. Strategies included living shorelines, minor waterfront improvements, permanent flood walls and levees, bulkhead raising, deployable flood barriers, and underground utility hardening.

Coastal Flood Resilience Design Guidelines and Zoning Overlay District, Boston Planning and Development Agency (BPDA), Boston, MA – Resiliency Lead
Mr. Brahim was the lead resiliency planner on the consultant team that prepared the BPDA's precedent-setting coastal resilience design guidelines and zoning overlay district recommendations. The goal of the project was to create the regulatory and design framework for Boston's new and existing buildings to be made resilient to sea level rise and storm surge flooding impacts. Mr. Brahim led the authorship of guidance on coastal flood modeling, design flood elevations, building floodproofing strategies, building code issues, and integration of district-scale solutions. He also contributed to zoning recommendations, including applicability standards, phased implementation, and approvals process and governance. The project won an American Planning Association National Excellence in Sustainability Award in 2020, and The Architect's Newspaper Best of Design Award and US Green Building Council – Massachusetts Chapter's Market Leader in Resilience Award in 2019.

Coastal Resilience Solutions for Downtown and the North End, City of Boston, Boston, MA – Technical Lead
Mr. Brahim was the technical lead for the City of Boston's third district-scale coastal resiliency plan focused on the Downtown and North End neighborhoods. The district waterfront characteristics include dense waterfront development, an abundance of pier and wharf structures, water transportation uses, public parks and community facilities, historic and cultural resources, and significant private ownership. The goal of the project was to develop, in collaboration with key stakeholders and the community, coastal protection design concepts and implementation plans to address flooding risks over the next 50 years or more. Mr. Brahim led the development of flood pathways analysis, design flood elevations, engineering alternatives, and cost estimates and led the engagement and coordination of public infrastructure owners.

Coastal Resilience Solutions for East Boston and Charlestown, City of Boston, MA – Project Manager
Mr. Brahim led the City of Boston's first district-scale coastal resiliency plan, focused on the vulnerable East Boston and Charlestown neighborhoods. The district characteristics include a high concentration of Environmental Justice populations and critical transportation infrastructure in the floodplain, historical inequity in waterfront and open space access, underutilized marine industrial properties, and new luxury waterfront development. The goal of the project was to develop, in collaboration with key stakeholders and the

KEY PROJECTS (CONTINUED)

community, coastal protection design concepts and implementation plans to address flooding risks over the next 50 years or more. Mr. Brahim led the development of existing conditions and opportunities/constraints analysis, engineering alternatives, cost estimates, benefit cost analyses, design flood elevations, evaluation criteria, and implementation strategy. Through leadership in stakeholder engagement, he built consensus among departments, state agencies and authorities, landowners, and community organizations on the plan's recommendations. Several recommendations are being implemented as a result, including a deployable flood barrier, resilient waterfront park designs, infrastructure adaptations, and zoning changes. The project won World Landscape Architect's Conceptual Design Award of Excellence and American Planning Association - Massachusetts Chapter's Sustainability and Resiliency Award in 2018.

Climate Change Asset Management Plan, Rose Kennedy Greenway Conservancy, Boston, MA – Project Manager
The Greenway is a 17-acre linear park in Downtown Boston located over the Central Artery Tunnel system. Mr. Brahim led the first phase of the Greenway's climate resiliency and greenhouse gas mitigation planning study. He led the evaluation and selection of climate change hazard scenarios, identification of sensitive asset types, development of exposure assessment methods, and collection of field data on existing conditions. He also subconsultants preparation of a greenhouse gas inventory and mitigation options analysis.

Aquarium Station and Blue Line Floodproofing Improvements, Massachusetts Bay Transportation Authority (MBTA), Boston, MA – Deputy Project Manager and Technical Lead
Mr. Brahim led the existing conditions analysis, design development, and permitting for MBTA's coastal flood protection improvements at Aquarium subway station and the Blue Line tunnel. He led alternatives analysis and design development for floodproofing station entrances using deployable flood barriers and permanent flood walls, flood doors, and flood shields. He also led the environmental permitting and historic, cultural resources, and urban design approvals with state and local authorities. Mr. Brahim also developed emergency operating procedures for the deployment of the flood barrier systems and associated protective actions.

Coastal Flooding Adaptation Project for the Central Artery Tunnels and Critical Facilities, Massachusetts Department of Transportation (MassDOT), Boston, MA – Deputy Project Manager and Technical Lead
Mr. Brahim led MassDOT's asset-level vulnerability assessment, adaptation planning, floodproofing design, and emergency planning efforts focused on protecting the Central Artery System in Boston from sea level rise and storm surge flooding. He carried out vulnerability assessments of critical highway facilities and tunnel entrances. He also oversaw an assessment of tunnel drainage backflow vulnerabilities and associated tide gate condition assessments. He led the design development of floodproofing alternatives including permanent and deployable flood protection systems for vulnerable tunnel entrances and facilities including cost estimates for each. In addition, Mr. Brahim led the development of an emergency flood response plan linked to flood forecast levels to minimize operational disruption and ensure timely implementation of traffic management, flood barrier deployment, and utility protection measures.

Piers Park Phase II, Massachusetts Port Authority (Massport), Boston, MA – Deputy Project Manager, Resiliency and Stakeholder Engagement Lead
Mr. Brahim was the deputy project manager, resiliency lead, and stakeholder engagement lead for the design of a 4.5-acre waterfront park development in East Boston. The park is being designed to form part of the neighborhood coastal flood protection system envisioned in the City of Boston's Climate Ready East Boston plan,

KEY PROJECTS (CONTINUED)

which Mr. Brahim led as consultant project manager. Mr. Brahim led early stage planning, including park user surveys, needs assessment, and engagement with local stakeholders through the park advisory council. Mr. Brahim helped lead design development and alternatives analysis for the park. A critical design feature is a coastal flood protection berm to be integrated with the park landscape. The berm will be designed to meet the City of Boston's climate resilient flood design criteria.

Critical Asset Flood Resiliency Project, Massachusetts Port Authority (Massport), Boston, MA – Deputy Project Manager and Technical Lead

Mr. Brahim is deputy project manager and technical lead for the development and implementation of physical and operational flood resiliency measures for Massport's Logan International Airport and maritime facilities. Mr. Brahim carried out vulnerability assessments, developed design alternatives and cost estimates, and assisted with engineering design, preparation of bid documents, and construction phase services for temporary and permanent flood prevention measures. He also developed a cutting-edge flood operations plan, which included a detailed time-based action plan for Massport departments tied to flood forecast monitoring to ensure that flood control measures are fully operational prior to a significant storm. He led an extensive engagement and coordination process involving all Massport departments and public safety personnel to develop the plan and carry out tabletop exercises. The project won the American Council of Engineering Companies of Massachusetts's Gold Engineering Excellence Award and Construction Managers Association of America - New England Chapter's Project Achievement Award in 2017.

Airport and Maritime Facilities Disaster and Infrastructure Resiliency Plan, Massachusetts Port Authority (Massport), Boston, MA – Technical Lead

Mr. Brahim led a comprehensive sea level rise and storm surge vulnerability assessment and resiliency plan for Massport's Logan International Airport and South Boston Maritime Facilities. The assessment included hundreds of critical assets including runways, taxiways, aprons, airfield drainage systems, navigational aids, airfield electrical assets, terminals, fueling facilities, utilities, and administration and maintenance facilities. He worked with a multi-disciplinary team, academics, and Massport decision-makers to develop design flood elevations incorporating sea level rise and storm surge projections. He also co-authored a floodproofing design guide that is now used for all major capital projects. Mr. Brahim led the development and selection of flood mitigation alternatives, order-of-magnitude cost estimates, and a risk-based prioritization for capital programming. The resiliency plan included recommendations for capital improvements, design standards, operational planning, stakeholder engagement, monitoring and reporting, and areas for further study. The project won the American Council of Engineering Companies of Massachusetts's Silver Engineering Excellence Award in 2015.

Climate Resiliency Plan for Wastewater Treatment Facilities and Pump Stations, Narragansett Bay Commission (NBC), Providence, RI – Project Manager

Mr. Brahim led the NBC's climate vulnerability assessment and resiliency plan, focused on impacts from flooding (extreme rainfall, sea level rise, and storm surge) on their wastewater treatment facilities and pump stations. The project was initiated in response to Pollution Discharge Elimination System permit conditions. Mr. Brahim analyzed climate projections and engineering records to assess vulnerabilities, estimated damage costs, and time horizons for flooding impacts and developed resiliency strategies, cost estimates, and benefit cost analyses for protecting vulnerable critical assets. The plan was rapidly approved by regulators and is referenced by the regulator as a model for other wastewater facility owners and operators in Rhode Island.

KEY PROJECTS (CONTINUED)

Nature-Based Solutions for Community Resilience on North Nantasket Beach, Town of Hull, MA – Deputy Project Manager and Technical Lead
Mr. Brahim led the evaluation of the efficacy of large-scale beach nourishment and dune restoration along North Nantasket and developed conceptual design recommendations to mitigate flooding through existing dune crossings. He helped to Town obtain grant funding for the project. Mr. Brahim led the dune vulnerability assessment, restoration alternatives analysis, and risk-based prioritization, incorporating field data collection, GIS analysis, cross-shore modeling, and stakeholder input. He led a multi-disciplinary team to develop conceptual designs for closing and restoring illegal dune crossings, enhancing Town-maintained crossings, and closing large gaps in the dune system. Mr. Brahim also coordinated the Town's Working Group and led community engagement events.

Beach Access Resiliency and Accessibility Improvements, Town of Swampscott, MA – Deputy Project Manager and Technical Lead
Mr. Brahim led the finalization of designs and specifications for flood resiliency improvements and other aesthetic and programming enhancements to two Town of Swampscott beach access areas. He helped the Town obtain grant funding for design, permitting, and construction of these improvements. The design approach to improving the access ways includes adding and grading compatible sediment to the maximum elevations and slopes feasible without adversely impacting abutting properties or exceeding accessibility guidelines, stabilizing the sand using native vegetation, and installing access mats along designated paths to improve accessibility and minimize sand compaction and vegetation disturbance. These measures were designed to incorporate sea level rise through 2030 and prevent stillwater flooding up to the 0.1% annual chance flood elevation, virtually eliminate flood volumes from wave runup and overtopping in nuisance events, and significantly reduce runup and overtopping flood volumes in extreme events.

Waterfront Access Elevation and Flood Protection Project, Town of Swampscott, MA – Deputy Project Manager and Technical Lead
Mr. Brahim led the initiation of priority recommendations from the Town of Swampscott coastal resiliency plan, which he authored, including obtaining grant funding, and developing draft design plans, specifications, and permit applications. The selected design approach utilized nature-based storm damage prevention techniques and structural measures to elevate seven low-lying public shoreline access areas and mitigate flood pathways that impact major roadways, public safety, stormwater, and sewer infrastructure in addition to many private homes and businesses. Mr. Brahim led the planning, design, and stakeholder engagement processes.

Various Confidential Real Estate Property Management Companies, Flood Barrier Design, Operations Planning, and Approvals, Boston, MA – Project Manager
Mr. Brahim provided deployable flood barrier feasibility assessment, design, operations, and local permitting support to real estate owners and property managers of five commercial and mixed-use developments in South Boston. Operational support included flood emergency deployment plan development, flood forecast monitoring, estimating deployment time and labor requirements, and addressing regulatory issues.

Flood Barrier Feasibility Analysis, Confidential Higher Education Institution, Metro Boston, MA – Project Manager
Mr. Brahim led a university study evaluating the feasibility of using various flood wall, gate, and barrier systems to protect critical buildings on campus from future coastal and inland flooding. A diverse set of buildings was

KEY PROJECTS (CONTINUED)

evaluated including central utilities, research, laboratory, residential, and parking. Mr. Brahim led the building vulnerability assessments, developed engineering alternatives analyses and benefit cost analyses, developed operational and policy recommendations, managed a multi-department stakeholder group, authored the final report, and presented results to executives.

Coastal Climate Change Vulnerability Assessments and Adaptation Plans, Waterford, CT; Duxbury, Edgartown, Gloucester, Hingham, Hull, Oak Bluffs, Sandwich, Swampscott, MA – Deputy Project Manager and Technical Lead

Mr. Brahim led or supported climate change vulnerability assessments and adaptation plans for nine coastal municipalities - separate projects with similar scopes of work. The assessments focused on natural resource and public infrastructure risks from flooding due to sea level rise and storm surge, and, in the case of Waterford, CT, heavy precipitation. Mr. Brahim worked closely with modelers to map flood depths and probabilities for future scenarios. He carried out quantitative risk assessments of vulnerable systems and developed and prioritized adaptation recommendations with cost estimates in collaboration with multi-disciplinary design teams, municipal department staff, and multi-stakeholder steering groups. Adaptation strategies included engineering, operations, and policy measures. Mr. Brahim was also responsible for public involvement, including delivering presentations, facilitating workshops, and engaging with media.

Climate Change Vulnerability Assessment, City of Cambridge, Cambridge, MA – Resiliency Specialist

Mr. Brahim conducted the urban infrastructure climate change vulnerability and risk assessment for this ground-breaking project, including for coastal flooding (sea level rise and storm surge), inland flooding (riverine and urban drainage), and extreme heat. This comprehensive assessment covered a broad range of infrastructure types including commuter rail lines, subway stations and rail lines, energy infrastructure, telecommunications infrastructure, roads, bridges, public safety facilities, schools, and community centers. Mr. Brahim also developed and facilitated technical workshops, public meetings, and other stakeholder engagement events.

Climate Ready DC Vulnerability Assessment, District Department of Energy and Environment, Washington, DC – Resiliency Specialist

Mr. Brahim conducted the urban infrastructure climate change vulnerability and risk assessment including for coastal flooding (sea level rise and storm surge), inland flooding (riverine and urban drainage), and extreme heat. To inform the climate projections and hazard exposure scenarios used in the assessment, Mr. Brahim conducted research on sea level rise projections and historic flooding events in Washington, DC. He also conducted a policy gap analysis and developed a menu of regulatory and policy tools for adaptation. The project won the Cities4Tomorrow Award from Bloomberg Philanthropies C40 Cities in 2017.

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Joseph Famely, M.E.M.

Senior Environmental Scientist

EXPERTISE

Focused on environmental and sustainability planning, Mr. Famely has expertise in assessing climate change vulnerability and risk for infrastructure and natural resources, and developing adaptation and resiliency plans for communities and organizations. As a trained provider in the Massachusetts Municipal Vulnerability Preparedness (MVP) Program, he has facilitated community engagement workshops following the Community Resilience Building Framework and successfully obtained funding through the MVP Action Grant program.

In addition to numerous sea level rise and storm surge vulnerability assessments in the New England region, he has developed customized greenhouse gas assessment tools to help organizations benchmark and track their carbon footprints and prepare sustainability reports, and led strategic land use planning projects.

Mr. Famely's background in risk assessment, urban ecology, and environmental design brings a systems thinking approach to projects and facilitates collaboration with engineering and design professionals, as well as with clients and stakeholders.

QUALIFICATION SUMMARY

- 18 years' experience in the environmental science and planning
- Certified MA Municipal Vulnerability Preparedness Program Provider
- Climate change vulnerability assessment / adaptation planning
- Land use sustainability planning and metrics
- Greenhouse gas inventory and sustainability reporting
- Environmental impact statements
- Ecological risk assessment
- Project management and grant writing

WORK EXPERIENCE

2009–Present	Woods Hole Group, Inc. (Senior Environmental Scientist)
2011–2012	Except Integrated Sustainability (Sustainability Consultant)
2009–2012	Anthrocology (Sustainability Consultant)
2008	Yale Urban Design Workshop (Sustainability Planning Fellow)
2006–2007	Exponent (Environmental Scientist)
2000–2006	Menzie-Cura & Associates (Environmental Scientist)

Education

2009 – M.E.M.
Yale School of Forestry & Environmental Studies

2000 – B.A.
Bowdoin College

Licenses & Registrations

- MA EOEEA Municipal Vulnerability Preparedness (MVP) Program Provider
- OSHA 40-Hour HAZWOPER

Publications & Presentations

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KEY PROJECTS

Sandwich Municipal Vulnerability Preparedness Program
MVP Lead Facilitator
Led the Sandwich Community Resilience Building workshop following guidelines for the MA EOEEA Municipal Vulnerability Preparedness (MVP) Program. Presented the Community Resilience Building framework and regionally downscaled climate change projections, and discussed potential hazards and risks. Guided stakeholders and workshop facilitators in assessing local vulnerability of infrastructure, environmental and societal assets, and developing and prioritizing actions to reduce vulnerability and increase resilience throughout the community. Led the preparation of the Summary of Findings report, and wrote a successful MVP Action Grant ($88,025) that enabled the Town to fund a detailed sea level rise and storm surge vulnerability assessment for infrastructure and natural resources.

Falmouth Municipal Vulnerability Preparedness Program
MVP Facilitator
Facilitated stakeholder engagement on climate change vulnerability and adaptation for the Falmouth Community Resilience Building workshop following guidelines for the MA EOEEA Municipal Vulnerability Preparedness (MVP) Program. Guided stakeholders in assessing local vulnerability of infrastructure, environmental and societal assets, and developing and prioritizing actions to reduce vulnerability and increase resilience throughout the community.

Provincetown Municipal Airport Coastal Vulnerability Assessment
Project Manager
Developed sea level rise and storm surge vulnerability assessments for present and potential future impacts to the Provincetown (MA) Municipal Airport under two scenarios – closed and opened tidal gates at the Hatches Harbor dike road. The vulnerability assessments were used to inform adaptation and resiliency planning for the airport.

Environmental Permitting for Dredging and Dredge Materials Management in Support of Electric Boat Facilities Master Plan
Technical Lead, Greenhouse Gas Assessment
Preparing an alternatives analysis for the comparative carbon footprints of two dredging and dredge material disposal alternatives.

MassDOT I-90 Allston Interchange Project Environmental Impact Report
Environmental Planner
Assessed climate change vulnerability (including sea level rise, storm surge, and heat) for existing conditions and multiple design alternatives for a major urban highway realignment project environmental review. Authored EIR sections on climate change impacts, as well as described design features and specifications (mitigation) that would enhance system resiliency for the future.

Joseph Famely
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KEY PROJECTS (CONTINUED)

MBTA Blue Line Vulnerability Assessment and Adaptation Prioritization
Technical Lead, Geospatial Analysis
Developing vulnerability assessments for sea level rise and storm surge impacts to Aquarium and Maverick T Stations and supporting infrastructure. The assessments will include probability and depth of inundation, flood residence time, and detailed flood pathway analyses to inform Blue Line climate resiliency planning.

Boston Harbor Barrier Alternatives Evaluation
Technical Lead, Geospatial Analysis
Developed a detailed inventory of district shoreline solutions necessary throughout the Boston region over time (to 2100) to plan adequate protection under various Harbor Barrier and No Harbor Barrier alternatives. Also analyzed the areas of avoided flood risk over time based on these adaptation alternatives. Both assessments informed the benefit/cost analyses in the "*Feasibility of Harbor-wide Barrier Systems Preliminary Analysis for Boston Harbor*" report.

Palm Beach (FL) Coastal Vulnerability Assessment and Adaptation Prioritization
Technical Lead, Geospatial Analysis
Developing a sea level rise and extreme weather vulnerability and risk assessment for the Town of Palm Beach, Florida. Coordinating with Town staff to obtain sea wall elevations to fill data gaps for the vulnerability assessment, and to develop a consequence of loss scoring matrix for all Town infrastructure to inform the risk assessment and help prioritize adaptation investments.

Trustees of Reservations Coastal Vulnerability Assessment and Adaptation Prioritization
Technical Lead, Geospatial Analysis
Prepared vulnerability assessment, based on results of a highly resolved sea level rise and extreme weather model, for all Trustees of Reservations coastal properties. Worked closely with Trustees' staff to develop a coastal vulnerability index for all assets, including infrastructure, habitats, endangered species, natural resource recreational areas, and historical/cultural resources, which will inform prioritization of resilience projects across 30+ properties.

Stonington (CT) Coastal Vulnerability Assessment and Adaptation Prioritization
Technical Lead, Geospatial Analysis
Prepared vulnerability maps, based on results of the U.S. Army Corps of Engineers' North Atlantic Coast Comprehensive Study (NACCS) extreme weather model, for a coastal community in Connecticut with multiple tidally-influenced rivers and embayments. Vulnerability maps were then used to support emergency preparedness and adaptation scoping over various planning horizons – present day, 2030, and 2070.

Ecological Risk Assessment Review and Development of Cleanup Goals
Project Manager/Environmental Scientist
Conducted a technical review of a Stage II ecological risk characterization for a former printing facility in Massachusetts, and developed recommendations for finalization and submittal. Developed risk-based remedial goals for cadmium in sediment and wetland soil, and oversaw a sediment coring program to determine the vertical and horizontal extents of cleanup.

Joseph Famely
Senior Environmental Scientist
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KEY PROJECTS (CONTINUED)

Sea Level Rise and Storm Surge Inundation Mapping for Great Marsh Communities
Technical Lead, Geospatial Analysis
With funding from a Hurricane Sandy Coastal Resiliency Grant, and in partnership with National Wildlife Federation and USGS, prepared vulnerability maps for six Essex County (MA) communities based on results of a highly resolved sea level rise and extreme weather model. Vulnerability maps were then used to support emergency preparedness and adaptation planning, with specific emphasis on nature-based solutions.

Climate Change and Extreme Weather Vulnerability Assessments for Massachusetts Coastal Communities
Technical Lead, Geospatial Analysis
Prepared vulnerability maps, based on results of a highly resolved sea level rise and extreme weather model, for a number of Massachusetts coastal communities, including: Gloucester, Swampscott, Revere, Winthrop, Chelsea, Everett, Malden, Medford, Somerville, Cambridge, Boston, Quincy, Hingham, Hull, and Oak Bluffs. Vulnerability maps were then used to support emergency preparedness and adaptation scoping over various planning horizons – present day, 2030, and 2070.

MassDOT – FHWA Pilot Project for Climate Change and Extreme Weather Vulnerability Assessments and Adaptation Options of the Central Artery
Technical Lead, Geospatial Analysis
GIS analyst on a technically advanced, leading-edge pilot project for the Federal Highway Administration evaluating vulnerability to sea level rise and extreme weather events for the Central Artery in Boston, MA using a highly resolved, numerical processes model. Contributed to the development of a geodatabase of infrastructure assets for vulnerability assessment and evaluation of adaptation options. Performed model post-processing and QA/QC, and prepared asset vulnerability maps to support vulnerability assessment, emergency response planning, and adaptation planning.

CTDOT SEIS for the Designation of Dredged Material Disposal Site(s) in Eastern Long Island Sound
Project Manager
Collaborated with partners at Louis Berger and the University of Connecticut to develop the Supplemental EIS evaluating dredged material disposal site alternatives in Eastern Long Island Sound. Developed analyses of sediment toxicity and bioaccumulation, calculated a dilution criterion for ocean disposal suitability from suspended particulate phase toxicity tests, and authored relevant sections of the SEIS.

Sesuit Harbor Use and Capacity Study
Project Manager
Lead a team of engineers, marina development advisors, and landscape architects in the preparation of a master plan for a municipal marina in Dennis, MA. Analyzed current use and capacity, land and water assets, harbor regulations and by-laws, fee structure, and marina operations and maintenance. Provided the Town with recommendations and cost estimates for land and water improvement design alternatives, and recommendations for changes to administrative and capital processes, to support the safe and efficient operation of the harbor.

KEY PROJECTS (CONTINUED)

Boston Coastal Climate Change Adaptation and Engineering Alternatives
Technical Lead, Geospatial Analysis
Developed a range of sea level rise and storm surge scenarios using LIDAR data and a customized GIS connectivity analysis to evaluate potential risk to property and critical infrastructure. Supported the development of preparedness plans and engineering adaptations for two sites in Boston – Long/Central Wharves and UMass Boston, which were presented in the Boston Harbor Association's "*Preparing for the Rising Tide*" report.

Groton (CT) Coastal Climate Change Adaptation and Engineering Alternatives
Technical Lead, Geospatial Analysis
Worked with Battelle Ocean Sciences and the University of Southern Maine on assessing the impacts of climate change on coastal communities of Groton, Connecticut. Specifically, the regions of Groton Long Point and the infrastructure surrounding the Mystic River were evaluated. The evaluation included the impacts of sea level rise and storm events on potential flooding using LIDAR data and a customized GIS connectivity analysis. For each location, supported the development of conceptual designs for engineering adaptation alternatives. The alternatives ranged from management approaches (e.g., evacuation, floodproofing of structures, etc.), to soft-engineering options (e.g., beach nourishment, creation of wetlands, etc.), to more significant hard engineering structures (e.g., modular seawalls, revetments, tide gates, hurricane barriers, etc.).

Seagrass Restoration Optimization Strategies in a Changing Climate: Southern New England and New York
Environmental Scientist
Evaluated the interactive effects of multiple stressors (eutrophication, climate-induced heat stress, sea-level rise-induced light reduction) on the potential success of future seagrass conservation and restoration efforts. Assisted in the development of a database cataloguing relevant characteristics of 170 embayments from Long Island to Cape Cod – including estuarine area and volume, estuarine flushing time, watershed nitrogen loading, sediment physical characteristics, and extent of current or historical seagrass. Contributed to nitrogen loading analyses for twenty selected embayments and ranked overall risk to stressors. The Nature Conservancy uses this tool to prioritize investments in restoration projects, adjoining land preservation, and local changes in policy and planning.

Ecological Risk Assessment in a Tidally Influenced Freshwater Wetland and Creek in Fairfield (CT)
Environmental Scientist
Conducted a baseline ecological risk assessment for a former metals facility in Connecticut. Planned and led field investigations, managed data analysis, and authored risk characterization report. The analysis included modeling risks to ecological receptors in the wetland and creek from metals and polycyclic aromatic hydrocarbons.

Ecological Risk Assessment in a Riparian Environment in Canton (MA)
Project Manager/Environmental Scientist
Conducted a Stage I and Stage II ecological risk characterization for a former rubber and vinyl tape facility in Massachusetts. Planned and led field investigations, managed data analysis, and authored risk characterization

KEY PROJECTS (CONTINUED)

report. The analysis included modeling metals and polycyclic aromatic hydrocarbons in fish and plant tissue from sediment concentrations.

Eastham (MA) Conservation Land Inventory and Analysis
Project Manager
Conducted an inventory of conservation land in Eastham, including private, municipal, and nonprofit land trust-owned parcels. Reviewed Registry of Deeds documents and relevant Massachusetts conservation law to supplement parcel data with information on the date, method and purpose of protection, the custodian of the protected land, the level of protection, and the existence of wetlands, unrestricted areas, or building envelopes. The work product included a database of conservation land which is hyperlinked to all Registry of Deeds and Town of Eastham documents relevant to the conservation restrictions and readily appended to the Town's GIS system. The analysis included recommendations for increasing the level of protection on conservation lands.

Yale Community Carbon Fund Calculator
Technical Lead, Transportation and Solid Waste Emissions
Developed a greenhouse gas emissions model for the Yale Office of Sustainability to calculate emissions related to travel, commuting, and events associated with the Yale University community. The calculator is a web-based application which includes integrated explanatory text and a standalone report on methodology. The tool enables members of the community to determine the appropriate quantity of emissions to offset with an online donation to the Yale Community Carbon Fund, which supports carbon mitigation projects for organizations and low-income households in New Haven.

Long Island Sound Dredged Materials Management Planning
Environmental Scientist
Conducted a review of literature on dredge materials management and environmental data for Long Island Sound. Reviewed potential sites throughout the Sound for alternative placement of dredge materials – including beach nourishment via direct placement, upland beneficial use, shoreline confined disposal, and nearshore placement for beach nourishment and shoreline protection. Reviews of alternatives included site visits and desktop review (in an ArcGIS environment) based on spatial analysis of environmental, physical, cultural, and infrastructure impacts of project development. Prepared a synthesizing report in support of the USACE's Dredged Materials Management Plan for Long Island Sound.

Delaware Estuary Regional Sediment Budget
Technical Lead, Geospatial Analysis
Performed an estuary-wide analysis of historical shoreline change to derive a sediment source term for the fine sediment budget. Using synoptic historical shoreline data and sediment properties data for the wetland coast, calculated the surface area of the estuarine shore lost and gained between the 1880s and 2008, as well as the mass of mineral or organic sediment produced through time. The time-averaged rate of sediment production by shore erosion was then used for the sediment budget analysis, prepared for the USACE Philadelphia District.

KEY PROJECTS (CONTINUED)

Shoreline Change Analyses for Private Properties on Long Island
Technical Lead, Geospatial Analysis
Conducted numerous quantitative spatial analyses of shoreline and dune movement over time in support of Coastal Erosion Hazard Area evaluations in New York. Analyzed multiple historical aerial photographs to digitize the shoreline and calculate long-term rates of change along transects through the beach and dune. Summarized results and recommended changes in the delineation of resource areas based on review of the data with respect to the New York State Coastal Erosion Management Regulations.

New Bedford Harbor Superfund Site
Environmental Scientist
Data analysis and technical reporting in support of Remedial Investigation and Feasibility Study for New Bedford Harbor Operable Unit #3. Analyzed sediment and tissue chemistry data along with toxicity tests and benthic community data to support management decisions in areas outside the harbor. Supported the development of the ecological risk assessment, which was submitted to USACE and USEPA.

Greenhouse Gas Impacts Modeling for a New York Real Estate Development Environmental Review
Project Manager/Technical Lead, Greenhouse Gas Assessment
Developed a greenhouse gas model to evaluate the impacts of multiple development alternatives for a proposed socially- and environmentally-conscious resort and residential community development's Environmental Impact Statement under the New York State Environmental Quality Review process. Prepared summary tables and text for the EIS submittal as well as a full report documenting the methodology and results.

Greater Dwight Development Corporation Neighborhood-Scale Sustainability Master Plan
Environmental Planner
In collaboration with the Yale Urban Design Workshop, developed a neighborhood-scale sustainability plan for a nonprofit community-based development organization in New Haven, CT. The master plan included spatially-informed sustainability metrics (carbon, water, air pollution, greenspace, social, etc.) and suggested projects for continuous improvement.

Materials Flow Analysis on the Island of O'ahu
Environmental Scientist
Researched and prepared report on material flows in the sectors of imports, exports, and natural resource extraction on the island of O'ahu for the Hawaii Community Foundation. The industrial ecology research aggregated available public data and supplemented with phone and field interviews. The report summarized findings and proposed strategies for the optimization of material flows on an isolated island.

PUBLICATIONS AND PRESENTATIONS

Hoffnagle, B, J Famely, T Wickwire, T O'Shea, V Antil. 2017. Poster Presentation: The Use of a Coastal Vulnerability Assessment to Prioritize Habitat Adaptation Strategies in Response to Future Climate Change. Cape Cod Natural History Conference, Barnstable, MA. March 11, 2017.

PUBLICATIONS AND PRESENTATIONS (CONTINUED)

Wickwire T.W. and J. Famely. 2016. The Value of GIS and the Ecological Risk Framework for Analyzing Climate Vulnerability of Ecological Assets. ECO: Environmental Coastal and Offshore, October 2016; 18-22.

Bain, A., N. Caruso, J. Famely, R. Herzl, and J. Wu. 2009. Master Plan for Nusajaya / Zone B, Iskandar, Malaysia. Yale School of Architecture Retrospecta 08-09.

Famely, J. 2008. Adapting Vernacular Architecture for Sustainable and Restorative Environmental Design Elements. Presented Urban Villages, Inc.

Famely, J., E. Gladek, and C. Ziemba. 2008. Material flows on the island of Oahu: Imports, exports, and resource extraction. New Haven: Yale Center for Industrial Ecology.

Von Stackleberg, K., C. Amos, C. Butler, T. Smith, J. Famely, M. McArdle, B. Southworth, and J. Steevens. 2006. Screening Level Ecological Risk Assessments of Some Military Munitions and Obscurantrelated Compounds for Selected Threatened and Endangered Species. ERDC-TR-06-11. Engineer Research and Development Center – Construction Engineering Research Laboratory. Champaign, IL.

Famely, J., W.T. Wickwire, and C.A. Menzie. 2005. Assessment and planning approaches in watershed assessment: The embayment eutrophication case study. New England Estuarine Research Society, Spring, 2005 Meeting, Eastham, MA, April 27, 2005.

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M. Leslie Fields, CFM, M.S., B.S.

Coastal Geologist/Marine Environmental Analyst

EXPERTISE

Coastal hazards evaluation, GIS development, environmental impact analyses, coastal wetland delineation, sediment transport analyses, tidal inlet hydrodynamics, nearshore wave propagation analyses, storm surge analyses, and permitting (local, state, and federal).

QUALIFICATION SUMMARY

- Over 33 years of experience in multi-jurisdictional environmental studies
- Specializes in floodplain management, coastal hazards assessments and environmental studies of coastal and marine projects, including resource and existing conditions surveys, impact analyses, flood zone mapping, and mitigation/restoration planning for climate change
- Extensive experience with local, state, and federal permitting of coastal projects
- Experience with field data collection of sediments, water, plants, fish, and benthic infauna for environmental studies, and with laboratory services required to analyze such samples
- Skilled at utilizing GIS and database technology to display and analyze spatially related data for coastal and marine projects
- Strong written, communication, and organizational skills, including expert testimony

WORK EXPERIENCE

1989-Present	Woods Hole Group, Inc., Senior Coastal Geologist
2003-2004	Massachusetts Coastal Zone Management, Special Project Scientist and GIS Analyst
1984-1989	U.S. Army Corps of Engineers, CERC, Coastal Scientist
1981-1984	Rutgers University, Teaching and Research Assistant
1980-1981	Sun Energy and Development Co., Intern

Education
1984 – M.S.
Coastal Geology
Rutgers University
1981 – B.S.
Geology
Southern Methodist University

Licenses and Registrations
CFM Certified Floodplain Manager, US, Certificate# US-14-07618

Professional Affiliations
N/A

Publications & Presentations
66

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KEY PROJECTS

Environmental Review and Coastal Permitting for General Dynamics, Electric Boat Corporation, Groton, CT – Coastal Geologist and Environmental Analyst
Worked on a project for General Dynamics, Electric Boat Corp. (EB) to provide environmental assessment services required for Connecticut DEEP, US Army Corps of Engineers, and Federal Consistency permitting for improvements to EB's South Yard facility to support construction of a new class of submarine for the US Navy. Improvements included landside and in-water work, including a waterfront deck structure to support an assembly building, a floating dry dock and sinking basin that required dredging 984,000 cubic yards of material. This work included evaluation of project impacts on wetlands, benthic habitat, fisheries, water quality, tidal circulation, as well as review of sediment chemistry, bioaccumulation, bioassay, and elutriate chemistry data to evaluate ecological and human health risks associated with dredging and dredge material disposal. A dredge material management plan was also prepared to evaluate alternatives for placement of the dredged sediment.

Technical Review of FEMA's Southwest Florida Risk MAP Process for Lee County, FL – Project Manger
Managed a multi-year project to provide technical review of FEMA's Risk MAP development process for Lee County, FL. The work included review of the Coastal Discovery Report, Intermediate Data Submittal Reports #1 through #5, and FEMA's Work Maps. The Woods Hole Group team is presently reviewing the ADCIRC/SWAN modeling, CHAMP database and associated modeling, wave runup and overtopping calculations, and the FEMA Preliminary FIRMs. The technical reviews evaluated the assumptions and decisions made by FEMA and FEMA's contractors to develop the Risk MAP products, identification of issues with the methods employed, including the application of coupled numerical models for evaluating base flood levels, hydrodynamics, and wave impacts. Results from evaluation of the Preliminary FIRMs will be used to determine whether an appeal is warranted.

Technical Evaluation of Preliminary FEMA FIRMs for the Cities of Boston, Revere, Chelsea, and Town of Revere, MA – Project Manager
Managed projects for the Cities of Boston, Revere, Chelsea and the Town of Revere to perform coastal hydrologic and hydraulic evaluations of preliminary FEMA FIRMs released in 2013. The work included assessment of 100-yr stillwater elevations, offshore wave conditions, and wave setup criterion utilized by FEMA in the coastal modeling. Woods Hole Group worked with the communities to select specific transects for detailed evaluation using FEMA's models and methods for erosion, PFD delineation, overland wave transformation, wave runup, and overtopping. Results from the analyses were used as the basis for appeals of the Preliminary FIRMs to FEMA. The appeals were approved and revised FIRMs were issued in March 2016.

Technical Evaluation of Preliminary 2013 FEMA FIRMs for the Towns of Scituate, Marshfield, and Duxbury, MA – Project Manager
Managed projects for the Towns of Scituate, Marshfield, and Duxbury to perform coastal hydrologic and hydraulic evaluations of preliminary FEMA FIRMs released in May 2013. The work included assessment of 100-yr stillwater elevations, offshore wave conditions, and wave setup criterion utilized by FEMA in the coastal modeling. Woods Hole Group worked with the communities to select specific transects for detailed evaluation using FEMA's models and methods for erosion, PFD delineation, overland wave transformation, wave runup, and overtopping. The work was performed on an accelerated schedule and resulted in an appeal to FEMA for revisions the FIRMs. The appeals were approved and revised FIRMs were issued in November 2016.

KEY PROJECTS (CONTINUED)

Technical Evaluation of Preliminary 2013 FEMA FIRMs for areas in Barnstable County, MA – Project Manager
Managed three (3) separate projects in Barnstable County to perform coastal hydrologic and hydraulic evaluations of preliminary FEMA FIRMs released in May 2013. The work included sites in the Towns of Chatham, Barnstable, and Falmouth. Elevations for the 100-yr stillwater conditions, offshore wave conditions, and wave setup criterion utilized by FEMA in the coastal modeling were evaluated. FEMA's models and methods for erosion, PFD delineation, overland wave transformation, wave runup, and overtopping were used to assess the 100-yr flood conditions at each site. Results from the analyses indicated that an appeal of the preliminary FIRMs was warranted for the Chatham site, but not for the sites in Barnstable or Falmouth. The Chatham appeal was accepted by FEMA and the map revisions were reflected in the Effective FIRMs.

Nauset Estuary Dredging Feasibility Assessment – Project Manager
Managed a project for the Town of Orleans, MA to evaluate the feasibility of dredging a navigation channel in Nauset Estuary for improved access between the town landings and mooring fields and the Atlantic Ocean. The feasibility of establishing a dredging program for the estuary was evaluated based on environmental impacts, expected project lifetime, costs and schedule for environmental permitting, and costs for project construction.

Risk and Vulnerability Assessment for the Martha's Vineyard Hospital, Oak Bluffs, MA; Board of Trustees MV Hospital and MV Commission - Project Manager/Floodplain Analyst
Managed and conducted an extensive risk and vulnerability assessment for reconstruction of the Martha's Vineyard Hospital. The analysis considered risks of the existing hospital site to various natural hazards including storm surge, flooding, wind, snowfall, wildfire, coastal erosion, sea-level rise, and earthquakes. Vulnerability of the site and impacts to critical hospital services were considered. Results from the risk and vulnerability analysis were used to provide recommendations for reconstruction of the hospital facilities.

Town of Palm Beach Technical Review of Proposed Coastal Management Program; Town of Palm Beach – Coastal Geologist
Worked on the WHG team to conduct a technical review of the Palm Beach CCMP. Reviewed a broad range of reference documents and data describing the history of coastal management and coastal processes at Palm Beach. Developed island-wide recommendations for inlet management, evaluation of beach nourishment project performance and feeder beach strategies, sand source alternatives, maintenance of coastal structures, and protection of hardbottom resources. A selection of shore protection alternatives were also evaluated in terms of performance and value to help formulate recommendations for improved coastal management.

Long Island Sound Dredged Material Management Plan (LISDMMP) Potential Dredged Material Containment Sites and Investigation of Nearshore Placement Sites for Materials Suitable for Beneficial Use as Nourishment – Environmental Scientist
Worked with a team of Woods Hole Group scientists to assess candidate sites in the Long Island Sound area for disposal of dredged materials from surrounding waterways. The assessments evaluated capacity for dredged material, preliminary engineering design, and potential environmental and community impacts. Site types included Confined Aquatic Disposal sites, nearshore Confined Disposal Facilities, Island Confined Disposal

KEY PROJECTS (CONTINUED)

Facilities, and nearshore placement sites. Potential impacts to cultural, infrastructure, physical, and environmental resources were assessed on a site by site basis.

Investigation of Upland, Beneficial Reuse, and Sediment Dewatering Sites for Dredged Materials Management in Long Island Sound; US Army Corps of Engineers – Environmental Scientist
Conducted investigations at 104 upland, beneficial reuse, and sediment dewatering sites for potential dredged materials management in the Long Island Sound area. Site summaries provided information on general location, ownership, surrounding land use, zoning, wetland resources, proximity to habitat for rare and endangered species, sediment type, site access, and staging areas. Conceptual engineering designs were evaluated and site capacities were determined.

Management of the New Bedford Harbor Superfund Site Environmental Management Information System; US Army Corps of Engineers – Project Manager
Served as project manager for the New Bedford Harbor superfund site information system containing environmental measurements and geographic information generated for contaminant identification, delineation, and regulatory compliance during the Corps remediation activities. The information management system incorporates an Oracle environmental database, a web-based front-end that provides data access for project team members, and data management methods and procedures for quality assurance and data validation. The database holds over 300,000 analytical, biological, toxicological, and geotechnical results generated by a team of field and laboratory contractors.

Comprehensive 10-Yr Permitting for Town of Falmouth Dredging and Beach Nourishment Projects; Town of Falmouth – Project Manager
Managed a project for the Town of Falmouth Harbormaster and Department of Public Works offices to secure comprehensive 10-yr permits for dredging and beach nourishment throughout the town. The purpose of the project was to consolidate and manage environmental permits for 25 dredging and beach nourishment sites associated with maintenance of the Town's waterways, harbors, salt ponds, and public beaches. The work involved sediment sampling and analyses, wetland delineation, impact analyses, plan preparation, and permitting. Applications were secured from the appropriate local, state, and federal agencies.

Coordination, Design, and Permitting for the Vineyard Haven Harbor Dredging and Beach Nourishment Project; Town of Tisbury- Project Manager/Coastal Scientist
Coordinated, designed, and permitted a dredging and beneficial reuse beach restoration project in Vineyard Haven Harbor, Martha's Vineyard. Shoaling at the western entrance to Vineyard Haven Harbor created problems for navigation and threatened water quality in the Inner Harbor. Sandy dredge material was permitted for restoration of critically eroded beaches. Work on the project included preparation and filing for the full range of environmental permits from local, state, and federal agencies.

KEY PROJECTS (CONTINUED)

Evaluation of Beach Replenishment Alternatives for Narragansett Beach, Rhode Island; Town of Narragansett – Project Manager/Coastal Scientist
Managed a project to evaluate a range of alternatives for beach replenishment at Narragansett Town Beach. Erosion of the beach has historically been managed by trucking in small quantities of sand immediately prior to the summer beach season. The Town was interested in identifying longer-term solutions that would enhance the recreational resource and provide improved storm damage protection. This project evaluated quantities of sand needed for various beach nourishment scenarios involving different berm widths, elevations, nearshore slopes, and beach lengths. Levels of storm protection and project performance were evaluated. Potential sand sources and associated construction costs were also identified, and permitting requirements were addressed.

Development of a Plan to Address Beach Erosion at Chapin Beach, Dennis, MA; Town of Dennis – Coastal Geologist
Worked to develop a plan addressing long-term erosion at the Town of Dennis public beach area known as Chapin Beach. Concern over high erosion rates along the barrier beach prompted the Town to commission a study of causes and potential remedial actions. The work involved mapping of critical resources, analysis of historical shoreline change, investigation of site specific erosion processes, as well as an analysis of alternatives for mitigating the erosion. Planning level cost estimates and regulatory requirements for a series of recommended solutions were identified.

Preparation of a Waterways Asset and Resources Master Plan for Dredging and Beach Nourishment for the Town of Dennis, MA; Town of Dennis – Project Manager/Coastal Scientist
Documented existing conditions and management practices at the four waterways and eight primary public beach sites within the Town of Dennis. The project resulted in a master plan for dredging activities in the waterways, as well as associated beach nourishment to restore the public coastal resources. Available information from town records and permit documents was used to evaluate dredging needs and environmental resources in the different waterways. The beach sites were evaluated using a combination of information from town records, permit documents, State and Federal agencies, and survey data collected specifically for this study. Recommendations were developed and prioritized for improved management of the Towns waterways and beach resources.

Beach Management Plan for Town of Falmouth Public Beaches; Office of the Town Manager and Falmouth Beach Committee - Project Manager/Coastal Scientist
Managed and prepared a comprehensive Beach Management Plan for 10 public beaches in the Town of Falmouth. The project involved collection of beach profile data, sediment analyses, resource area delineations, and infrastructure assessments. Dominant coastal processes, directions of sediment transport, historical shoreline change, and history of human alterations were all addressed. Recommended management activities were provided for infrastructure maintenance, beach monitoring, routine maintenance, restoration activities, education, enforcement, and fund raising. Results from the Beach Key Projects Management Plan were used to file for and secure a local permit from the Falmouth Conservation Commission for a number of the recommended management activities.

KEY PROJECTS (CONTINUED)

Coordination, Design, and Permitting for the Menauhant Beach and Dune Restoration Project, East Falmouth, MA; Town of Falmouth - Project Manager/Regulatory Specialist
Coordinated, designed, and permitted a beneficial reuse dune and beach restoration project at Menauhant Beach in East Falmouth. Through extensive interagency coordination and cooperation, the Town of Falmouth was able to secure sand from a nearby dredging project that created a deepwater port in Great Harbor Woods Hole for a new NOAA research vessel. Dredged sand was dumped at a temporary, nearshore rehandling site offshore of Menauhant Beach, and then hydraulically pumped to Menauhant public beach to form a protective dune. The project required the full range of environmental permits from local, state, and federal agencies. Coordination between local Town of Falmouth representatives, DEP regulatory officials, the Barnstable County Dredge office, NOAA, and USACE project managers was required to construct this beneficial reuse project.

Environmental Impact and Risk Assessments for Proposed Natural Gas Pipelines Offshore of Trinidad and Tobago; National Gas Company of Trinidad and Tobago Limited - Project Manager/Environmental Analyst
Managed a large-scale environmental impact and risk assessment project for two proposed natural gas pipelines offshore of Trinidad and Tobago. The work involved extensive field data collection and laboratory analysis of oceanographic, coastal, and terrestrial data. Detailed descriptions of the projects were provided along with alternatives analyses, existing conditions reports, and environmental impact analyses. Recommendations were provided to the project applicant and the regulatory agencies of Trinidad and Tobago for minimizing adverse impacts and for long-term monitoring.

Analysis of Historical Shoreline Change and Management Alternatives for Nauset Beach, Orleans, MA; Orleans Parks and Beaches Department - Project Manager/GIS Analyst
Managed and performed a comprehensive analysis of shoreline change and management alternatives for Town of Orleans public beach areas located on Nauset Beach. The project involved a quantitative analysis of historical shoreline change using ArcGIS, as well as an analysis of barrier breaching and inlet formation. Results from the study were utilized to develop recommendations for short- and long-term management of the public beach facilities and the extensive off-road vehicle trails and barrier spit to the south.

Design, Environmental Impact Analysis and Permitting for Chapoquoit Beach Replenishment, West Falmouth, MA; Chapoquoit Associates - Project Manager/Coastal Geologist
Managed a large private/public partnership project to replenish eroding beaches along the Chapoquoit Beach section of West Falmouth, MA using sand dredged from the Cape Cod Canal by the US Army Corps of Engineers. The project involved detailed design computations for the replenishment, as well as wave and sediment transport modeling to evaluate spreading and potential impacts of the project. Extensive project management was required to facilitate permitting on a fast track basis and to coordinate construction with the USACE's schedule.

KEY PROJECTS (CONTINUED)

Design, Environmental Impact Analysis, and Permitting for the Centerville River Dredging Project, Centerville, MA; Town of Barnstable - Project Manager/Coastal Geologist
Managed a large-scale municipal project to dredge the Centerville River for the purposes of improving navigation. This project involved extensive field investigations of the physical environment, biology, wetland resources, and sediments within the river. The nature of the sediments required identification of two types of reuse sites for the dredged material. The design included beach replenishment at the adjacent barrier beach for the sand sized material, and a variety of upland reuse sites for the fine-grained sediments. The project required the full range of environmental permits from local, state, and federal agencies.

Design, Environmental Impact Analysis, and Permitting for the Mashpee River Dredging Project, Mashpee, MA; Town of Mashpee - Project Manager/Coastal Geologist
Managed a large-scale municipal project to dredge the Mashpee River for the purposes of improving navigation. This project involved extensive field investigations of the physical environment, biology, wetland resources, and sediments within the river. A detailed alternatives analysis was performed to identify potential dewatering and beneficial reuse sites. The fine-grained nature of the proposed dredge sediments coupled with the lack of nearby staging sites for dewatering and storage has presented a number of unique and difficult challenges to this project. The WHG is currently working with the Town of Mashpee to identify and scope several alternative technologies for dredging and dewatering the sediments.

Federal Emergency Management Agency (FEMA) Flood Insurance Restudy for the Town of Hampton, NH, FEMA - Project Manager/Coastal Geologist
Performed and managed a Flood Insurance Restudy (FIS) for the Town of Hampton, NH. This project involved updating the FEMA Flood Insurance Rate Maps (FIRM) for the Town of Hampton by re-establishing the flood zone boundaries. Numerical models were utilized to simulate nearshore wave transformation and wave runup, and were combined with estimates of erosion potential to determine the location of the flood zones. The FIRMs were updated using quantitative information on waves, wave runup, and flooding, and were graphically displayed using GIS techniques.

Assessment of Sand Resources in Northern and Central San Francisco Bay, CA; Hanson Aggregates - GIS Analyst
Worked with a team of WHG professionals to assess sand resources in Northern and Central San Francisco Bay, and to evaluate Hanson Aggregate and RMC leased sand borrow regions to determine their viability as a renewable sand resource. The work was accomplished using available hydrodynamic, geophysical, sediment, and geological data as well as digital terrain modeling tools available with the GIS software ArcInfo. Historical changes in bottom topography were evaluated using an acoustic survey of the bedrock surface, coupled with NOS bathymetric surveys and a high resolution multibeam survey collected by the USGS. Isopach maps showing changes in sediment thickness were generated and used to compute variations in sediment volume within specified borrow sites.

KEY PROJECTS (CONTINUED)

Historical Shoreline Change Analysis: Western Town Line to Horton Point, Southold, NY, Town of Southold - Project Manager/Coastal Geologist
Managed and performed a comprehensive historical analysis of a 10-mile segment of shoreline within the western portion of the Town of Southold, NY. The analysis was performed using historical T-sheets, traditional aerial photography, and low-altitude, high-resolution digital photography. Rates of shoreline change were computed at 100-ft intervals throughout the study area. The impacts of shoreline protection structures and storms on the historical rates of shoreline change were evaluated. Estimates of longshore sediment transport rates were obtained from the shoreline data.

Beach Nourishment Design, Permitting, and Oversight at Long Beach, Centerville, MA, Long Beach Association, Inc. - Project Manager/Coastal Geologist
A beach nourishment project was designed and permitted at Long Beach, Centerville, MA to alleviate long-term erosion of the shoreline and to provide improved storm damage protection and flood control. The beach was designed with a berm elevation of +9 ft MLW and a width of 100 ft. Sediment was dredged from shoals seaward of the East Bay tidal inlet, and hydraulically pumped to Long Beach. Approximately 2,100 ft of beach was nourished with 60,000 cubic yards of clean, compatible sand. This was a multi-disciplinary project involving analysis of coastal processes, environmental sensitivity, coordination with regulatory officials and marine contractors, and management of project funds.

Federal Emergency Management Agency (FEMA) Flood Insurance Restudy for the Town of Greenwich, CT, FEMA - Project Manager/Coastal Geologist
Performed and managed a Flood Insurance Restudy (FIS) for the Town of Greenwich, CT. This project involved updating the FEMA Flood Insurance Rate Maps (FIRM) for the Town of Greenwich by adding the effects of wave runup to the designation of flood zone boundaries. Numerical models were utilized to simulate nearshore wave transformation and wave runup, and combined with estimates of erosion potential to determine the location of flood zones. The FIRMs were updated using quantitative information on waves, wave runup, and flooding, and were graphically displayed using GIS techniques.

Sediment Transport Study - Evaluation of Causeway on Coastal Processes, Westport, MA, Massachusetts Department of Environmental Management - Coastal Geologist
Team member involved in a comprehensive evaluation of regional sediment transport processes along Horseneck Beach, Gooseberry Neck, East Horseneck Beach, and Little Beach in the Towns of Westport and Dartmouth, MA. Sediment transport patterns and alternatives for beach stabilization were evaluated along with various management and engineering alternatives for the causeway connecting Gooseberry Neck to the mainland. The historical evolution of the coastal system was evaluated, and an analysis of shoreline change was performed using historical maps and aerial photography. A combination of field data and numerical modeling was used to provide a detailed evaluation of the littoral processes. Nearshore wave transformation was modeled to provide the necessary data to drive the longshore sediment transport model. Cross-shore sediment transport was also modeled and combined with the longshore sediment transport model results to provide an estimate of the net annual longshore sediment transport.

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Adam J. Finkle, M.S., P.W.S., C.E.R.P

Coastal Scientist

EXPERTISE

Ecological restoration, coastal bank stabilization, erosion control, beach nourishment, dune enhancement, wetland resource area delineation, eelgrass surveys, native plant identification, invasive plant management, restoration planting plan development, mitigation plan development, bioengineering design and implementation, construction management.

QUALIFICATION SUMMARY

- 10 years of experience in the coastal sciences.
- Design, implementation, and construction management of large-scale ecological restoration and coastal resiliency projects throughout New England.
- Design, implementation, and construction management of coastal bank stabilization, dune enhancement, beach nourishment, salt marsh enhancement, and native planting projects.
- Construction site supervision and project management to ensure client satisfaction with project deliverables.
- Identification and delineation of coastal and freshwater wetland plant communities and resource areas.
- Development and implementation of invasive plant management plans.
- Development of site restoration, mitigation, and monitoring plans.
- Collaboration with project engineers, consulting teams, state and municipal officials.

WORK EXPERIENCE

2016 – Present	Coastal Scientist, Woods Hole Group, Inc.
2015 – 2016	Assistant Project Manager, SumCo Eco Contracting
2013 – 2015	Environmental Technician, Wilkinson Ecological Design
2010 – 2013	Research Assistant and Collaborator, *Plant-Pollinator Dynamics in Bahamian Coastal Communities*, The Ohio State University & Siena College
2009 – 2011	Teacher – Naturalist, National Environmental Education Development Collaborative

Education

2013 – M.S.
Sustainability Science
University of Massachusetts Amherst
2009 – B.S.
Biology
Siena College

Licenses and Registrations

Professional Wetland Scientist
PWS No. 2960

Certified Ecological Restoration Practitioner
CERP No. 0231

Rutgers University Wetland Delineation Certificate

Massachusetts Certified Invasive Plant Manager

Massachusetts Licensed Herbicide Applicator

Hoisting Engineer (MA, RI)

OSHA HAZWOPER

PADI Scuba Certification

Publications & Presentations

13

Adam J. Finkle
Coastal Scientist
afinkle@woodsholegroup.com
(508) 495-6272

KEY PROJECTS

Mattapoisett Neck Road Flood Resiliency CZM Grant, Project Manager, Coastal Scientist

Worked with the project team, town officials, public, and private stakeholders to assess the vulnerability of Mattapoisett Neck Road in the Town of Mattapoisett. Developed site-specific inundation maps and figures to better understand future nuisance and storm-induced flood risk. Developed conceptual, nature-based, living shoreline alternatives to improve the resilience of roadway side slopes. Hosted and present at a series of public meetings and online forums (ongoing).

Eastham Targeted Vulnerability of Low-Lying Roadways CZM Grant, Project Manager, Coastal Scientist

As project manager, worked closely with the municipal project team to assess the vulnerability of (4) low-lying roadways in the Town of Eastham. Developed Town-wide and site-specific inundation maps and figures to prioritize between the (4) sites and better understand risk associated with present day and future sea level rise scenarios and coastal storm impacts. Drafted conceptual alternatives to improve the resilience of roadway side slopes to coastal impacts. Engaged local stakeholders through a series of public meetings, online publications, and newspaper articles to keep the public abreast of municipal resiliency planning efforts.

Orleans Dredge Purchase Feasibility Study, Project Manager, Coastal Scientist

As project manager, worked with the Town Dredge Advisory Committee to determine the feasibility of owning and operating municipal dredging equipment in the Town of Orleans. Compiled sediment quantity and quality datasets to determine the current and future need for dredging in the Town of Orleans. Developed a financial model to evaluate dredging equipment alternatives to complete municipal dredging projects. Facilitated (2) site visits to view Barnstable County dredging equipment and operations and view Town of Edgartown municipal dredging equipment and operations. Facilitated informational meetings between the Orleans Dredge advisory board, Barnstable County officials, and Town of Edgartown municipal dredge team.

Duxbury Beach Dune Enhancement CZM Resiliency Grant Project, Duxbury, MA, Construction Manager

Facilitated the implementation of 76,000 tons of beach compatible upland sand to increase the resilience of existing 3,600 linear foot barrier dune system at Duxbury Beach Reservation. Provided construction oversight during mobilization, sand import, grading, sand fence installation, and revegetation. Worked closely with project partners, State officials, and stakeholders throughout construction phase. Provided updates via weekly construction monitoring reports.

Nauset Beach Phased Retreat Project, Orleans, MA, Construction Manager

Facilitated the implementation of 27,000 tons of beach compatible upland sand to increase resilience of existing resource area and buffer adjacent upland infrastructure from coastal storm impacts. Provided construction oversight of asphalt removal, septic tank removal and certification, sand import and grading, and installation of restoration plantings. Documented progress through weekly construction monitoring reports. During planning phase, developed alternatives for relocation and/or replacement of historic buildings and infrastructure located within coastal resource areas.

KEY PROJECTS (CONTINUED)

East Harbor Tidal Restoration Project, Truro, MA, Coastal Scientist

Conducted pre-construction resource area delineations and developed and performed vegetation monitoring assessments for joint Town of Turo – NRCS culvert replacement project designed to reestablish tidal flow between Cape Cod Bay, Moon Pond, and East Harbor. Monitoring to continue at 1-, 3-, and 5-years post-construction to evaluate the factors leading to the successful or delayed achievement of project goals and objectives.

Blaney Point Revetment Reconstruction Project, Yarmouth, ME, Coastal Scientist, Construction Manager

Drafted adaptive management report for Blaney Point, Yarmouth, ME, including recommendations for revetment reconstruction, coastal bank stabilization measures, and living-shorelines approaches for the parcel. Supervised the reconstruction of a 500 l.f. sloping rock revetment. Drafted restoration and revegetation protocol for the site and facilitated the implementation of coastal bank stabilization measures and coastal salt tolerant vegetated buffer in concert with revetment reconstruction.

Eagle Neck Creek Tidal Restoration Project, Truro, MA, Coastal Scientist

Conducted pre-construction resource area delineations and performed vegetation and sediment monitoring assessments for joint Town of Turo – NRCS culvert replacement project designed to reestablish tidal flow between Cape Cod Bay, Pamet Harbor, and Eagle Neck Creek. Monitoring to continue at 1-, 3-, and 5-years post-construction to evaluate the factors leading to the successful or delayed achievement of project goals and objectives.

Lake Tashmoo Town Beach Nourishment Project, Tisbury, MA, Construction Manager

Supervised dredging and beneficial reuse of 14,000 tons of beach compatible sand from Lake Tashmoo to reconstruct a more resilient beach profile on adjacent Town Beach. Worked with Edgartown Municipal Dredge crew to establish and maintain dewatering and placement areas throughout construction phase. Conducted bi-weekly site inspections to monitor progress and placement of dredged material. Worked with dredge crew to establish and certify final grades.

Great Pond Herring Run Restoration, Eastham, MA, Project Manager, Coastal Scientist

As project manager, worked with NRCS Staff, MA DMF scientists, and Town officials to develop alternatives for culvert replacement and herring run restoration under Great Pond Road, Eastham, MA. Developed alternatives for stormwater management and mitigation with project partners and conducted comprehensive wetland delineation to assist with permitting efforts. Prepared NOI for Ecological Restoration permitting documents for submittal (ongoing).

Town of Eastham Harbor and Waterways Planning, Eastham, MA, Project Manager, Coastal Scientist

As project manager, attended public meetings and facilitated table discussions to solicit feedback on Municipal Harbor and Waterways Plan priorities. Conducted formal field investigations and engineering assessments at (3) Town landings and (1) harbor location. Developed recommendations for improvements to existing infrastructure and municipal assets located at each site and alternatives for improved resilience to climate impacts.

KEY PROJECTS (CONTINUED)

Town of Edgartown MVP Certification, Edgartown, MA, Coastal Scientist, Facilitator

Facilitated table discussions with Town officials and public stakeholders during day-long MVP Certification Workshop. Identified and categorized vulnerable municipal assets, resource areas, and infrastructure. Developed and prioritized action items to address vulnerabilities, adapt to climate impacts, and improve resilience.

Shark Mitigation Alternatives Analysis, Chatham, MA, Project Manager, Coastal Scientist

As project manager, facilitated series of working group meetings with Outer Cape Regional Shark Working Group representatives, Town administration, and Cape Cod National Seashore management. Formally reviewed technology, barrier, and biological-based alternatives to mitigate shark-human interaction. Analyzed alternatives within the context of ocean, bay, and estuarine beaches characteristic of outer Cape Cod. Prepared technical report and executive summary fact sheets.

Improvements to Mill Pond Road, Orleans, MA, Project Manager, Coastal Scientist

Conducted salt marsh delineation to provide update to existing conditions plan. Developed recommendations for coastal bank stabilization, stormwater management, erosion control, and revegetation. Formally reviewed site plans and engineering design details for permitting documents (ongoing).

MVPC North Shore Dredge Purchase Feasibility Study, Haverhill, MA, Project Manager, Coastal Scientist

As project manager, facilitated public stakeholder meetings with Town officials, public safety officials, Massachusetts State Senators, and Massachusetts State Representatives to review project goals and objectives and present results. Reviewed existing datasets to establish estimates of the quantity and quality of sediment found in North Shore waterways. Identified suitable dredging equipment and provided cost estimates for ownership and operation. Developed comprehensive list of recommendations, considerations, and next steps (ongoing).

SMPDC Southern Maine Dredge Purchase Feasibility Study, Saco, ME, Project Manager, Coastal Scientist

As project manager, facilitated public stakeholder meetings with Town officials and public safety officials to review project goals and objectives and present results. Facilitated meeting with Barnstable County Dredge staff and SMPDC staff to review municipal and operational perspectives of regional dredging. Reviewed existing datasets to establish estimates of the quantity and quality of sediment found in southern Maine waterways. Identified suitable dredging equipment and provided cost estimates for ownership and operation. Developed comprehensive list of recommendations, considerations, and next steps. Prepared and presented results in technical report.

Town of Orleans MVP Certification, Orleans, MA, Coastal Scientist, Facilitator

Facilitated table discussions with Town officials and public stakeholders during day-long MVP Certification Workshop. Identified and categorized vulnerable municipal assets, resource areas, and infrastructure. Developed and prioritized action items to address vulnerabilities, adapt to climate impacts, and improve resilience.

KEY PROJECTS (CONTINUED)

Lighthouse Pond Aquatic Restoration Project, Edgartown, MA, Coastal Scientist

Performed wetland delineations and bathymetric surveys to assist in the development of an ecological restoration plan for Lighthouse Point Pond in Edgartown, MA. The proposed plan includes targeted dredging of in-filled sections of the pond, nourishment of the seaward barrier beach, and restoration of aquatic vegetation bordering the pond. Restoration measures would help to mitigate the loss of open water habitat while removing excess nitrogen from the system, improving water quality, and preserving salt marsh habitat.

Cow Bay Bridge and Causeway Restoration, Edgartown, MA, Coastal Scientist

Developed recommendations to guide development of mitigation and restoration plans following reconstruction of the Cow Bay Bridge and causeway in Edgartown, MA. Delineated coastal wetlands, conducted vegetation assessments, and developed engineering recommendations for restoration, slope stabilization, and mitigation. Assisted in all-aspects of environmental permitting.

Adaptive Land Management Plan for The Knob, Quissett, MA, Project Manager, Coastal Scientist

Developed adaptive land management plan for the Knob, Quissett, MA. Supervised the implementation of adaptive land management activities for Quissett Harbor Preservation Trust and Salt Pond Area Bird Sanctuaries. Improvements included stormwater management along walking paths and on steep coastal banks, beach nourishment, coastal bank stabilization, invasive plant management, and the installation of coastal salt tolerant restoration plantings.

Beach Nourishment and Dune Enhancement- Gaines Way, Edgartown, MA, Coastal Scientist

Monitored the placement of dredged, beach-compatible sand along Fuller Street Beach. Facilitated the implementation of 3,000 cubic yards of upland sand to construct a 270 linear-foot coastal dune to add resilience to vulnerable coastal property. Supervised the implementation of American Beach Grass restoration plantings.

Nauset Estuary Dredging Project, Orleans, MA, Coastal Scientist

Conducted eelgrass survey to inform channel layout and design for improvement dredging in Nauset Estuary. Assisting with Federal NEPA, Army Corps; State MEPA, Chapter 91-Water Quality; and Local NOI permit applications. Coordinating stakeholder meetings to educate public on research findings and improve understanding of project need.

East Harbor Culvert Design and Permitting, Truro, MA, Coastal Scientist

Culvert, installed in 1956, has failed between Route 6A and Route 6, creating a large, amorphous salt marsh. Bordering vegetated wetland has developed along Route 6, where stormwater has impacted local hydrology. Conducted large-scale wetland delineation of salt marsh and bordering vegetated wetland resource areas.

KEY PROJECTS (CONTINUED)

Hospital Cove Salt Marsh Monitoring Program, Bourne, MA, Project Manager, Coastal Scientist

Conducted a salt marsh evaluation of a coastal embayment in Bourne, MA using historic methods to determine if seasonal float storage has a measurable impact on salt marsh vegetation. Presented findings to local Conservation Commission. Worked with homeowners, the local Conservation Commission, and Massachusetts Division of Marine Fisheries to enhance salt marsh monitoring protocol for future use.

Popponesset Spit Dune Enhancement, Mashpee, MA, Coastal Scientist

Supervised the placement of 15,000 cubic yards of beach compatible sand and implementation of American Beach Grass restoration plantings along Popponesset Spit, to increase the elevation of the existing barrier dune, providing greater resilience to coastal properties. Facilitated partnership between Save Popponesset Bay, the Town of Mashpee, MA, and Mass Audubon.

Herring River Station Deployment and Monitoring, Wellfleet, MA, Coastal Scientist

Deployed four (4) water quality and tidal monitoring stations within the Herring River system. Water quality and tidal conditions relayed remotely and published open-source at https://wqdatalive.com/project/view/820.

Hubler Way Design and Permitting, Orleans, MA, Coastal Scientist

Conducted wetland and coastal resource area delineation of Hubler Way property. Property being developed to facilitate phased retreat from Nauset Public Beach through the development of less vulnerable, upland parcel.

Allandale Woods, West Roxbury, MA, Assistant Project Manager, Construction Foreman

Lead Boston Parks and Recreation effort to improve pedestrian access, storm water management, native plant diversity, and trail conditions at Allandale Woods, a 101-acre Urban Wild conservation area located in Boston's West Roxbury neighborhood.

Breakwater Landing Coastal Resiliency and Habitat Restoration Project, Brewster, MA,

Assistant Project Manager, Construction Foreman

Facilitated the implementation of the Massachusetts CZM-funded Town of Brewster Breakwater Landing Coastal Resiliency Project. Removed impervious pavement and relocated 30 parking spaces to a less vulnerable location, reconstructed and restored coastal dune, constructed dry swales and bio-retention areas to mitigate stormwater, implemented native plantings to enhance coastal resource areas.

Muddy River Flood Risk Management and Restoration, Boston, MA Construction Foreman

Implemented a geo-cell system to provide steep slope and channel wall stabilization for the Muddy River Restoration Project. Supervised restoration of historic, native plant communities throughout the project area.

Port Norfolk Remediation and Restoration, Dorchester, MA, Construction Foreman

Served as landscape project foreman and oversaw the implementation of native herbaceous and salt marsh restoration plantings as part of $4.25 million DCR-funded remediation and restoration of 14-acre Neponset River industrial site.

PUBLICATIONS & PRESENTATIONS

Finkle, A.F. 2021. ***So, You Wanna Buy A Dredge? Exploring Lessons Learned Following 3 Dredge Purchase Feasibility Studies in New England***. 2021 American Shore and Beach Preservation Association National Conference.

Finkle, A.F. 2021. ***Reestablishing Habitat Connectivity Along the Coastal River Continuum*.** Society for Ecological Restoration National Conference.

Finkle, A.F. 2020. ***A Targeted Vulnerability Assessment of Low-Lying Roads in the Town of Eastham*.** 2020 American Shore and Beach Preservation Association National Conference.

Finkle, A.F., Lavallee, K. 2019. ***Upper North Shore Dredge Purchase Feasibility Study***. Massachusetts Statehouse Office of Senator Bruce Tarr; Merrimack River Beach Alliance; Northeast Coastal Coalition.

Finkle, A.F., Morrison, A.T., Buck, M. A., Hamilton, R.P. 2019. ***Outer Cape Shark Mitigation Alternatives Analysis***. Towns of Chatham, Orleans, Eastham, Wellfleet, Truro, and Provincetown.

Finkle, A.F. 2019. ***Mother Nature Erodes Best Laid Plans: Phased Retreat and Lessons Learned at Nauset Public Beach.*** 2019 American Shore and Beach Preservation Association National Conference.

Finkle, A.F. 2018. ***Phased Retreat, Resilience, and Recreation at Nauset Public Beach.*** 2018 American Shore and Beach Preservation Association National Conference.

Finkle, A.F. 2018. ***Beach Nourishment and Dune Enhancement: Adaptation in Action on the Cape and Islands.*** 2018 Environmental Business Council of New England Ascending Professionals Forum.

Finkle, A.F. 2018. ***Beach Nourishment and Dune Enhancement: Effective Adaptation Strategy, or "For the Birds"? Balancing conservation and restoration on the Cape and Islands***. 2018 Mass Audubon Cape Cod Natural History Conference.

Landry, C.L., Elliott, N.B., Finkle, A.J., Kass, L.B. 2013. ***Plant-Pollinator Interactions in Bahamian Coastal Communities***. Caribbean Naturalist.

Finkle, A.F. ***Understanding Toxic Plant Exposure***. 2013. Outer Cape Environmental Awareness Newsletter.

Landry, C.L., Elliott, N.B., Finkle, A.J., Kass, L.B. 2012. ***Pollinator Networks- What's the Buzz? Understanding Coastal Community Dynamics on San Salvador Island, Bahamas***. Proceedings of the 14th Symposium on the Natural History of the Bahamas.

Finkle, A.F., Elliott, N.B. 2011. ***Status of Endemic S. plumieri and invasive S. taccada on San Salvador Island, Bahamas***. Proceedings of the 13th Symposium on the Natural History of the Bahamas.

TECHNICAL REPORTING

Finkle, A.F., Gunn, E. 2021. Mattapoisett Neck Road Flood Resiliency Technical Report. Mattapoisett, MA.

Finkle, A.F. 2020. Town of Orleans Dredge Purchase Feasibility Study. Orleans, MA.

Finkle, A.F. 2020. A Targeted Vulnerability Assessment of Low-Lying Roads in the Town of Eastham, Eastham, MA.

Finkle, A.F., Lavallee, K. 2019. Upper North Shore Dredge Purchase Feasibility Study. Boston, MA.

Finkle, A.F., Morrison, A.T., Buck, M. A., Hamilton, R.P. 2019. Outer Cape Shark Mitigation Alternatives Analysis. Chatham, MA.

Finkle, A.F., Kubick, J., Engineering Assessment of Eastham Town Landings. In support of Eastham Municipal Harbor and Waterways Plan. Eastham, MA.

Finkle, A.J., Crawford, J., Crawford, N. 2018. The Knob Land Management Plan. Falmouth, MA.

Finkle, A.J., Marden, T. 2018. Lighthouse Pond Tidal Flow Improvement Project Narrative and Performance Standards Narrative, Edgartown, MA.

Finkle, A.J., 2018. Waquoit Bay Yacht Club Preliminary Field Data Collection, Falmouth, MA.

Finkle, A.J., Weishar, L.L. 2018. Southern Maine Dredge Purchase Feasibility Study, Saco, ME.

Finkle, A.J., Fields, M.L. 2017. Hospital Cove Salt Marsh Evaluation, Bourne, MA.

Finkle, A.J.; Fields, M.L. 2017. Revisions to the Hospital Cove Salt Marsh Evaluation and Monitoring Protocol, Bourne, MA

Finkle, A.F., Fields, M.L. 2017. Nauset Estuary Dredging Project, Economic Analysis, and Project Need Narrative, Orleans, MA.

Finkle, A.J., Marden, T. 2017. Cow Bay Bridge and Causeway Performance Standards Narrative for Wetland Resource Areas, Edgartown, MA.

Finkle, A.J., Marden, T. 2016. Cow Bay Bridge and Causeway Restoration Project Narrative, Wetland Assessment, and Impact Analysis, Edgartown, MA.

Finkle, A.J., Fields, M.L. 2016. Comprehensive Permit Project Narrative, Adaptive Land Management Recommendations, and Construction Methods for The Knob, Quissett, MA.

WOODSHOLEGROUP.COM

Adam J. Finkle, M.S., P.W.S., C.E.R.P

Coastal Scientist

EXPERTISE

Ecological restoration, coastal bank stabilization, erosion control, beach nourishment, dune enhancement, wetland resource area delineation, eelgrass surveys, native plant identification, invasive plant management, restoration planting plan development, mitigation plan development, bioengineering design and implementation, construction management.

QUALIFICATION SUMMARY

- 10 years of experience in the coastal sciences.
- Design, implementation, and construction management of large-scale ecological restoration and coastal resiliency projects throughout New England.
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- Construction site supervision and project management to ensure client satisfaction with project deliverables.
- Identification and delineation of coastal and freshwater wetland plant communities and resource areas.
- Development and implementation of invasive plant management plans.
- Development of site restoration, mitigation, and monitoring plans.
- Collaboration with project engineers, consulting teams, state and municipal officials.

WORK EXPERIENCE

2016 – Present	Coastal Scientist, Woods Hole Group, Inc.
2015 – 2016	Assistant Project Manager, SumCo Eco Contracting
2013 – 2015	Environmental Technician, Wilkinson Ecological Design
2010 – 2013	Research Assistant and Collaborator, *Plant-Pollinator Dynamics in Bahamian Coastal Communities*, The Ohio State University & Siena College
2009 – 2011	Teacher – Naturalist, National Environmental Education Development Collaborative

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Rutgers University Wetland Delineation Certificate

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Massachusetts Licensed Herbicide Applicator

Hoisting Engineer (MA, RI)

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Publications & Presentations

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KEY PROJECTS

Mattapoisett Neck Road Flood Resiliency CZM Grant, Project Manager, Coastal Scientist

Worked with the project team, town officials, public, and private stakeholders to assess the vulnerability of Mattapoisett Neck Road in the Town of Mattapoisett. Developed site-specific inundation maps and figures to better understand future nuisance and storm-induced flood risk. Developed conceptual, nature-based, living shoreline alternatives to improve the resilience of roadway side slopes. Hosted and present at a series of public meetings and online forums (ongoing).

Eastham Targeted Vulnerability of Low-Lying Roadways CZM Grant, Project Manager, Coastal Scientist

As project manager, worked closely with the municipal project team to assess the vulnerability of (4) low-lying roadways in the Town of Eastham. Developed Town-wide and site-specific inundation maps and figures to prioritize between the (4) sites and better understand risk associated with present day and future sea level rise scenarios and coastal storm impacts. Drafted conceptual alternatives to improve the resilience of roadway side slopes to coastal impacts. Engaged local stakeholders through a series of public meetings, online publications, and newspaper articles to keep the public abreast of municipal resiliency planning efforts.

Orleans Dredge Purchase Feasibility Study, Project Manager, Coastal Scientist

As project manager, worked with the Town Dredge Advisory Committee to determine the feasibility of owning and operating municipal dredging equipment in the Town of Orleans. Compiled sediment quantity and quality datasets to determine the current and future need for dredging in the Town of Orleans. Developed a financial model to evaluate dredging equipment alternatives to complete municipal dredging projects. Facilitated (2) site visits to view Barnstable County dredging equipment and operations and view Town of Edgartown municipal dredging equipment and operations. Facilitated informational meetings between the Orleans Dredge advisory board, Barnstable County officials, and Town of Edgartown municipal dredge team.

Duxbury Beach Dune Enhancement CZM Resiliency Grant Project, Duxbury, MA, Construction Manager

Facilitated the implementation of 76,000 tons of beach compatible upland sand to increase the resilience of existing 3,600 linear foot barrier dune system at Duxbury Beach Reservation. Provided construction oversight during mobilization, sand import, grading, sand fence installation, and revegetation. Worked closely with project partners, State officials, and stakeholders throughout construction phase. Provided updates via weekly construction monitoring reports.

Nauset Beach Phased Retreat Project, Orleans, MA, Construction Manager

Facilitated the implementation of 27,000 tons of beach compatible upland sand to increase resilience of existing resource area and buffer adjacent upland infrastructure from coastal storm impacts. Provided construction oversight of asphalt removal, septic tank removal and certification, sand import and grading, and installation of restoration plantings. Documented progress through weekly construction monitoring reports. During planning phase, developed alternatives for relocation and/or replacement of historic buildings and infrastructure located within coastal resource areas.

KEY PROJECTS (CONTINUED)

East Harbor Tidal Restoration Project, Truro, MA, Coastal Scientist

Conducted pre-construction resource area delineations and developed and performed vegetation monitoring assessments for joint Town of Turo – NRCS culvert replacement project designed to reestablish tidal flow between Cape Cod Bay, Moon Pond, and East Harbor. Monitoring to continue at 1-, 3-, and 5-years post-construction to evaluate the factors leading to the successful or delayed achievement of project goals and objectives.

Blaney Point Revetment Reconstruction Project, Yarmouth, ME, Coastal Scientist, Construction Manager

Drafted adaptive management report for Blaney Point, Yarmouth, ME, including recommendations for revetment reconstruction, coastal bank stabilization measures, and living-shorelines approaches for the parcel. Supervised the reconstruction of a 500 l.f. sloping rock revetment. Drafted restoration and revegetation protocol for the site and facilitated the implementation of coastal bank stabilization measures and coastal salt tolerant vegetated buffer in concert with revetment reconstruction.

Eagle Neck Creek Tidal Restoration Project, Truro, MA, Coastal Scientist

Conducted pre-construction resource area delineations and performed vegetation and sediment monitoring assessments for joint Town of Turo – NRCS culvert replacement project designed to reestablish tidal flow between Cape Cod Bay, Pamet Harbor, and Eagle Neck Creek. Monitoring to continue at 1-, 3-, and 5-years post-construction to evaluate the factors leading to the successful or delayed achievement of project goals and objectives.

Lake Tashmoo Town Beach Nourishment Project, Tisbury, MA, Construction Manager

Supervised dredging and beneficial reuse of 14,000 tons of beach compatible sand from Lake Tashmoo to reconstruct a more resilient beach profile on adjacent Town Beach. Worked with Edgartown Municipal Dredge crew to establish and maintain dewatering and placement areas throughout construction phase. Conducted bi-weekly site inspections to monitor progress and placement of dredged material. Worked with dredge crew to establish and certify final grades.

Great Pond Herring Run Restoration, Eastham, MA, Project Manager, Coastal Scientist

As project manager, worked with NRCS Staff, MA DMF scientists, and Town officials to develop alternatives for culvert replacement and herring run restoration under Great Pond Road, Eastham, MA. Developed alternatives for stormwater management and mitigation with project partners and conducted comprehensive wetland delineation to assist with permitting efforts. Prepared NOI for Ecological Restoration permitting documents for submittal (ongoing).

Town of Eastham Harbor and Waterways Planning, Eastham, MA, Project Manager, Coastal Scientist

As project manager, attended public meetings and facilitated table discussions to solicit feedback on Municipal Harbor and Waterways Plan priorities. Conducted formal field investigations and engineering assessments at (3) Town landings and (1) harbor location. Developed recommendations for improvements to existing infrastructure and municipal assets located at each site and alternatives for improved resilience to climate impacts.

KEY PROJECTS (CONTINUED)

Town of Edgartown MVP Certification, Edgartown, MA, Coastal Scientist, Facilitator

Facilitated table discussions with Town officials and public stakeholders during day-long MVP Certification Workshop. Identified and categorized vulnerable municipal assets, resource areas, and infrastructure. Developed and prioritized action items to address vulnerabilities, adapt to climate impacts, and improve resilience.

Shark Mitigation Alternatives Analysis, Chatham, MA, Project Manager, Coastal Scientist

As project manager, facilitated series of working group meetings with Outer Cape Regional Shark Working Group representatives, Town administration, and Cape Cod National Seashore management. Formally reviewed technology, barrier, and biological-based alternatives to mitigate shark-human interaction. Analyzed alternatives within the context of ocean, bay, and estuarine beaches characteristic of outer Cape Cod. Prepared technical report and executive summary fact sheets.

Improvements to Mill Pond Road, Orleans, MA, Project Manager, Coastal Scientist

Conducted salt marsh delineation to provide update to existing conditions plan. Developed recommendations for coastal bank stabilization, stormwater management, erosion control, and revegetation. Formally reviewed site plans and engineering design details for permitting documents (ongoing).

MVPC North Shore Dredge Purchase Feasibility Study, Haverhill, MA, Project Manager, Coastal Scientist

As project manager, facilitated public stakeholder meetings with Town officials, public safety officials, Massachusetts State Senators, and Massachusetts State Representatives to review project goals and objectives and present results. Reviewed existing datasets to establish estimates of the quantity and quality of sediment found in North Shore waterways. Identified suitable dredging equipment and provided cost estimates for ownership and operation. Developed comprehensive list of recommendations, considerations, and next steps (ongoing).

SMPDC Southern Maine Dredge Purchase Feasibility Study, Saco, ME, Project Manager, Coastal Scientist

As project manager, facilitated public stakeholder meetings with Town officials and public safety officials to review project goals and objectives and present results. Facilitated meeting with Barnstable County Dredge staff and SMPDC staff to review municipal and operational perspectives of regional dredging. Reviewed existing datasets to establish estimates of the quantity and quality of sediment found in southern Maine waterways. Identified suitable dredging equipment and provided cost estimates for ownership and operation. Developed comprehensive list of recommendations, considerations, and next steps. Prepared and presented results in technical report.

Town of Orleans MVP Certification, Orleans, MA, Coastal Scientist, Facilitator

Facilitated table discussions with Town officials and public stakeholders during day-long MVP Certification Workshop. Identified and categorized vulnerable municipal assets, resource areas, and infrastructure. Developed and prioritized action items to address vulnerabilities, adapt to climate impacts, and improve resilience.

KEY PROJECTS (CONTINUED)

Lighthouse Pond Aquatic Restoration Project, Edgartown, MA, Coastal Scientist

Performed wetland delineations and bathymetric surveys to assist in the development of an ecological restoration plan for Lighthouse Point Pond in Edgartown, MA. The proposed plan includes targeted dredging of in-filled sections of the pond, nourishment of the seaward barrier beach, and restoration of aquatic vegetation bordering the pond. Restoration measures would help to mitigate the loss of open water habitat while removing excess nitrogen from the system, improving water quality, and preserving salt marsh habitat.

Cow Bay Bridge and Causeway Restoration, Edgartown, MA, Coastal Scientist

Developed recommendations to guide development of mitigation and restoration plans following reconstruction of the Cow Bay Bridge and causeway in Edgartown, MA. Delineated coastal wetlands, conducted vegetation assessments, and developed engineering recommendations for restoration, slope stabilization, and mitigation. Assisted in all-aspects of environmental permitting.

Adaptive Land Management Plan for The Knob, Quissett, MA, Project Manager, Coastal Scientist

Developed adaptive land management plan for the Knob, Quissett, MA. Supervised the implementation of adaptive land management activities for Quissett Harbor Preservation Trust and Salt Pond Area Bird Sanctuaries. Improvements included stormwater management along walking paths and on steep coastal banks, beach nourishment, coastal bank stabilization, invasive plant management, and the installation of coastal salt tolerant restoration plantings.

Beach Nourishment and Dune Enhancement- Gaines Way, Edgartown, MA, Coastal Scientist

Monitored the placement of dredged, beach-compatible sand along Fuller Street Beach. Facilitated the implementation of 3,000 cubic yards of upland sand to construct a 270 linear-foot coastal dune to add resilience to vulnerable coastal property. Supervised the implementation of American Beach Grass restoration plantings.

Nauset Estuary Dredging Project, Orleans, MA, Coastal Scientist

Conducted eelgrass survey to inform channel layout and design for improvement dredging in Nauset Estuary. Assisting with Federal NEPA, Army Corps; State MEPA, Chapter 91-Water Quality; and Local NOI permit applications. Coordinating stakeholder meetings to educate public on research findings and improve understanding of project need.

East Harbor Culvert Design and Permitting, Truro, MA, Coastal Scientist

Culvert, installed in 1956, has failed between Route 6A and Route 6, creating a large, amorphous salt marsh. Bordering vegetated wetland has developed along Route 6, where stormwater has impacted local hydrology. Conducted large-scale wetland delineation of salt marsh and bordering vegetated wetland resource areas.

KEY PROJECTS (CONTINUED)

Hospital Cove Salt Marsh Monitoring Program, Bourne, MA, Project Manager, Coastal Scientist

Conducted a salt marsh evaluation of a coastal embayment in Bourne, MA using historic methods to determine if seasonal float storage has a measurable impact on salt marsh vegetation. Presented findings to local Conservation Commission. Worked with homeowners, the local Conservation Commission, and Massachusetts Division of Marine Fisheries to enhance salt marsh monitoring protocol for future use.

Popponesset Spit Dune Enhancement, Mashpee, MA, Coastal Scientist

Supervised the placement of 15,000 cubic yards of beach compatible sand and implementation of American Beach Grass restoration plantings along Popponesset Spit, to increase the elevation of the existing barrier dune, providing greater resilience to coastal properties. Facilitated partnership between Save Popponesset Bay, the Town of Mashpee, MA, and Mass Audubon.

Herring River Station Deployment and Monitoring, Wellfleet, MA, Coastal Scientist

Deployed four (4) water quality and tidal monitoring stations within the Herring River system. Water quality and tidal conditions relayed remotely and published open-source at https://wqdatalive.com/project/view/820.

Hubler Way Design and Permitting, Orleans, MA, Coastal Scientist

Conducted wetland and coastal resource area delineation of Hubler Way property. Property being developed to facilitate phased retreat from Nauset Public Beach through the development of less vulnerable, upland parcel.

Allandale Woods, West Roxbury, MA, Assistant Project Manager, Construction Foreman

Lead Boston Parks and Recreation effort to improve pedestrian access, storm water management, native plant diversity, and trail conditions at Allandale Woods, a 101-acre Urban Wild conservation area located in Boston's West Roxbury neighborhood.

Breakwater Landing Coastal Resiliency and Habitat Restoration Project, Brewster, MA,

Assistant Project Manager, Construction Foreman

Facilitated the implementation of the Massachusetts CZM-funded Town of Brewster Breakwater Landing Coastal Resiliency Project. Removed impervious pavement and relocated 30 parking spaces to a less vulnerable location, reconstructed and restored coastal dune, constructed dry swales and bio-retention areas to mitigate stormwater, implemented native plantings to enhance coastal resource areas.

Muddy River Flood Risk Management and Restoration, Boston, MA Construction Foreman

Implemented a geo-cell system to provide steep slope and channel wall stabilization for the Muddy River Restoration Project. Supervised restoration of historic, native plant communities throughout the project area.

Port Norfolk Remediation and Restoration, Dorchester, MA, Construction Foreman

Served as landscape project foreman and oversaw the implementation of native herbaceous and salt marsh restoration plantings as part of $4.25 million DCR-funded remediation and restoration of 14-acre Neponset River industrial site.

PUBLICATIONS & PRESENTATIONS

Finkle, A.F. 2021. ***So, You Wanna Buy A Dredge? Exploring Lessons Learned Following 3 Dredge Purchase Feasibility Studies in New England***. 2021 American Shore and Beach Preservation Association National Conference.

Finkle, A.F. 2021. ***Reestablishing Habitat Connectivity Along the Coastal River Continuum*.** Society for Ecological Restoration National Conference.

Finkle, A.F. 2020. ***A Targeted Vulnerability Assessment of Low-Lying Roads in the Town of Eastham*.** 2020 American Shore and Beach Preservation Association National Conference.

Finkle, A.F., Lavallee, K. 2019. ***Upper North Shore Dredge Purchase Feasibility Study***. Massachusetts Statehouse Office of Senator Bruce Tarr; Merrimack River Beach Alliance; Northeast Coastal Coalition.

Finkle, A.F., Morrison, A.T., Buck, M. A., Hamilton, R.P. 2019. ***Outer Cape Shark Mitigation Alternatives Analysis***. Towns of Chatham, Orleans, Eastham, Wellfleet, Truro, and Provincetown.

Finkle, A.F. 2019. ***Mother Nature Erodes Best Laid Plans: Phased Retreat and Lessons Learned at Nauset Public Beach.*** 2019 American Shore and Beach Preservation Association National Conference.

Finkle, A.F. 2018. ***Phased Retreat, Resilience, and Recreation at Nauset Public Beach.*** 2018 American Shore and Beach Preservation Association National Conference.

Finkle, A.F. 2018. ***Beach Nourishment and Dune Enhancement: Adaptation in Action on the Cape and Islands.*** 2018 Environmental Business Council of New England Ascending Professionals Forum.

Finkle, A.F. 2018. ***Beach Nourishment and Dune Enhancement: Effective Adaptation Strategy, or "For the Birds"? Balancing conservation and restoration on the Cape and Islands***. 2018 Mass Audubon Cape Cod Natural History Conference.

Landry, C.L., Elliott, N.B., Finkle, A.J., Kass, L.B. 2013. ***Plant-Pollinator Interactions in Bahamian Coastal Communities***. Caribbean Naturalist.

Finkle, A.F. ***Understanding Toxic Plant Exposure***. 2013. Outer Cape Environmental Awareness Newsletter.

Landry, C.L., Elliott, N.B., Finkle, A.J., Kass, L.B. 2012. ***Pollinator Networks- What's the Buzz? Understanding Coastal Community Dynamics on San Salvador Island, Bahamas***. Proceedings of the 14th Symposium on the Natural History of the Bahamas.

Finkle, A.F., Elliott, N.B. 2011. ***Status of Endemic S. plumieri and invasive S. taccada on San Salvador Island, Bahamas***. Proceedings of the 13th Symposium on the Natural History of the Bahamas.

TECHNICAL REPORTING

Finkle, A.F., Gunn, E. 2021. Mattapoisett Neck Road Flood Resiliency Technical Report. Mattapoisett, MA.

Finkle, A.F. 2020. Town of Orleans Dredge Purchase Feasibility Study. Orleans, MA.

Finkle, A.F. 2020. A Targeted Vulnerability Assessment of Low-Lying Roads in the Town of Eastham, Eastham, MA.

Finkle, A.F., Lavallee, K. 2019. Upper North Shore Dredge Purchase Feasibility Study. Boston, MA.

Finkle, A.F., Morrison, A.T., Buck, M. A., Hamilton, R.P. 2019. Outer Cape Shark Mitigation Alternatives Analysis. Chatham, MA.

Finkle, A.F., Kubick, J., Engineering Assessment of Eastham Town Landings. In support of Eastham Municipal Harbor and Waterways Plan. Eastham, MA.

Finkle, A.J., Crawford, J., Crawford, N. 2018. The Knob Land Management Plan. Falmouth, MA.

Finkle, A.J., Marden, T. 2018. Lighthouse Pond Tidal Flow Improvement Project Narrative and Performance Standards Narrative, Edgartown, MA.

Finkle, A.J., 2018. Waquoit Bay Yacht Club Preliminary Field Data Collection, Falmouth, MA.

Finkle, A.J., Weishar, L.L. 2018. Southern Maine Dredge Purchase Feasibility Study, Saco, ME.

Finkle, A.J., Fields, M.L. 2017. Hospital Cove Salt Marsh Evaluation, Bourne, MA.

Finkle, A.J.; Fields, M.L. 2017. Revisions to the Hospital Cove Salt Marsh Evaluation and Monitoring Protocol, Bourne, MA

Finkle, A.F., Fields, M.L. 2017. Nauset Estuary Dredging Project, Economic Analysis, and Project Need Narrative, Orleans, MA.

Finkle, A.J., Marden, T. 2017. Cow Bay Bridge and Causeway Performance Standards Narrative for Wetland Resource Areas, Edgartown, MA.

Finkle, A.J., Marden, T. 2016. Cow Bay Bridge and Causeway Restoration Project Narrative, Wetland Assessment, and Impact Analysis, Edgartown, MA.

Finkle, A.J., Fields, M.L. 2016. Comprehensive Permit Project Narrative, Adaptive Land Management Recommendations, and Construction Methods for The Knob, Quissett, MA.

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Robert P. Hamilton, Jr., M.C.E., B.S.

President/Coastal Engineer

EXPERTISE

Business and Project Management in Environmental Consulting sector with focus on coastal and oceanographic environments. Business and client development in government, private, power utilities, oil and gas, and manufacturing markets. Technical specialty solving problems and managing projects related to planning, engineering design and environmental permitting for shore protection, dredging, habitat restoration, and infrastructure development (e.g., seawalls, pipelines) in the coastal zone. Advanced technical skills related to numerical modeling, data collection and analysis, and integration with environmental policy and stakeholder requirements to solve complex, multi-disciplinary problems.

QUALIFICATION SUMMARY

- Provides strategic advice and a high level of service to key clients
- Manages multi-disciplinary projects
- Maintains diverse technical expertise related to coastal and environmental sciences and engineering
- Completes QA/QC review of deliverables
- Possesses strong writing and verbal communication skills
- Delivers short and long-term sales objectives
- Establishes and implements strategic plans for corporate growth
- Wave, circulation, sediment transport, water quality, and pollutant dispersion models, data collection, and analysis.
- Environmental impact assessments, permitting, and compliance.
- Federal contract management

WORK EXPERIENCE

2014-Present	President, Woods Hole Group. Inc.
2003-2014	Vice President, Business Development, Woods Hole Group, Inc.
2001-2003	Vice President, Scientific Operations, Woods Hole Group, Inc.
1998-2001	Business Unit Director, Woods Hole Group, Inc.
1994-1998	Coastal Engineer, Aubrey Consulting, Inc.
1993-1994	Teaching and Research Assistant, University of Delaware
1991-1992	Civil Engineering Assistant, KCI Technologies, Inc.

Education
1994 – MCE
Civil Engineering
University of Delaware
1992 – BS
Civil Engineering
Lehigh University

Licenses and Registrations
N/A

Professional Affiliations
Environmental Business Council, Director
Northeast Shore and Beach Preservation Association, Director
Marine and Ocean Technology Network, Director
American Society of Civil Engineers
NERACOOS Strategic Planning & Implementation Team

Publications & Presentations
17

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KEY PROJECTS

Great Marsh and Plum Island Evaluation, Merrimack Valley Planning Commission – Project Manager / Sr. Coastal Engineer

A stakeholder group led by MVPC was awarded a NFWF grant to better understand circulation in the marsh system as it related to wetland health, and to understand sediment transport patterns along Plum Island as related to shoreline erosion and stability. A team effort was completed together with BU to collect a comprehensive data set, and to apply high resolution numerical models to the system. A CMS circulation and salinity model was applied to the Great Marsh system, and focused on the influence of the Plum Island Turnpike bridge constriction on circulation. Present day and future scenarios were examined, including sea level rise and high precipitation/runoff. Multiple bridge configurations also were simulated to determine if modifications could help enhance marsh resiliency. For the beach, a high resolution wave and sediment transport model was applied to understand rates and directions of longshore sediment transport to provide a more solid basis for future coastal erosion project planning. Comprehensive reports and electronic deliverables, including visualization tools and GIS work products, were delivered. The project will be completed on the grant schedule and within prescribed budgets. Woods Hole Group provided matching in kind services and high performance computing resources.

Coastal Engineering Services, Town of Palm Beach, FL – Senior Coastal Engineer/Project Manager

In 2009, Woods Hole Group was awarded a 5-year Coastal Engineering services contract. Primary deliverables developed between 2012 and 2013 included a technical review of the overall proposed coastal management program. Results were presented to Town Council. The 10-year program was conceptually accepted, and the first fiscal year was approved for action. Previously, between 1997 and 2002, Mr. Hamilton represented Woods Hole Group as the Town's expert Coastal Engineering Peer Review Consultant. Services included review of long-term comprehensive management plans, and presentation of targeted recommendations to improve the performance and cost-effectiveness of future shore protection projects. Key recommendations included a phased approach to a 30-year barrier-wide shoreline erosion management plan, including specific beach nourishment and coastal structures projects. An adaptive management and monitoring strategy also was incorporated to improve the design of future projects based on the performance of past projects. The resulting plan allowed for high priority projects to be permitted and constructed in the short-term, and provided the basis for substantial savings of municipal and state tax dollars.

Environmental Planning and Consulting Services Task Order Contract, US Army Corps of Engineers New England District – Senior Engineer/Corporate Support

Woods Hole Group is the prime contract holder for a Task Order contract with USACE NED that will extend up to 5 years and $15M beginning in November 2008. The scope of work includes a diverse suite of environmental consulting services, such as field data collection and monitoring, laboratory studies, risk assessments, EIS preparation, HTRW site support, and other specialty service areas as required by NED and other Districts within the North Atlantic Division (e.g., oceanography, coastal modeling, environmental economics, archaeology, etc.). Mr. Hamilton developed the team, led the proposal effort, and completed the contract negotiation process. He

KEY PROJECTS (CONTINUED)

will support the ongoing Program in a corporate function, and provide project management and technical support for some of the individual Task Orders.

Hydraulic Study to Assess Feasibility of Tidal Restoration within Stony Brook, Town of Brewster, MA – Coastal Engineer/Project Manager

Completed a field data collection and numerical modeling investigation of the Stony Brook system upstream from Rte. 6A to assess the potential for restoration of salt marsh habitat and the anadromous fish run. The scope of work included collection of synoptic tide and salinity data, calibration of a hydrodynamic and salinity model (EFDC), evaluation of restoration alternatives, and recommendations for conceptual engineering alternatives and potential environmental impacts. Woods Hole Group also made a contribution to the Corporate Wetlands Restoration Partnership (CWRP) in the form of bathymetric data collection, land surveying, and numerical modeling.

Reverse Osmosis Water Treatment Facility Discharge Dilution Analysis and Environmental Impact Assessments, Various Locations in Florida as Prime and Subcontractor– Engineer/Project Manager

Demand for potable drinking water has spurred a need for desalination facilities to supplement the local freshwater supply in Florida. For communities in the Town of Jupiter, Palm Coast, Tarpon Springs, City of Melbourne, and the South Martin Regional Utility, Woods Hole Group has conducted dilution studies of reverse osmosis discharge concentrate. The scopes of work have been diverse, involving field data collection (water quality and circulation parameters), numerical modeling (CORMIX and EFDC), and environmental impact studies. Contaminants of interest have included heavy metals, radionuclides, and overall acute toxicity. Results from the work include support for environmental permit approvals, including mixing zones, and engineering recommendations for diffuser configurations to support expansion of water treatment facilities while minimizing environmental impacts.

Environmental Impact Statement (EIS) for the HubLine Natural Gas Pipeline, Massachusetts Bay, MA, Federal Energy Regulatory Commission (FERC) c/o Foster Wheeler, Inc. – Project Manager

Prepared marine portion of the EIS for the controversial HubLine pipeline working under tight scheduling constraints. Compiled data and formulated environmental impact assessment of impacts related to physical oceanography, sediment transport and geology, marine benthic habitat, as well as marine fisheries and shellfish. The scope included preparation and approval of an expanded Essential Fish Habitat (EFH) Assessment. Close cooperation with Foster Wheeler and FERC was required. The document was accepted by the federal authorities, and provided the basis for the state and local level environmental impact report, permits, and monitoring/mitigation protocols. The project was constructed.

Evaluation of Thermal Discharge and Intake Processes and Regulatory Compliance at Salem and Hope Creek Stations, Newark, NJ, Public Service Electric and Gas Co. - Coastal Engineer/Project Manager

Key member of a multi-disciplinary team conducting 316(a) and 316(b) federal water quality standards regulatory demonstrations. Performed numerical modeling, data analysis, and technical writing to support a

KEY PROJECTS (CONTINUED)

comprehensive hydrothermal and biothermal assessment of a cooling water discharge system in an Estuary. Completed analysis of the region of influence of cooling water intake on circulation patterns and waterborne eggs and larvae. Completed extensive and innovative scope of work of unprecedented scientific and engineering defensibility within required fast-track schedule. Excellent communication with team members and the client was essential for the successful completion of this project. NJDEP granted approval based on comprehensive materials that demonstrated compliance with 316(a) and 316(b) requirements.

Natural Resources and Beach Management Plan for Sandy Neck Beach, Town of Barnstable, MA - Project Scientist and Manager

Lead multi-disciplinary team to develop a management plan for a controversial set of beach users related to ORV use, private property access, endangered species protection (i.e., piping plovers, least terns, and diamondback terrapins), recreational use, and municipal management and revenue needs/objectives. Conducted research, site assessments, public and environmental regulatory workshops; prepared documents; held public hearings; and obtained environmental permits. Final management plan was used to resolve pending appeals of environmental permits, resolve stakeholder conflicts, and secure new permits for beach use.

Identification of 1-, 10-, 20-, and 50-Year Design Wave Conditions for the Deer Island Waste Water Treatment Facility Shoreline Protection, Boston, MA, Parsons Brinckerhoff - Coastal Engineer/Project Manager

Completed storm wave modeling and analysis to support the design of extensive shore protection structures for a large wastewater treatment facility in Boston, MA. The scope of work included specification of offshore wave conditions in Massachusetts Bay, wave diffraction/refraction modeling (REF/DIF) into Boston Harbor, and site-specific extremal analysis to calculate design conditions for wave height, period, runup and overtopping. Results were used to size armor stone, and specify revetment toe depth and crest elevation. Maintained long-term support throughout the duration of the project.

Tidal Flushing and Water Quality Assessment of Cape Cod Estuaries, Cape Cod Commission and Municipalities - Coastal Engineer/Project Manager

Designed and participated in field data collection programs related to bathymetric surveying and tide gauging. Completed numerical modeling of tidal circulation (RMA-2) and water quality (RMA-4) processes, and technical report writing. Work was completed within the Three Bays Estuary, Popponesset Bay, Centerville River, Upper Bass River, Pleasant Bay, Red Brook Harbor, and West Falmouth Harbor. Presented results at public meetings. Results included residence time calculations that were used by the Cape Cod Commission to determine impacts of current and future developments. Results also provided a basis for the Massachusetts Estuaries Program to evaluate manageable nutrient loading rates and needs for wastewater management facilities.

Shoreline Erosion and Management Planning and Beach Nourishment Performance Monitoring, Town of Jupiter Island, FL – Coastal Engineer/Project Manager

The Town of Jupiter Island has a long-term commitment to managing coastal erosion through beach nourishment by dredging sand from the offshore regions and placing sand on its beaches. Woods Hole Group worked with the Town to develop a large-scale beach nourishment design. Mr. Hamilton completed the bulk of

KEY PROJECTS (CONTINUED)

the technical work for the project, including wave data collection and analysis, wave modeling (REF/DIF), sediment transport modeling, and shoreline change modeling (GENESIS). The models were developed and calibrated to the Jupiter Island coast from St. Lucie Inlet south to Jupiter Inlet. The calibrated models then were applied to simulate a range of shore protection alternatives, including various beach nourishment design configurations, and combinations of coastal structures to hold the sand on the beaches. Beach nourishment projects were constructed in 1996 and in 2003 according to the updated design. Beach profile monitoring data were collected and analyzed, and demonstrated that the new project design provides improved protection, including hurricane flood damage control. Substantial costs were saved by nourishing longer stretches of the shoreline, over-nourishing at historical hot-spots of beach erosion, and insisting on a course grain size. The more robust design also proved effective at minimizing hurricane damage. The design also qualified the project for damage claims from FEMA in response to storm-induced erosion.

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Brittany L. Hoffnagle, M.S., B.S.

Environmental Scientist & GIS Specialist

EXPERTISE

Climate change and resiliency planning, geospatial data collection and analysis, coastal environmental management, STEM education curriculum development, long-term water quality monitoring, in-situ field data collection, tidal creek morphology and migration.

QUALIFICATION SUMMARY

- Conduct climate change vulnerability assessments and ecological risk assessments
- Develop advanced educational and outreach materials including ArcGIS StoryMaps and climate change STEM curriculum frameworks.
- Manage large workflows for Geospatial data processing and develop QA/QC procedures.
- Experienced geospatial data collector and analyst using ESRI's ArcGIS and AGOL framework for coastal and marine projects.
- Experience in field data collection of water, elevation, vegetation, birds, marine mammals, and invertebrates.
- Provide technical support for visual and verbal scientific communication to diverse audiences.
- Software expertise: ESRI ArcGIS and AGOL; ETGeowizards; HYPACK; Fledermaus; MatLab; SigmaPlot; Onset HOBOware; Microsoft Office Suite; Adobe Photoshop and Illustrator; SLAMM: Sea Level Affecting Marshes Model.

WORK EXPERIENCE

2015-Present	Environmental Scientist, Woods Hole Group, Inc.
2013-2014	NSF Graduate STEM Fellow, Horry County, SC Schools
2012-2015	Graduate Assistant, Coastal Carolina University
2010	Research Technician, Arizona Game and Fish Dept.
2009-2010	Research Technician, Whale Center of New England
2008-2009	Environmental Education Intern, Delaware Nature Society

Education

2015 – M.S.
Coastal Marine and Wetland Studies
Coastal Carolina University
2008 – B.S.
Environmental Biology
Millersville University

Certificates of Training

- MA EOEEA Municipal Vulnerability Preparedness (MVP) Program Provider
- OSHA 40-Hour HAZWOPER
- NOAA Coastal Inundation Mapping
- Edward Tufte: Presenting Data and Information

Professional Affiliations

Northeast Arc Users Group (Board Member, Secretary)

Publications & Presentations

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KEY PROJECTS

Climate Vulnerability Assessment of Coastal Properties, Trustees of Reservations, State-wide, MA – Environmental Scientist & GIS Technician
Conducted detailed climate change vulnerability assessments for 35 of Trustees of Reservations coastal properties. Evaluated coastal flooding risks using the Boston Harbor Flood Risk Model (BH-FRM) – a high resolution, probabilistic, hydrodynamic, sea level rise and storm surge model – and, outside the BH-FRM domain, a highly modified bathtub analysis approach. Prepared maps and geospatial data analyses to inform qualitative and quantitative vulnerability scoring of properties and assets (i.e., natural resources, cultural resources, trails, infrastructure, buildings). Results were summarized as a composite Coastal Vulnerability Index (CVI) for the purpose of understanding absolute and relative risk. The CVI results are being used by the Trustees of Reservations to prioritize adaptation efforts.

2020 & 2021 State of the Coast Report, Trustees of Reservations, MA – Environmental Scientist & Project Manager.
Carried out analyses of publicly accessible GIS data to provide statistics, data, and advanced analyses of a variety of metrics including coastal inundation, coastal habitat, coastal shoreline characterization, and public access to the coast for 13 North Shore communities (Swampscott to Salisbury) and the islands of Gosnold, Martha's Vineyard, and Nantucket in Massachusetts. Both the MC-FRM and the Sea Level Affecting Marsh Migration (SLAMM) model results served as foundational datasets to assess the number of buildings and miles of roadways flooded by water; and the extent and acreage of marsh migration and transition for present and future climate conditions. The Trustees of Reservations utilized the data and graphics developed in this work as the basis for the State of the Coast report communicating the current hazards and potential impacts of climate change to the North Shore communities in Massachusetts.

Cape Cod Low-Lying Roads Climate Change Vulnerability Assessment- Cape Cod Commission -- Environmental Scientist &Technical Lead
Developed coastal vulnerability assessments for low-lying roadways in ten towns in Barnstable County, MA using data derived from the Massachusetts Coast Flood Risk Model and helping communities prioritize investments in roadway adaptation over time. Led protocol development for a customized roadway criticality framework and analysis protocol using the Level 2 MC-FRM Water Surface Elevation data developed for the Executive Office of Energy and Environmental Affairs.

Coastal Climate Change Vulnerability Assessments and Adaptation Plans, Duxbury, Edgartown, Falmouth, Gloucester, Hingham, Hull, Oak Bluffs, Sandwich, and Eastham, MA – Environmental Scientist & GIS Technician
Prepared maps and carried out geospatial data analyses for climate change vulnerability assessments of various Massachusetts communities. Evaluated coastal flooding risks in present, 2030, 2050, and 2070 horizons using the BH-FRM and Massachusetts Coast Flood Risk Model (MC-FRM). Maps and analyses were used to score the vulnerability of thousands of municipal assets, inform risk-based prioritization, develop adaptation recommendations, and communicate risks and adaptation strategies.

KEY PROJECTS (CONTINUED)

Climate Change Resiliency and Community Outreach, Town of Sandwich – Environmental Scientist & Project Manager
Developed a community outreach strategy for the Town of Sandwich to communicate and educate the public on Sandwich's resiliency efforts in the face of climate change. An ArcGIS Story Map platform was developed to help communicate current resiliency efforts, probability of inundation results derived from the Massachusetts Coast Flood Risk Model, and display the results of a new modeling effort to understand the protective benefits of a bolstered dune along Sandwich's coast. The project also included development of 7th and 8th grade STEM curriculum on climate change and resiliency for Sandwich Public Schools.

Inundation Mapping of Georges Pond, Department of Conservation and Recreation, MA – Environmental Scientist & GIS Technician.
Provided cartographic mapping and GIS analysis for the wetland restoration of George's Pond in Dartmouth, MA which experiences insufficient tidal exchange and shoaling from an undersized culvert. High water and high annual tide water levels extracted from the modeling of a culvert replacement were mapped to show extent of inundation from an increased tidal range and potential inundation risks to a rare and endangered plant species.

Massachusetts Coast Flood Risk Model, Massachusetts Department of Transportation – Environmental Scientist & GIS Technician.
Developed and tested the procedures for post-processing results derived from the MassDOT Massachusetts Coast Flood Risk Model (MC-FRM), a statewide probabilistic storm surge and sea level rise model and initiated comprehensive procedures and protocols for data quality assurance and control. Vulnerability maps were then used to support emergency preparedness and adaptation scoping over various planning horizons – present day, 2030, 2050, and 2070. Data developed from this modeling effort has been used by MassDOT and various coastal towns to conduct climate change vulnerability assessments, adaptation plans, and resilient design initiatives.

MassDOT-FHWA Pilot Project for Climate Change Vulnerability Assessments of the Central Artery, Massachusetts Department of Transportation, Boston, MA – Environmental Scientist & GIS Technician
Utilized previously completed vulnerability assessment data to conduct a time-step GIS analysis of flood pathways and flooding residence times for Central Artery areas containing important infrastructure and tunnel networks. Flooding pathways and residence times were displayed in maps to support emergency response and adaptation planning for present day, 2030, and 2070 time horizons.

Climate Change Resiliency Investigation and Feasibility Evaluation of Easton Pond, City of Newport, Rhode Island -- Environmental Scientist.
Critically reviewed and assessed the technical merits of existing mapping platforms (i.e., FEMA Flood Insurance Maps, NOAAs SLR viewer, Climate Centrals Surging Seas, etc.) to provide the city of Easton information about their accuracy and limitations. Conducted a climate change and vulnerability assessment for Easton Pond for various planning horizons- present day, 2030, 2070. All findings of the review and the results of the vulnerability assessment were provided to Fuss & O'Neill to assist the City of Newport in future planning, maintenance, and adaptations of Easton pond and associated dams in response to climate change and sea level rise.

KEY PROJECTS (CONTINUED)

Provincetown Municipal Airport Coastal Vulnerability Assessment Horsley Witten Group, -- GIS technician
Completed the sea level rise and storm surge vulnerability assessments for present and potential future impacts to the Provincetown (MA Municipal Airport under two scenarios in the GIS platform. Two scenarios- closed and opened tidal gates- were mapped at the Hatches Harbor dike road.

Municipal Vulnerability Preparedness (MVP) Community Workshops, Edgartown, Yarmouth, Orleans, Falmouth, Marshfield, Sandwich, and Wareham, MA – MVP Facilitator/Lead Facilitator
Facilitated stakeholder engagement on climate change vulnerability and adaptation for Community Resilience Building workshops in multiple coastal communities following MA EOEEA MVP guidelines. Guided stakeholders in assessing local vulnerability of infrastructure, environmental, and societal assets to multiple hazards, and developing and prioritizing actions to reduce vulnerability and increase resilience. For the Town of Edgartown, served as lead facilitator and led the preparation of the project report and public listening session presentation.

Coastal Flood Vulnerability Assessment, Town of Palm Beach, FL – Environmental Scientist & GIS Technician
Conducted detailed climate change vulnerability assessment of public infrastructure assets (public safety buildings, recreational assets, roads, wastewater, and stormwater infrastructure, etc.) for the Town of Palm Beach using a sea level rise and storm surge model. Flood modeling results and geospatial asset information were used to develop exposure scores, considering the present and future probability of flooding. Consequence scores were developed for each asset with local stakeholder input. This data was used to calculate a Coastal Vulnerability Index (CVI) for each asset to understand relative risks of flooding. Flood pathways were identified where shoreline adaptations could be implemented to prevent the entry of water into larger inland areas. The analyses are being utilized by the Town to inform a Coastal Resilience Implementation Plan that prioritizes strategic adaptation and resiliency efforts at multiple scales.

Technical Support for Evaluation of Preliminary and Effective FEMA FIRMS for various Massachusetts Counties/Towns -- Environmental Scientist
Utilized ESRI ArcGIS to visualize updated modeling results for predicted Special Flood Hazard Areas (SFHA's) and Base Flood Elevations (BFE's) along identified transects. Produced annotated and topographic maps to reflect flood zone changes.

Ecological Risk Assessment of Newtown Creek, NYCDEP -- Environmental Scientist.
Provided technical support for the ecological risk assessment of Newtown Creek in support of the CERCLA process. Reviewed and synthesized benthic community data to understand differences in species abundance, number of species, and dominant species index within the study site, as well as four regional reference areas. Evaluated the effects of Combined Sewage Outflows (CSO's) on these benthic community metrics. Utilized ArcMap to create figures and graphics representing results of the synthesis of data.

PUBLICATIONS & PRESENTATIONS

Roberts, K.E, Hoffnagle, B.L., 2022. Planning for Local climate Change Using the Massachusetts Flood Risk Model. Massachusetts Association for Conservation Commissions Annual Environmental Conference. Virtual. March 2022.

Orescanin, M.M., Hamilton, R.P., Hoffnagle, B.H., 2019. Tidal choking in an anthropologically modified salt marsh estuary: Improving circulation through constriction removal. Estuar. Coast Shelf Sci. 218, 148-162.

Hoffnagle, B.H., J. Famely, T. Wickwire, T. O'Shea, and V. Antil. 2017. Using the ArcGIS Framework to Conduct Coastal Climate Change Vulnerability Assessments for Trustees of Reservations' Properties. Poster Presentation at the Northeast ARC User Group Spring Spatial Technologies Conference, Newport, RI, Nov 2017.

Hoffnagle, B.H., J. Famely, T. Wickwire, T. O'Shea, and V. Antil. 2017. Using the ArcGIS Framework to Conduct Coastal Climate Change Vulnerability Assessments for Trustees of Reservations' Properties. Oral Presentation at the Northeast ARC User Group Spring Spatial Technologies Conference, Amherst, MA, May 2017.

Hoffnagle, B, J Famely, T Wickwire, T O'Shea, V Antil. 2017. Poster Presentation: The Use of a Coastal Vulnerability Assessment to Prioritize Habitat Adaptation Strategies in Response to Future Climate Change. Cape Cod Natural History Conference, Barnstable, MA. March 11, 2017.

O'Shea, T, T Wickwire, B Hoffnagle, V Antil, R Hopping. 2016. PRESENTATION: Habitats, Roads, Cultural and Recreational Resources, Buildings and Bathrooms: In a Changing Climate, What Should We Protect? Coastal Vulnerability Indexing, Mapping, Assessment and Adaptation on The Trustees of Reservations Coastal Properties – Case Study. 4th Annual Cape Coastal Conference, "Taking Action for a Prosperous and Healthy Cape: Putting Science, History and Innovative Economic Strategies to Work", Hyannis Resort and Conference Center, Hyannis, MA. December 6-7, 2016.

Famely, J., K. Bosma and B. Hoffnagle. 2016. Sea Level Rise and Storm Surge Inundation Mapping—Great Marsh Communities (Essex County, MA). Prepared by Woods Hole Group for National Wildlife Federation and U.S. Geological Survey.

Hoffnagle, B.L. 2015. Linking water quality and beach morphodynamics in a heavily impacted tidal creek in Myrtle Beach, South Carolina. Master's Thesis. Coastal Carolina University. Conway, South Carolina.

Hoffnagle, B.L., and A.E. Grogan. 2014. Enhancing a middle school curriculum with research and technology, the importance of integrating scientists in education. South Estuarine Research Society 40th Anniversary Meeting. Savanna, Georgia. Poster

Hoffnagle, B.L., E.E. Hackett, R.N. Peterson, M.P. Slattery, and R.F. Viso. 2014. Effect of morphological change on tidal range within a tidal creek. Southeastern Estuarine Research Society Semi-annual Meeting. Carolina Beach, North Carolina. Oral 2013 National Science Foundation Graduate STEM Fellowship. Placement in 8th grade Horry County, South Carolina science classroom.

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Grace Medley, M.S.

Coastal Scientist

EXPERTISE

Experienced in modeling the hydrodynamics of coastal and continental shelf systems using structured and unstructured grids. Modeling experience includes Storm surge, wave dynamics, sediment transport, estuarine circulation, saltmarsh hydrodynamics, as well as applied modeling of the effects of dredging. Experienced in leading fieldwork campaigns to collect hydrodynamic and hydrographic data using ADCP's, CTD's and Tilt Current Meters, as well as being a scientific team member on an oceanographic research vessel. Experienced in processing, analyzing, and visualizing oceanographic data.

QUALIFICATION SUMMARY

- Numerical hydrodynamic modeling experience with ADCIRC, EFDC, SWAN, XBeach, CMS-Wave, CMS-Flow, HEC-RAS, ACES, EXTRM2 and ROMS
- Programming experience using MATLAB, Python, C, Linux/Vi
- Experienced in data processing, analysis and visualization
- Experienced in planning and conducting coastal oceanographic field work
- Strong written and verbal communication skills
- ArcGIS, SMS, Microsoft Office

WORK EXPERIENCE

2019-Present	Coastal Scientist, Woods Hole Group, Inc.
2017-2019	Research Assistant, Coastal Physical Oceanography, University of Rhode Island Graduate School of Oceanography
2015-2017	Volatile Organics Analyst, ESS Laboratory, Div. of Thielsch Engineering Inc.

Education

2019 – M.S.
Oceanography
University of Rhode Island
2015 – B.A.
Environmental Geoscience
Connecticut College

Professional Affiliations

- New England Estuarine Research Society
- LSPA Massachusetts
- Geological Society of America

Publications & Presentations

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KEY PROJECTS

Hampton Roads Bridge Tunnel Expansion Project (Hampton, VA) – Coastal Scientist, Modeler
Assisted in the development of a hydrodynamic model for the lower Chesapeake Bay using a 2-dimensional version of ADCIRC for the purpose of providing MetOcean model results to aid the construction efforts of the Hampton Roads Bridge Tunnel Expansion Project in Hampton, VA. The new model mesh increased the resolution in the area of interest to a level that was sufficient to characterize the conditions at the site, while maintaining computational efficiency. ADCIRC was run for one modeled year using reanalysis data from ECMWF-ERA5 to hind-cast water velocities at the bridge tunnel project. Model outputs were used to better inform the operational constraints for the bridge and tunnel expansion project.

Resiliency Options at the Amelia Earhart Dam and Abutting Sites to Mitigate SLR and Storm Surge Flooding in the Mystic River Watershed (Cambridge, MA) – Modeler
Provided technical and modeling expertise by modifying the Massachusetts Coastal-Flood Risk Model (MC-FRM) modeling grid to include structural designs for resiliency options on the banks of the Mystic River in Cambridge, MA, in direct and indirect association with the Amelia Earhart Dam (AED). ADCIRC/SWAN was used to simulate a 1% storm with 2070 sea level rise to test the capability of the AED design modifications in mitigating key flood pathways and reducing the flooding in the upper Mystic River. Overtopping fluxes were calculated at a series of points along the dam and surrounding abutments to determine the importance of each modification in reducing flooding upstream of the AED.

Moakley Park Waterfront Resiliency (Dorchester, MA) - Modeler
Used the ADCIRC/SWAN Boston Harbor-Flood Risk Model (BH-FRM) model to assess the resiliency and flood-protection capabilities of the Moakley Park Vision Plan. Three resiliency alternatives for Moakley Park were created using all or parts of the design elements from the Moakley Park Vision Plan. BH-FRM was run using these alternatives to determine the flood-protection potential for each element. Water surface elevations for a 1% and a 10% annual chance storm event under 2030 and 2070 sea-level-rise conditions were calculated in an effort to assess the resiliency of the Moakley Park Vision Plan under storm conditions. Structural overtopping analysis was also performed on these alternatives.

Climate-Ready Dorchester: Near-Term and Long-Term Coastal Resiliency (Dorchester, MA) – Modeler
Used the ADCIRC/SWAN Boston Harbor-Flood Risk Model (BH-FRM) to gauge the flood risk performance of a series of flood mitigation designs on the Dorchester waterfront. Representative storms with sea level rise for 2030 (near term resiliency measures) and 2070 (long term resiliency measures) were simulated using BH-FRM, and reduction in flooding extents and depths were mapped in an effort to assess the performance of each design under a series of storm conditions.

Vulnerability Assessment and Feasibility Study for the Beverly Pump Station (Beverly, MA) – Modeler
Provided technical assistance to the vulnerability assessment and resiliency alternative development for the low-lying, critical infrastructure at the Beverly Pump Station. XBeach was used to model the existing dune protection, as well as proposed nature-based and hybrid alternatives including varying dune heights, slopes, associated green infrastructure, and integrated backing seawalls. XBeach was run for a series of storm events

KEY PROJECTS (CONTINUED)

under three sea level rise conditions to assess the performance of the existing dune system as well as the proposed designs.

National Grid Substation #12 Flood Resilience Project (Beverly, MA) – Modeler
Provided technical and modeling expertise to support work in the performance evaluation of resiliency alternatives designed to protect critical infrastructure at the National Grid Substation #12 site in Beverly, MA. A high-resolution sub-modeling approach was taken to down-scale the Massachusetts Coast Flood Risk Model (MC-FRM, ADCIRC/SWAN) results in order capture critical detail at the site. From this high-resolution performance evaluation, the flood extent and depth reduction due to the protective measures was determined and an analysis as to whether or not the placement of the proposed design would cause negative impacts (velocities, redirection of flood waters) to adjacent properties.

Hingham Inner-Harbor Resiliency (Hingham, MA) – Modeler, Coastal Scientist
Provided technical and modeling expertise to assess the performance of a series of flood protection measures being undertaken on the Hingham waterfront. The Massachusetts Coastal-Flood Risk Model (MC-FRM, ADCIRC/SWAN) modeling grid was edited to include structural designs for resiliency options at the waterfront. Through a series of representative storm simulations, the performance of each design was assessed under a series of conditions occurring in the years 2030, 2050 and 2070. Wave overtopping, reflection and flooding residence times were calculated analytically using modeled outputs for wave and water surface elevation time-series. Associated impacts on adjacent properties due the placement of the flood protection measured were assessed.

Assessing Socio-Economic Impacts for the National and Emergency Coastal Resilience Funds, National Fish and Wildlife Foundation – Modeler
Modeled the physical impacts and socio-economic benefits of a suite of green and hybrid-grey/green infrastructure coastal resilience projects in the National and Emergency Coastal Resilience Funds grant portfolio. The project included the development of a numerical modeling approach that compares the expected impacts from specified storm and sea-level rise scenarios on flood extent and depth, wave energy, and erosion risk with and without the proposed project in place. A series of project types were assessed, ranging from offshore reefs, and living shorelines to aquatic connectivity and stormwater infrastructure projects. Models utilized were site-specific and included Xbeach, ADCIRC, HEC-RAS, and SWAN. The outputs of the modeling will serve as the basis for measuring the socioeconomic benefits of other portfolios of projects and will serve as a baseline for assessing the performance of future projects.

Jones Lane Culvert Hydraulic Assessment (East Sandwich, MA) – Modeler
The culvert that transects Jones Lane in East Sandwich MA has been shown to act as a constriction in the Scorton Creek system. A range of culvert alternatives were tested using HEC-RAS (USACE Hydraulic Engineering Center- River Analysis System) under normal flow and extreme conditions (10-year, 50-year and 100-year storms) to assess the hydraulics of the system and ultimately the ability of each design to restore the upper marsh. A raised Jones Lane roadway was also simulated under coastal storm conditions as part of the culvert design.

KEY PROJECTS (CONTINUED)

Resilient Ring's Island (Salisbury, MA) – Modeler
Provided technical and modeling services to support work in the design of culvert replacements around Ring's Island, specifically along Ferry Road, March Road and 1St Street in Salisbury, MA. HEC-RAS (USACE Hydraulic Engineering Center- River Analysis System) was used to model the hydrodynamics and hydraulics of the section of Great Marsh associated with the project site. A range of culvert types (circular or boxed), dimensions, inverts and configurations were tested in HEC-RAS under normal flow and extreme conditions to assess the strength of the design in restoring tidal flow and drainage capacity to the upstream marsh system.

Town of Marshfield Beach Nourishment Design Permitting, Wave and Sediment Transport Modeling (Marshfield, MA) – Coastal Scientist, Modeler
Provided wave transformation and sediment transport modeling services to support work being done to characterize sediment transport mechanisms on the Marshfield, MA coastline. CMS-Wave was used to model the offshore wave transformation over the irregular bathymetry off the coast of Marshfield. Nine cases were created from an average annual condition and run in the model, along with 10-, 50-, and 100-year storm conditions. Radiational stresses from the wave model were used as input into a sediment transport model that was used to determine the direction and magnitude of sediment movement on specific beaches in Marshfield. These model data were used to support structural design to mitigate shoreline erosion on the Marshfield coast.

Penobscot Bay Working Waterfront Resiliency (Penobscot Bay, ME) – Coastal Scientist, Modeler
Used the Coastal Hazard Analysis Modeling Program (CHAMP) to run a series of wave height analysis tests for nine locations in the Penobscot Bay region of Maine to assist in resiliency planning efforts. Base flood elevations were calculated for present day conditions as well as 3 future-year sea-level rise scenarios.

Strategic Dredging for Water Quality Enhancement in the Providence River Estuary: A Hydrodynamic Modeling Study using ROMS – Modeler
Calibrated and validated ROMS (Regional Ocean Modeling System) to simulate the three-dimensional currents, temperature and salinity in Narragansett Bay and the Providence River Estuary (Providence, Rhode Island). The calibrated model was used to assist the Army Corps of Engineers (USACE) in determining optimal CAD (confined aquatic disposal) cell placement locations within the estuary. Using numerical particle tracking (Lagrangian drifters) as well as numerical diffusive dyes, the extent to which the hydrodynamics affects the water quality in the Providence River was analyzed and quantified. The goal of the project was to analyze the natural flushing patterns of the Providence River, and how these circulation/flushing patterns are impeded/enhanced by the orientation and depth of both the Providence River Ship Channel as well as access channels to the CAD cell. As an extension to this project, an investigation was conducted using the ROMS sediment module to determine the area of influence of the sediment plumes resulting from CAD cell dredging and disposal activity.

PUBLICATIONS & PRESENTATIONS

Medley, G. 2019. Models of Circulation in the Providence River Estuary. University of Rhode Island Master's Thesis, Kingston, RI.

Medley, G., Kincaid, C., and Rosa, K. 2018. Dredging for Environmental Benefit: Models of the Flushing Dynamics of the Providence River Estuary. NEERS Fall 2018 Meeting, SMAST, New Bedford, MA.

Medley, G. and Kincaid, C. 2018. Strategic Dredging for Water Quality Enhancement in the Providence River: A Hydrodynamic Modeling Study using ROMS. Department of Homeland Security EPSCoR Spring 2018 Research Symposium, Kingston, RI.

Thompson, D. Fixler, S., Zhao, A., Iezzi, A., Medley, G. and Roberts, K. 2017. Natural pool-riffle formation and maintenance by large wood in a gravel-bed river impacted by in-stream structures built in the 1930's and 1940's. AGU Fall Meeting 2017, San Francisco, CA.

Medley, G. and Thompson, D. 2015. Wind, Waves and Surge: Analysis of the Movement and Post-Storm Recovery of Bushy Point Beach in Groton, CT. Geological Society of America Northeastern Conference 2015, Bretton Woods, NH.

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Alex J. Shaw, M.S., B.S

Coastal Engineer

EXPERTISE

Hydrodynamic modeling using numerical and analytical models on coastal and estuarine systems using both structured and unstructured grids. Validation of models based on observed data and analytical methods. The use of SMS, ArcGIS, MATLAB and other programs to visualize and process model inputs and outputs.

QUALIFICATION SUMMARY

- M Coastal numerical modeling experience with ADCIRC, WHAFIS, SLOSH, STWAVE, EFDC, ACES, CMS flow, HEC-RAS and SWAN.
- Programming experience with MATLAB
- Laboratory and numerical model assessment of storm surge flooding and the effects of dredging
- Strong written and verbal communication skills
- Strong data processing and analysis skills

WORK EXPERIENCE

2016-Present	Coastal Engineer, Woods Hole Group
2014-2016	Teaching/Research Assistant, University of Rhode Island
2013	Intern, Applied Science Associates (RPSASA)
2012	Intern Office of Marine Programs

Education

2016 – M.S.
Ocean Engineering
University of Rhode Island
2014 – B.S.
Ocean Engineering
University of Rhode Island

Licenses and Registrations

- Advanced SCUBA certification
- HAZWOPER certification

Professional Affiliations

- Member; Coast, Oceans, Ports, and Rivers Institute
- Member; Order of the Engineer
- Tau Beta Pi Engineering Honor Society
- Omega Epsilon Ocean Engineering Honor Society

Publications & Presentations

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Alex J. Shaw
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KEY PROJECTS

MassDOT Massachusetts Coasts Flood Risk Model – Engineer/Modeler
Worked to expand Woods Hole Groups previous award-winning effort, the Boston Harbor Flood Risk Model, to encompass the entire state. The coupled ADCIRC/SWAN model was utilized to simulate both extra-tropical and tropical cyclone events using an ensemble Monte Carlo approach. Probabilistic results are being utilized to identify road and infrastructure risk around the state. The large state-wide grid has also been utilized to analyze tidal conditions across the state. Overtopping analysis was also performed as part of this modeling effort and incorporated into the probabilistic results.

Palm Beach Coastal Vulnerability – Engineer/Modeler
Worked to develop a modeling effort for the town of Palm Beach using ADCIRC/SWAN modeling. The coupled model was utilized to simulate a suite of tropical events, both historical and synthetic, to generate probabilistic results for present day and future conditions. Overtopping was incorporated as part of the modeling effort to determine the additional flooding caused by this process.

Lighthouse Beach Sediment Transport Analysis – Engineer/Modeler
Created a 2-D wave model to propagate offshore waves onto Lighthouse Beach in Edgartown, Massachusetts. Used the results of the wave analysis to determine sediment transport along the beach. Quantified the amount of material entering the channel from the beach and how long it would take to fill in.

Sandwich Harbor Dredging – Engineer/Modeler
Created a Hec-RAS model to analyze the effect of dredging the harbor on the dynamics of the estuary. Fluxes both during existing conditions and during alternatives were determined and showed an increase in flushing of the system.

Eagle Neck Creek Restoration – Engineer/Modeler
The culvert under Old County Road in Truro, Massachusetts was assessed to determine the size needed for tidal restoration in Eagle Neck Creek. To assess the culverts an EFDC model was created and run for existing conditions, as well as alternatives to determine the restoration effects of different culvert sizes.

Maraspin Creek – Engineer/Modeler
Worked on the development of a hydrodynamic model for Maraspin Creek, Massachusetts. The model used was Hec-RAS. The model was used to determine best adaptations to alleviate flooding in the community using results from overtopping, precipitation, and storm surge.

Monroe County FIRM Appeal – Engineer/Modeler
Performed a review of the methods used by FEMA to develop the FIRM. After this analysis worked to provided more accurate data using an updated ADCIRC/SWAN modeling and additional WHAFIS transects. Remapped the county for resubmittal to FEMA.

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KEY PROJECTS (CONTINUED)

Many Letters of Map Revisions – Engineer/Modeler
Completed many Letters of Map Revision (LOMR's) located in Bastable, Plymouth, Suffolk, and Essex counties as well as LOMR's in Rhode Island, New York, Connecticut, and Florida. Each of these projects included the use of CHAMP and SWAN to propagate waves onshore. Each of these projects has also been adopted by FEMA.

Swampscott Overtopping and Runup Analysis – Engineer/Modeler
Different properties in Swampscott, Massachusetts were accessed for their vulnerability to runup and overtopping. Using equations from the Coastal Engineering Manual (CEM), the topography of the area, and probability curve for water levels the overtopping rate and runup elevation were calculated for each site. Design alternatives for reduced runup and overtopping were accessed to determine effectiveness.

Narrow River Dredging Project for the CRMC and Fish and Wildlife Service – Engineer/Modeler
Created a hydrodynamic model using ADCIRC to assess the impact of multiple dredging scenarios on the Narrow River flushing times and tide ranges. The dredging scenarios considered included dredging to 1, 1.4, 2, and 3 meters in the narrows of the river to increase flow and decrease flushing time. Both tidal and surge cases were evaluated. The work was completed ahead of schedule and is being considered by the CRMC and other agencies.

Effect of Erosion on Storm Surge Flooding: Case Study of Coastal Ponds in Rhode Island – Engineer/Modeler
Developed and validated high resolution model of the south coast of Rhode Island. Erosion was estimated for 25 years and after a storm event where the dunes have been eroded. Two storms, Hurricane Bob and a synthetic 100-year recurrence event, were simulated both with and without erosion. The erosion of the shoreline was shown to have negligible effects on flooding extents, while dune erosion produced a dramatic increase in flooding along the coastline for smaller scale events.

PUBLICATIONS & PRESENTATIONS

Hashemi, M. Reza, Malcolm L. Spaulding, Alex Shaw, Hamed Farhadi and Matt Lewis. 2016. "An efficient artificial intelligence model for prediction of tropical storm surge." Natural Hazards 82.1 (2016): 471-491.

Shaw, Alex, Mohammad Reza Hashemi, Malcolm Spaulding, Bryan Oakley and Chris Baxter. 2016. "Effect of Coastal Erosion on Storm Surge: A Case Study in the Southern Coast of Rhode Island." Journal of Marine Science and Engineering 4.4 (2016): 85.

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Matthew F. Shultz, M.S., B.S., P.E.

Environment & Climate Business Unit Manager / Senior Coastal Engineer

EXPERTISE

Modeling of coastal and estuarine hydrodynamics, waves, and sediment transport processes and in the evaluation of structural and non-structural shoreline protection alternatives. Project management of large-scale coastal modeling studies, the development of models for assessment of coastal hazards and adaptation measures, as well as large-scale marsh restoration and the assessment of hydraulic structures. Extensive experience in programming languages and in developing software to present, analyze, and solve engineering and scientific problems. Experience in areas of marine structure design, waterfront construction, and construction project management.

QUALIFICATION SUMMARY

- More than fifteen years of diverse professional experience in the fields of coastal, civil and software engineering
- Experienced with modeling coastal hydrodynamics, sediment and particulate transport, coastal wave dynamics, and tidal hydraulics
- Strong programming skills and knowledgeable in software design and advanced concepts
- Numerical model experience with XBeach, SRH-2D, CMS, MIKE21, EFDC, DELFT3D, HEC-RAS, ADCIRC, SWAN, RMA, STWAVE, SBEACH, CSHORE GENESIS, DYNLET, CORMIX, and ACES
- Programming experience with MATLAB, FORTRAN, C++, JAVA, VBScript, JavaScript, HTML, XML, XSL
- Database experience: Oracle, SQL Server, SQL Anywhere, MS Access

WORK EXPERIENCE

2016-present	Senior Coastal Engineer, Woods Hole Group
2010-2016	Senior Coastal Engineer/PM, Dewberry
2005-2010	Coastal Engineer, Woods Hole Group
2004	Graduate Assistant, University of Rhode Island
1998-2004	Senior Consultant, WinMill Software
1997-1998	Field Engineer, Modern Continental Construction

Education

2005 – M.S.
Ocean Engineering
University of R.I.
1996 – B.S.
Civil Engineering
Tufts University

Licenses and Registrations

- P.E., Professional Engineer, Connecticut License PEN.0030884
- P.E., Professional Engineer, Louisiana License PE.0036650
- P.E., Professional Engineer, Massachusetts License 47832
- P.E., Professional Engineer, Delaware License 21748

Professional Affiliations

- Member, American Shore & Beach Preservation Association (ASBPA)
- Member, Coasts, Oceans, Ports, and Rivers Institute (COPRI)
- Member, American Society of Civil Engineers (ASCE)

Publications & Presentations

15

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KEY PROJECTS

Back River Salt Marsh Restoration Hydraulics and Hydrology Study, Woolwich, ME – Project Manager
Worked with the Kennebec Estuary Land Trust, Maine DOT and other stakeholders to evaluate the potential structure replacement at the Route 1 crossing of the Back River Estuary in Woolwich, ME. Tidal flow to the marsh system has been impaired for upwards of 100 years due to a series of culverts underneath US-1 and George Wright Road which bisect the marsh. The system is additionally crossed by the Rockland Branch Railroad in the middle portion of the marsh, and Middle Road (ME-127) at the upper portion of the marsh, where additional culverts further restrict flow. A Hydraulics and Hydrology (H&H) study was conducted to assess restoring salt marsh, as well as to provide habitat and infrastructure resiliency in the face of rising sea levels. The study included a field data collection program, development of a two-dimensional hydrodynamic model together with model simulations for a range of environmental conditions, and an alternatives analysis for the culvert replacement at US-1.

Sluice Creek Restoration Feasibility Study, Guilford, CT – Project Manager
The Sluice Creek estuary is a complex tidal system involving interactions between tidal flows from Long Island Sound and freshwater inflows from the East River. There are multiple stream crossings at roads and the Amtrak railway which have restricted tidal elevations within reaches of Sluice Creek. In support of Ducks Unlimited and CT Department of Energy and Environmental Protection, Woods Hole Group conducted a study to evaluate a range of alternatives to potentially alleviate the anthropogenic tidal restrictions within Sluice Creek and restore salt marsh habitat. The study involved the development of two-dimensional hydrodynamic and wave models to assess the tidal dynamics and coastal processes. The alternatives included removing a tide gate at the Old Whitfield St crossing, creating a bypass channel to route flows around the Guilford Marina, and creating an open-span bridge. The alternatives were evaluated for their potential restoration benefits and increasing resiliency of the marsh, as well as the potential for any adverse impacts in terms of flooding and erosion within the surrounding areas.

Penobscot Bay Working Waterfront Resiliency Analysis – Lead Coastal Engineer
The Maine Department of Marine Resources, Maine Coastal Program was seeking to provide resiliency and vulnerability analyses and recommendations for adaptation measures for ten distinct working waterfront sites (WWS) in Penobscot Bay, Maine. Led the vulnerability analyses using critical elevations of infrastructure (for over-land and for over-water assets) derived from site and facility baseline characterizations conducted at each WWS. Regional and site-specific water surface elevation exposure profiles were then developed for each WWS to summarize the range of chronic (tidal) inundation and acute (storm surge) inundation occurring presently and reasonably expected to occur over the planning period due to sea level rise. For sites subject to wave exposure site-specific wave modeling was conducted for existing and future sea levels to better quantify wave hazards and potential increases in wave heights. Detailed vulnerability matrices were developed inform the planning and prioritization approach of adaptation needs for each WWS.

Argilla Road Resilience and Adaptation Design, Ipswich, MA. – Lead Coastal Engineer
The Town of Ipswich, in partnership with The Trustees of Reservations are conducting a climate adaptation project targeting Argilla Road, a key point of access for over 350,000 visitors to The Crane Estate. The Town and Trustees have identified building resilience in Argilla Road as the most important climate adaptation project

KEY PROJECTS (CONTINUED)

within the community due to the project's vulnerability, emergency access needs, local and regional value, and visibility. Design considerations will include elevating the road surface, re-sizing a culvert to allow greater tidal flow between Castle Neck Creek and an upstream salt marsh and stabilizing the road banks using green infrastructure techniques in a designated area of critical environmental concern. The evaluation and adaptation design are targeted towards building resilience for extreme tidal and storm conditions with projected increases in sea level over the expected design life.

Mt Hope Park Master Plan, Portsmouth, RI. – Lead Coastal Engineer
In support of the development of a Master Plan for restoring the waterfront park, conducted a shoreline stabilization suitability analysis and developed conceptual designs for mix of green and gray stabilization measures at the site including a living shoreline, recreational beach, concrete seawall, and wave attenuator.

Eagle Neck Creek Salt Marsh Restoration, Truro, MA – Project Manager
Eagle Neck Creek, an approximately 15-acre marsh, is tidally restricted by undersized and failing culverts at Old County Road. MA Division of Ecological Restoration and the Town of Truro were interested in conducting a targeted assessment to identify an appropriately-sized culvert crossing for the replacement of the failing structures. The project involved reviewing prior studies and recommendations, a multi-phase modeling approach that involved 1-D and 2-D components to adequately characterize the hydraulics of the system, and an assessment of alternatives to restore salt marsh and promote better drainage of the marsh system. Alternatives included culvert replacement, lowering of a breach opening in the former railroad berm, and targeted dredging of the marsh channels. The validated model was used to simulate and evaluate each of the proposed alternatives under typical tides and coastal storm events together with a selected sea level scenario. This resulted in the selection of a preferred alternative that can advance to the engineering design and full-permitting phase.

Seacoast Reliability Project, Durham, NH. – Modeling Subject Matter Expert
Provided expert testimony on behalf of the Town of Durham on evaluation and analysis of the Seacoast Reliability Project (SRP), proposed by the Public Service Company of New Hampshire d/b/a Eversource and submitted for approval to the New Hampshire Site Evaluation Committee (SEC). The evaluation focused on the hydrodynamic and sediment transport modeling conducted to assess impacts related to the proposed burial of transmission cables in Little Bay, NH. The evaluation related to concerns with the methods applied and underlying assumptions used to assess the sediment dispersion/deposition and associated impacts that would occur with the proposed cable burial activities, specifically with the use of a jet plow and hand jetting.

Coastal Processes Evaluation for Plum Island, Newburyport, MA. – Lead Coastal Engineer
In support of a NFWF Grant for Community Risk Reduction through Comprehensive Coastal Resiliency Enhancement for Great Marsh Upper North Shore, MA, Woods Hole Group conducted a coastal processes analysis to assist with the understanding of existing conditions and causes for shoreline retreat and erosion along Plum Island. Wave and sediment transport models were developed to characterize sediment transport trends in average annual and extreme storm wave conditions. The coastal study will give further insight into erosion hotspots that have historically occurred along the barrier island, the influence of jetty structures/nearshore features near the inlet to the Merrimack River, and potential mitigation solutions.

KEY PROJECTS (CONTINUED)

Chapoquoit Beach Restoration, Falmouth, MA - Senior Coastal Engineer
Planning and design project to restore critically eroded Chapoquoit Beach using sand dredged from the Cape Cod Canal by the US Army Corps of Engineers. Updated coastal processes analysis for the West Falmouth shoreline in Buzzards Bay to develop a sediment budget in support of the beach restoration study. Sediment transport analysis assisted in determining rate of infilling occurring at the inlet to West Falmouth Harbor and maintenance dredging requirements. Work was conducted under funding from the office of Massachusetts Coastal Zone Management's (CZM) Coastal Community Resilience Grant Program.

Design and Permitting of Nearshore Borrow Site and Sand Bypass System at Scusset Beach, Sandwich, MA. – Senior Coastal Engineer
Conducted an analysis of coastal processes to characterize existing wave environment and sediment transport trends at Scusset Beach State Reservation. Wave and sediment transport models were then used to evaluate different sand source alternatives including offshore/nearshore borrow sites along with beach profile adjustment and mining of sand dunes. An alternatives analysis was conducted to refine the borrow site location and dimensions, and to also gauge potential impacts of sand bypassing on adjacent infrastructure and natural resources. Engineering design and permit level plans of the recommended alternative were developed to support the Town of Sandwich in the permit process for sand placement at Town Neck Beach. Work was conducted with funding from the office of Massachusetts Coastal Zone Management's (CZM) Coastal Community Resilience Grant Program.

Hudson River Project: Resist, Delay, Store, Discharge NEPA EIS, Hudson County, NJ. -Lead Coastal Engineer
Feasibility Study and EIS for a $230-million comprehensive urban water strategy conceived to protect the Hoboken waterfront, as well as parts of Weehawken and Jersey City. Known as Resist, Delay, Store, Discharge, the project incorporates hard and nature-based infrastructure measures to address surge protection, coastal defense, and systemic drainage issues. Responsible for developing a MIKE21 coastal hydrodynamic model that was integrated with a MIKE URBAN stormwater model using MIKE FLOOD. Work also involved preliminary design of flood protection concepts through wave runup and overtopping analysis, overland wave modeling using a 1-D wave transformation model, computing dynamic wave loading and forces, and evaluating landward hazards to developments and built infrastructure.

Oakwood Beach Flood Attenuation Feasibility Study, Staten Island, NY - Lead Coastal Engineer
Integrated water resources study evaluating the feasibility of coastal storm damage reduction, storm water drainage and BMPs with added nature-based-infrastructure to increase ecological restoration opportunities for a community impacted by Hurricane Sandy. Responsible for the development and evaluation of alternatives to USACE's proposed revetment including the assessment of design waves and water levels to be used in wave runup and overtopping assessments. Conducted technical oversight and QAQC for 2-D hydrodynamic model used to evaluate newly proposed channels and revetment alignment combined with flow-control structures under tidal and extreme storm conditions. Working with regional offices consulted with NY DEC, USACE, The Nature Conservancy, NYC and other stakeholders to help ensure combined needs were properly assessed and incorporated into the project.

KEY PROJECTS (CONTINUED)

Coastal A Zone Maps, Massachusetts - Senior Coastal Engineer
Served as technical advisor and provided quality assurance and control for the development of new Coastal A Zone Maps for the Commonwealth of Massachusetts. Developed the technical review process and administered quality reviews for new and revised mapping of the Limit of Moderate Wave Action (LiMWA) to advise community officials of hazards due to waves and where Massachusetts State Building Code requirements and other regulations would apply. Coastal A Zone maps were developed for over 1,100 miles in eight coastal counties in Massachusetts keeping with the new FEMA guidance for delineating wave hazards.

FEMA Risk MAP Production & Technical Services (PTS), Federal Emergency Management Agency, Nationwide - Senior Coastal Engineer and Project Manager
Led several countywide coastal updates in FEMA Regions II and III. Projects included task management of terrain processing, field reconnaissance, coastal hydrodynamics and wave modeling, erosion analyses, hazard risk assessment, mitigation, outreach, and floodplain mapping. Provided technical oversight for storm surge modeling and coastal hazard assessments. Also provided direction and input on coastal appeal resolution, as well as the development of new coastal guidelines and procedures for FEMA's coastal flood studies.

Levee Analysis and Mapping Pilot Studies, FEMA Region VI – Lead Coastal Engineer
Served as lead engineer and subject matter expert for new Levee Analysis and Mapping Procedures being implemented by FEMA HQ and Region VI for assessing non-accredited levees. Led working group in the development of new procedures for non-accredited levees subject to coastal flooding. Work involved developing consensus among multiple agencies including representative FEMA regions and the USACE. Conducted pilot studies in LA (Plaquemines and Lafourche Parishes) and TX (Freeport Levee System) to apply and evaluate new methodologies in assessing coastal risk in areas protected by non-accredited levees. Work involved levee breach assessments and the integration of 1-D to 2-D coastal hydraulic models to define the hazards within the polder.

Coastal Hazard Assessment for Lake Erie, FEMA Region V – Senior Coastal Engineer
Provided technical oversight and input on the 2-D coupled surge and wave model setup including the historical storm characterization, mesh development, and model validation. Assisted in the development of a Coastal Modeling and Analysis framework for the implementation of new methodologies and guidelines for the assessment of coastal hazards in the Great Lakes. Integrated modules to assess response-based (multi-event) erosion and wave runup using CSHORE-1D model and extreme statistical distributions. Using joint probability distributions, evaluated five combinations of waves and water levels for the assessment of hazards at the 1% and 0.2% annual return frequencies

NY-NJ Storm Surge Study, FEMA Region II - Senior Coastal Engineer
Served as lead engineer for storm surge model development tasks including ADCIRC and SWAN mesh development, model validation, and the QAQC of over 175 storm surge model simulations. Validation was conducted through hindcasts of both tropical and extratropical storms and the verification of simulated maximum surge and wave conditions. Storms were developed using the Joint Probability Method-Optimum

KEY PROJECTS (CONTINUED)

Sampling and modeling was conducted on a high-performance computing environment. Provided technical oversight and review of computed storm surge return frequencies developed for coastal hazard assessments.

Big Bend FL Storm Surge Study, FEMA Region IV - Senior Coastal Engineer
Storm surge study encompassing Taylor, Dixie, and Levy Counties in Florida. Provided technical oversight and input for storm selection, the statistical methods (JPM) developed for study area, and model validation. Conducted detailed reviews of the seamless bathymetry/terrain surface developed for mesh generation and of the ADCIRC and SWAN modeling meshes to ensure features were adequately represented.

Climate Change Adaptation Strategies for Coastal Community, East Boston, MA – Coastal Engineer
Managed development of coastal engineering alternatives to protect coastal community against varying levels of projected sea level rise combined with extreme coastal storm events. Investigated retrofitting techniques, including floodproofing and other adaptation strategies, for an urban community to address impacts of climate change. Drafted design concepts and estimated projected costs for alternatives to assist in a scenario-based risk assessment. Participated in outreach activities to inform community of potential impacts, coastal engineering alternatives, and other community-specific adaptation strategies

Numerical Modeling of Hydrodynamics and Constituent Transport for Stony Brook Wetlands Restoration Feasibility Study, Brewster, MA – Coastal Engineer
The project consisted of implementation of a field data collection program, development and calibration of a two-dimensional numerical circulation model using the Environmental Fluid Dynamics Code (EFDC), and the application of the calibrated model to conduct an alternatives analysis aimed at restoring tidal flow to the Stony Brook estuarine system. The hydrodynamics and salinity model was utilized to simulate existing conditions, as well as alternatives involving the replacement of two culvert structures which convey tidal flow under the Route 6A roadway to the upstream/landward portion of the marsh. The potential benefit and impacts of each proposed restoration alternative were evaluated including upland flooding, sediment transport/scour of the channel bed or adjacent roadway, effects on drainage/infrastructure, and any effects on migratory anadromous fish. The alternatives were simulated under typical tidal, low-flow, and storm conditions to fully assess their performance and to make a recommendation on how to best achieve restoration with minimal impacts.

Coastal Structure Design for Fisheries and Marina Facilities, KSA - Lead Coastal Engineer
Evaluation and design of revetment and composite breakwater structures for fishing port developments in the Eastern Province. Conducted nearshore wave transformation modeling using STWAVE to arrive at design wave conditions. Computed wave runup, overtopping, and transmission for design scenarios and determined static and dynamic loading for composite rubble-mound/vertical wall structure.

Flood Plain Analysis for Cameron Parish, LA – Coastal Engineer
Reviewed Flood Insurance Rate Maps (FIRMs) and Base Flood Elevations (BFEs) established by the Federal Emergency Management Agency (FEMA) for coastal parish. Gathered LIDAR topographic data for the parish communities and performed comparison with elevation data used within the two-dimensional model to establish the flood zone boundaries. Developed wind field for Hurricane Ike using data from various sources for

KEY PROJECTS (CONTINUED)

input into an ADCIRC model. Performed hindcast of Hurricane Ike using a two-dimensional ADCIRC model in order to compare simulated storm surge levels with data recorded locally within the parish, during the storm.

Numerical Modeling of Hydrodynamics for Proposed Arabian Canal, Dubai, UAE, Limitless – Coastal Engineer
In order to evaluate the conceptual design of a proposed canal in Dubai, two separate hydrodynamic models (1-D and 2-D) were developed. The models were used for a preliminary analysis of the flushing characteristics of the proposed 75-kilometer canal which would be connected to the Arabian Gulf. A one-dimensional analytical model and a two-dimensional numerical model of the canal were developed. The analytical model provided preliminary results that were used to determine whether certain design concepts warranted more detailed analysis, and to guide the development of the numerical model. Sensitivity analyses were then conducted to assist in developing components of the canal design, including the locations, size, and operation of tide gates, channel dimensions, and potential marina developments. The components of the canal design were varied within the models, water flushing/refreshment periods were computed, and areas having potential water quality issues were identified. Recommendations were made in order to achieve the water quality objectives while also preserving the design objectives for the development.

Evaluation of Shoreline Protection at Beach Facility, Bristol, RI. - Lead Coastal Engineer
Responsible for conducting field investigation of existing shoreline protection measures at neighborhood association beach facility in order to propose alternatives for remediating erosion incurred at the site. Analyzed average annual and extreme storm conditions in conducting desktop study to evaluate alternatives to replace or repair the existing degraded seawall structure at the beach facility. Evaluation of alternatives included an assessment of overall effectiveness, structural lifetime, construction feasibility, as well as estimates of permitting, engineering, and construction costs. Developed recommendations for the neighborhood association to effectively control erosion at the site, to retain the upland facility, and to provide safe access to the recreational resource.

Hydrodynamic Characterization and Sediment Transport Evaluation at the Former Callahan Mine Property, Brooksville, ME – Coastal Engineer
The Goose Pond estuary is a site of environmental concern and is classified as a Superfund site on the National Priorities List by the Environmental Protection Agency (EPA). The site is the former location of a zinc/copper open-pit mine where mining operations were conducted adjacent to and beneath the tidal estuary. Supported the Maine Department of Transportation (DOT) for an evaluation of contaminant transport and fate at the former Callahan Mine site connected to the Penobscot River in Brooksville, ME. Characterized the hydrodynamics and transport processes within the flooded former mine property influenced by the tides of Penobscot Bay. The project consists of a field data collection program, and the development of a three-dimensional hydrodynamic and sediment transport model to evaluate overall circulation patterns and transport within Goose Pond. Processed measured water level, salinity, and current speed/direction data to characterize baseline conditions at the site and to calibrate the model. Applied numerical model to simulate significant precipitation and storm surge events to assess the potential for sediment mobility under extreme conditions.

KEY PROJECTS (CONTINUED)

Evaluation of Shoreline Restoration at Nantasket Beach, Hull, MA. – Coastal Engineer
Responsible for developing wave and sediment transport models to simulate existing conditions and conduct an alternative analysis in support of a comprehensive coastal processes study to address ongoing coastal erosion at Nantasket Beach. Quantified site-specific wave conditions using measured wind and wave data, and the STWAVE numerical wave transformation model. Simulated transport processes along the barrier beach using a state-of-the-art sediment transport model to evaluate the performance of the existing seawall, as well as structural and non-structural shore protection measures under various environmental conditions. Assessed the performance and lifetime of the selected shore protection measures to provide guidance on potential long-term solutions for the area.

Numerical Modeling of Reverse Osmosis Water Treatment Facility Discharge Dilution, Melbourne, FL, Reiss Environmental – Coastal Engineer
Developed a three-dimensional model of the Eau Gallie River using the Environmental Fluid Dynamics Code (EFDC) to simulate the hydrodynamics and particulate transport within the estuarine system. The modeling effort was for the continued evaluation of the City of Melbourne's reverse osmosis concentrate discharge into the Eau Gallie River. Application of EFDC model involved the development of a curvilinear-orthogonal grid defining the geometry of the system, as well as defining conditions at both upstream and downstream boundaries of the Eau Gallie River, the atmospheric conditions, and the concentrate discharge into the model domain. Existing conditions were simulated, and the model was calibrated and verified using collected field data. The model was then applied to simulate DEP specified design flow conditions (7Q10) to characterize the concentrate dilution and the extent of mixing zones for the parameters of interest.

Hydraulic Modeling and Scour Assessment for WM. T Morrissey Boulevard Bridge at Pattens Cove, Dorchester, MA – Project Manager/Coastal Engineer
The potential for scour was assessed for the Morrissey Boulevard Bridge crossing at Pattens Cove for both 100-year and 500-year storms. The DYNLET1 numerical model was employed to evaluate the hydraulic characteristics of the tidal waterway. The model was driven and calibrated using field data collected at the site. The tidal current velocities and water elevations obtained from the storm simulations were used to compute the maximum scour potential for the open-bottom box culvert. The scour analysis, performed following FHWA and USACE methodologies, assisted in determining the single-digit code under Item 113 of the *FHWA Recording and Coding Guide for Structure Inventory and Appraisal of the Nation's Bridges* for the Morrissey Boulevard/Pattens Cove bridge crossing. Recommendations of scour countermeasures were made for the site to offer protection from future extreme storm events.

Flood Plain Analysis for Federal Emergency Management Agency (FEMA) Letter of Map Revision (LOMR), Falmouth, MA – Project Manager/Coastal Engineer
Conducted flood plain analysis to support a FEMA LOMR application to revise the base flood elevations and flood zone map for coastal properties fronting Vineyard Sound in Falmouth, MA. The 100-year return period wave height and storm surge levels were established and wave transformation and wave runup modeling were completed utilizing the FEMA Coastal Hazard Analysis Modeling Program (CHAMP) and US Army Corps of

KEY PROJECTS (CONTINUED)

Engineer's methodologies. The potential for erosion was estimated and flood zone delineations were made based on the model results.

Mixing Zone Evaluation in Lake Michigan, Indiana Dept. of Environmental Management - Coastal Engineer
Conducted study to support the review of a permit renewal application for a discharge into Lake Michigan. The study included a literature review on Lake Michigan currents to help characterize receiving waters in the vicinity of the discharge. Observations of currents in Lake Michigan were also made over a 45-day period using two Acoustic Doppler Current Profiler (ADCP) systems in order to better determine the discharge site-specific ambient conditions. The current data were processed, and an attempt was made to correlate the currents with wind observations obtained from nearby locations in order to model long-term conditions. This data was then analyzed to define the appropriate ambient water input conditions to use in modeling the discharge's dilution and mixing zone.

Numerical modeling of a ship-to-shore causeway in waves, N. Kingstown, MA, University of Rhode Island/Vibtech Inc. - Coastal Engineer
Developed numerical model to analyze the motion of an articulated ship-to-shore causeway system in nearshore areas. The vertical motions of the floating structure were evaluated for sea state 3 conditions. The model was developed using potential flow theory to solve the equations of motion. The work involved conducting a wave simulation from a wave spectrum to construct the time history of the structure's response. Results from the model were compared with those obtained from experimental data. A study was then completed to analyze the sensitivity of the system's dynamics to the variation of critical parameters.

Material testing and transport for casting basin at Fort Point Channel, Boston, MA, Modern Continental Construction - Engineer
Managed the environmental testing, transport, and disposal of over 500,000 cubic yards of dredge and excavate material taken from and around Fort Point Channel. Portions of the channel were dredged for the construction of a series of cofferdam cells used to close off a casting basin (dry dock) at the waterfront. Material was also excavated to form the casting basin used to construct concrete tunnel sections. The material was transported to a temporary storage location for sorting and testing. Material was then transported to various locations throughout the Northeast following DEP regulations.

Construction management at Fort Point Channel Crossing, Boston, MA, Modern Continental Construction - Engineer
Oversaw areas of construction related to the fabrication of concrete tunnel tube sections for the Fort Point Channel Crossing Central Artery/Tunnel project. Managed implementation of a multi-media groundwater filter system. Monitored and managed operation of technical systems, including groundwater control, construction noise control, and geotechnical instrumentation. Also worked with subcontractors in obtaining project approval and in reviewing and procuring necessary submittals.

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Nadine A. Sweeney

Executive Assistant

EXPERTISE

Ms. Sweeney has been with Woods Hole Group since 1993, and has a complete understanding of the corporate management systems and procedures. She also is primarily responsible for the publication of high-quality deliverables, including layout, formatting, and production. She has a wide range of publication software skills, including expertise with MS Word, Excel, and PowerPoint, as well as graphics software experience with Adobe Photoshop and Illustrator. For operations management support, Ms. Sweeney is a MS Project specialist, including applications for individual project scheduling and planning, as well as program roll-ups for resource tracking across multiple projects, clients, and departments within Woods Hole Group. She also helps define and track work breakdown structures in support of Project Managers for individual projects. In support of financial management, Ms. Sweeney acts as the Project Manager's liaison with the Woods Hole Group accounting and finance department. Ms. Sweeney creates project and client files within the Sage corporate financial management system, including entry and tracking of budgets for individual tasks and subtasks. With her experience and knowledge of management processes, Ms. Sweeney also has the intangible ability to effectively encourage Project Managers in their duties. Specifically, she helps Project Managers review and produce monthly (at minimum) project budget update reports, client invoices, and progress reports as required.

QUALIFICATION SUMMARY

- 25 years of professional experience supporting project managers and engineers on a variety of technical projects
- Strong written and verbal communication skills
- Excellent organizational and coordinating skills
- Excellent communicative skills with clients and project managers

WORK EXPERIENCE

1993-Present Executive Assistant, Woods Hole Group

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David R. Walsh, M.S.

Senior Project Manager/Coastal Scientist
(Team Leader, Coastal Measurements and Sediments Group)

Field Party Chief/Field Oceanographer
(Oceanography and Measurement Systems Division)

EXPERTISE

Design and implementation of real-time data monitoring systems in coastal and estuarine environments. Oceanographic data collection systems. Coastal and deep-water mooring system instrumentation and deployment techniques. Field operations logistics, efficiency, safety, and shipboard deck operations. Programming, deployment, and data analysis of oceanographic instruments including the ADCP, ADV, and CTD. Mooring design, floatation/hardware components, and acoustic releases.
Research interests in coastal geomorphology and sedimentology. Application of field and laboratory research to resolve and evaluate geologic processes within coastal, estuarine, and oceanic environments. Utilization of GIS and other geospatial software packages to map and define geomorphological processes and sediment characteristics, including the presence of contaminants. Design, acquisition, and interpretation of bathymetric, side-scan sonar, and sub-bottom sonar surveys. Implementation of sediment sampling strategies to ground-truth geophysical survey data (physical properties, sediment stratigraphy, layer thickness) and estimate sedimentation rates.

QUALIFICATION SUMMARY

- 17 years of experience
- Extensive field/shipboard operations and logistics management of geologic and oceanographic sampling
- Experienced in the deployment/recovery of oceanographic mooring systems, instrumentation, and data processing
- Specializes in oceanographic data collection program management and operational logistics for both surface and subsurface systems.
- Use of ADCPs for temporal (moorings) and spatial (vessel surveys) oceanographic studies
- Sediment core collection and characterization
- Geochronological analysis of sediment cores using radioisotopes activities and contaminant histories
- GIS geospatial analysis applications, cartographic transformations, and digital terrain modeling of topographic and bathymetric data
- Geophysical survey data acquisition, processing, and interpretation (bathymetric, side-scan, sub-bottom)

Education
2004 – M.S.
Marine Studies - Oceanography
University of Delaware
1999 – B.S.
Geoscience
Hobart College

Work Experience
- 2018-Present Woods Hole Group, Inc. (Team Leader, Coastal Measurements and Sediments Group)
- 2012-Present Woods Hole Group, Inc. (Sr. Project Manager)
- 2004-2012 Woods Hole Group, Inc. (Coastal Scientist)
- 2001-2004 University of Delaware (Research Assistant)
- 1999-2001 USGS Coastal and Marine Geology Program (Sediment Lab and Mooring Systems Technician)

David R. Walsh
Coastal Scientist/Field Oceanographer
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KEY PROJECTS

Long-term Measurements of Hydrology, Meteorology, and Sediment Oxygen Demand in the Delaware Estuary. Philadelphia Water Department. 2012–Present. Project Manager

The Philadelphia Water Department (PWD) is in the process of developing a hydrodynamic water quality model of the tidal Delaware Estuary between Trenton, NJ and Delaware City, DE. As part of this process, the PWD contracted the Woods Hole Group (WHG) and their subcontractors to collect data that will be used to calibrate and validate the PWD model. The contract's project is split into two parts: 1) the collection of hydrodynamic and meteorological time-series, and 2) seasonal and spatial characterization of sediment oxygen demand, and other important biogeochemical processes in the model domain.

Hydrodynamic data (current magnitude and direction, conductivity) have been collected at three long-term stations that consisted of an acoustic Doppler current profiler (ADCP), conductivity sensor, data logger, and a surface buoy telemetry system. Data collected at each system were transmitted to the Woods Hole Group base station at 6-minute intervals. In addition to the three long-term systems, multiple short-term (30-day) data collection stations were deployed to characterize currents at specific locations of interest to the PWD modeling team. Multiple water quality monitoring buoys equipped with multiparameter sondes are also maintained throughout the estuarine model domain.

The seasonal and spatial characterization of sediment oxygen demand (SOD) is being performed via direct measurements, along with other relevant sediment parameters. Samples have been repeatedly collected at over 88 stations in the model domain during four separate sediment collection surveys. Additionally, four water quality surveys have been performed since it has since been determined that the water column is a major contributor to the biogeochemical cycling of nutrients and oxygen.

Herring River Real-Time Observation Network (HeRRON). Friends of Herring River. 2015–Present. Project Manager

Woods Hole Group has successfully designed and installed a network of five real-time water quality monitoring stations in the Herring River, Wellfleet, MA. The HeRRON stations will be used to provide baseline data for the restoration of the Herring River estuary, and also provide monitoring information that can be used to assess the management of restoration through implementation of flow controls on a structure that will be constructed as part of the project. Stations are anticipated to provide data for the next 20-years: before, during, and after the restoration construction. All stations are autonomously power with a solar array and transmit data at 30-minute intervals. Sensors are surveyed to provide water level information relative to the vertical datum of NAVD88. Data parameters include water level, temperature, conductivity, pH, dissolved oxygen, and turbidity.

Oceanography Measurement Program, New York Bight. 2008–2009. Field Operations Manager

WHG designed, deployed and maintained two long-term monitoring locations in the New York Bight. Each location contained a complex array of instrumentation designed to fully characterize the oceanographic properties of the water column at the two specific sites over the course of a year. Surface and internal waves, currents, and water column stratification are of primary interest. The effort has included instrumentation mounted to surface buoys, subsurface moorings, and bottom platforms, with all positions monitored by satellite tracking. Quarterly service visits, reports, and data are deliverables to the client.

KEY PROJECTS (CONTINUED)

Delaware Estuary Regional Sediment Budget. USACE-Philadelphia District. 2009–2012. Coastal Scientist, Project Manager

The objective of this project is to identify sediment sources, transport pathways, and sinks in the Delaware Estuary with application towards a regional sediment budget, with emphasis placed on fine-grained (cohesive) sediments. The budget is being derived from the most up-to-date data available from federal and state government agency sources and the University of Delaware. The final sediment budget is intended to provide a framework for managing sediment and related resources in the estuary. This work is being performed in concert with the Delaware Estuary Regional Sediment Management (RSM) initiative of the United State Army Corps of Engineers Philadelphia District.

Field Data Collection and Historic Chart Digitization, Merrimack River, Newburyport, MA. USACE-New England District. 2012–2013. Project Manager

This multidisciplinary study was performed to assess historic and present conditions within the dynamic Merrimack Estuary and Newburyport Harbor, and to develop long term maintenance strategies. The project was comprised of three tasks. The field program, consisting of Tasks 1 and 2, had the objective to collect current, water level, and salinity data at discrete locations within the project area over a 60-day period. To accomplish this, Woods Hole Group deployed five (5) current meters and four (4) multi-parameter data loggers. The objective of Task 3 was historic chart digitization; to this end, Woods Hole Group processed 27 historic navigation charts or maps of the Merrimack River Estuary. Most charts represent yearly progress maps depicting the depth conditions during the time the jetties at the river inlet were being constructed. Some of the oldest charts (i.e. 1851 and 1880) show the condition of the area prior to the installation of the jetties. All field and chart digitization data were provided to the NAE for internal analysis.

Sediment Boring Collection and Analysis Offshore the Former Aerovox Property, New Bedford Superfund Site, New Bedford, MA. USACE-New England District. 2012–2013. Project Manager

The primary objective of this project was to obtain a vertical profile of contaminants along the former Aerovox Site facility shoreline, from the sediment water interface to bedrock. The secondary goal was to identify potential pathways for contaminant transport within the sediment using analytical data and geotechnical data. The objectives of the project were achieved with twelve (12) sediment borings using a barge mounted sonic drill rig as the sampling platform. One hundred twenty-three (123) analytical field samples were collected from the boring sections. Each sample was collected from a half-foot (0.5) interval of sediment and was submitted for analysis of PCBs (Aroclors), VOCs, and SVOCs, and an archive sample for possible PCB 209 Congeners analysis. All split sediment boring sections were measured, photographed, described, and logged by a trained soil scientist. In all cases, boring collection ceased at bedrock, whether verified with the recovery of a plug of stone, or through drill rig characteristics and feedback provided by the driller. A group of seven (7) site specific contaminants-of-concern were chosen by the USACE-NAE and USEPA for detailed reporting based on: 1) historical usage of these compounds by the Aerovox Corporation and respective degradation compounds, and 2) observations of high concentrations in New Bedford Harbor sediment from this area.

KEY PROJECTS (CONTINUED)

New Bedford Harbor Environmental Monitoring Program, New Bedford Superfund Site, New Bedford, MA. USACE-New England District. 2009–2014. Project Manager
In support of the remediation efforts for the New Bedford Harbor Superfund Site (NBHSS), the Woods Hole Group is performing various types of environmental monitoring. The project includes monitoring, sampling, and chemical analysis as necessary to support ongoing remedial actions and compliance with project remediation requirements. Water quality monitoring was performed in support of dredge operations, and included both vessel based monitoring crews and the use of four (4) real-time telemetry buoys equipped with sensors to monitor temperature, conductivity, turbidity, and DO. The telemetry systems supplemented on-site monitoring, collected a comprehensive data set for the client, and provided alerts to management personnel if water quality parameter thresholds were exceeded. Other environmental monitoring efforts at the NBHSS included groundwater monitoring to support ongoing O&M at the Sawyer Street Confined Disposal Facility, sediment sampling to assist in determining the extent of contamination within the harbor sediments, installation/sampling of sediment traps throughout the upper harbor and support compliance with project goals and objectives, and post-remediation sampling and monitoring.

Mixing Zone Evaluation, Lake Erie. Reserve Environmental Services. 2012–2013. Project Manager
In order to comply with permitting requirements from the state of Ohio, a mixing zone study, dilution monitoring, and effluent diffusion modeling were performed for the client's discharge outfall into Lake Erie. In support of this goal, the Woods Hole Group performed three tasks: 1) characterization of the wave and current environment in the vicinity of the outfall, 2) a 60-day *in situ* monitoring and total dissolved solids (TDS) data acquisition, and 3) dilution modeling at the outfall site, calibrated with field observations. The results of this study revealed that the mixing zone boundary previously imposed on the outfall diffuser was improperly defined and that the application of a different model, Cormix 2, was more technically applicable for the system design and provided a more accurate representation of mixing. The application of the comprehensive field data set with the Cormix 2 model resulted in the recommendation that the area if initial mixing (AIM) boundary be extended. This revised AIM boundary would ensure that performance of the diffuser could be evaluated with a greater degree certainty for a wide range of likely conditions, which in turn provided a realistic operational requirement for the client's permit.

Tisbury Great Pond Transport Study, TGP Munitions Response Site, Martha's Vineyard. UXB International. 2011–2012. Project Manager
One of the more unique projects that Woods Hole Group has worked on in recent time, this project was performed to evaluate the potential for historic UXO (unexploded ordnance) transport from burial in the Tisbury Great Pond barrier beach. The location had been a former aerial bomb training site for the military and contains a number of buried UXO in need of disposal. The WHG evaluation included a field data collection program and development of a calibrated hydrodynamic model to accurately assess the potential for transport of the historic munitions if uncovered by coastal processes. Calibration to a prospective inlet breach of the barrier beach, the most likely cause for acute exposure and transport, was accomplished through comprehensive measurement program scheduled around the actual excavation of a trench through the barrier beach – which quickly developed into a tidal inlet. The field data collection program consisted of three components: 1) deployment of an instrument platform to measurement offshore waves over a 60-day period, 2) deployment of instruments to

KEY PROJECTS (CONTINUED)

measure water levels within Tisbury Great Pond and in the Atlantic Ocean over 30-days, and 3) measurement of inlet current velocities during the 48-hours following inlet excavation. Through incorporation of the observed field data, the calibrated hydrodynamic model was able to confidently identify areas of potential exposure and/or transport of UXO at the site, and these results were used to define the search pattern for remaining UXO in need of disposal by the client.

Sampling and Analysis in Support of the Greenwich Harbor Federal Navigation Project, Greenwich, CT. USACE-New England District. 2011–2012. Project Manager

The objective of this work was to acquire data for the analysis of environmental impacts associated with the proposed maintenance dredging of approximately 300,000 cubic yards of sediments from the Greenwich Harbor Federal Navigation Project (FNP), with proposed disposal of the dredged material at either the Central (CLIS) or Western (WLDS) Disposal Site in Long Island Sound. The environmental sampling consisted of collecting sediment cores from 34 locations and water samples from eight locations within the Greenwich Harbor FNP, as well as sediment grab and water samples from the CLIS and WLDS reference locations. Samples were delivered to the laboratory for analysis of physical, chemical, and toxicological parameters as required by the EPA and NAE Regional Implementation Manual. The results were used to characterize the sediment in order to determine whether it is suitable for offshore disposal at either CLIS or WLDS.

Currents and Sediment Dynamics Studies for the Raritan Bay Slag Superfund Site, Old Bridge, NJ. 2010–2011. Coastal Scientist/Project Manager

The Woods Hole Group performed a one-month field data collection program to characterize the nearshore current, wave and sediment dynamics in the vicinity of the Raritan Bay Slag Superfund Site, as well as quantify the hydraulic and particle exchange between Raritan Bay and Chessequake Creek. The site shoreline is fronted by sandy beaches and engineered structures such as seawalls, groins, and jetties. A major physiographic feature of the site is the Cheesequake Creek Inlet; the construction material of the inlet's western jetty is a known source of contamination at the site. Woods Hole Group quantified the tidal exchange through Cheesequake Creek Inlet, in addition to characterizing the littoral wave and current regime along the shoreline. These data will be used to help understand the wave and current regime and sediment transport dynamics. Estimates of water volumetric flux, as well as suspended sediment flux were calculated, and when coupled with dissolved and particulate contaminant concentrations, the flux estimates were used by the client to refine the conceptual site model (CSM) and to estimate contaminant flux.

Hydrodynamic Analysis and Alternatives Design Assessment for the Restoration of Bride Brook, Rocky Neck State Park, East Lyme, CT. 2007–2010. Coastal Scientist/Project Manager

This project investigated the hydrodynamic characteristics of the degraded Bride Brook estuary and provided an assessment of the potential alternatives designed to restore more natural conditions to the system. The estuary has been structured since the early 20th century by twin elliptical culverts located at the mouth of the estuary on Long Island Sound. Since that time, alewife numbers in Bride Brook have declined and the estuarine salt marsh surface is noticeable degraded with pockets of vegetation die back; these present conditions have spurred a restoration effort. The WHG investigation was performed by collecting field observation data and incorporating the data into a 1-D hydrodynamic model. The model was calibrated and verified using the field observations for

KEY PROJECTS (CONTINUED)

existing conditions, and subsequently modified to conceptual design specifications for two proposed alternatives. The model was used to assess hydrodynamic conditions (water level and velocity) for the two alternatives during typical conditions and extreme event conditions. Model output was used in a channel scour analysis for both alternatives to determine whether scour was likely to occur in the channel. A recommended alternative was chosen by the client based on the WHG investigation report and construction plans for the restoration were provided as final products.

Evaluation of Sedimentation and Associated Contaminant Transport Processes in a Shallow Estuarine Cove, Southeastern, MA. 2004–2006. Coastal Scientist/Interim Project Manager

Woods Hole Group, Inc. executed a comprehensive investigation of the transport processes of sediments and associated contaminants in a shallow estuarine cove located in southeastern Massachusetts. The purpose of this investigation was to provide quantitative results that will assist in the development of required remedial alternatives for this location. The investigation involved: 1) field data collection to quantify and rank transport processes more accurately, 2) laboratory analysis to constrain contaminant "hot-spots" and quantify contaminant mass, and 3) a quantitative characterization of certain hydrodynamic and sediment transport processes, and their associated rates. This investigation was intended to provide a detailed understanding of contamination history and transport processes to aid in determining the possible need for remediation and, as appropriate, provide input for evaluating possible remedial alternatives.

Environmental Assessments and Impact Evaluation of Hammonasset Beach State Park, Madison, CT. 2007–2008. Coastal Scientist/Field Technician Lead

In this multi phase project, Mr. Walsh led the field data collection program, performed a shoreline change analysis, and assisted in writing several report chapters pertaining to the coastal geology and morphology of Hammonasset Beach, and beach nourishment sand sources. In preparation for the wave modeling phase of this project, Mr. Walsh performed a nearshore bathymetric survey and successful deployment of two trawl resistant bottom mounted ADCP moorings (near-shore, offshore) to collect wave and current data over a 60-day time period. A subaqueous sediment sampling program (using a petite ponar grab) was also completed to delineate potential beach nourishment resources.

Historical Shoreline Change Analysis. South Shore, Suffolk County, Long Island, NY. 2004–2008. Coastal Scientist

Woods Hole Group, Inc. (WHG) was contracted to perform an evaluation of historical shoreline change and sediment transport modeling of Long Island's southern shoreline in support of legal proceedings for Suffolk County, New York. The study evolved over a five year period into a comprehensive morphological evaluation of the Suffolk County shoreline. A primary area of focus for this investigation was the vicinity of three groins near Georgica Pond. To that end, a shoreline change analysis, spanning 113 years, 30 miles of shoreline, and 24 data sources, revealed that the background variability of shoreline position to either side of the groins has not changed markedly since the construction of the groins in the early 1960's. Additionally, this work was supported by the development of a process-based analytical model that included time-variable wave spectra (wave heights, periods, and directions) from a linked wave model, and use of the actual bathymetry and shoreline data. The model withstood rigorous legal review and results indicated the three

KEY PROJECTS (CONTINUED)

groins have a small, localized zone of influence on sediment transport. It was found that the natural bathymetric features in the vicinity of Georgica Pond produce changes in the rate that are larger than those caused by the groins. Therefore, the natural features of the regime have just as much influence on the shoreline as the groins. The application of the comprehensive shoreline change analysis, coupled with the advanced technical approach that WHG took with this investigation provided valuable, objective results that assisted the County in their successful legal defense.

NOAA CO-OPS National Current Observation Program, Penobscot River and Bay, Maine. 2006. Field Technician Lead

Mr. Walsh managed the WHG field operations during the Penobscot Current Observation Program in 2006, participating in all three cruises. The program consisted of data collection at nine stations using TRDI ADCPs mounted in both SUBS buoys and TRBM platforms. During this project Mr. Walsh received experience working directly with NOAA CO-OPS personnel, policies, and equipment. GFE instrumentation consisted of TRDI ADCPs, ORE CART, Benthos 875-A PUB, Benthos UAT-376 transponders, and RBR XR-420 CTD. In addition to preparing, maintaining, and deploying the GFE, Mr. Walsh assisted with CTD casts, and prepared the final NOAA formatted log sheets. The experience that the Penobscot Current Observation Program has provided WHG and Mr. Walsh with a working knowledge of NOAA operations and requirements that will prove invaluable to the success of future projects.

Oceanographic Investigation of the Brazilian Shelf and Slope, Southern Atlantic Ocean, Brazil. 2008–2009. Field Technician Lead

The objective of this project is to collect a two-year time-series of oceanographic data at various locations off the Brazilian coast. Mr. Walsh was the lead field technician during the project's initial deployment. Six deepwater moorings are deployed on the continental shelf and slope in water depths ranging from 300 to 2,200 meters. Contour normal CTD transects are also performed are also performed at each 90-day turnaround for data recovery and instrument maintenance. Current magnitude/direction and water physical properties are measured using TRDI 75 kHz ADCPs, Nortek Aquadopp ADVs, and Seabird 37-SMPs.

Offshore Current Observations via a Deepwater Mooring Array, Caribbean Sea, Colombia. 2007–2008. Field Technician Lead

Mr. Walsh was a key participant in six research cruises performed to collect a continuous year-long time-series of oceanographic data at three deepwater locations off the Caribbean coast of Colombia, South America. Mooring water depths ranged between 750 and 1500 meters. Current magnitude/direction and water physical properties are measured using TRDI 75 kHz ADCPs, Nortek Aquadopp ADVs, and Seabird 37-SMPs.

Regional Current Velocity Mapping and Long-Term Observations, Strait of Gibraltar. 2007. Field Technician Lead

Managed the planning and design of a field survey of tidal currents offshore Europa Point, Gibraltar and Ceuta, Spain. The vessel based survey was performed using a TRDI 150 kHz Quartermaster ADCP with bottom-tracking in order to profile currents out to a depth of approximately 350 meters and collect

KEY PROJECTS (CONTINUED)

bathymetric soundings. Subsequent to a rigorous spatial survey mapping current magnitude and direction over a 6 day period, the current meter was deployed in a subsurface mooring to collect a time-series of the complete lunar cycle of tidal currents over 30 days.

Hydrodynamic Observations of the Merrimack River, Manchester, NH. 2006. Coastal Scientist/Field Technician Lead

WHG was contracted to collect a 30-day time series of current velocity and water level in the Merrimack River at Manchester, NH. Mr. Walsh was the lead scientist and field technician for this project that required a unique approach to ensure the successful collection of data. Data collection was performed at two locations across a transect normal to river flow using the Nortek 2 MHz ADP. One instrument was located in the thalweg, and the other was jetted into the river bottom on the shallow (<1 meter) flats flanking the thalweg. Despite the difficulties caused by the riverine water turbulence, water column debris, and shallow water levels, a complete data record was recovered and provided to the client.

Hydrodynamic Observations at the Former Callahan Mine Property, Brooksville, Maine. 2006. Coastal Scientist/Field Technician Lead

Mr. Walsh led the field data collection program for this project located in this interesting coastal Maine estuary. At the project site, a complex interaction between the strong Penobscot Bay tides, an inlet restriction, the flooded former mine pit (>300 feet deep), and the extremely shallow upper estuary created an exceptional hydrodynamic situation and required a unique data collection plan. A time series of currents, turbidity, water level, salinity, and temperature were collected for 60-days at three locations in the estuary in order to characterize these complex hydrodynamics. Subsequent to collection, data were applied to calibrate and verify a 3-D model that was used to estimate the effects of extreme events on the system's hydrodynamics, and to estimate sediment transport potential.

Reverse Osmosis Concentrate Dilution Analysis and Ambient Water Quality Characterization, Melbourne, FL. 2005. Coastal Scientist/Field Technician Lead

Completed collection and processing of field data for application in an analytical model to characterize the dilution of a reverse osmosis (RO) plant discharge in the Eau Gallie River. The field data collection program consisted of measurements of tide, salinity, and temperature over a 45-day period using four strategically placed CTD sensors, a high resolution bathymetric survey, water quality sampling, and additional CTD surveys to account for spatial variability. River flow and discharge data were obtained from the City of Melbourne and other sources to complete the comprehensive data set required for the dilution analysis. The field data was processed and used in an analytical model to simulate the existing discharge and determine if a mixing zone could be achieved and permitted under existing water quality regulations and both the State and Federal level.

Mixing Zone Evaluation, BP Products North America, Whiting Business Unit, Lake Michigan. 2005. Field Technician Lead

Conducted study to support the review of a permit renewal application for a discharge into Lake Michigan. The study included a literature review on Lake Michigan currents to help characterize receiving waters in the vicinity of the discharge. Observations of currents in Lake Michigan were also collected over a 45-day period using two TRDI ADCP systems in order to better determine the discharge site-specific ambient conditions. The current

KEY PROJECTS (CONTINUED)

data were processed and an attempt was made to correlate the currents with wind observations obtained from nearby locations in order to model long-term conditions. This data was then analyzed to define the appropriate ambient water input conditions to use in modeling the discharge's dilution and mixing zone.

NOAA CO-OPS, Physical Oceanographic Real-Time Systems (PORTS), Narragansett Bay, RI. 2004–Present. Field Technician

Over his tenure with WHG, Mr. Walsh has been assisting with the operation and maintenance of sensors comprising the Narragansett Bay PORTS. Duties included on-site service and maintenance, and reporting. Mr. Walsh is knowledgeable with PORTS measurement systems, including current meter, water level, meteorological stations and data telemetry.

Instituto Mexicano del Petroleo Deepwater Oceanography Enhancement, Bay of Campeche, Gulf of Mexico. 2005. Instrument Specialist/Field Technician

Mr. Walsh facilitated and assisted with classroom and field training in the maintenance, programming, and deployment of oceanographic instruments. Specifically, these instruments comprised a 1,500 meter deep-water mooring system. Mooring components included the TRDI 75 kHz ADCP, TRDI 300 kHz ADCP, Nortek Aquadopp ADV, and Benthos 865-A acoustic releases. A one-month training deployment was successfully performed in the May of Campeche, Gulf of Mexico.

Investigation of Sediment Shoaling in Hyannis Harbor, Hyannis, Massachusetts. 2004–2005. Coastal Scientist/Field Technician

Mr. Walsh assisted with the design and implementation of a one-month oceanographic instrument deployment in order to identify processes responsible for the observed shoaling of Hyannis Harbor. The deployment consisted of two TRBM instrument platforms, each housing a Sontek ADV current meter and D&A OBS-3A turbidity sensor. Subsequent to a successful deployment, Mr. Walsh performed the data processing, analysis, and reporting of the time-series data and assisted with reporting.

WOODSHOLEGROUP.COM

Daniel R. Weirauch, M.S., B.A.

Marine Technician/Oceanographer

EXPERTISE

Preparation, installation, and maintenance of real-time monitoring systems, including the deployment of Acoustic Doppler Current Profilers (ADCPs), tidal and meteorological equipment. Configuration and installation of real-time and long-term deployment data collection and communication platforms. Responsible for day-to-day management, planning, reporting, and customer correspondence on multiple projects. Regular quality-control of data for all stations in the Delaware River and Bay, Chesapeake Bay, New York / New Jersey Harbor, Narragansett Bay, and Jacksonville PORTS systems. Experience with computer programming, hardware installation, networking, and electronics device troubleshooting.

QUALIFICATION SUMMARY

- 9+ years of preparation, calibration, and maintenance of oceanographic and land-based meteorological monitoring equipment
- Assembly, deployment, and recovery of current monitoring systems
- Operation and maintenance of YSI water quality sensors and associated data collection platforms
- Geodetic survey work, including benchmark installations, NGS documentation, digital level operation, and level data processing
- Research at sea for extended periods of time on both small and large vessels
- Experience in quality control and analysis of real-time oceanographic data
- Experience with Sutron Xpert, Sutron 9210, Sutron 9000, NexSens, YSI EcoNet, Campbell Scientific, and Vitel data collection platforms
- Software expertise: Nortek Aquapro, Sontek SonUtils, RD Instruments, Windesc, Translev, YSI software, X-CTU, Ace Manager, SigmaPlot, SmartDraw, ProComm, Microsoft Office
- Computer hardware installation and troubleshooting
- Excellent technical writing and communication skills

WORK EXPERIENCE

2008-Present	Woods Hole Group, Marine Technician/Oceanographer
2005-2007	University of Delaware, Research Assistant
2004-2005	Event Network, Data Entry Specialist
2003	Pennsylvania State University, Lab Assistant

Education

2007 – M.S.
Marine Studies
University of Delaware
2004 – B.A.
Geosciences
Pennsylvania State University

Licenses and Registrations

- OSHA 40-Hour HAZWOPER
- NOAA National Geodetic Survey Digital Leveling
- SUTRON Data Collection Platform

Professional Affiliations

N/A

Publications & Presentations

N/A

Daniel R. Weirauch
Marine Technician/Oceanographer
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KEY PROJECTS

National Oceanic and Atmospheric Administration, National Ocean Service, Center for Operational-Oceanographic Products and Services (NOAA/NOS/COOPS), Great Lakes VDatum Water Level Stations – Field Party Chief / Technician Lead
Management of station reconnaissance, installations, and removals for seasonal water level stations in the Great Lakes region in support of hydrographic and shoreline mapping and new release of the International Great Lakes Vertical Datum 2020. In charge of managing day-to-day operations, project timelines, budgeting, documentation, and final deliverables. Provide technical and field support for installations, removals, and emergency maintenance visits.

National Oceanic and Atmospheric Administration, National Ocean Service, Center for Operational-Oceanographic Products and Services (NOAA/NOS/COOPS), Physical Oceanographic Real-Time Systems (PORTS), Delaware River & Bay – Local Operator/Marine Technician
Serve as PORTS technical assistant to Project Manager, Clinton Hare, and Delaware Field Office. Assist with day-to-day operations, technical support and reporting, including field support for routine operation and maintenance, annual inspection, and emergency service visits.

National Oceanic and Atmospheric Administration, National Ocean Service, Center for Operational-Oceanographic Products and Services (NOAA/NOS/COOPS), Physical Oceanographic Real-Time Systems (PORTS), Chesapeake Bay – Local Operator/Marine Technician
Serve as PORTS technical assistant to Project Manager, Clinton Hare, and Delaware Field Office. Assist with day-to-day operations, technical support and reporting, including field support for routine operation and maintenance, and emergency service visits.

National Oceanic and Atmospheric Administration, National Ocean Service, Center for Operational-Oceanographic Products and Services (NOAA/NOS/COOPS), Physical Oceanographic Real-Time Systems (PORTS), New York/New Jersey Harbor – Local Operator/Marine Technician
Serve as PORTS technical assistant to Project Manager, Clinton Hare, and Delaware Field Office. Assist with day-to-day operations, technical support and reporting, including field support for routine operation and maintenance activities, annual inspection, and emergency service.

Philadelphia Water Department, Measurements of Current Profile and Sediment Oxygen Demand in Select Tidal Reaches for the City of Philadelphia – Marine Technician
Serve as marine technician, providing assistance to Project Manager, David Walsh, for long-term current monitoring buoys, short term current meter deployments, and water quality sampling. Perform current meter calibrations, data recovery, and routine system inspections. Assist with site selection and survey data collection

KEY PROJECTS (CONTINUED)

for short-term current meter deployments. Perform routine inspection, cleaning, calibration, and configuration of water quality instrumentation.

Jacksonville Marine Transportation Exchange, Physical Oceanographic Real-Time Systems (PORTS), Jacksonville, FL – Survey Party Chief/Marine Technician
Serve as PORTS technical assistant to Project Manager, Clinton Hare, and WHG installation team. Assist with installation of current monitoring, water level, and meteorological stations. Serve as survey party chief for installation of benchmarks, documentation of benchmark descriptions and photographs, and operation of digital level and level data processing.

The Nature Conservancy of Delaware, Milford Neck Preserve Restoration – Field Operations Lead/Marine Technician
Serve as the primary point-of-contact for field service scheduling. Organize field activities, carry out hydrodynamic sensor deployment, RTK GPS surveying, and field data collection.

AKRF, B. L. England Generating Station, Great Egg Harbor Bay, Thermal Plume Monitoring –Marine Technician
Organize field activities, carry out hydrodynamic sensor deployment, RTK GPS surveying, and field data collection.

The Port Authority of NY & NJ, La Guardia Airport Water Quality Monitoring Buoys– Project Lead/Marine Technician
Serve as the primary point-of-contact for field service scheduling and general correspondence with customer. Perform monthly water quality instrument calibrations, preventative maintenance on buoy components, repairs, and monthly reporting.

World Meteorological Organization, MARINEMET Project: Supply, Installation, Commissioning, and Maintenance of Tide Gauge Stations and Meteorological Stations for Mauritania, Cape Verdi, Senegal and The Gambia – Survey Party Chief/Installation Technician
Serve as survey party chief for installation of benchmark network, documentation of benchmark descriptions and photographs, and operation of digital level and level data processing. Assist with tide station installation and station documentation for sensor diagrams and reports.

National Oceanic and Atmospheric Administration, National Ocean Service, Center for Operational-Oceanographic Products and Services (NOAA/NOS/COOPS), Physical Oceanographic Real-Time Systems (PORTS), Pascagoula – Marine Technician
Serve as PORTS technical assistant to Project Manager, Clinton Hare, and Houston Field Office. Assist with day-to-day operations, technical support and reporting, including field support for routine operation and maintenance, annual inspection, and emergency service visits.

KEY PROJECTS (CONTINUED)

National Oceanic and Atmospheric Administration, National Ocean Service, Center for Operational-Oceanographic Products and Services (NOAA/NOS/COOPS), Physical Oceanographic Real-Time Systems (PORTS), Narragansett – Marine Technician
Serve as PORTS technical assistant to Project Manager, Clinton Hare, and Falmouth Field Office. Assist with day-to-day operations, technical support and reporting, including field support for routine operation and maintenance, annual inspection, and emergency service visits.

Kinder Morgan, Fairless Hills Terminal, PA – Project Lead
Designed and installed a wind monitoring system linked to visual and audio alarms to meet permitting requirements for offloading fine grain products. Primary tasks included oversight of design, testing, and installation of system, along with coordination with site personnel before, during, after the installation.

GHD, Rehoboth Beach Ocean Outfall Study– Local Operator/Marine Technician
Serve as local point-of-contact for field service scheduling, data delivery, and general field activity correspondence with the customer. In charge of bi-monthly CTD transect survey planning and field data collection. Assist with deployment and recovery of ADCP platforms and guard buoys.

Environ International Corporation, Morton Salt Mixing Zone Study– Marine Technician
Serve primarily as field technician for CTD survey data collection and processing. Assist with construction, mobilization, deployment, and recovery of ADCP platform and river currents transect.

National Oceanic and Atmospheric Administration, National Ocean Service, Center for Operational-Oceanographic Products and Services (NOAA/NOS/COOPS), Physical Oceanographic Real-Time Systems (PORTS), Lake Charles – Marine Technician
Serve as PORTS technical assistant to Project Manager, Clinton Hare, and Houston Field Office. Assist on an as-needed basis with technical support and reporting tasks, including field support for routine operation and maintenance activities, annual inspections, and emergency service.

National Oceanic and Atmospheric Administration, National Ocean Service, Center for Operational-Oceanographic Products and Services (NOAA/NOS/COOPS), National Water Level Observation Network (NWLON), Category 3 Hurricane Hardened Single Pile Water Level & Meteorological Observing Stations (4), Gulf of Mexico – Marine Technician
Serve as technical assistant to Project Manager, Robert Catalano. Assist on an as needed basis with initial equipment installation, testing, technical support, and reporting tasks.

KEY PROJECTS (CONTINUED)

A High-Resolution Record of Climate Instability Spanning ~1.0 Myr across the Mid-Pleistocene Transition – Research Scientist

A study of millennial-scale variability using oxygen isotopes of planktonic foraminiferal species *Globigerinoides ruber.* Prepared over 500 samples for analysis, operated and maintained mass spectrometer, analyzed dataset using spectral, wavelet, and other statistical techniques.

Daniel R. Weirauch
Marine Technician/Oceanographer
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A GHD Associate

Michael Barnett, PE, D.CE

Senior Coastal Engineer

Location

Mobile, AL

Experience

36 years

Qualifications/Accreditations

- ME, Coastal & Oceanographic Engineering, 1987
- BS, Ocean Engineering, 1981
- Diplomate in Coastal Engineering (D.CE) from the Academy of Coastal, Ocean, Port & Navigation Engineers
- Registered Professional Engineer (Civil) in Alabama, Florida, Louisiana, Mississippi, and Texas

Key technical skills

- Beach and dune restoration design and permitting
- Living shoreline design
- Coastal armoring design and permitting – revetments, seawalls, groins

Memberships

- American Society of Civil Engineers
- American Shore & Beach Preservation Association
- Florida Shore & Beach Preservation Association
- Society of American Military Engineers, Mobile Post

Relevant experience summary

Mr. Barnett has over 36 years of experience in coastal engineering. He has led the feasibility, planning, engineering design, permitting and construction/contract document preparation for beach restoration and nourishment projects, seawalls, living shoreline and muck removal projects in the southeastern US. He has led offshore sand source investigations for restoration and nourishment projects in Florida and managed the construction of a mitigative artificial reef as an element of the Miami Harbor Deepening Project. Mr. Barnett served as the former Chief of the Florida Department of Environmental Protection's Bureau of Beaches and Coastal Systems for nearly eight years.

Reach 2 Sand Forepassing Regulatory and Construction Support Service | Town of Palm Beach, FL

Role: Project Manager
Client: Town of Palm Beach
Location: Town of Palm Beach, FL
Project value: $34,000
Dates: January 2022 – present

The Town of Palm Beach has engaged the services of a contractor to transport, via off-road trucks, stockpiled sand resulting from maintenance dredging of the Lake Worth Inlet Federal Navigation Channel, and place it in the form of an upper berm/dune configuration along an approximately 1,800 linear foot segment of shoreline south of the Inlet. To date, this segment of shoreline has not benefitted from direct placement of sand. The permit authorizes the placement of approximately 20,000 cubic yards of sand. The GHD Team prepared exhibits and written documentation for an Individual Permit Application meeting with the Florida Department of Environmental Protection (FDEP) in accordance with the requirements of the Beach Management Agreement, and organized a pre-construction meeting with the selected Contractor, the Florida Fish & Wildlife Conservation Commission, the Town, and the Town's Marine Turtle Permit Holder. GHD conducted a pre-construction visual inspection of the project and is conducting periodic site inspections. Reporting and certification of project completion will be provided to FDEP upon completion of construction activities at the end of April 2022.

St. Johns County FEMA Berm Project | Continental Heavy Civil Corp | St. Augustine, FL

Role: Project Director
Client: Continental Heavy Civil Corp.
Location: St. Johns County, FL
Project value: $1.14M (Construction $33M)
Dates: March 2021-present

Michael is serving as the Project Director and Engineer of Record for a Design-Build project to restore 20 miles of eroded dunes throughout St. Johns County that were impacted by Hurricanes Matthew and Irma. Led permitting coordination and application submittal to the FDEP for the placement of approximately 750,000 cubic yards of truck-haul sand to be mechanically placed on the eroded dunes. Construction began in September 2021 and is currently underway. Sand placement and dune vegetation activities will be complete by October 2022.

Miami Dade County Coastal Erosion Hotspots: Modeling, Planning & Design Services

Role: Coastal Engineer and Project Director
Client: Miami Dade County RER-DERM
Location: Miami-Dade County, FL
Project value: $298,640
Date(s): April 2021 - Present

The Miami-Dade County Division of Environmental Resources Management (DERM), Department of Regulatory and Economic Resources (RER) retained GHD to provide coastal modelling, planning, permitting, and design services to identify and mitigate coastal erosion hotspots along approximately 13 miles of the Miami-Dade County shoreline. The shoreline of interest extends from Florida Department of Environmental Protection (FDEP) reference monuments R-7 to R-74 and comprises beach shorelines extending from a northern boundary of Sunny Isles to the Government Cut north jetty. Mr. Barnett provided quality assurance reviews of the shoreline modelling and evaluation, and assessments of permit feasibility of proposed modifications to the existing sediment management protocols currently being employed by Miami-Dade County and the US Army Corps of Engineers, Jacksonville District.

Lake Worth Inlet Sand Transfer Plant Integrity Assessment | Town of Palm Beach, FL

Role: Project Manager
Client: Town of Palm Beach
Location: Palm Beach Island, FL
Project value: $142,000
Dates: February 2021-March 2022

Mr. Barnett served as Project Manager for the conduct of a detailed visual inspection and assessment of the components of the Town's fixed sand bypassing plant located on the north side of Lake Worth Inlet, a federally authorized navigation channel. The plant pumps a sand and water slurry via a submerged pipeline underneath the inlet and discharges it to the north end of Palm Beach Island. A visual inspection of the discharge pipeline was also conducted using a crawler unit with a high-resolution video camera. A risk exposure and core risk matrix was prepared, and a capital improvements budget and prioritization program was presented to the Town.

Mid-Town Seawall Replacement Project | Town of Palm Beach, FL

Role: Project Manager
Client: Town of Palm Beach
Location: Town of Palm Beach, FL
Project value: $736,000
Dates: September 2020 - present

Michael is serving as Project Manager for this multidisciplinary data collection, planning, design, and permitting project associated with replacement of approximately 2,700 linear feet of aging seawall that protects South Ocean Boulevard and upland properties from storm impacts. The project area is along the Town's Mid-Town shoreline, which has a managed and maintained beach project providing storm protection and recreational benefits to residents and visitors. The GHD Team conducted a coastal engineering assessment of the seawall and collected site-specific topographic survey data and the acquisition of a series of Standard Penetration Test borings to characterize the subsurface soil conditions. A combination of anchored and, in special consideration areas, cantilevered wall alignments have been evaluated and designed. The design plans and specifications are currently at a 90 percent level of completeness. A permit application will be submitted to the Florida Department of Environmental Protection (FDEP) in summer 2022. The GHD Team will finalize the design in late 2022 and assist the Town with bid phase services once a permit is issued by FDEP.

Centerville Road Rock Slope Protection Revetment Design | Humboldt County, CA

Role: Coastal Engineering Lead
Client: Humboldt County, CA
Location: Pacific Ocean, Humboldt County, CA
Project value: $28,000
Date(s): April – June 2020

Mr. Barnett participated in the preparation of a coastal hazard assessment and design memorandum to determine the appropriate level of coastal storm protection needed to stabilize an approximately 750 ft segment of road along the Pacific Ocean. The evaluation included existing and projected beach profile changes attributed to sea level rise, as well as evaluations of projected wave runup and scour potential. Calculation of a stable revetment stone size and configuration were included in the design memorandum, as well as the potential beneficial reuse of the native sands and gravels present on the beach seaward of the existing coastal highway.

Pillar Point Living Shoreline Project | West Trail Shoreline Stabilization

Role: Coastal Engineer & Technical Reviewer
Client: San Mateo County Harbor District
Location: Pillar Point Harbor, CA
Project value: $26,000
Date(s): July 2018 – April 2022

The West Trail is a north-south oriented trail located along the western edge of Pillar Point Harbor (pedestrian and emergency vehicle access to the Mavericks surf break) that has been subject to erosion and emergency repairs since 1994. Mike provided final QA/QC verifications and sign-off on design methodology for shore protection to the trail and coordinated design elements to protect infrastructure that is subjected to erosional stresses along the shoreline. Construction was completed in April 2022.

Jon A. Brent, PE, SE B.S.C.E, M.S.C.E

Marine Structural Engineer

Location

Jacksonville, FL

Experience

10+ years

Qualifications/Accreditations

- M.S. Civil Engineering, 2013
- B.S. Civil Engineering, 2011
- Licensed Professional Engineer (FL, GA, IL, VA)
- Licensed Structural Engineer (GA, IL)
- Port Engineering Certificate, 2021 (ASCE)

Key technical skills

- Coastal, port, and waterfront structures
- Structural analysis, modelling, design, and detailing
- Construction observations and structural inspections
- Adaptive reuse projects

Memberships

- American Society of Civil Engineers
- Florida Structural Engineers Association
- Florida Engineering Society
- Propeller Club of Jacksonville

Relevant experience summary

Jon is a Marine Structural Engineer and Certified Inland Maritime Port Manager with over 10 years of design, management, and construction experience in a variety of infrastructure and private facility projects including ports and waterfront structures, high and heavy load cargo terminals, complex drainage and water resources structures, pipe racks and process towers for oil and gas facilities, and low-rise buildings. He has led the planning, modelling, computation, and detailing of structures for projects subject to a wide range of environmental conditions across North America and contributed as a subject matter expert for asset management initiatives and grant applications. Jon's experience also includes facility planning and site layout, 3D modelling and construction drawing development, project specifications, and discipline coordination for new construction, renovations, structural upgrades, and adaptive reuse projects.

Project Experience

Hurricane Matthew FEMA CAT B. Emergency Berm Restoration

Role: Resident Engineer
Client: St. Johns County Board of County Commissioners
Location: St. Johns County, FL
Date(s): 2020 – Present

Resident Engineer for the Design-Build Project to create a sand berm feature along 3 individual shoreline segments along the St Johns County coastline fronting the Atlantic Ocean. The project will repair damage from two devastating storm events, Hurricanes Matthew and Hurricane Irma, and provide future storm protection to improved coastline infrastructure and replacement of crucial species habitat and nesting grounds. The 11 total miles of berm will be constructed along the upper portion of the beach between the dune and Mean High Water Line. An estimated 500,000 cubic yards of sand will be sourced from nearby upland mines and truck hauled to the project site. GHD lead the project design, permitting, and environmental monitoring effort, and will continue to support through construction. The Design-Build Team fast-tracked a 60% design submittal and Florida Joint Coastal Permit (JCP) application for the project, both of which were complete within six weeks. This fast-tracked schedule constraint was required for FEMA authorized funding. Other project challenges include multi-agency coordination, limited site access, and sensitive coastal habitats. The project is slated to begin construction in late Summer 2021.

Mid-Town Seawall Replacement

Role: Structural Engineer of Record
Client: Town of Palm Beach
Location: Town of Palm Beach, FL
Date(s): 2020 – Present

Structural engineer responsible for the structural design, detailing, and specifications for the Mid-Town

Seawall Replacement in the Town of Palm Beach, Florida. The section of wall to be replaced is 2,700 linear feet providing storm protection for Ocean Boulevard, fronting the Atlantic Ocean. The wall was originally built in 1929 and partially repaired in 1957 and 1974, with the addition of toe wall in 1987, eight groins in 2001, and sheet pile repairs in 1957. Design challenges include limited as-built information for the varied existing seawall, conflicting lifeguard and restroom facilities, and a below ground outfall. Currently in design, the proposed anchored steel sheet pile wall will provide the Town protection from 100-Year storm events, including extreme scour. The design will allow for future wall expansion should the town determine they want to raise the wall elevation for additional resiliency and protection.

Asset Management Strategic Improvements Initiative – Wharf Asset Class Risk Workshop

Role: Waterfront Subject Matter Expert
Client: Port Houston
Location: Houston, TX
Date(s): 2021

Supported Port Houston's Asset Management Strategic Improvements Initiative as a subject matter expert for ports and waterfront infrastructure. Facilitated wharf asset class risk workshops and utilized a Consequence of Failure Matrix to demonstrate scoring each asset both without mitigations and with mitigations and redundancies in place. Helped port staff define the potential failures and examine the impacts and likelihood of those failures to help prioritize risk-based maintenance decisions and manage capital improvement projects.

Barge Terminal 2 Dock Wall Rehabilitation Grant Application

Role: Grant Writer
Client: St. Paul Port Authority
Location: St. Paul, MN
Date(s): 2021

Responsible for supporting the Saint Paul Port Authority's application to the Maritime Administration's Port Infrastructure Development Program for the dock wall rehabilitation project. Assisted with the application development to address aging infrastructure and improve the safety and efficiency of operations at Barge Terminal 2 (BT2), a critical barge servicing facility located on the Upper Mississippi River. The existing dock wall at BT2 exhibited signs of severe corrosion and operational damage and has experienced an increase in adverse environmental conditions over the years. The BT2 Project includes installation of a new steel sheet pile wall directly in front of the existing dock wall and a new tie-back system. GHD supported a successful $4.2 million grant application that was awarded in 2021.

Breakwater Access Improvements

Role: Structural Engineer
Client: Port of Camas-Washougal
Location: Washougal, WA
Date(s): 2020 – Present

Structural engineer responsible for the design of a new ADA access ramp to an existing breakwater at the Port of Camas-Washougal on the Columbia River in Washougal, Washington. The existing ramp alignment was not ADA compliant and required adjustments to reduce the slope. The design included a new landside abutment, three (3) new steel pipe pile-supported pentagonal concrete platform landings, new aluminum ADA ramps and hinged gangway, and the re-routing of all dock utilities. The layout and design of a practical platform arrangement and ramp alignment that matched both the location and alignment of the existing breakwater to remain and the adjacent riverbank while reducing the ramp slope was a significant challenge the project faced. In addition, all structural components were designed and detailed to meet the site's seismic requirements and the standards set forth in ASCE 61 – Seismic Design of Piers and Wharves.

***R9/27 RSA Culvert**

Role: Structural Engineer of Record
Location: Moline, IL

Structural engineer responsible for the design, analysis, and detailing of a 1,000 ft double barrel precast box culvert traversing the Runway Safety Area (RSA) of Runway 9/27 at the Quad City International Airport. Due to the culvert alignment location within the RSA, which was required for improved drainage within the airfield, the culvert had to be detailed to withstand the loads from the airport's design aircraft. For the precast sections outside the RSA, typical precast culvert sections were selected and checked for the recommended AASHTO loads. The dimensions for the typical precast section were used as a baseline and the reinforcement for the sections within the RSA was designed and detailed to meet the required aircraft loading. This allowed the units to utilize the same formwork at the precast fabricator's yard and provided a seamless transition of the typical culvert section to the aircraft-rated section within the RSA without the need for a transition collar. Due to the selected alignment, cast-in-place end sections and wing walls were required to match the existing upstream and downstream ditches.

*****Denotes work completed with previous firm***

A GHD Associate

Melissa K. Burns, PE

Structural Engineer

Location

Orlando, FL

Experience

11 years

Qualifications/Accreditations

- BS, Civil Engineering, 2011
- Licensed Professional Engineer (FL, GA, LA, SC)

Key technical skills

- Coastal structure inspection and repair recommendation
- Coastal structures design and permitting
- Linear Infrastructure design – retaining walls, roadway, bridge, deep foundations
- Structural finite element analysis
- Beach and dune restoration design and permitting
- Alternative Delivery/ Design-Build Project Management

Memberships

- American Society of Civil Engineers, East Central Branch (President)
- American Council of Engineering Companies of Florida (ACEC-FL), Transportation & Legislative Committees
- Society of American Military Engineers, Space Coast Post

Relevant experience summary

Ms. Burns is a Marine and Linear Infrastructure Structural Engineer and Project Manager with 11 years of design and management experience. Her projects have encompassed a wide range of private and public facilities including feasibility evaluations, design, modelling, and computation of structural elements, and production detailing of plan sets within all phases of design from preliminary engineering pursuit to the final design of structures for both design-build and conventional projects. She is thoroughly experienced in both linear infrastructure and coastal projects ranging in complexity from simple structures to multi-phase projects accounting for future year expansion capacities.

Coastal Design

City of Key West - Turtle Kraals & C-Dock Task Orders

Role: Deputy Project Manager and Structural Engineer

Client: City of Key West

Location: Key West, FL

Project value: $140,000

Dates: September 2021 - present

Deputy Project Manager and Structural Engineer for the Task Work Orders Issued under the City of Key West Environmental Engineering Contract. The combined two tasks include the Engineering Assessment & Conceptual Repair Alternatives of approximately 450 linear feet of C-Dock in the Historic Key West Bight Marina. Ms. Burns oversaw the underwater inspection and condition assessment on the concrete seawall and will provide Repair Alternatives with estimates of probable construction costs. The paired tasks of the Historic Turtle Kraal includes underwater evaluation of structural piling for the educational recreation of the historic Key West Turtle harvesting industry. Project site inspection was completed in Fall 2021 with final reports and evaluations to be delivered in Spring 2022.

Confidential Client– Tampa, FL Seawall Investigation

Role: Structural Engineer of Record

Client: Confidential Client

Location: Tampa, FL

Project value: $7,000

Dates: December 2021

Structural Engineer of Record for a due diligence inspection of a concrete panel seawall in Tampa, FL for a Confidential Client. The task included the inspection of concrete seawall along the Hillsborough River in Tampa, FL. Melissa completed the inspection

and condition assessment on the concrete seawall and will provided Repair Alternatives with estimates of probable construction costs. Additionally, repairs and recommendations included a future development analysis considering client anticipated land use, environmental conditions, and flood/ sea level rise risk.

South Bayshore Lane Roadway and Drainage Improvements – Phase II Stormwater Pump Station

Role: Structural Engineer of Record

Client: City of Miami

Location: Miami, FL

Date(s): 2021-Present

Served as Structural Engineer of Record for upsizing a 15” outfall through a seawall to 36”. GHD Served subconsultant to ADA Engineering. Project includes the design and analysis of an un-dated seawall with limited as-built and modification records. Detailed analysis and construction plans provided to ensure the integrity of the seawall and upland improved infrastructure such as high-density condominiums and apartments. Project challenges included an accelerated schedule, close proximity design components and limited as-built structural information.

Mid-Town Seawall Replacement

Role: Structural Engineer

Client: Town of Palm Beach

Location: Town of Palm Beach, FL

Project value: $736,000

Dates: September 2020 - present

Structural engineer responsible for the type selection, layout and design of the Mid-Town Seawall Replacement in the Town of Palm Beach, Florida. The section of wall to be replaced is 2,700 linear feet providing storm protection for Ocean Boulevard, fronting the Atlantic Ocean. Originally built in 1929 and partially repaired in 1957 and 1974, addition of toe wall in 1987, addition of eight groins in 2001, and sheet pile repairs in 1957. Design challenges include limited as-built information for the varied existing seawall, conflicting lifeguard and restroom facilities, aesthetic clocktower, and a below ground outfall. Project has completed 90% design and is in the permitting application process. The proposed anchored steel sheet pile wall will provide the Town protection from 100 Year storm events, including extreme scour. The design will allow for future wall expansion should the town determine they want to raise the wall elevation for additional resiliency and protection. The team will finalize the design in early 20222 and assist the Town with bid phase services following permit issuance

St. Johns County Hurricanes Matthew and Irma FEMA Emergency Berm Restoration

Role: Deputy Project Manager and Lead Design Engineer

Client: St Johns County

Location: St Johns County, FL

Project value: $1.14M (Construction $33M)

Date(s): March 2021 - Present

Deputy Project Manager and Lead Design Engineer for the Design-Build Project to create a sand berm feature along 8 individual shoreline segments along the St Johns County coastline fronting the Atlantic Ocean. The project repairs damage from two devastating storm events, Hurricanes Matthew and Irma, and provides future storm protection to improved coastline infrastructure and replacement of crucial species habitat and nesting grounds. The 20 total miles of berm will be constructed along the upper portion of the beach between the dune and Mean High Water Line. An estimated 750,000 cubic yards of sand will be sourced from nearby upland mines and truck hauled to the project site. The GHD Team led project design, permitting, environmental monitoring and construction support services. The Design-Build Team has fast-tracked a 60% design submittal and Florida Joint Coastal Permit (JCP) application for the project, which were both complete within six weeks. The fast-tracked schedule constraint issued by FEMA on the authorized funding. Other project challenges include multi-agency coordination, limited site access, and sensitive coastal habitats. The project is currently in construction phase, slated to be completed in Spring 2022.

SR A1A/ Heckscher Drive from Ft. George Trailhead to Huguenot Park

Role: Structural Engineer

Client: FDOT, District 2

Location: Duval County, FL

Served as lead structural project engineer for the design and plans of the new Multi-Use bridge alignment adjacent to the existing Haulover Creek bridge crossing. Structural design elements include a four span, 248’-0” total length, AASHTO type II beam structure with a continuous cast in place deck. The bridge is founded on 24” Square prestressed concrete piles with concrete clad sheet pile retaining wall abutments.

Melissa served as the lead project engineer and was responsible for the overall design of the bridge. She was responsible for the following calculations: Bridge Development Report alternatives and preliminary alternatives feasibility including bridge geometry and layout, Phases 30% through 90% design of Concrete AASHTO Type II Beams, reinforced cast-in-place concrete deck, driven concrete pile design including cap reinforcement, overturning, and min-tip analysis, driven sheet pile wall design and layout, bridge elevations, reinforcing designs, and performed QA of the remaining quantities and structural components.

*****Denotes work completed with previous firm***

[Choose an option...]

Craig Kruempel MS

Senior Coastal Scientist

Location

West Palm Beach, Florida, United States

Experience

36 years

Qualifications/Accreditations

- Offshore Protected Species Observer, 2020
- NEPA Certificate Program Coursework, Duke University, 2003
- MS, Coastal Zone Management, Florida Institute of Technology, 1984
- BS, Biology, St. Johns University (MN), 1981

Memberships

- American Academy of Underwater Scientists – Voting Member since 2007
- Divers Alert Network – Member since 1990
- National Association of Environmental Professionals – Member since 1989
- Florida Association of Environmental Professionals – Member since 1989
- Member of the Florida Shore & Beach Preservation Association (FSBPA)
- Member of American Water Resources Association

Relevant experience summary

Mr. Kruempel has more than 36 years of experience providing clients with coastal zone resource planning, documentation, permitting, and monitoring services. His extensive experience includes the development and implementation of comprehensive characterization, monitoring, and restoration program documents with an emphasis on natural hardbottom and artificial marine habitats. Mr. Kruempel has over 30 years of compliance and coordination experience implementing the National Environmental Policy Act (NEPA) regulations for federal agency actions, with a comprehensive understanding of State and Federal coastal resource permitting requirements. Additional areas of specialization include physical and biological assessments and project effect determinations and he has served as team leader and principal scientist since 1988 for numerous field investigations and site assessments. He has served as project manager on numerous linear projects, including offshore energy project proposals. He has extensive experience overseeing shore protection project construction, including beach nourishment, and dune restoration activities throughout Florida. As a consultant to the National Oceanic and Atmospheric Administration, he served as project manager and senior consulting scientist for four (4) large-scale reef restoration projects resulting from ship grounding incidents in Puerto Rico and the Florida Keys.

Project experience

Reach 2 Forepassing Dune Construction Project

Permitting / Local Coordination |
Town of Palm Beach, FL | $34,128 | 2021 – 2022

Mr. Kruempel is supporting the permitting and local coordination for the second sand placement project within the Town of Palm Beach's Reach 2 shoreline. In January 2022, the Palm Beach Harbor Maintenance Dredging and Bypassing Project commenced dredging operations within the Federal Navigation Channel with beneficial reuse of the dredged material. Approximately 400,000 cubic yards of beach-quality sand are designed to be placed south of the Inlet to restore the shoreline and supplement sand bypassing around the Inlet. The Project limits span approximately 1,812 ft. of the Reach 2 shoreline and will be implemented using off-road trucks to transport the sand from the bypassing project and place it in a dune feature throughout the Reach 2 Project limits.

Miami Dade County Coastal Erosion Hotspots: Modeling, Planning & Design Services

Senior Marine Scientist & Permitting Specialist

Miami Dade County RER-DERM | Miami-Dade County, Florida | $500,000 | 2021-ongoing

The Miami-Dade County Division of Environmental Resources Management (DERM), Department of Regulatory and Economic Resources (RER) retained GHD to provide coastal modelling, planning, permitting, and design services to identify and mitigate coastal erosion hotspots along approximately 13 miles of the Miami-Dade County shoreline. The shoreline of interest extends from FDEP reference monuments R-7 to R-74 and comprises beach shorelines extending from a northern boundary of Sunny Isles to the Government Cut north jetty. Mr. Kruempel is supporting the client during preliminary State and Federal regulatory agency coordination that will lead to existing authorization modifications to allow shore protection projects within a broader segment of the County's shoreline by Miami-Dade County and the US Army Corps of Engineers, Jacksonville District.

Lake Worth Inlet Sand Transfer Plant Condition Assessment Project

Detailed Assessment |
Town of Palm Beach, Florida | $141,700 | 2021

Mr. Kruempel is supporting the Town in performing a detailed assessment of the Town's Sand Transfer Plant (STP). Built in 1958 and subjected to numerous improvements since, the STP is located on the north side of the Lake Worth Inlet north jetty. The purpose of the STP is to bypass a portion of the sand that is interrupted by the navigation channel, which acts as a sediment sink and a barrier to longshore sand transport. When combined with navigation channel maintenance dredging the Town's management program strategically bypasses approximately 200,000 cy of sand on an annual basis. Services associated with this Project include an assessment of the STP key operational components, creation of an asset register, and develop a Business Risk Exposure (BRE) profile for all assets. The BRE is an advanced asset management methodology used to focus on high-risk assets and develop a Capital Improvements Program for the Town to strategically manage this important installation.

Port Everglades Harbor Monitoring Project

Quality Assurance/Quality Control |
Port Everglades Harbor, Florida | $920,000 | 2020 - 2021

Mr. Kruempel served as QA/QC and coordinated logistics associated with a scope of work that includes providing water quality monitoring services to support the Operation and Maintenance (O&M) dredging event for Port Everglades Harbor in Florida. The services include on-site inspection, monitoring, reporting, and oversight at the Federal Channels of Port Everglades, FL. A robust monitoring program was refined and implemented to collect sediment samples at fixed locations, water quality (turbidity and TSS) at fixed as well as variable sites, and ADCP data collection during the O&M navigation dredging at the Port which occurred from December 2020 through March 2021.

Mid-Town Seawall Replacement Project

Design, Permitting and Bid Phase Services |
Town of Palm Beach, Florida | $736,483.50 | 2020 - Ongoing

Mr. Kruempel is supporting the Town's Project that is working on the Design, Permitting and Bid Phase Services associated with replacement of an aging section of existing seawall fronting the Atlantic Ocean in order to provide storm protection for Ocean Boulevard, which serves as the hurricane evacuation route for this segment of the Island. The Mid-Town Seawall Replacement Project (Project) comprises approximately 2,700 linear feet of seawall protecting Ocean Boulevard along a very popular public beach in the heart of the Town. A number of design consideration have been identified along the alignment, and GHD's engineers and scientists have performed baseline investigations, preliminary (30%) design, and coordinated with the FDEP on regulatory requirements associated with Project development and implementation.

Lake Worth Lagoon Moored Vessel Investigation Project

Detailed Investigation |
Town of Palm Beach, Florida | $29,201.69 | 2020

Mr. Kruempel supported the Town in performing a detailed investigation of vessels moored adjacent to the Town's western boundary within the Lake Worth Lagoon. The purpose of the investigation was to determine the nature and extent of undocumented and unauthorized mooring installations within the Town's jurisdiction. The results of the study are being used by the Town and Florida Department of Environmental Protection to determine vessel ownership and develop a management strategy for these unauthorized mooring installations.

Terminal Expansion at PortMiami

Technical Expert |
MSC Cruises | Miami Beach, FL | 2019

MSC Cruises is proposing a new terminal expansion to be located along the eastern end of Dodge/Lummus Island. Construction is expected to occur in 2022. GHD has been retained to provide a coastal study that includes the development of: Site environmental conditions, Underkeel clearance and scour potential during vessel arrival/departure, Mooring and berthing analysis; and a Top of wall assessment. Mr. Kruempel has served as a technical expert and performed QA/QC review of the project deliverables.

South Beach Development Project Sampling and Analysis Plan Development

Technical Expert & Regulatory Support |
Hotel Del Coronado | Coronado, CA | 2018 - 2019

Mr. Kruempel co-authored the approved and implemented Sampling and Analysis Plan (SAP) to support the Hotel Del Coronado in efforts towards characterization of export materials from the South Beach Development Project (Project) for potential use for beach nourishment at adjacent beaches. The Project proposes a major expansion of the Hotel Del Coronado to include a new conference center, guest rooms, and a subterranean parking garage on an existing surface parking lot. Proposed cut depths for the construction of the Project would be to about 15 feet below existing grade and is anticipated to generate about 50,000 CY of export sand available for beneficial reuse. The receiving beach being considered for placement was a previously approved placement site under the City of Coronado's Opportunistic Beach Fill Program in 2008. Use of upland materials for beach placement requires sampling and analysis of the materials in order to determine their compatibility by resource agencies. The SAP developed, implemented and analyzed proposed export materials from the Project in accordance with USACE and USEPA protocols. These agencies are responsible for issuing material compatibility determinations for placement of fill in Waters of the United States.

Living with The Bay Coastal Marsh Restoration – 30% Design

Quality Assurance / Quality Control |
NY Governor's Office for Storm Recovery (GOSR) |
East Rockaway, New York | 2017 - 2018

QA/QC professional for the preparation of a 30% design of a coastal marsh restoration project (Project V), under contract with the New York Housing Trust Fund Corporation and the Governor's Office for Storm Recovery (GOSR) in support of the Living with the Bay Resiliency Strategy. Located in western embayment of the overarching Hempstead Bay, the Project Area is situated south of Bay Park in East Rockaway, New York, inclusive of Hewlett Bay. The total Project Area (1,609 acres) includes 7 salt marsh systems within the Project Area: Hewlett Hassock (Nums Marsh), Pearsalls Hassock, West Meadow, North and East Meadow, Cedar Island, Black Banks Hassock, and Simmons Hassock. The Coastal Marsh Restoration Project goals include adaptations for sea level rise and increased capacity of the marshes to attenuate storm surge and storm wave effects. Several design concepts include marsh edge stabilization techniques (to reduce marsh losses due to erosion); as well as the beneficial use of dredged materials and potential offshore borrow source materials to raise the marsh platform elevations of mudflat and low marsh areas. Mr. Kruempel also prepared a comprehensive evaluation of the Living with the Bay Project area using the National Estuarine Research Reserve Association's (NERRA) Marsh Resilience to Sea Level Rise (MARS) tool developed to quantify marsh resilience in the face of sea level rise.

Hurricane Irma Debris Management & Monitoring Services

Operating Unit Project Manager |
Over 50 Regional and Municipal Governments |
Florida | 2017 - 2018

On September 10, 2017, Category 4 Hurricane Irma made landfall in the Florida Keys with maximum sustained winds of 130 mph and proceeded north over the entirety of the Florida Peninsula. Flooding, wind damage, and power outages were experienced throughout Florida with virtually the entire State affected. The firm was retained by over 50 regional and municipal governments to support debris management and monitoring efforts after passage of the storm. Mr. Kruempel was tasked with serving as the Operating Unit's Project Manager to support the selection, mobilization, and deployment of nearly 40 Associates from throughout North America and Puerto Rico to affected areas in Florida. Over the course of approximately 60 days, these Associates logged over 12,000 hours in support of the client communities throughout Florida under Mr. Kruempel's supervision.

Palm Beach Island Beach Management Agreement Consulting

Biological Expert |

Palm Beach Island, Florida | $18,527.94 | 2012 – 2018

In 2012, the Florida Department of Environmental Protection's (FDEP) Bureau of Beaches and Coastal Systems initiated a pilot project designed to take a regional approach to permitting beach nourishment and inlet management. The pilot project includes about 15 miles of shoreline and stretches across several public and private boundary lines from the Lake Worth/Palm Beach Inlet to the South Lake Worth/Boynton Inlet in Palm Beach County. The FDEP worked with local governments and other groups in a stakeholder-driven process to develop a cooperative agreement to manage the entirety of the Island (Source: http://www.dep.state.fl.us/BEACHES/pb-bma/index.htm). Under contract to the Town of Palm Beach, Mr. Kruempel supported the Town and FDEP throughout the public scoping process to prepare and implement a comprehensive beach management strategy designed to more effectively monitor, manage, and protect coastal resources within the project area - thereby allowing for a more efficient process for shore protection project implementation.

Pradeep Nagarajan P.E., CFM

Technical Director – Integrated Water Management

Location

Atlanta, GA, USA

Experience

18 years

Qualifications/Accreditations

- Registered Professional Engineer/FL/PE66651, 2007
- Master of Science, Computer Science (Advanced Information Systems), 2002
- Master of Science, Environmental Engineering, 2000
- Bachelor of Technology, Chemical Engineering, 1998

Key technical skills

- Hydrologic and Hydraulic Modeling
- Master Planning
- Water Resources, Water Quality
- Watershed Studies and Planning
- Asset Management
- Integrated Water Management; Stormwater Management
- Green Infrastructure/LID
- Flood Mitigation and Floodplain Analyses
- Environmental Assessments

Memberships

- Association of State Floodplain Managers (ASFPM).
- American Society of Civil Engineers (ASCE)

Relevant experience summary

Over 18 years of experience specializing in the field of water resources, stormwater, water and wastewater master planning, modeling and design projects. He also mentors and supervises several water resource and wastewater engineers on a wide variety of projects. Pradeep has a strong background and extensive experience in surface/ground water hydrology, hydraulics, basin-scale water resources studies, flood analysis, stormwater management, preparation of watershed master plans, utility planning, computer-based mathematical 1D/2D modeling of water resources and environmental systems using INFOWORKS, ICPR, MIKE SHE, MIKE 11, MIKE URBAN, MIKE FLOOD, MIKE 21, MIKE VIEW, PCSWMM, XPSWMM, HEC-HMS, HEC-RAS, ASAD etc., design of stormwater management and treatment structures, pumps, and piping systems, floodplain mapping, and water quality modeling. His experience also includes water distribution and wastewater collection system modeling, design of pipelines, preparation of HMGP/PDM applications through FEMA to obtain federal and state grants for several clients on different projects.

City of Charleston Watershed Master Plan for DuPont/Wappoo Watershed

Role: Task Manager
Client: City of Charleston
Location: Charleston, SC, USA
Project (CAPEX) value - $384K
Date(s): 2017 - 2019

Task Manager responsible for managing the overall aspects of the project that included data collection and development, GIS data acquisition and analysis, condition assessment of the structures, hydrologic and hydraulic model development and calibration, development of system alternatives and preparation of watershed masterplan report. The DuWap watershed comprises portions of the Dupont and Wappoo watersheds located in the West Ashley area of Charleston County and encompasses an area of approximately 1,600 acres. The primary purpose of the Plan is to provide an overall assessment of the existing stormwater infrastructure and make recommendations for improvements to the DuWap watershed with regard to surface water management. Scope of services included delineation of watershed boundaries using ArcHydro and interconnects using elevation data and ArcGIS, development of hydrologic/hydraulic model of the watersheds using

ICPR 4.0, calibration of the model for Hurricane Irma and identification of improvement projects and best management practices to enhance flood control and water quality in the watersheds.

City of Charleston Watershed Master Plan for Cooper/Jackson Watersheds

Role: Task Manager
Client: City of Charleston
Location: Charleston, SC, USA
Project (CAPEX) value - $480K
Date(s): 2020 - 2021

Task Manager responsible for managing the overall aspects of the project that included data collection and development, GIS data acquisition and analysis, 2D-hydrologic and hydraulic model development and calibration using ICPR / InfoWorks ICM, development of system alternatives and preparation of watershed masterplan report. The Copper/Jackson watershed is in the Peninsula region of Charleston County and encompasses an area of approximately 200 acres.

City of Decatur Stormwater Master Plan

Role: Task Leader

Client: City of Decatur

Location: Decatur, GA, USA
Project (CAPEX) value - $590K
Date(s): 2018 – 2020

Task Leader responsible for the delivery of optimized hydrologic and hydraulic model of the City's drainage system that solve the City's stormwater and water quality challenges for the next 20 years. The scope of work includes delineation of watershed boundaries and interconnects using elevation data and ArcGIS, development of hydrologic/hydraulic model of the watersheds using PCSWMM, water quality modeling, and identification of improvement projects and best management practices to enhance flood control and water quality in the watersheds.

Digital Flood Insurance Rate Map and Flood Insurance Study for Broward County

Role: Technical Leader
Client: FEMA Region IV
Location: Broward County, FL, USA
Project (CAPEX) value - $1.2M
Date(s): 2009 – 2011

Technical Leader responsible for managing the overall aspects of the project that included data collection and development, GIS data acquisition and analysis, modeling, and development of the final report. The project area encompasses the complete Broward County with some portions of Dade County on the north and Palm Beach County on the south. Scope of services included modification of MIKE SHE/MIKE 11 model for the entire Broward County with new LIDAR based DEM and new Land Use data, calibration and verification of the model using known Hurricane storm events by modifying Structure/Gate openings, Tidal boundaries and Boundary Conditions, simulating the calibrated model for several design storm event scenarios and development of final report.

Sarasota County Watershed Model Maintenance and GIS Update – Lemon Bay Model

Role: Project Manager
Client: Sarasota County
Location: Sarasota County, FL, USA
Project (CAPEX) value - $120K
Date(s): 2011 – 2012

Project Manager responsible for managing the overall aspects of the projects, which included submitting project deliverables on time and within budget. Scope of work include updating the Lemon Bay Model by incorporating several subdivisions such as the Oak Forest, Arlington Cove, integrating Alligator Creek, incorporating Winchester Blvd to name a few. The Lemon Bay AdICPR Model was updated to incorporate the as-built conditions of the aforementioned subdivisions. The main storage areas in the subdivisions (Lakes and Ponds) were used as the base to develop the new node-link network inside the sub-divisions. Overland flow was represented by using natural weirs. The nodes from the original model that included the areas where the subdivisions are located were also modified. The updates made to the Lemon Bay AdICPR Model were documented using the DBF Comparator utility. Based on the revisions made to the model, the scope of work also included updating the Sarasota County GIS database system based on the revisions made to the model along with development of 100-year 24 hr floodplain delineation maps.

Collier County, Public Utilities Master Plan

Role: Technical Advisor
Client: Collier County
Location: Collier County, FL, USA
Project (CAPEX) value - $1.1M
Date(s): 2020 - 2021

Technical Advisor responsible for overseeing the master plan that included water, wastewater, and irrigation systems. A comprehensive master plan that provides direction to CCWSD for near- and long-term infrastructure management strategies supported by technical evaluations and capital improvement programs focused on meeting future customer demands with best value solutions and fully leveraged assets. The project included evaluation of population trends and demands, treatment capacity assessments, hydraulic modeling for infrastructure improvements (InfoWorks InfoSWMM), and evaluation and prioritization of capital improvement projects. Final Master Plan Report is developed that would meet customer requirements over a 20-year planning horizon and final build-out condition anticipated in the Year 2034.

Matthew Trzcinski, PE

Senior Project/Design Manager

Qualified: Bachelor of Science, Civil Engineering, The Ohio State University (OSU). Register professional engineer in the states of Florida and Texas.

Connected: Member of American Water Works Association (AWWA), WateReuse Association, Water Environment Federation (WEF)

Professional Summary: Mr. Trzcinski has over 27 years' experience in the water sector serving as an engineer and project manager. He has extensive experience applying membrane technologies to water related applications. He has been involved with more than twenty membrane projects ranging from reuse to ultrapure water. His experience includes managing design activities; supervising engineering efforts; managing sub-consultant and contractor activities; managing project schedules and budgets; performing quality assurance reviews; managing project risk and change; providing construction, commissioning, and startup support services; mentoring engineers; and preparing reports for municipal and industrial projects across North America and Asia, including alternative delivery projects.

Project/Design Manager
Backup Deep Injection Well Design and Permitting | City of Fort Myers | Fort Myers, FL

Mr. Trzcinski is serving as project/design manager for the design, permitting, procurement, and construction of a 11.4 MGD UIC Class I UIC well. Responsibilities include coordinating engineering disciplines; overseeing permitting activities; managing sub-consultants; performing quality assurance reviews; communicating with client, preparing progress reports, and managing scope, schedule and budget. The Class I Injection Well will improve the reliability of the Reverse Osmosis WTP by providing operational flexibility and an emergency disposal method of the plant's brine stream.

Program Management Project Manager
Ocean Outfall Legislation | Miami-Dade Water and Sewer Department | Miami, FL

Mr. Trzcinski played a key role in the implementation of a multi-billion-dollar wastewater treatment system improvements and expansion program by keeping key projects on budget and schedule. He accomplished this by implementing key program processes; developing comprehensive task authorizations; negotiating contracts; and assessing and mitigating risk. He also managed design consultants; provided quality assurance reviews; and acted as the liaison between WASD and the design consultants. Mr. Trzcinski was responsible for developing progress reports; recommending approval of deliverables and invoices; preparing for and holding meetings and workshops; and implementing quality procedures.

Project/Design Manager
FGD ELG UIC Well System Phase II | Tampa Electric Company | Tampa, FL

Mr. Trzcinski served as project/design manager for Phase II, the design and permitting of two Class I UIC wells. Responsibilities included coordinating engineering disciplines; overseeing permitting activities; managing sub-consultants; performing quality assurance reviews; communicating with client, preparing progress reports, and managing scope, schedule and budget. The Class I Injection Wells will allow TEC to meet the EPA Final Rule related to ELGs for coal fueled steam electric power generating facilities.

Project/Design Manager
FGD ELG UIC Well System Phase III | Tampa Electric Company | Tampa, FL

Mr. Trzcinski is serving as project/design manager for Phase III, the design, procurement, and installation of the storage, pretreatment, and conveyance systems for FGD wastewater disposal into two Class I UIC injection wells. Responsibilities include coordinating engineering disciplines; managing sub-consultants; performing quality assurance reviews; communicating with client, preparing progress reports, and managing scope, schedule and budget. The Class I Injection Wells allow TEC to meet the EPA Final Rule related to ELGs for coal fueled steam electric power generating facilities.

Technical Specialist/Project Engineer
Darat Water Management Project | Brunei Shell Petroleum | Seria, Brunei

Served as technical specialist during the define phase for an USD 200 million EPC 20,000 m3/d onshore seawater treatment facility. The design utilized seawater NF technology for a low sulfate / high TDS injection water for improved oil recovery. Mr. Trzcinski was responsible for resolving technical queries; reviewing drawings, specifications, and material requisitions; and assisting in the development of scopes of work for owner procured equipment and demolition/construction contracts. He assisted in implementing Shell's Flawless Project Delivery and Systemization programs and provided technical support during all aspects of the project including Desktop, OMAR, and Constructability reviews; HAZOP, HAZID, SAFEOP, IPF, Novelty/Complexity, VE

workshops; and bid reviews. He assisted in the development of Plant O&M Philosophy, O&M Cost Estimate, Operations Readiness Plan, and the development of bid evaluation criteria.

Project Manager/Design Manager
Appomattox Gulf of Mexico Semi-Submersible Deep-Water Project | Shell Offshore Inc. | Houston, TX

Served as project/design manager and technical specialist for the design, fabrication, and testing of two ultrapure water treatment skids for the Appomattox semi-submersible deep-water production facility. The design utilized BWRO, membrane deaeration, and continuous electrode ionization processes to produce boiler feed water for once-through stream generation. It is the first time the combination of these technologies was used in the oil and gas industry. He was responsible for developing the design and responding to clarifications during the proposal phase; assembling project execution team; overseeing and managing design, procurement, and fabrication activities; developing internal and external progress reports; managing budget and schedule; meeting with the client; and resolving commercial and technical issues.

Owner's Engineer
Industrial Complex Development | Confidential Client | Washington, DC

Serving as owner's engineer to support the development of a business plan for EPC of multiple industrial complex projects across the globe. Each project will produce up to 300 MGD of desalinated seawater, 3 GW of electrical power (via geothermal wells), and 350 thousand tons of chlor-alkali products from the brine waste stream of the desalination process at an estimated cost of US$6 – 8 billion for each project. Responsibilities include the development of a gap analysis to identify tasks on the critical path; information/reports/actions required to complete each task; the current state of the information/action; risk register items; missing information/reports/actions required to complete each task; outlines of required reports/plans; duration to develop each report/plan; required completion date to support owner's schedule. Other activities include conceptual development of water related processes; estimating capital and O&M costs; and delivery methodology advice.

Technical Specialist
Kay Bailey Hutchinson RO Desalination Facility | El Paso Water Utilities | El Paso, TX

Served as technical specialist during the design, construction, and start-up of the 27.5 MGD RO Facility for El Paso Water Utilities. Mr. Trzcinski was responsible for process design; process mechanical detailing; specification writing; developing commissioning, start-up, and performance testing procedures; providing construction support and inspection services; plant start-up and oversight; and assisting in the development of operator training materials and classes. The facility won the 2007 Engineering Excellence Gold Award from the Texas Council of Engineering Companies and the 2008 Superior Achievement Award from the American Academy of Environmental Engineers.

Technical Advisor
Sulaibiya Wastewater and Reclamation Plant | Government of Kuwait | Sulaibiya, Kuwait

Mr. Trzcinski provided technical support and oversight during the mechanical completions phase at the Sulaibiya Wastewater and Reclamation Plant. Responsibilities included specialty inspection; developing punch list items; and reviewing commissioning and start-up procedures. The reclamation plant included 100 MGD ultrafiltration facility and an 80 MGD RO facility.

Project/Design Manager
Newark Desalination Facility Phase 2 | Alameda County Water District | Newark, CA

Mr. Trzcinski served as project/design manager during the design of the Phase 2 Newark Desalination Facility Expansion project. Responsibilities included supervising the preparation of a design report and design; coordinating engineering disciplines; process design oversight; managing sub-consultants; performing quality assurance reviews; communicating with client, preparation of progress reports, and managing scope, schedule and budget. The Newark Desalination Facility was expanding from 6 MGD to 12.5 MGD.

Project Engineer/Technical Specialist
Newark Desalination Facility Phase 1 | Alameda County Water District | Newark, CA

Mr. Trzcinski served as technical specialist during the design and construction of a 6 MGD reverse osmosis desalination plant for the Alameda County Water District. Responsibilities included process design; chemical system design; mechanical detailing; equipment evaluation; specification writing; shop drawing review; specialty field observation for 6 months during construction; CSU support; and O&M training.

Project Manager
Security Systems Planning, Design, and Construction | Tampa Bay Water | Clearwater, FL

Mr. Trzcinski was responsible for overseeing the development of a security master plan and implementing the client's Protective Measures Index safeguards by developing site-specific security improvement designs in a prioritized manner and by performing the duties of Construction Services Engineer. Responsibilities included

supervising engineers; coordinating project activities; reviewing submittals; answering RFIs; preparing change order documents; approving payment applications, preparing progress reports and schedules; performing quality assurance reviews; and managing budget and schedule.

Project/Design Manager
Reclaimed Water Pilot Plant Design | Santa Clara Valley Water District | San Jose, CA

Mr. Trzcinski served as project/Design manager during the development of a pilot plant design and test protocol for a study to evaluate RO and pretreatment technologies for wastewater reclamation. Responsibilities included managing scope, schedule, and budget; developing pilot test protocol; process design; and the development of commissioning, start-up, and performance testing procedures. The design incorporated pressurized microfiltration technology.

Technical Specialist
Santa Cruz Seawater RO Pilot Test Program | City of Santa Cruz | Santa Cruz, CA

Mr. Trzcinski served as technical specialist during the design and construction of the City of Santa Cruz pilot test program. Responsibilities included regulatory compliance; developing pilot test protocols; process design; construction oversight; and start-up and commissioning oversight. The pilot plant tested conventional flocculation/sedimentation; pressurized media filtration; slow sand filtration; submerged and pressurized UF; chlorine dioxide; and UV.

Technical Advisor
Tuen Mun Seawater Pilot Study | Water Supplies Department of Hong Kong | Hong Kong

Mr. Trzcinski served as technical advisor during the construction, commissioning, and start-up of the desalination pilot plant. Responsibilities included specialty site inspection; developing punch list items; startup oversight; and training the operators in the operation and maintenance of the facility. The pilot plant utilized three separate treatment trains using two ultrafiltration membrane technologies and multi-media filtration as pretreatment to the SWRO process.

Technical Advisor
Technology Evaluation | California Water Company | Salinas, CA

Mr. Trzcinski evaluated the feasibility of treating well water for the City of Salinas to remove MTBE; PCE; nitrate; and arsenic. The feasibility study included the review of water quality data and evaluation of the distribution system to determine the appropriate treatment processes and the feasibility of centralizing treatment facilities. Treatment processes evaluated included air stripping, reverse osmosis, ion exchange and GAC adsorption.

Project Engineer
Groundwater Contaminants Feasibility Study | California Water Company | Kern River Valley, CA

Mr. Trzcinski served as project engineer for a feasibility study for the removal of nitrate and 1,1-dichloroethylene (DCE) from groundwater. Reverse osmosis, granular activated carbon, ion exchange, and ultraviolet technologies were evaluated. The study also included the preliminary design of an ion exchange process for nitrate removal and a packed column for air stripping DCE.

Project Manager
Pure WTP | Sony Display Devices | Singapore

Mr. Trzcinski served as project manager during the design and construction of a pure-water treatment plant expansion for Sony. Responsibilities included process design; developing cost proposal; negotiating scope of work and price; plant design; overseeing the day-to-day activities during design and construction; preparing progress reports and managing schedule and budget. Reverse osmosis and ion exchange technologies were utilized to produce 2 Mohm-cm water.

Process Engineering/Design Manager
US Embassy Water Treatment Facility | Perini Corporation | Baghdad, Iraq

Mr. Trzcinski was the process Engineering Manager during the design of a water treatment facility for the U.S. embassy in Iraq. Responsibilities included providing process design oversight; supervising the activities of engineers; preparing progress reports and schedules; performing quality assurance reviews; managing the engineering budget and schedule; and meeting and communicating with the client. The facility could treat both surface and ground water using ultrafiltration and reverse osmosis technologies and was housed in containers to facilitate quick installation and start-up.

Technical Specialist
Water Reuse Evaluation | US DOD | Norfolk, VA

Mr. Trzcinski served as a team member responsible for providing quality assurance and quality control oversight during the evaluation of a proposed brackish desalination system to use reclaimed water in a steam generation process.

Technical Specialist
Seawater RO Design-Build | Sand City | Sand City, CA

Mr. Trzcinski served as technical specialist during the development of the 30% design design-build submittal for the Sand City 0.6 MGD design-build seawater desalination facility. Responsibilities included process design; overseeing and coordinating engineering disciplines; developing drawings; and regulatory compliance.

Thomas Pierro, PE, D.CE

PRINCIPAL ENGINEER

5301 N. Federal Highway, Suite 335, Boca Raton, FL 33487
tpierro@coastalprotectioneng.com; 561-756-2535

PROFESSIONAL QUALIFICATIONS

Thomas Pierro, PE, D.CE, is a Managing Member of Coastal Protection Engineering (CPE) and serves as Principal Engineer for the firm and its clients. Since 2001, Mr. Pierro has designed, permitted, and supervised construction of numerous shore protection projects, with a primary focus in Florida and New York. He directs complex analysis of beach/inlet processes, designs programs that control high erosion near coastal inlets, and promotes forward thinking throughout his team to support sustainable coastal programs. In 2011, Mr. Pierro was awarded the Jim Purpura / T.Y. Chiu Award from the FSBPA for outstanding contribution to coastal engineering in the State of Florida. He has supported the Town of Palm Beach on many components of their coastal program for over 15 years, which provides him with an in-depth understanding of the Town's project history, comprehensive management plans, and future project needs.

RELEVANT EXPERIENCE

Town of Palm Beach, Florida

Mr. Pierro has worked on many facets of the Town's coastal program since 2006 and communicates frequently with Town staff on various coastal issues and history. In the earlier years, Mr. Pierro performed permit required physical monitoring and Town-wide analyses including an updated sediment budget and littoral transport evaluation. He developed a comprehensive engineering report and artificial reef design in support of the Reach 8 project. Mr. Pierro designed the 0.8-acre limestone boulder artificial reef, developed plans and specifications, and managed construction in 2007. More recently, Mr. Pierro performed a comprehensive coastal structures peer review and independent assessment for Town-wide groin rehabilitations. He also provided technical and management oversight for the Southern Palm Beach Island Comprehensive Shoreline Stabilization EIS as Senior Project Manager under the direction of the USACE. He also supported the Town during construction of the 2020 Mid-Town Beach Nourishment Project and oversaw preparation of the post-construction report. Mr. Pierro maintains close communication with Town staff and frequently presents on coastal issues to the Shore Protection Board and Town Council.

Education

Master of Science, Ocean Engineering, Florida Atlantic University, Boca Raton, Florida, 2001

Bachelor of Science, Ocean Engineering, Florida Atlantic University, Boca Raton, Florida, 1999

Highlights

Recognized industry expert in Florida in the fields of coastal engineering, beach nourishment, coastal structures numerical modeling of coastal processes, and inlet management.

Broad experience in beach project construction management, planning, design and permitting, engineering, and modeling, plans and specifications, field investigation, construction oversight, and feasibility studies of coastal engineering projects.

Registrations/Certifications

Professional Engineer, Civil, Florida, License No. 64683, Active

Professional Engineer, Civil, New York, License No. 090464-1, Active

Diplomate, Coastal Engineering (ACOPNE), 2010, ASCE, Active, Nationwide

Professional Affiliations

Member, American Society of Civil Engineers (ASCE)

Member, Florida Shore and Beach Preservation Association (FSBPA)

Member, American Shore and Beach Preservation Association (ASBPA)

Employment History

CPE 2019 – Present

APTIM 2001 – 2019

Southern Palm Beach Island Comprehensive Shoreline Stabilization Project, Palm Beach County & Town of Palm Beach, Florida

The project addresses erosion concerns by providing additional storm protection to upland property while minimizing impacts to nearshore hardbottom. Due to the potential for adverse impacts to hardbottom resources, an Environmental Impact Statement has been developed by members of The CPE Team as required for permitting of the project, which includes advanced DELFT3D modeling. This requires close coordination with USACE, FDEP, Town and County to balance concerns and objectives. Mr. Pierro provided coastal engineering support and oversight in evaluating project alternatives, reviewing numerical modeling results, developing reports and permit documents, and coordinating with stakeholders. Mr. Pierro is also the Engineer of Record for the County's project and developed a unique way of assessing the potential for downdrift spreading, which satisfied agency requests.

Delray Beach Erosion Control Program, Delray Beach, FL

Mr. Pierro has been the Project Manager and Senior Engineer for Delray Beach's Federal Storm Damage Reduction Project since 2006. He served as Project Manager and Engineer of Record for the Fifth Periodic Beach Renourishment Project constructed in 2013. He managed the project design, permitting and construction on a reimbursable basis with USACE. Tasks included project administration, contractor selection, construction observation, verification of fill volume placement, compliance with project permit requirements and confirmed contractor requests for payment. He continues to oversee the management of City's program in close coordination with Palm Beach County and the USACE.

Comprehensive Coastal Erosion Control Program, Manatee County, FL

Mr. Pierro directed the comprehensive feasibility study for Manatee County in 2007 to evaluate the cost and need for shore protection in areas outside the Federal (USACE) project area. Based on the recommendations of the report, the County constructed the Coquina Beach Nourishment Project, which included construction of a 5-acre mitigative artificial reef in 2011, designed and permitted by Mr. Pierro. He designed and managed the installation of geotextile tubes to sand tighten the Longboat Pass Jetty to improve the performance of the beach nourishment project and subsequently completed a comprehensive modeling study of Longboat Pass resulting in an updated Inlet Management Plan. He also worked with the County to remove three derelict groins along Cortez Beach and replace them with Permeable Adjustable Groins, a project which was designed with use of the Delft3D numerical model. Mr. Pierro assisted the USACE in design and permitting of the Manatee County Shore Protection Project constructed in 2014 and continues to play a key role in the management of the County's island-wide shore protection program in implementing the federally authorized and county-managed projects, including an ongoing Inlet Management Study for Passage Key Inlet, which is the primary sand source for the Anna Maria Island beach nourishment program.

Upham Beach Groin Stabilization Structures, Pinellas County, FL

Mr. Pierro worked with Pinellas County over the course of several years to evaluate options to install permanent groin stabilization structures to reduce erosion at Upham Beach. The project included development of engineering alternatives, advanced wave breaking modeling and permitting assistance. Additional efforts included project bidding and construction observations. The project construction was completed in 2018 with Mr. Pierro serving as Sr. Project Manager and the Engineer of Record and was recently awarded the 2021 Best Restored Beach Award from ASBPA.

Tara Brenner, PG, PE

SENIOR COASTAL ENGINEER

5301 N. Federal Highway, Suite 335, Boca Raton, FL 33487
tbrenner@coastalprotectioneng.com; 631-896-9137

PROFESSIONAL QUALIFICATIONS

Tara Brenner, PG, PE, is a Senior Coastal Engineer for Coastal Protection Engineering (CPE). Since 2007, she has performed a variety of engineering services in support of beach nourishment projects throughout Florida, including permitting, engineering analysis, development of construction plans and specifications, construction observations, post-construction monitoring calculations, and report preparation. She also routinely leads data analysis, incorporating geotechnical requirements for state and federal permitting, and supporting borrow area design for beach nourishment projects. Ms. Brenner regularly presents at industry conferences, and public meetings in both formal and informal settings. As Project Manager for several coastal projects throughout Florida, she works with clients to ensure project objectives and timelines are met and that work products are of the highest quality.

RELEVANT EXPERIENCE

Mid-Town Beach Nourishment Project, Town of Palm Beach, Florida
Ms. Brenner performed observations during the 2020 construction of the initial installment of the federal project under a 50-year partnership. She also prepared and submitted the post-construction report for the project.

South Lake Worth Inlet (SLWI), Palm Beach County, Florida
Ms. Brenner oversaw surveying of the dredge pit and engineering analysis to estimate the production of the SLWI Sand Transfer plant in 2016 and 2018. She is currently assisting the County with design and permitting for maintenance dredging of the ICW, Oyer boat channel and expansion of the sand trap inside of the South Lake Worth Inlet.

Currie Park East Dredge Hole Restoration Project, Palm Beach County, Florida
As part of ongoing restoration within the Lake Worth Lagoon, Ms. Brenner is supporting the County with design and permitting of fill placement restoration areas within a large historic dredge hole east of Currie Park. These areas are designed to receive mixed materials from lagoon projects.

Delray Beach Coastal Program, City of Delray Beach, Florida
As Project Manager, Ms. Brenner is performing a variety of coastal consulting tasks to support Delray's Beach Nourishment Program including: public outreach, assisting in securing state and federal project funding, annual physical monitoring engineering analyses, a recent sand

Education

Master of Science, Civil Engineering, Florida Atlantic University, Boca Raton, Florida 2012

Bachelor of Science, Environmental Geosciences, University of Notre Dame, Notre Dame, Indiana, 2007

Highlights

More than 14 years of coastal engineering and geology experience.

Regularly works on Florida coastal projects from feasibility through construction, including field investigations, engineering design and permitting.

Registrations/Certifications

Professional Engineer, Florida License No. 82305, Active

Professional Geologist, Florida, License No. PG2828, Active

BOEM and NMFS Protected Species Observer

PADI Open Water Diver, 2008

PADI Enriched Air Nitrox Diver, 2009

Professional Affiliations

Member, Florida Shore and Beach Preservation Association (FSBPA)

Member, American Shore and Beach Preservation Association (ASBPA)

Member, American Public Works Association – Gold Coast

Member, Divers Alert Network (DAN)

Member, University of Notre Dame Alumni Club – Boca Raton

Employment History

CPE 2019 – Present

APTIM 2007 – 2019

search investigation, post-storm impact assessments and coordination as needed, and planning for the City's next renourishment project.

Seawall Vulnerability Study, City of Delray Beach, Florida
Ms. Brenner managed and completed a seawall vulnerability study to address frequent flooding experienced in Delray along the Intracoastal Waterway. She led the study to predict future water levels, inventory seawall and outfall elevations, perform structural assessments, and analyze current backflow prevention devices. As part of this work, Ms. Brenner regularly collaborated with City engineers and presented study findings and recommendations to the City Commission.

St. Lucie South Jetty Assessment, Martin County, Florida
Ms. Brenner managed surveying, engineering and biological observations of the South Jetty. This work compared traditional survey methods with 3D laser scan and drone photogrammetry. The assessment deliverables included engineering assessment report, drone video, georeferenced drone imagery, survey data, and georeferenced point cloud in an online platform. Having this baseline assessment allowed for assessment of Hurricane Dorian impacts to the structure using post-storm drone imagery.

2021-2022 Collier County Truck Haul Beach Renourishments
As Project Manager, Ms. Brenner prepared construction plans and technical specifications for the County to bid the project and provided support throughout construction by reviewing contractor submittals, participating in weekly progress meetings and reviewing pay applications. The project placed 155,000 cy of sand along Naples, Vanderbilt, and Pelican Bay beaches using truck haul methods. As the Engineer of Record, Tara Brenner certified the project after its completion in January 2022.

Panama City Beaches Nourishment Program, Bay County, Florida

Ms. Brenner supports the Bay County with their beach nourishment program. As Project Manager for the 2017 nourishment project, Ms. Brenner assisted with hot-spot identification and development of the project scope. This hopper dredge and fill project was completed in May 2017 and placed approximately 835,000 cy along four separate reaches in Panama City Beach from offshore borrow areas. She also conducted coastal engineering design in development of the construction plans and technical specifications and led pre-bid, pre-construction and all during-construction progress meetings. She recently assisted the TDC during federal construction of the beach nourishment project, providing engineering and coastal engineering technical support in the preparation and construction of the project.

Mexico Beach Sand Search, Bay County, Florida
In support of a post-Hurricane Michael beach restoration project at Mexico Beach, Ms. Brenner is managing an offshore sand search investigation including geophysical and geotechnical data collection and processing, borrow area design, and a wave impact modeling study.

Shell Key & Grand Canal Feasibility Study & Permitting, Pinellas County, Florida
Ms. Brenner is led a team in performing a feasibility study and related field and modeling efforts to evaluate a highly dynamic area of Pinellas County. Shell Key has recently melded back onto the mainland along its northern coast. Residents are concerned about continued shoaling that has closed Shell Key North Pass and may threaten the entrance to Grand Canal. The feasibility study along with the Shell Key Morphology Study evaluated potential management alternatives for this area. In support of this project, Ms. Brenner presented in public meetings and oversaw work done by engineering, survey, and coastal modeling groups. Currently, Ms. Brenner is supporting the County with design and permitting for maintenance dredging of a channel and sediment basin in this environmentally sensitive area.

Lindino Benedet, Ph.D.

PRINCIPAL SCIENTIST

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lbenedet@coastalprotectioneng.com; 561-609-9144

PROFESSIONAL QUALIFICATIONS

Lindino Benedet is a Principal Scientist for Coastal Protection Engineering (CPE) with over 20 years professional experience dedicated to coastal engineering. Dr. Benedet obtained his Ph.D. at Delft Institute of Technology, with a focus on Hydraulic Engineering/Numerical Modeling utilizing Delft3D. He has worked on hundreds of projects, published dozens of scientific papers in international journals, and presented at technical conferences. Dr. Benedet introduced the Delft3D model to the Florida consulting market in 2004 and has since used the model to evaluate coastal engineering projects. He is currently working with the latest version of Delft3D Flexible Mesh (FM) that combines hydrodynamic, hydrologic, and water quality processes to evaluate sea level rise adaptation strategies for coastal communities.

RELEVANT EXPERIENCE

Collier County Coastal Storm Risk Management Study, Collier County, FL
Numerical modeling of the impacts of proposed flood control structures (storm surge gates on major inlets) on water quality utilizing Delft3D FM.

Lake Mattamuskeet Watershed Management Modeling Study, Hyde County, NC
Numerical Modeling of the performance of flood reduction/sea level adaptation strategies on managing lake water level and reducing flooding in the Lake watershed utilizing Delft3D FM.

Grand Bayou Hydrologic Restoration, Lafourche Parish, LA
Delft3D FM Numerical modeling of hydraulic restoration project consisting of engineering alternatives designed to increase freshwater flow to marshes stressed by increased salinity due to SLR. The study utilized Delf3D FM.

Wiggins Pass Inlet Study, Collier County, FL
Numerical modeling of waves, currents, and sediment transport and beach-inlet morphology utilizing the DELFT3D model to evaluate inlet channel dredging strategies and the effect of inlet channel re-alignment alternatives on sedimentation rates and erosion of adjacent beaches.

Upham T-Head Groins Numerical Modeling, Pinellas County, FL
Bouss2D Boussinesq wave modeling and Delft3D sediment transport and morphology modeling to evaluate the performance of T-Head groins designed to reduce hotspot erosion.

Education

Doctor of Philosophy, Hydraulic Engineering, TU Delft, Delft, Holland, Defense Date: April 2016

Master of Business Administration, Business Administration, Fundação Dom Cabral, Belo Horizonte, Brazil, 2014

Master of Science, Marine Geology, Florida Atlantic University, Boca Raton, Florida, 2001

Bachelor of Science, Oceanography, Universidade do Vale do Itajai, Itajai, Brazil, 2000

Highlights

More than 20 years of experience in coastal oceanography, geology, and engineering.

Recognized international expert in in the fields of coastal numerical modeling, coastal engineering, beach nourishment, and marine sand investigations.

Professional Affiliations

Associate Editor, Journal of Coastal Research, Journal of the Coastal Research and Education Foundation

Editorial Board Member, Shore & Beach, Journal of the American Shore & Beach Preservation Association (ASBPA)

Associated Editor, Brazilian Journal of Aquatic Sciences

Member, Florida Shore and Beach Preservation Association (FSBPA)

Member, American Shore and Beach Preservation Association (ASBPA)

Employment History

CPE 2019 – Present

APTIM 2001 – 2019

Town of South Palm Beach Breakwaters, Palm Beach County, Florida
Dr. Benedet and his team performed numerical modeling of waves, currents, alongshore sediment transport and beach morphology change utilizing the numerical model Delft3D to evaluate performance and impacts of proposed breakwaters along the Town of South Palm Beach.

Barrier Island Restoration Projects, Louisiana Department of Natural Resources (DNR), Louisiana
Dr. Benedet led numerical modelling activities to evaluate project performance and borrow area impacts of many Barrier Island Restoration projects along the Louisiana Coast including the Shell Island Sandy Point Borrow area, West Belle Pass Restoration Project and the Cheniere Ronquille Barrier Island Restoration project. These projects involved numerical modeling of waves, currents, alongshore sediment transport and beach morphology utilizing the Delft3D model, under average conditions, tropical storms and hurricanes, to evaluate performance of Barrier Island Restoration (beach, dune and marsh) over timescales of years to decades.

Figure Eight Island Restoration and Inlet Realignment Project, Figure Eight Island, North Carolina
Dr. Benedet performed numerical modeling of waves, currents, sediment transport and beach-inlet morphology utilizing the numerical model Delft3D to evaluate performance of inlet re-location alternatives and terminal groins on the erosion of Figure Eight Island, NC.

Panama City Nourishment, Panama City Tourism Development Council. Panama City Beach, Florida
Dr. Benedet planned a waves and current data collection efforts where two ADCPs were deployed near the project location to collect oceanographic data to calibrate the numerical model, and conducted numerical modeling of coastal processes (waves, currents, sediment transport, morphology) utilizing Delft3D to evaluate the impacts on Hurricane Ivan on Panama City Beach and evaluate a proposed maintenance nourishment project.

Louisiana Statewide Numerical Modeling as a Response to Deepwater Horizon, Louisiana Department of Natural Resources (DNR), Louisiana
Dr. Benedet led a team of several numerical modelers that were tasked with developing a model that covers Most of the Louisiana Coast and Marshes. The model was conducted to refine the design of proposed sand berms to contain oil from the Deepwater Horizon oil spill from contaminating marshes, and to evaluate the effect of the berms on water quality (residence time), marsh salinities, waves and currents. It was an ambitious 24/7 modeling effort performed in parallel by several numerical modelers under the direct supervision of Dr. Benedet, in order to be able to provide results in an expedited manner to be used to support decisions in the aftermath of the environmental disaster.

Longboat Key Islander Permeable Adjustable Groins, Longboat Key, Florida
Dr. Benedet led Delf3D numerical modeling activities and coastal processes analysis development to evaluate the effect of proposed permeable structures to manage an erosional hotspot on Longboat Key Florida. The project was constructed after the study and it performed very similar to model prediction.

Mearim Port, Maranhão, MA, Brazil
Dr. Benedet led a project team that deployed 4 ADCPs in extreme conditions (21 ft tides, 6-12 ft/s currents), conducted bathymetric and geophysical surveys, performed the deployment of current drifters, and led extensive numerical modeling activities of coastal proceses and channel shoaling with Delft3D, ship maneuvering modeling with PCRembrandt, mooring modeling with Optimoor, and the development of engineering design of a grains port terminal.

Stacy Buck, MS

SENIOR MARINE BIOLOGIST

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PROFESSIONAL QUALIFICATIONS

Stacy Buck is a Senior Marine Biologist with Coastal Protection Engineering (CPE) who has managed environmental permitting and biological monitoring for shoreline stabilization projects for clients throughout Florida since 2004. Ms. Buck has over 20 years of experience in biological and environmental science, the last 18 of which have focused on coastal and marine biology in south Florida. She manages project budgets, coordinates workloads, directs field operations, and collaborates with clients and agencies on a regular basis. She is responsible for the complete coordination of the biological components of projects from pre-permit application coordination through final report deliverables.

Ms. Buck manages environmental tasks for CPE's projects on Florida's east coast and has been working on Town of Palm Beach projects since 2005, including biological monitoring for multiple beach projects and artificial reefs. She assists the Town with environmental permitting, regulatory coordination, NEPA compliance, and projects approved under the BMA.

RELEVANT EXPERIENCE

Town of Palm Beach Coastal Protection Program BMA Annual Monitoring, Town of Palm Beach, Florida
Ms. Buck currently leads the annual biological mapping and monitoring effort for the Beach Management Agreement (BMA) in the Town. This effort includes cell-wide biological monitoring, in situ mapping, and aerial delineation of nearshore hardbottom resources, and report production.

2020 Mid-Town Beach Restoration, Town of Palm Beach, Florida
Ms. Buck worked with the project team to ensure permit compliance during construction of the 2020 Mid-Town Beach Restoration project. She coordinated with FDEP, FWC, and USFWS to obtain an extension for project construction.

Mid-Town Groin Project, Town of Palm Beach, Florida
Ms. Buck worked with the USACE and FDEP to expedite the permit modification for the Mid-Town Groin Project to ensure construction would not interfere with sea turtle nesting. Additionally, initial authorization did not include consultation with NMFS for Section 7 consultation since the groin was originally planned to be built on the newly nourished beach. Our Team designed the project so that construction of the groin would be built "in the dry", otherwise consultation would have not made construction

Education

Master of Science, Coastal Zone Management, Nova Southeastern University, Dania Beach, Florida, 2007

Bachelor of Science, Marine Science, University of South Carolina, Columbia, South Carolina, 1999

Highlights

Over 20 years of biological and environmental science experience with the last 18 years focused on coastal and marine biology in South Florida.

Registrations/Certifications

SDI Dive Master, Dry Suit Specialty Diver, Enriched Air Nitrox Diver

PADI: Rescue Diver and Advanced Diver

NAUI Open Water Diver, 1997

Emergency First Responder (CPR, 1st Aid, AED)

DAN O_2 Administration

BOEM and NMFS Protected Species Observer

Professional Affiliations

Member, Florida Shore and Beach Preservation Association (FSBPA)

Member, American Shore and Beach Preservation Association (ASBPA)

Member, American Academy of Underwater Sciences (AAUS)

Member, Divers Alert Network (DAN)

Employment History

CPE 2019 – Present

APTIM 2006 – 2019

feasible for that season. The permit modification requests were submitted in late December 2017 and the project was deemed substantially complete in May 2018.

Reach 8 Beach Restoration Project, Town of Palm Beach, Florida
Reach 8 is the Town of Palm Beach's component of the Southern Palm Beach Island Comprehensive Shoreline Stabilization Project (SPBICSSP) EIS and Ms. Buck worked closely with the USACE, the Town and the County to provide a comprehensive assessment of potential alternatives and their respective effects. She led an in situ assessment of the benthic habitat to support the EIS and environmental permitting. Ms. Buck is currently coordinating with the USACE to facilitate NMFS consultation for ESA Section 7 and under the Magnuson-Stevens Act. She is also leading the state permitting effort to obtain a joint coastal permit for the Reach 8 project.

Palm Beach County Coastal Program, Palm Beach County Florida
Ms. Buck led state and federal permitting for the County's component of the SPBICSSP project and developed the permit-required mitigation and monitoring programs. She coordinated and implemented field activities, provided data analysis, conducted aerial analysis of nearshore hardbottom resources, and led report preparation. She is currently assisting the County with permitting for the South Lake Worth Inlet Dredge Maintenance Project, which includes benthic investigations and coordination with FDEP to update to the biological monitoring plan. She is also managing state and federal permitting for the Currie Park East Dredge Hole Restoration Project.

City of Deerfield/Hillsboro Beach Nourishment Project, Deerfield Beach, Florida
Ms. Buck is currently leading the environmental permitting for the Deerfield Beach/Hillsboro Beach Nourishment project. Permit applications have been submitted and she is currently coordinating with the Corps to facilitation ESA Section 7 consultation. She is leading a survey for ESA listed coral species and is managing the annual biological monitoring of the nearshore hardbottom resources in the project area

City of Delray Beach Coastal Program, Delray Beach, Florida
Ms. Buck assists the City with permitting, agency coordination, and biological monitoring in support of their coastal program. She has led state and federal permitting, ESA Section 7 consultation, EFH assessment, and development of an EA in compliance with NEPA and field investigations to map the reef edge and survey for the coral species listed under the Endangered Species Act on the reef east of the borrow areas. She also coordinated with the sea turtle monitoring team to ensure permit compliance and co-led public nest excavation events in 2019. Ms. Buck recently developed a monitoring plan and led an investigation for seagrass resources within the newly designed borrow areas.

Sectors 3 and 5 Beach and Dune Restoration Project, Indian River County, Florida
Ms. Buck led the environmental permitting, development of biological monitoring plans, coordination and implementation of field activities, data analyses, and report preparation for the Sector 3 and the Sector 5 projects. She prepared environmental documents in support of NEPA for Sector 5 and coordinated with federal resource agencies for consultation under the Endangered Species Act Section 7 and the Magnuson-Stevens Act for both projects. Project construction has been completed and we are currently in the post-construction monitoring phase.

96th St Bulkhead Project, Martin County, Florida
Ms. Buck led the state and federal permitting and a biological investigation for submerged aquatic vegetation (SAV) resources within the project area to support construction of a bulkhead along the St. Lucie Canal (C-44) in Martin County. The County currently uses the shoreline for loading and transporting artificial reef materials and wanted to stabilize the shoreline and provide a permanent structure for the barges to dock. The state permit was issued, and the federal permit is anticipated in May/June 2022.

Quin Robertson, PhD, PG, GISP, CC-P

SENIOR SCIENTIST

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PROFESSIONAL QUALIFICATIONS

Quin Robertson is a Senior Scientist with Coastal Protection Engineering (CPE). Dr. Robertson's is a Certified Climate Change Professional (CC-P) whose research focuses on using conventional survey and remote sensing data to quantify change in coastal morphology and develop models from these results using GIS to aid in coastal mitigation. Dr. Robertson has several projects with the USACE conducting studies, compiling online geodatabases, and creating tools for analyzing remote sensing data.

RELEVANT EXPERIENCE

Regional Sediment Management, Nationwide

Dr. Robertson is currently Project Manager of an online GIS database developed for USACE's Regional Sediment Management (RSM) program. RSM placement is quantified (beneficial use vs. disposal) under multiple categories. Tools were developed to improve use of sediments and identify RSM opportunities to compare sediment characteristics of channel and beach disposal areas. These tools were written to ingest USACE nationwide and District data, identify and standardize project names, assign disposal codes and quantify sediment placement metrics.

LiDAR Elevation Change Analysis, Gulf of Mexico and East US Coastline

Dr. Robertson was Project Manager for a Florida Gulf of Mexico to Maine LiDAR elevation change analysis for USACE's Joint Airborne LIDAR Bathymetry Technical Center of Expertise (JALBTCX). The project quantified coastal change from more than 2,000 LiDAR data sets on 3,290 km of Gulf of Mexico and east US coastline utilizing a grid-based approach to measure shoreline and volume differences within GIS using a custom Python-coded system. Volume change was quantified by bins along the coastline and summarized in terms of the total positive, negative, net and normalized volume change. The final products were a geodatabase that contained the extracted metrics along with the series of tools that executed the quantifications to enable further scientific and engineering research.

Delray Beach, Florida

Dr. Robertson generated bathymetric DEMs from existing LiDAR and bathymetry data sets for input into morphologic models, to determine locations of previous dredging, and aid in planning future nourishment projects. He collected, processed and displayed high-resolution multi-beam data to detect the edge and height of reefs. Dr. Robertson has

Education

Doctor of Philosophy, Geosciences, Florida International University, Miami, Florida, 2007

Certificate, Geographic Information Systems, Florida International University, Miami, Florida, 2004

Master of Science, Geology, Florida International University, Miami, Florida, 2002

Bachelor of Arts, Geology, Skidmore College, Miami, Florida, 1997

Highlights

Over 20 years of project management, GIS, sand search, remote sensing and conventional survey experience.

Registrations/Certifications

Professional Geologist, NY, 1213

Geographic Information Systems Professional, Nationwide, 45100

Certified Climate Change Professional (CC-P)

Professional Affiliations

Member, American Geophysical Union

Member, American Shore & Beach Preservation (ASBPA)

Member, Florida Shore and Beach Preservation Association (FSBPA)

Member, American Society for Photogrammetry & Remote Sensing

Member, Coastal Education & Research Foundation

Member, Surfrider Foundation

Employment History

CPE 2019 – Present

APTIM 2007 – 2019

International Hurricane Research Center 1999 – 2007

Woods Hole Oceanographic Institution 1997 – 1999

supervised the 2019 geophysical and geotechnical borrow area data collection, along with the forthcoming 2019 borrow area permitting and design.

Broward County, Florida
Dr. Robertson managed the 2008 LiDAR bathymetric data collection offshore of Broward County. More than 13 million points were used to generate a DEM illustrating the offshore geomorphic and benthic features. Bottom reflectance data were converted to grids that identified variations in sea bottom characteristics that aided benthic habitat classification.

Panama City Beach, Florida
Dr. Robertson has participated in multiple projects for Panama City beaches. The most recent project involved utilizing existing LiDAR data to generate DEMs and contours of the beach and surrounding dunes. This required application of various types of custom filters to ensure that the beach morphology was preserved while non ground objects were removed. The bare earth contours were used to help design locations for dune planting and fence installation. Other projects include geophysical and geotechnical data collection, analysis, borrow area design and reporting.

Climate Change, Sea Level Rise, SLOSH and Saltwater Intrusion, MA, CT, VA, MS
Dr. Robertson was project manager of multiple SLOSH modeling projects that addressed predicted climate conditions for the EPA. Multiple sea level rise scenarios, pressure gradients, wind radii, hurricane speeds and directions generated more than 6,500 SLOSH model runs. The results were combined to generate maximum of maximums (MOMs) and differenced from LiDAR derived DEMs. Developed the methodology and supervised the historical analysis and modeling, organized and attended client meetings and co-authored the final report. Potential effects of sea level rise and increased storm activity on the salinity distribution and its effect on surrounding aquifers were evaluated using HECRAS.

Southwest Florida ROSSI Borrow Area Update, Florida
Dr. Robertson was Project Manager for updating FDEP's Regional Offshore Sand Source Inventory (ROSSI) database for southwest Florida. Assessed the sediment needs for several counties in southwest Florida. Historic bathymetric, seismic and geotechnical data were evaluated and used to identify offshore sand sources that meet predetermined sediment characteristics. Sediment sources were assigned categories and volumes for each source were calculated.

Fire Island Renourishment Project, New York
Dr. Robertson was on-site Project Manager and helped develop a strategy for the beach restoration of the 6 affected communities in 2009 and the expansion of the project to five other neighboring communities, to achieve improved project performance, and maximize FEMA participation. Construction for the eleven-community project began on January 27, 2009. The 2009 project renourished four reaches of Fire Island, which encompassed over 26,000 linear feet of shoreline, with a renourishment volume of 1.8 million cubic yards. The 2009 project successfully brought 11 communities together in order to achieve one common goal of restoring the shoreline of Fire Island. Other than the FEMA storm aid, the communities' projects were privately funded to provide beach protection until the larger Federal project can be approved and implemented. Each Fire Island project required beach and bathymetric surveys to support design, permitting and monitoring all conducted or managed by APTIM.

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CHRIS BARNES, RLA Studio Director / NOLA

Chris Barnes, RLA, is Studio Director of SCAPE's New Orleans office. He brings a strong interest in the social dynamics of landscapes and believes in their power to bring people of all backgrounds together while simultaneously providing ecological benefits. With a wide range of experience, Chris brings to each project an ability to integrate regional ecologies, local community interests and resilient design strategies to develop concise solutions for complex sites.

Chris holds a Bachelor's in Landscape Architecture from Louisiana State University (LSU), where he received the LSU Director's Award, the LSU Design Excellence Award and an ASLA Student Honor Award.

REGISTRATION

Landscape Architect: NY, LA, AR
CLARB Certified, 2012-2018

PRACTICE

SCAPE Landscape Architecture D.P.C., New York, NY, 2013-Present
- Chattahoochee River Greenway Study, Atlanta Metro Region, GA
- Airline Highway Park, Baton Rouge, LA
- Perth Amboy 2nd Street Park, Perth Amboy, NJ
- Climate Resiliency Design Guidelines, Department of Design and Construction, New York, NY
- McCoys Creek Recreation and Restoration Plan, Jacksonville, FL
- Arkansas Museum of Fine Arts Little Rock, AR
- Brooklyn Cultural District Apartments, New York, NY
- First Avenue Water Plaza, New York, NY
- Blake Hobbs Play-za, New York, NY
- New York Presbyterian & Columbia University Medical Campus Joint Master Plan, New York, NY
- Red Hoek Point, Brooklyn, NY
- Brooklyn Waterfront Greenway, Brooklyn, NY

Thomas Balsley Associates New York, NY / Project Manager / Designer, 2011-2013
- Sheikh Khalifa Medical City, Abu Dhabi, UAE
- Data Center and Office Complex (Client Confidential), Mexico City, Mexico
- 3732 Faria Lima, São Paulo, Brazil
- Consumer Finance Protection Bureau Headquarters, Washington, DC

Ecoland Beijing, China / Designer, 2009-2010
- Galaxy SOHO (Chaoyangmen SOHO), Beijing, China
- Zhuowu Qing Community Center Phase 1, Tianjin, China

Landworks Studio, Boston, MA, 2008

Spackman Mossop + Michaels, New Orleans, LA, 2008

EDUCATION

Louisiana State University, Baton Rouge, LA
Bachelor of Landscape Architecture, 2009

AWARDS

L.S.U. Director's Award, LSU, 2007
National ASLA Student Honor Award
"Bayou Bienvenue: An Inherent Opportunity," LSU, 2008
L.S.U. Design Excellence Award. LSU, 2009
Essay selected for IFLA Conference, Suzhou, China
"Chinese Garden Acre Park for Shanghai 2010 Expo (Acre Park)", 2010

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PIPPA BRASHEAR, RLA Resilience Principal

Pippa Brashear is Resilience Principal at SCAPE. A leading national expert on resilience planning and design for climate adaptation, Pippa works with multi-disciplinary teams to develop landscape strategies and next-century infrastructure that integrate environmental, economic and social benefits. She leads both planning and built work teams within the firm, bringing an ecological and people-driven approach to SCAPE's projects—informed by systems thinking; an understanding of natural and nature-based systems; engineering methods; and social and environmental equity.

Pippa holds a Master's in Landscape Architecture and Master's in Urban Planning with Distinction from the Graduate School of Design (GSD) at Harvard University. She also holds a Bachelor's of Arts, cum laude, in Environmental Science and Public Policy from Harvard College.

REGISTRATION

Landscape Architect: NY

PRACTICE

SCAPE Landscape Architecture D.P.C., New York, NY, 2015-Present
- The Financial District and Seaport Climate Resilience Master Plan, New York, NY
- Climate Ready Dorchester, Boston, MA
- Resilient Boston Harbor Vision, Boston, MA
- Ohio Creek Watershed Resilience Park, Norfolk, VA
- Living Breakwaters, Staten Island, NY
- Public Sediment: Resilient By Design Challenge, Bay Area, CA
- Hayward Regional Shoreline Adaptation Master Plan, Hayward, CA
- Measuring Success: Monitoring Natural and Nature Based Shorelines in New York State, NY
- CSO+: New Jersey Future, Glouchester, Jersey City, Perth Amboy, NJ
- National Disaster Resilience Competition, Facilitator & Subject Matter Expert, USA
- Hudson River RBD Feasibility Study, Hoboken, NJ
- Stormwater Greenstreets, Hutchinson River DEP Priority CSO Tributary Area, Bronx, NY
- Living Breakwaters, Rebuild by Design Competition, HUD, NJ/NY Metropolitan Region (Winner)

Parsons Brinckerhoff, New York, NY / Project Manager, Designer, Planner, 2012-2015
- New York Rising, Resiliency Planning for Seven Communities in New York City, NY
- SIRR Coastal Protection Planning, New York, NY
- Downtown Crossing Route 34 Reconstruction Project, New Haven, CT
- Nassau County Infill Redevelopment Feasibility Study, Nassau County, NY

Spatial Information Design Lab, Columbia University, New York, NY / Designer, 2012

Project for Public Spaces, New York, NY / Project Manager, Designer, 2010-2012

Wallace Roberts & Todd, New York, NY / Designer, Planner, 2007-2010

EDUCATION

Harvard University Graduate School of Design, Cambridge, MA
- Master in Landscape Architecture
- Master in Urban Planning with Distinction

Harvard College, Cambridge, MA
- Bachelor of Arts, cum laude, in Environmental Science and Public Policy

AWARDS

Charles Eliot Traveling Fellowship in Landscape Architecture, Harvard GSD, 2007

ACADEMIC

Studio Critic, Masters in Urban Design, Columbia University GSAPP, 2014-2019

Part-time Lecturer in Landscape Architecture, Rutgers University School of Environmental and Biological Sciences, 2011 - 2014

ORGANIZATIONS

American Society of Landscape Architects (ASLA), Member
American Planning Association (APA), Member
Member of the selection committee for National Cooperative Highway Research Program, 2011
Project 20-05; Topic 42-11: Local Policies & Practices that Support Safe Pedestrian Environments

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LIZ CAMUTI, RLA Senior Designer

Liz Camuti is a Senior Designer at SCAPE. Influenced by her experiences living in Louisiana, her work has centered around designing responsive forms of infrastructure in rapidly changing environments—with a focus on climate adaptation and resilience planning projects across the U.S.

Liz holds a Master's in Landscape Architecture from the University of Virginia, where she received an ASLA Certificate of Honor, was named an Olmsted Scholar and continued research through the Landscape Architecture Foundation's (LAF) Fellowship for Innovation and Leadership. She also holds a Bachelor's in International Agriculture and Rural Development from Cornell University.

PRACTICE

SCAPE Landscape Architecture D.P.C., New York, NY / 2018 – Present
- Louisiana Coastal Protection Restoration Authority Master Plan, New Orleans, LA
- Financial District and Seaport Climate Resilience Master Plan, New York, NY
- Airline Highway Park, Baton Rouge, LA
- Chattahoochee Greenway Study, Atlanta Metro Region, GA
- Pensacola Waterfront Framework Plan, Pensacola, FL

Asakura Robinson, New Orleans, LA | Landscape Designer / 2018
- Gentilly Resilience District: St. Anthony Green Streets, New Orleans, LA

Andrea Cochran Landscape Architecture, San Francisco, CA | Design Extern / 2018

Michael Van Valkenburgh Associates, Brooklyn, NY | Design Intern / 2017
- Barack Obama Presidential Center, Chicago, IL
- University of Toronto Masterplan, Toronto, ON

Spackman Mossop + Michaels, New Orleans, LA | Landscape Designer / 2016

The American Society of Landscape Architects, Washington, D.C. | Communications Intern / 2015-2016

EDUCATION

University of Virginia, Charlottesville, VA
- Master of Landscape Architecture / 2018

Louisiana State University, Baton Rouge, LA
- Master of Landscape Architecture, Transfer to University of Virginia / 2018

Cornell University, Ithaca, NY
- Bachelor of Science in International Agriculture + Rural Development, Minor in Urban Planning / 2014

AWARDS

Olmsted Scholar, National Winner, Landscape Architecture Foundation / 2018
ASLA Student Honor Award, American Society of Landscape Architects, Virginia Chapter / 2018
All-University Graduate Teaching Award Nominee, University of Virginia / 2018
Benjamin C. Howland Travelling Fellowship, UVA School of Architecture / 2018
Mellon Colloquium Award, Dumbarton Oaks / 2017

ACADEMIC

Guest Lecturer, 2nd Year Undergraduate Architecture Studio
- Tulane University School of Architecture / 2018

Research + Teaching Assistant
- UVA School of Architecture / 2016-2018

Research + Teaching Assistant
- LSU RRSLA + Coastal Sustainability Studio / 2014-2015

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JOHN DONNELLY, RLA Technical Principal

John Donnelly, RLA, is Technical Principal at SCAPE. He leads the management, documentation and construction of the studio's major built work projects across the U.S. In more than 16 years of professional practice, John's work has included the design, documentation and construction of award-winning urban parks; streetscapes; cultural and educational campuses; mixed-use developments master plans; recreational trails and a variety of on-structure landscapes.

As the lead for SCAPE's Technical Team, he works across the practice to ensure design and technical excellence through an integrated and collaborative process of quality assurance, quality control and peer review. John ensures that all SCAPE projects are developed with a sound technical underpinning from the earliest project phases to documentation and construction.

John holds a Bachelor's in Environmental Planning and Design and a Bachelor's in Psychology from Rutgers University.

REGISTRATION

Landscape Architect: NY, CA, AR, TN, MI, FL
CLARB Certified

CERTIFICATION

Green Infrastructure, Pratt Institute, 2013

PRACTICE

SCAPE Landscape Architecture D.P.C., New York, NY, 2013-present
China Basin Park, San Francisco, CA
Tom Lee Park, Memphis, TN
Arkansas Arts Center, Little Rock, AR
Stapleton Waterfront Park, Staten Island, NY
Amazon HQ2: PenPlace, Arlington, VA
Newtown Creek, Brooklyn & Queens, NY
McCoy's Creek Recreation and Restoration Plan, Jacksonville, FL
Borinqueneer Park, Perth Amboy, NJ
Spelman College, Atlanta, GA
1 Huron Street, Brooklyn, NY
Cold Spring Residence, NY
Arlo Wynwood, Miami, FL
Grosvenor Union Market, Washington, D.C.
200 Park Avenue, NY, New York
Ohio Creek Watershed Project Design and Implementation, Norfolk, VA
Dwight Englewood Middle School, Englewood, NJ
New York Presbyterian & Columbia University Medical Campus Joint Master Plan, New York
First Avenue Water Plaza, New York, NY
Be'er Sheva Quarry Park, Be'er Sheva, Israel
Town Branch Commons, Lexington, KY
172 Madison Ave, New York, NY
Journal Square, Jersey City, NJ
Marble Collegiate Church Office Building, New York, NY, 2017
Greenpoint Environmental Education Center, Brooklyn, NY, 2015-present
161 West Street: The Cove, Brooklyn, NY
Midtown Center Plaza, Washington, DC
Paragon Paint Intertidal Plaza, New York, NY
Lucas Museum of Narrative Art Landscape, Chicago, IL
The White Residence Landscape Masterplan, Aurora, NY
Water Works Park, Minneapolis, MN
Buffalo Outer Harbor Master Plan, Buffalo, NY
Tia'nan Cyber Park, Longgang, Shenzhen, China
New York Coastal Green Infrastructure Initiative, New York, NY

Cove-Co Habitat, Long Island, NY

Thomas Balsley Associates New York, NY / Project Manager, Designer, 2008-2013
Hunters Point South Waterfront Park, Queens, NY
Heritage Field Park at Yankee Stadium, Bronx, NY
Ferry Point Community Park, Golf Course, and Waterfront Park Bronx, NY
University of Albany Master Plan and Open Space Improvements, Albany, NY
SkyPark, Mexico City, Mexico
Yongsan Tower, Seoul South Korea

Melillo+Bauer Associates Manasquan, NJ / Project Manager, Designer, 2005-2008

EDUCATION

Rutgers University, New Brunswick, NJ
Bachelor of Arts, Environmental Planning and Design, 2005
Bachelor of Arts, Psychology, 2005

SERVICE

Gowanus Canal Conservancy Committee Member / Project Coordinator, 2010-Present
Active participant in volunteer committee; leads volunteer efforts and establishes research initiatives. Projects include floating garden trials, low-altitude aerial mapping documentation, stewardship, garden installation and other constructions.

LECTURES

Invited lectures and guest critic/studio review at Cornell University, SUNY ESF, Rutgers University, Pratt University, University of Minnesota, and University at Buffalo

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ANNA HOCHHALTER, RLA Associate

Anna Hochhalter, RLA, is an Associate at SCAPE. She works with clients across the U.S. to create more resilient and meaningful public spaces and ecological systems. With a wide-ranging background in municipal arts and sustainability planning, water management and environmental stewardship, she leads design teams for design and planning initiatives of all scales, with a particular interest in leveraging water for high-performance public spaces.

Anna holds a Master's of Landscape Architecture from University of Illinois at Urbana-Champaign and a Bachelor's of Science with distinction in Environmental Studies from Northland College.

REGISTRATION

New York: Licensed and Registered Landscape Architect

PRACTICE

SCAPE Landscape Architecture D.P.C., New York, NY | Associate / 2021-Present

AECOM, NYC Landscape Architecture and Urban Design Studio, Brooklyn, NY | Associate, Designer 2016-2021

- Rebuild by Design Meadowlands, New Jersey Department of Environmental Protection, Bergen County, NJ
- Nassau Expressway Operational & Resiliency Improvements, New York State Department of Transportation, Nassau County, NY
- Green Infrastructure Management Solutions at Holland and Lincoln Tunnels; New York and New Jersey Port Authority, Weehawken/Jersey City, NJ
- Waterway Infrastructure Community Engagement, New York Power Authority, Western, NY
- Northern Avenue Bridge, City of Boston, Boston, MA
- Southwest Brooklyn Framework, AECOM Cities Program, Brooklyn, NY

AECOM, Chicago, IL | Designer / 2013-2016

- Increasing Financial Support for Green Infrastructure; Natural Resources Defense Council; Chicago, IL
- Public Art Streetscape Aesthetic Plan, City of El Paso, El Paso, TX
- West Lake Corridor Wetland Delineation, Northern Indiana Commuter Transportation District, Cook County, IL and Lake County, IN
- Chicago West Side Resiliency Planning, City of Chicago, Chicago, IL
- Wetland Mitigation Feasibility Analysis and Design, Rochester Gas and Electric, Monroe County, NY
- Ottawa Wetland Restoration, US Army Corps of Engineers, Ottawa, OH
- Central Loop Bus Rapid Transit, Chicago Department of Transportation, Chicago, IL
- Headlands Observatory Facility & Site, Emmet County, Petoskey, MI
- South Milwaukee Shoreline Park, City of South Milwaukee, South Milwaukee, WI
- Year Five Wetland Monitoring, Univision Radio, Calumet Park, IL
- Lyons Levee Wetland Delineation/Tree Survey, Metropolitan Water Reclamation District of Greater Chicago, Lyons, IL

City of Urbana, Urbana, IL | Public Arts Coordinator and Community Development Associate / 2006-2011

- Urbana Sustainability Initiative and Urbana Climate Action Plan
- Urbana Public Arts Program and Percent for Art Program

Urbana Park District, Urbana, IL | Environmental Program Leader at Anita Purves Nature Center / 2007-2008

Sigurd Olson Environmental Institute, Ashland, WI | Land Stewardship Services Coordinator / 2004-2006

EDUCATION

University of Illinois at Urbana-Champaign, Urbana, Illinois
Master of Landscape Architecture, 2013
Northland College, Ashland, Wisconsin
Bachelor of Science, Environmental Studies, Art and Sustainability, 2006

AWARDS

Merit Award, ASLA-NY Design Awards for Southwest Brooklyn (with AECOM), 2017
Outstanding MLA Award, American Society of Landscape Architects Illinois Chapter, 2013

Honorable Mention, Detroit by Design 2012 Riverfront Design Competition, American Institute of Architects, Detroit Chapter, 2012
ACE Advocacy Award, 40 North|88 West, Champaign County Arts, Culture and Entertainment Council, 2010
Sigurd Olson Fellow, Sigurd Olson Environmental Institute and Northland College, 2005

ACADEMIC

Invited Juror, University of Illinois, Department of Landscape Architecture, Urbana, IL 2020—2021
Teaching Assistant, University of Illinois, Department of Landscape Architecture, Urbana, IL 2011—2013
Green Infrastructure Research Assistant, University of Illinois, Dept. of Landscape Architecture, Urbana, IL 2010—2011

AFFILIATIONS

Present: Associate member, American Society of Landscape Architects - NY Chapter, 2018
Volunteer, Gowanus Canal Conservancy, 2019—2019
Board of Directors, Illinois Green Business Association, 2009—2011
Board of Directors, 40 North|88 West, Champaign County Arts, Culture and Entertainment Council, 2007—2011

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KATE ORFF, RLA, FASLA Founder and Principal

Kate Orff, RLA, FASLA, is the Founding Principal of SCAPE. She focuses on retooling the practice of landscape architecture relative to the uncertainty of climate change and creating spaces to foster social life, which she has explored through publications, activism, research and projects. She is known for leading complex, creative and collaborative work processes that advance broad environmental and social prerogatives. In 2019, Kate was elevated to the American Society of Landscape Architects (ASLA) Council of Fellows—one of the highest honors bestowed on landscape architects practicing in the U.S. She currently sits on the Commission on Accelerating Climate Action for the American Academy of Arts & Sciences.

Kate was awarded the prestigious MacArthur Foundation Fellowship in 2017, the first given in the field of landscape architecture. In 2019, she accepted a National Design Award from the Cooper Hewitt, National Design Museum, on behalf of SCAPE, and was named a Hero of the Harbor by the Waterfront Alliance. She was a 2012 United States Artist Fellow, dubbed an Elle Magazine "Planet Fixer," and has been profiled and interviewed extensively for publications including The New Yorker, The New York Times, The Washington Post, The Economist, National Geographic and more.

Kate graduated with a Bachelor's in Political and Social Thought from the University of Virginia with Distinction and earned a Master's in Landscape Architecture from the Graduate School of Design (GSD) at Harvard University. She is also the Director of the Urban Design Program, Co-Director of the Center for Resilient Cities and Landscapes (CRCL), and Professor at Columbia University's Graduate School of Architecture, Planning and Preservation (GSAPP).

REGISTRATION

Landscape Architect, NY, CT, MA, NJ, PA, KY, SC, MN, KY, AR, VA, DC
CLARB Certified, 2005-present

PRACTICE

SCAPE Landscape Architecture D.P.C., New York, NY / Founder and Principal, 2004 - Present
- China Basin Park, San Francisco, CA
- Tom Lee Park, Memphis, TN
- Rio Seco Linear Resiliency Park, El Alto, Bolivia
- Blake Hobbs Play-Za, New York, NY
- PAVE Academy Playscape, New York, NY
- 103rd Street Community Garden, New
- Ecological Citizens, Venice Architecture Biennale
- Arkansas Museum of Fine Arts, Little Rock, AR
- Town Branch Commons, Lexington, KY
- Red Hoek Point, Brooklyn, NY
- NYC SIRR Coastal Protection Plan, New York, NY
- Living Breakwaters Rebuild by Design Competition, NY/NJ Metropolitan Region (Winner)
- Oyster-tecture, Gowanus Bay Pilot Project, Brooklyn, NY
- Safari 7 Exhibition, Studio-X, New York, NY

EDUCATION

Harvard University, Graduate School of Design, Cambridge, MA
Master of Landscape Architecture
The University of Virginia. College of Arts and Sciences, Charlottesville, VA
Bachelor of Arts in Political and Social Thought with Distinction

BOARD AND ADVISORY ROLES

Advisor, Urban Ocean Lab
Member, Commission on Accelerating Climate Action, American Academy of Arts & Sciences
Contributor, Committee on Infrastructure, Climate & Sustainability, NYC Mayoral Transition Team for Eric Adams

LECTURES

Waterfront Conference, Waterfront Alliance, May 2021; "New Now Next: Kate Orff," Irish Architecture Foundation, May 2021; "Design Across Scales: Design as a Humanist Discipline," MIT School Of Architecture + Planning, Spring 2021; Timothy Egan Lenahan Memorial Lecture, Yale School of Architecture, April 2021; Landscape Seminar Series: David Skinner Memorial Lecture, Edinburgh School of Architecture and Landscape Architecture, April 2021; Architecture Lecture Series: Kate Orff, Tulane

University, March 2021; “Toward an Urban Ecology”, Texas A&M University, March 2021; “The 6th Annual Urban Design Storytelling Symposium: Narrative Change for the Green New Deal,” Columbia GSAPP, March 2021; The Nature of Cities Festival, March 2021; “Tidal Communities,” Columbia GSAPP, February 2021; “Scales of Water,” Knowledge Center for Watershed and Stream Management, February 2021; “Our Fair City Virtual Conversation: In Between,” Museum of the City of New York, January 2021; “All We Can Save: Truth, Courage, and Solutions for the Climate Crisis,” Columbia GSAPP, January 2021; University of Maryland Center for Environmental Science, November 2020; “Everyday Ecologies,” The Bernard and Anne Spitzer School of Architecture at the City College of New York, October 2020; “A Green Way Forward,” Rebuild by Design, October 2020; Lecture at UM Taubman College, October 2020; “Activ-ISM,” University of Pennsylvania Weitzman School of Design, October 2020; “Resiliency and Climate Adaptation,” Exhibit Columbus New Middles Symposium, September 2020; “Conservation & Sustainability: Our Future Coast (with Tegan Wendland),” Washington Post Live, August 2020; “Trust by Design,” Design Trust for Public Space, July 2020; “Mission-Driven Practice,” ASLA Conference on Landscape Architecture, November 2019; “Un-making the Landscape,” The Architectural League of New York, October 2019; “Workshopping the Green New Deal,” University of Pennsylvania, McHarg Center, September 2019; US Senator Sheldon Whitehouse / 9th Annual Rhode Island Energy, Environment, and Oceans Leaders Day, 2018; Longwood Gardens’ Designing Water Symposium, 2018; Aspen Ideas Festival, 2018; Park Pride, Atlanta, 2018; Isabella Stewart Gardner Museum, 2017; Buckminster Fuller Institute, 2017; Israel Landscape Architecture Conference, 2017; Ninth International Biennale of Landscape Architecture, Barcelona, 2016; ASLA Annual Conference, New Orleans, 2016; The 2010 International TED Women Conference

AWARDS

Urbanist of the Year, *The Architect’s Newspaper,* 2020; ASLA Council of Fellows, 2019; National Design Award, Cooper Hewitt, Smithsonian Design Museum, 2019; Waterfront Alliance, Hero of the Harbor, 2019; ASLA-NY Honor Awards, Public Sediment for Alameda Creek and First Avenue Water Plaza, 2019; ASLA-NY Merit Award, Madison Avenue Plaza, 2019; ASLA-NY Merit Award, New York-Presbyterian & Columbia University Medical Campus Joint Master Plan, 2018; ASLA-NY Honor Awards, Hall of Science Discovery Terrace and Gowanus Lowlands, 2018; MacArthur Fellow, 2017; National ASLA Honor Award, Toward An Urban Ecology, 2017; American Academy of Arts and Letters Award in Architecture, 2015; Buckminster Fuller Challenge Winner, 2014; HUD Rebuild by Design Winner, 2014; Named One of Fast Company’s “Most Creative People,” 2014; National Academician, 2013; USA Artist Fellow, 2012; Architectural League of New York “Emerging Voice,” 2012; MoMA Rising Currents Team Leader, 2010

PUBLICATIONS

Author of Toward An Urban Ecology (The Monacelli Press, 2016).
Co-Author of Petrochemical America (Aperture, 2012).
Co-editor of Gateway: Visions for an Urban National Park (Princeton, 2011).

William "Bill" Bohn
Engineer and GIS Analyst

EXPERIENCE SUMMARY

Mr. Bohn has more than twenty years experience in climate change impact assessment, adaptation planning, modeling, hazard mitigation planning, emergency response, disaster management capacity building and training, and geographic information systems (GIS). He has provided support to numerous local and state governments, private sector clients, federal and international clients including FEMA, NOAA, EPA, USAID, World Bank, IDB, MCC and DoD.

RELEVANT EXPERIENCE

Climate Risk Assessment and Climate Change Adaptation Lead; Sea Level Rise, Coastal Flooding, and Hurricane Assessments; Key West and Miami, Florida; Private Client. Mr. Bohn supported a private client with conducting a sea-level rise, coasal flooding, and surge loss analysis using Hazus and other models for three hotels in Key West and Miami, Florida. Current and future conditions were assessed and adaptation strategies were identified.

Risk Assessment Lead, Sea-Level Rise Vulnerability and Adaptation Report, Hawaii Department of Land and Natural Resources (DLNR). As a subcontractor, Mr. Bohn led the Sobis effort in the development of the Sea Level Rise Vulnerability Assessment and Adaptation Report completed in 2018 for the State of Hawaii. The support included: Modeling future flood conditions, integrating coastal erosion estimates developed by the University of Hawaii into the flood conditions, integrating sea-level rise scenarios into future 1% annual chance flood conditions, integrating sea-level rise scenarios into future nuisance flooding conditions, using Hazus to estimate the impacts of future flooding on existing and future buildings at the building site level, evaluating the vulnerable populations who may be impacted by sea-level rise, and identifying coastal adaptation strategies.

Risk Assessment Lead, Impacts of Climate Change on Public Health in Rhode Island (Rhode Island Department of Health, Climate Change Program). Under the SafeWater RI contract, Mr. Bohn received a task order to conduct two studies on potential climate change impacts on public health in Rhode Island to support a grant from the Centers for Disease Control (CDC). Mr. Bohn supported the future conditions scenario development for the impact assessment in the first study, Future Social and Economic Loss from Weather Events and Sea Level Rise, which provided an assessment of the predicted impacts on life, health, safety, and the economy of Rhode Island; such as loss of homes and buildings and population displacement.

Project Manager, Resilience Plan, Albemarle County. Mr. Bohn is currently supporting Albemarle County, Virginia with their Resilience Plan which focuses on current and future natural hazards exacerbated by climate change. It also includes a social vulnerability task to identify current and future populations of elderly, non-English speaking, low income, and people of color. Outreach includes identifying vulnerable populations and integrating their feedback into the conversation and the planning process.

EDUCATION

M.S., Geographic and Cartographic Sciences, George Mason University, Fairfax, 2006

B.S., Aerospace and Ocean Engineering, Virginia Tech, Blacksburg, 1999

AREAS OF EXPERTISE

Climate Change Adaptation
GIS
Hazard Risk Assessment
Hazard Mitigation Planning

KEY TRAINING/ CERTIFICATIONS

FEMA Building Design for Homeland Security

FEMA Basic and Advanced HAZUS-MH Training

FEMA Homeland Security Exercise and Evaluation Program (HSEEP) Training

FEMA IS-00100 Introduction to the Incident Command System

FEMA IS-00120.An Introduction to Exercises

FEMA IS-00130 Exercise Evaluation and Improvement Planning

FEMA IS-00230 Principles of Emergency Management

OFFICE

Lynchburg, VA

YEARS OF EXPERIENCE

21

Climate Change Impact Specialist, Integrating Natural Infrastructure into Urban Coastal Resilience, Nature Conservancy (New York). Mr. Bohn supported the Nature Conservancy in Howard Beach, New York as a subcontractor to CH2MHill by quantifying the impacts of sea-level rise and coastal flooding on the community. Several scenarios were identified involving doing nothing, using only green infrastructure methods, using only gray infrastructure methods, and using a combination of gray and green infrastructure methods. Impact assessment tools including Hazus were used to identify the loss avoided for each scenario. The difference between the scenario loss and the baseline loss were used to generate the benefit in the benefit cost analysis. The report is provided here: **https://www.nature.org/media/newyork/howard-beach-report-12-23-2013.pdf**

Technical Specialist, Risk MAP Production and Technical Services (PTS), FEMA. Mr. Bohn currently supports FEMA's National Hazard Risk Assessment Program (NHRAP). In this position, he helps develop risk assessment course material, updates technical manuals, and provides ad hoc technical assistance to FEMA headquarters and the regions. Under this contract, he developed the Advanced Hazus course taught at the Emergency Management Institute (EMI). Mr. Bohn also helped develop FEMA's community resilience and risk index tool and website: https://hazards.fema.gov/nri/community-resilience.

Facilitator and Technical Consultant, Flood Resilience Workshop, USEPA Smart Growth. Supported EPA with developing a one day workshop on flood resilience for five U.S. communities. The workshop focuses on reducing damage in vulnerable areas, building in safer areas, integrating community plans, and implementing stormwater management, among others. Mr. Bohn led the workshop facilitation and community report for Mobile, Alabama; New Paltz, New York; Scituate, Massachusettes; and Newburyport, Massachusettes.

Course Developer and Trainer, Coastal Climate Change Adaptation Frameworks and Supporting Programs, NOAA. Mr. Bohn supported NOAA with the development of a climate change adaptation course for coastal communities. The course involves developing modules on climate science, governance, climate communication, climate risk assessment, and adaptation planning and implementation. He led the climate change risk assessment module and the intro to climate change module. He supported the modules on climate science and adaptation planning. He recently taught the class at the University of Rhode Island to federal and state government agencies, non-profit organizations, and university employees.

Climate Change Data and Risk Assessment Methodologies for the Caribbean, Inter-American Development Bank (IDB), 2013-2014. Lead risk assessment specialist for a climate change risk assessment for the IDB. The IDB has identified the need to search for effective sustainable development and environmental management practices, particularly against the backdrop of climate change. Tetra Tech is assisting the IDB's Environmental Safeguards Unit to guide the Bank's development financing and to assist its borrowers to reduce risks from climate change. Tetra Tech developed a climate change risk assessment process for the IDB to evaluate new and existing coastal infrastructure, industrial and tourism projects in the Caribbean region. Tetra Tech is currently working with the IDB to identify lessons learned and refine of process for identification of hazard mitigation/adaptation strategies, as well as monitor and evaluate their effectiveness.

Climate Risk Assessment and Risk Management in Support of Resilient Investment Decisions, Inter-American Development Bank (IDB), 2014-2015. Supported the development of typical Terms of Reference for climate risk assessment projects, led the pilot study risk assessment for a hotel in Jamaica using the technical note developed for the climate change data and risk assessment methodologies contract, and supported a climate risk assessment workshop for internal IDB staff.

Disaster Risk Assessment and Disaster Risk Management Plan for the Caracol Industrial Park, Haiti, Inter-American Development Bank (IDB), 2015-2016. Led the risk assessment for this project which is considering coastal flooding, storm surge, hurricanes, seismic events, landslides, heat waves, coastal erosion, salt water intrusion, and wildfires among others. The risk assessment consist of a hazard analysis, exposure calculation, vulnerability analysis, and risk estimation for present and future conditions (factoring in climate change).

Tim Brink, P.E.
Senior Engineer and Software Developer

EXPERIENCE SUMMARY

Mr. Brink is a senior software developer and civil engineer with more than twenty years of experience in information systems, GIS, and water resources engineering and modeling using EPA-SWMM, AdICPR, HEC-1 and HEC-2, HEC-RAS, HEC-HMS, KY-PIPE, and EPA NET. He has been involved in hazard risk assessment, climate risk assessment, watershed analyses, floodplain delineations, runoff method computations, hydraulic and hydrologic modeling and surface water systems design, and watershed and stormwater management plans. Mr. Brink has expertise in mobile application development, C# and ASP.Net programming, Java, C/C++, Objective C, Visual Basic 6, Visual Basic for Applications (VBA), Unified Modeling Language (UML) model development, and geographic information systems (GIS) development software (ArcObjects, ArcMap®, and ArcSDE). He has also developed tools and scripts that customize Hazus to perform automated study region creation and analysis, as well as data extraction and post-processing tools to sync Hazus with FEMA's Risk MAP products.

EDUCATION

B.S., Civil Engineering, Colorado State University

M.S., Civil Engineering, Colorado State University

AREAS OF EXPERTISE

Flood Modeling
Climate Adaptation
Application Development
Website Development
Software Development
Mobile Development
Dashboard Development
Process Automation
Database Management

OFFICE

Tampa Bay, Florida

YEARS OF EXPERIENCE

24

RELEVANT EXPERIENCE

Senior Developer, Hazus Script Development. Mr. Brink developed a flood depth grid script which takes FEMA National Flood Hazard Layer (NFHL) data – floodplain polygon and base flood elevations and converts it into a depth grid. This allows for easy import into Hazus. Mr. Brink also developed a program which takes parcel data and building footprints and converts them into a user-defined facility Hazus inventory input.

Senior Developer, Sea-Level Rise Vulnerability and Adaptation Report, Hawaii Department of Land and Natural Resources (DLNR). Mr. Brink developed a script for this project which would take parcel data and building footprint data and create a building layer in GIS with specific vulnerability data associated with it. This was used for every structure in the State and saved a great deal of time converting and manipulating data.

Senior Developer, Risk MAP Program Management, FEMA. Mr. Brink supported FEMA's Hazus Program as a subcontractor to Booz Allen Hamilton. In this position, he helped develop software to support Independent Varification and Validation (IV&V) testing for each new release of the Hazus risk assessment software. He also developed the defect tracking website to support the testing.

Senior Developer, MCA-Zambia, Lusaka Water Supply, Sanitation and Drainage (LWSSD) Project. Mr. Brink developed a software script to help collect field data and integrate it into the project database. His script allowed for the data to be quickly and efficiently collected in a standardized format.

Senior Developer, Watershed Analyst, Tampa, Florida. Mr. Brink served as a programmer on this project and developed in-house ESRI ArcGIS extension for GIS-based watershed modeling to support

Federal Emergency Management Agency (FEMA) study projects. The extension allows for complete GIS-based preparation of input files for SWMM or HEC-RAS/HMS, and GIS-based display of the results. Watershed Analyst provides the capability to perform a Zone A flood engineering analysis entirely automated from the ArcGIS environment. Capabilities include automated basin delineation, time of concentration calculations using TR-55, runoff coefficients, hydraulic analysis, floodplain generation, and graphic display such as profile plotting. The extension's software architecture is designed so that it can be easily extended to any water resource modeling task, and the development of calculators minimize the need for external engineering software. It is programmed with Microsoft C#, and C/C++.

Senior Developer, User-Defined Workflow Tool, South Florida Water Management District (SFWMD), South/Central Florida. Mr. Brink was the lead programmer to create a set of tools that allow the user to assemble unrelated tools into a workflow tree in an ArcMap Contents View. Different ArcMap commands, toolbox tools, data, and documents can be assembled together that were previously in different locations in the ArcMap user interface. As the user executes the parts of the workflow, the steps are logged for later review.

Lead Programmer, FloodMap Desktop, Tampa, Florida. Mr. Brink was the lead programmer on the ESRI ArcMap extension to support production of digital flood insurance rate map (DFIRM) data and panels. The software allows the creation of a MapMod DFIRM or Riskmap project database and tools to automate creation of letters of map revision (LOMR) and base flood elevations (BFE), and to import data from routine analytical services (RAS) models. Data may be imported and exported to different formats including the deliverable formats. Profiles can be created through the interface using custom digitizing tools and the data is then stored in a Rasplot database. A set of cross-section tools are also provided that automate the cutting of cross-sections from different digital terrain maps (DTM). (FloodMap Desktop is a product currently developed and maintained by Atkins North America)

Lead Programmer, FloodMap Mobile, Private Insurance Clients. Mr. Brink is the lead programmer to create a set of mobile applications on iOS, Android, Windows Phone and Blackberry devices. The application allows the user to determine flood risk and an insurance estimate for any location in the US. The mapping is performed by Geoserver along with the devices built in mapping components. (FloodMap Mobile is a mobile application offered by Atkins North America)

Lead Programmer, One-Click Risk, Private Insurance Clients. Mr. Brink was the lead programmer to create a set of Web services to generate a risk ranking for floods, earthquakes, landslides, tornadoes, and hurricanes. The system constructs gage equations from peak flows at U.S. Geological Survey (USGS) gages within the surrounding hydrologic unit code (HUC) basin, cuts cross-sections from the 10 m NED, generates and runs a HEC-RAS model, and delineates floodplains all automatically based on user-selected reaches. The Web interface is Adobe Flash programmed with Adobe Flex, and the Web services consist of a map generator and all the GIS-related functionality to support the modeling analysis. GIS output is compatible with ArcGIS software.

Programmer, Polk County Utilities, Web-Enabled GIS Asset Information System, Polk County Utilities, Polk County, Florida. As a programmer, Mr. Brink was responsible for developing extensions to ESRI ArcGIS for automated import of field data shape files to the GIS database, translation table import of CADD files to the GIS database, export of GIS data to WaterCAD, and export of GIS data to Hansen CMMS. The programming involved the creation of extensive ArcIMS Internet plotting capabilities for Utilities GIS, as well as automated database linking and searching capabilities.

Zachary Baccala, CFM, GISP
GIS Analyst

EXPERIENCE SUMMARY

Mr. Baccala is a senior geographic information systems (GIS) analyst with more than 10 years of experience leveraging geospatial technologies to manage and support clients, including the use of desktop, mobile and web applications. Mr. Baccala currently provides program management support for the Federal Emergency Management Agency (FEMA) and Independent Validation and Verification testing of FEMA's Hazus software, an ArcGIS extension used for producing natural hazard risk assessments. Mr. Baccala focuses on continual process improvement and optimization through various solutions that are designed for increasing efficiency while maintaining high levels of quality. He is an adept collaborator able to work with organizations of all sizes, including public and private agencies.

EDUCATION

B.S., Geography & Geosciences, Salisbury University

AREAS OF EXPERTISE

GIS
Training
Application Ideation
Data Management

KEY TRAINING/ CERTIFICATIONS

2010, FEMA Certified HAZUS-MH Trainer

2010, Esri Certified ArcGIS Desktop Associate 10 (Certification Number: V00E4B1K1FRE5ZMW)

2011, Certified Floodplain Manager (CFM), Association of State Floodplain Managers (ASFPM) (License No.US-11-05564)

OFFICE

Sykesville, MD

YEARS OF EXPERIENCE

13

RELEVANT EXPERIENCE

Technical Specialist, Risk MAP Program Management, FEMA. Mr. Baccala supported FEMA's Hazus Program as a subcontractor to Booz Allen Hamilton. In this position, he helped manage the Independent Verification and Validation (IV&V) testing for each new release of the Hazus risk assessment software. This includes developing the IV&V Test Plan, overseeing the IV&V Team, and writing the IV&V Test Results Report. He also supports program management tasks for the program including: developing the Hazus Strategic Plan, organizing the Hazus SharePoint site, facilitating the Hazus technical committees, reviewing courses, reviewing User and Technical Manuals, and developing a Rolling Action Item List showing the latest program metrics.

Instructor for the Emergency Management Institute. Mr. Baccala has been an instructor at EMI for the past four years where he has taught Hazus Basic, Hazus Flood, CDMS, and Floodplain Management.

GIS Analyst, Technical Support for EPA Stormwater Rulemaking. GIS Analyst for a study to quantify the economic benefits of nationwide implementation of green infrastructure (GI). The study investigates the flood losses avoided as a result of the proposed stormwater regulations over the period between 2020 and 2040. The project utilizes hydrologic and hydraulic modeling, loss estimation using FEMA's Hazus model, and future projections of economic activity and assets exposed to flood risk. The study determined that GI can have a significant impact on flood loss reduction when implemented on a watershed basis. Environmental Protection Agency Office of Water, Washington, DC. Mr. Baccala's role was to process the various GIS datasets needed for modeling and performing the Hazus analysis.

Developer, FloodMap Desktop10 Development. Flood Map Desktop10 (FMD10) is publicly available software that acts as an extension of ArcGIS allowing the creation of FEMA's regulatory and non-regulatory products. Mr. Baccala coordinated the entire development process of FMD10 working with mangers, clients and developers to create a product that is user friendly and provides the necessary tools to complete FEMA mapping projects. Mr. Baccala's understanding of the Hazus data structure and SQL database layout has enabled him to design tools specifically for populating the Flood Risk Database through entirely automated methods.

GIS Specialist, Hazus Average Annualized Loss Study for FEMA Regions I, V, VII, X for FEMA Risk MAP Program. This project was part of an effort to develop standardized flood loss estimates and increase awareness of potential flood losses on a nationwide basis. Deliverables for the 1,121 counties studied were individual Hazus-MH HPR files, summary tables for losses, and a report outlining the study procedures, issues and limitations. Mr. Baccala managed the analysis of more than 750 individual U.S. counties, completed on 10 machines, tied to a single SQL server repository. This effort included riverine and coastal counties and took more than three months to complete. Mr. Baccala coordinated the roll-up process of all the Hazus study regions for the contiguous United States, managing multiple SQL server installations and working closely with the Hazus developers to ensure all results were compiled.

GIS Analyst, Flood Map Production Coordination Contract, FEMA. Mr. Baccala served as lead and supporting GIS analyst for DFIRM (Digital Flood Insurance Rate Map) production for FEMA Region V. Responsibilities included base cartographic data collection, community data collection, data capture & editing, data merging, DFIRM database creation, preliminary DFIRM production, and final DFIRM delivery. He worked closely with the engineering staff to produce DFIRMs and flood hazard data, and served as study lead for Hancock County, IN; Bay County, MI; Chippewa County, Pine County and Todd County, MN. Mr. Baccala served as GIS analyst on the GPO process for completed studies in FEMA Region VII. Mr. Baccala served as GPO lead, making all necessary corrections to the final printed map panels, completing the DFRIM database, and submitting all mapping data to the FEMA map service center.

GIS Analyst, Hazus CDMS Update for FEMA Region 10. Project Lead and GIS Analyst for incorporating local parcel data into the Hazus MR5 inventory for Lewis, Yakima, Grays Harbor and Cowlitz Counties in Washington, and Multnomah, Lane and Jackson Counties in Oregon. Mr. Baccala coordinated with federal, state, and local stakeholders to obtain the necessary data required for a Level 2 Hazus inventory update. He coordinated staff within multiple offices to ensure the project was completed to the standards required by the FEMA Region 10 office. Mr. Baccala later updated the data for Hazus 2.1 in order for the Region to continue using the improved inventory with the newer version of Hazus.

GIS Specialist, Parcel Mapping for Multiple Counties on Maryland's Eastern Shore. As a GIS Analyst Mr. Baccala scanned paper tax maps and then georeferenced the files to align with aerial imagery. Following the georeferencing, the maps were digitized to create GIS Parcel polygons, which were joined with state Tax Assessor data and provided to communities and county governments on the Eastern Shore.

Zak Brohinsky
Planner

EXPERIENCE SUMMARY

Mr. Brohinsky has eight years experience supporting conservation and risk assessment projects. He recently taught at Plymouth State University developing and teaching undergraduate curriculum in GIS foundations with focus in applied land protection and environmental research projects. Before working for Sobis, he prepared baseline documents, maps and all spatial needs related to land conservation transactions, and maintained the geographic database for the Squam Watershed. For the last three years with Sobis, he has supported Hazus projects for the State of Hawaii and other locales. He has completed FEMA Hazus basic and advanced training.

RELEVANT EXPERIENCE

Technical Specialist, Risk MAP Production and Technical Services (PTS), FEMA. Mr. Brohinsky currently supports FEMA's National Hazard Risk Assessment Program (NHRAP) as a subcontractor to AECOM. In this position, he supported the development of risk assessment course material, updated technical manuals, and provided ad hoc technical assistance to FEMA headquarters and the regions.

GIS Specialist, Howard County Historic and Cultural Resource Study, VPC. Mr. Brohinsky currently supports VPC by working with the County GIS office to identify and obtain the GIS layers for historic and cultural resources in the County, in addition to the 100-year floodplain, and base map; conduct a preliminary analysis to identify which resources are located in the County's 100-year floodplain, to determine those resources most vulnerable to flooding; and performing a vulnerability assessment that will utilize the FEMA Depth Grids for Howard County to determine approximate inundation levels of historic properties located in the 100-year floodplain.

EDUCATION

M.S., Conservation Biology and Planning, University of Massachusetts-Amherst, 2011

B.S., Cultural Ecology and Sustainability, Plymouth State University, 2009

AREAS OF EXPERTISE

GIS

Hazard Risk Assessment

Climate Change Adaptation

Hazus

KEY TRAINING/ CERTIFICATIONS

FEMA Basic HAZUS-MH Training

FEMA Hazus Flood Training

OFFICE

Holderness, NH

YEARS OF EXPERIENCE

8

Hazus and GIS Specialist: Hawaii Climate Impact Analysis and Mapping, Hawai'i (2017), State of Hawai'i (subcontractor to Tetra Tech). Mr. Brohinsky provided support running the Hazus flood model for each of the five counties in the State. Coastal floodplains and flood depth grids were developed and used to identify present and future risk to the Hawai'i shoreline. For this project, he:

- Supported the assessment of climate change hazards, including sea level risk, coastal erosion, and coastal flooding for each of the five counties.
- Calculated economic losses, displaced population, business interruption losses, and permanent land loss for three climate change time horizons.
- Developed maps showing impacts for each county and each time horizon. These maps were eventually made public using a NOAA website.

Hazus and Risk Assessment Specialist: Strengthening Climate Change Risk Assessments of IDB Operations (2017 to 2018), IDB (subcontractor to Tetra Tech). Mr. Brohinsky provided support for

several IDB projects in Latin America and the Caribbean region concerning risk assessment using GIS and Hazus software. Earthquake, flood, hurricane, landslide, drought, and wildfire were evaluated.

- Supported development of DECIDER methodology focusing on the sections for hazard mitigation and climate change adaptation strategies.
- Loss estimation and vulnerability identification for projects in Haiti, Jamaica, Chili, and Mexico.
- Hazard data collection and mitigation project identification.
- Hazus adaption for international use.

Program Coordinator: Plymouth Area Renewable Energy Initiative (2011 to 2014)
Mr. Brohinsky organized and facilitated market energy efficiency workshops throughout New Hampshire on behalf of state utilities. He acted as a liaison between utilities to prioritize workshop locations.

Contractor: Support to GeoLink (2015)
Mr. Brohinsky prepared Baseline Documentation Reports (BDR) as part of land conservation transactions for regional conservation groups in northeast. He collected and processed data on flora and fauna identification, developed technical reports and maps.

Mapping and Field Specialist: Squam Lakes Conservation Society (2013)
Mr. Brohinsky prepared baseline documents, maps and all spatial needs related to land conservation transactions, and maintain the geographic database for the Squam Watershed.

1.3.4 Workload and Scheduling (10%)

This section directly addresses the areas identified under Section 1.3.4 of the Solicitation Package, with a dedicated subsection for each bullet.

1.3.4.1 Overall Workload of the Company, Number of Current Contracts

Sections 1.3.1.2 and 1.3.1.3 itemize the projects comprising the majority of the workload and top contracts held by the Business Unit of Woods Hole Group that will perform the work for Town of Palm Beach; namely the Environment and Climate – Consulting Unit. To lend further insight into workload, Woods Hole Group management does a detailed monthly review of overall workload and backlog. The detailed monthly review also includes estimates of person power to fulfill contracted requirements. This is then compared to staffing levels and capacity of the workforce to ensure there is a match between adequate personnel resources and client commitments. Woods Hole Group management also does a detailed annual business plan and budget, which is approved by the Board of Directors before each calendar year begins. That budget is then reviewed in detail in May and October to update the business forecast, including person power projections and staffing. As a growing company with access to corporate resources for investment, Woods Hole Group also is always seeking new talent to round out the organization. This is why Palm Beach has had consistent access to people like Bob Hamilton, Kirk Bosma, Leslie Fields, and others over the years, while also gaining familiarity with personnel such as Nasser Brahim for the Level-Up Implementation Plan, Ted Wickwire for the Coastal Flood Vulnerability Assessment, Alex Shaw for the Flood Risk Modeling, and others. All of these decisions are based with the priority of matching the right staff members at Woods Hole Group with the technical nature of the assignments at hand for the Town. And all of these decisions require an assessment of overall workload of the company and number of current contracts. We staff the company as a matrix organization that allows for flexible staffing, particular for long-term clients such as Town of Palm Beach. In the end, based on the information presented about contracts and projects in prior sections, and based on analysis of the business as a whole, we are confident we have the necessary work force and technical expertise required to serve the Town on this Coastal Resiliency contract. With the added resources of our dedicated and exclusively committed team members, our confidence is even higher.

1.3.4.2 Project Scheduling Ability/Timely Completion of Work/Schedule to Accommodate this Contract

Woods Hole Group has always honored its commitments and deadlines with the Town, often driven by time certain dates in a public setting and requiring advance delivery of work products. Without detailed assignments pending, it is difficult to propose a specific schedule at this time. However, we evaluated the recommended path forward in Section 1.3.2.3 for the individualized approach to Palm Beach needs, and we are confident we can advance this level of activity within the first year of the contract if the Town agrees on these priorities, and sufficient resources are available to proceed. We specifically recommend initiating the following activities in Year 1:

- Asset specific upgrades, starting with those with successful Resilient FL grants

- Water level monitoring
- Surveying the Lake Worth shoreline and critical asset elevations
- Resilient FL compliance updates with updated hazard analysis and rankings, incorporating latest state guidelines on SLR, and assessing preliminary surge barrier performance
- Advancing the engineering recommendations for regional solutions, particularly Lake Worth shoreline, to conceptual design phase, including working with Landscape Architect and community to incorporate various stakeholder needs. Prepare conceptual design drawings, renderings and visualizations.
- Pursue more Resilient FL grants.
- Engage USACE and related stakeholders on surge barrier concept and pursue path toward Feasibility Study
- Ongoing consulting/advisory related to policy refinements, capital plan reviews, public engagement

Based on the analysis of existing contracts and staffing levels, the team can work with the Town on a schedule to accommodate this level of work on this contract.

1.3.4.3 Meeting the Town's Requirements

We will need to work with the Town to define specific tasks required on the Coastal Resiliency contract; however, we have done our best to propose specific steps forward as basis for consideration after contract award. Prior sections of this proposal also focused on Understanding Town Needs (1.3.1.5), Understanding Scope of Work (1.3.2.2), and Individualization of the Proposal to Palm Beach (1.3.2.3), and the prior section (1.3.4.2) on Scheduling. We intend for this combined information to give confidence for the Woods Hole Group team to meet the Town's requirements.

In addition to this prior information presented in the proposal, our team demonstrated quite recently the commitment to the Town and ability to meet requirements. For instance, just this past week and weekend, team member GHD with leadership from team member Mike Barnett helped implement the Reach 2 forepassing project under very strict timeframes with demanding scope of work to be completed.

As further evidence of our team's ability to meet Town needs, this specific activity came out of the Woods Hole Group review of the CCMP in 2014. The ability to place sand in this area, linking the Reach 1 and 2 inlet sand bypassing with the northern limits of the Mid-Town Nourishment project represents a major milestone toward overall Palm Beach barrier island beach restoration, shore protection in an area with exposed structures, providing for longer-term coastal resilience. We feel this recent example is a microcosm of what our team can offer the Town.

To achieve this success, GHD assisted the Town of Palm Beach with preparing an Individual Project Approval (IPA) application under the Beach Management Agreement. Then, working with the Town and the Town's Contractor, Rio-Bak Corporation, GHD led a pre-construction (virtual)

meeting with the Town, Rio-Bak, the Florida Fish & Wildlife Conservation Commission, and the Town's Marine Turtle Permit Holder (MTPH). GHD provided construction site observations and reporting as well as coordination with Rio-Bak as needed.

Work commenced on April 18, 2022 and was completed on April 30, 2022. During this compressed timeframe, 15,000 cubic yards of sand were hauled from the USACE maintenance dredge disposal site in Reach 1 (south of the south jetty of Lake Worth Inlet) via off-road dump trucks. GHD was on-site on one occasion prior to construction commencement, four times during active construction, and twice post-construction. Several marine turtle nests were deposited within the placement area limits, requiring careful coordination with the MTPH and precise movement of heavy equipment without disturbance to the five loggerhead and one leatherback turtle nests that were laid. The following photos illustrate project activity and results.

1.3.5 Volume of Previous Work (5%)

No response required per the RFQ documents.

1.3.6 Financial and Other Information (5%)

This section directly addresses the areas identified under Section 1.3.6 of the Solicitation Package, with a dedicated subsection for each bullet.

1.3.6.1 Financial Resources and Capabilities

Woods Hole Group has been in business continuously since 1986. The company is growing, generates market-appropriate profit margin, and positive cash flow. Detailed financial reports are generated monthly, and there is an annual audit conducted by a Certified Public Accounting firm KLR. We have strong banking relationships. Detailed financial reports are not made public; however, we do not object to sharing information if needed as part of the contracting process. We also understand the Town may wish to obtain a Dunn & Bradstreet report, to which we have no objection. The RFQ requests resources and necessary working capital available, and how it will relate to the firm's financial stability through completion of the project. In the course of conducting the work anticipated on the Coastal Resiliency contract, working capital requirements

1.3.5 Volume of Previous Work (5%)

No response required per the RFQ documents.

1.3.6 Financial and Other Information (5%)

This section directly addresses the areas identified under Section 1.3.6 of the Solicitation Package, with a dedicated subsection for each bullet.

1.3.6.1 Financial Resources and Capabilities

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will largely be related to the finances and cash flow required to pay salaries of Woods Hole Group employees, to support modest 3rd party expenses for travel and some field work, and the ability to finance subcontractors working on the project. The typical way to manage working capital for each project is to be sure to invoice timely (monthly), to provide sufficient detail to the Town to ensure timely payment (within ~30 days), and to then pay 3rd parties and subcontractors upon receipt of payment from the Town. Employees of course are paid on time regardless of Town payments as part of regular twice monthly payroll. Based on its own operations and reserves, Woods Hole Group has no problem supporting the business in this manner. Furthermore, when other capital investment or working capital is need, we also can access the CLS-wide cash pool, which is substantial compared to Woods Hole Group's operations and needs. Rest assured, there will be no working capital limited issues the Town will experience should Woods Hole Group be selected for this contract.

1.3.6.2 Evidence of Insurance and Bonding Capability

Woods Hole Group has sufficient insurance coverage that exceeds the requirements set forth in the solicitation. Below is a copy of our standard insurance binder, which certainly can be adapted to name the Town as additionally insured as part of the contracting process.

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 4/1/2022

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
Arthur J. Gallagher Risk Management Services, Inc.
250 Park Avenue, 5th Floor
NEW YORK NY 10007

CONTACT NAME: Anilia Wallace Pierre-Louis
PHONE (A/C, No, Ext): 212-763-3420 FAX (A/C, No):
E-MAIL ADDRESS: Anilia_WallacePierreLouis@ajg.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : XL Specialty Insurance Company	37885
INSURER B : Transportation Insurance Company	20494
INSURER C : Everest National Insurance Company	10120
INSURER D :	
INSURER E :	
INSURER F :	

INSURED WOODHOL-05
Woods Hole Group, Inc.
107 Waterhouse Road
Bourne MA 02532

COVERAGES CERTIFICATE NUMBER: 553592976 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	X COMMERCIAL GENERAL LIABILITY			UM00044627MA22A	1/1/2022	1/1/2023	EACH OCCURRENCE	$ 1,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 50,000
	X Marine Liability						MED EXP (Any one person)	$ 5,000
							PERSONAL & ADV INJURY	$ 1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$ 2,000,000
	X POLICY PRO-JECT LOC						PRODUCTS - COMP/OP AGG	$ 2,000,000
	OTHER:							$
B	AUTOMOBILE LIABILITY			7012097849	1/1/2022	1/1/2023	COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
A	UMBRELLA LIAB X OCCUR			UM00044626MA22A	1/1/2022	1/1/2023	EACH OCCURRENCE	$ 10,000,000
	X EXCESS LIAB CLAIMS-MADE						AGGREGATE	$ 10,000,000
	DED X RETENTION $ 25,000							$
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY	N / A		9700000409-221	1/1/2022	1/1/2023	X PER STATUTE OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y / N: N (Mandatory in NH)						E.L. EACH ACCIDENT	$ 1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	$ 1,000,000

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

CERTIFICATE HOLDER

Proof of Insurance

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

1.3.6.3 Present and Previous Litigation or Disputes

Woods Hole Group has no ongoing or pending litigation or disputes. The only past claim against the firm was made by a property owner in Massachusetts several years ago and was found to be without basis and resolved in our favor with zero damages.

1.3.6.4 Contract Denial, Lost and/or Terminated Contracts

Woods Hole Group has no contract denials, lost, or terminated contracts.

ATTACHMENT D FORMS

TOWN OF PALM BEACH

FEDERAL TERMS & GRANT FUNDING CONDITIONS

This solicitation is either fully or partially Grant funded. Bidder(s) shall comply with clauses as enumerated below and the accompanying certifications, which shall be executed and returned with all submittals. Bidder(s) may be deemed non-responsive for non-compliance and/or failure to submit required documents, inclusive of the executed certifications.

Byrd Anti-Lobbying Amendment, 31 U.S.C. § 1352 (as amended)

Contractors who apply or bid for an award of $100,000 or more shall file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency. (See Anti-Lobbying Certification)

Clean Air Act

1. The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. & 7401 et seq.
2. The contractor agrees to report each violation to the Town of Palm Beach and understands and agrees that the Town of Palm Beach will, in turn, report each violation as required to assure notification of the Federal Emergency Management Agency (FEMA), and the appropriate Environmental Protection Agency Regional Office.
3. The contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA.

Conflict of Interest

The vendor represents that it presently has no interest and shall acquire no interest, either direct or indirect, which would conflict in a manner with the performance or services required hereunder, as provided for in Chapter 112, Part III, and Florida Statutes. All vendors shall disclose the name of any Town employee or relative of a Town employee who owns, directly or indirectly, an interest of ten percent (10%) or more in the vendor's firm or any of its branches. Additionally, 2 CFR 200.318(c)(1) requires disclosure of a potential conflict of interest and standards of conduct for "organizational conflicts of interest", which may also apply to non-profit sub-recipients of federal funds; and, gift requirements that are different from those included in the Town's Code of Ethics. As such, the following provisions shall also govern in those instances where federal funds are utilized for purchasing goods or services:

1. No employee, officer or agent of the Town may participate in the selection, award, or administration of a contract supported by a federal award if he or she has a real or apparent conflict of interest. Such a conflict of interest would arise when the employee, officer, agent, any member of his or her immediate family, his or her partner, or an organization which employs or is about to employ any of the parties indicated herein, has a financial or other interest in or may receive a tangible personal benefit from a vendor considered for a Town contract. In addition, vendor shall disclose to the Town in writing all federal criminal law violations involving fraud, bribery or gratuity that potentially affect the award of this solicitation Failure to make the required disclosures can result in withheld payments, award termination, suspension or debannent of the vendor.

2. The vendor shall not have activities or relationships (a) causing the vendor to be unable, or potentially unable, to render impartial assistance or advice to the Town; (b) impairing the vendor's objectivity in performing the contract work; or (c) resulting in an unfair competitive advantage.
3. No vendor who is a party to, or receives a benefit from, this order/contract shall offer a gratuity, favor, or anything of monetary value to any officer, employee, or agent of the Town. Further, no officer, employee, or agent of the Town shall solicit or accept a gratuity, favor, or anything of monetary value from a vendor who is a party to, or receives a benefit from, this order/contract.

If applicable, the contractor must disclose in writing any potential conflict of interest to the Town of Palm Beach or pass-through entity in accordance with applicable Federal policy. (See Conflict of Interest Form?)

Contract Work Hours and Safety Standards Act – 29 CFR 5.5b

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any work week in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the cluse set forth in paragraph (b)(1) of this section, in the sum of $27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section
3. Withholding for unpaid wages and liquidated damages. The Town of Palm Beach shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.
4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

Contractor Compliance

1. Federal, State, County, Town and local laws, ordinances, rules and regulations that in any manner affect the items covered herein apply. Lack of knowledge by the vendor shall in no way be a cause for relief from responsibility. The vendor shall strictly comply with Federal, State and local building and safety codes. Equipment shall meet all State and Federal Safety regulations. Vendor certifies that all products meet all ANSI, NFPA, and all other Federal and State requirements. Vendor further certifies that the product delivered is subsequently found to be deficient in any of the aforementioned requirements in effect on date of delivery, all costs necessary to bring the product into compliance shall be borne by the vendor. Any toxic substance provided to the Town as a result of this order/contract shall be

accompanied by its Safety Data Sheet (SDS). Unless otherwise provided by federal law, the Uniform Commercial Code (Florida Statutes, Chapter 672) shall prevail as the basis for contractual obligations between the vendor and the Town for any terms and conditions not specifically stated otherwise.

2. The contractor shall comply with all uniform administrative requirements, cost principles, and audit requirements for Federal awards.

Discrimination Prohibited

The Town is committed to assuring equal opportunity in the award of contracts and complies with all laws prohibiting discrimination. The vendor warrants and represents that throughout the term of the contract, including any renewals thereof, all of its employees are treated equally during employment without regard to race, color, religion, disability, sex, age, national origin, ancestry, marital status, familial status, sexual orientation, gender identity or expression, or genetic information. Failure to meet this requirement shall be considered a default of contract. Vendor shall comply with all applicable Federal statutes relating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§16811683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29) U.S.C.§794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101- 6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended relating to nondiscrimination on tbe basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ec3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) Rehabilitation Act of 1973 any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and (j) the requirements of any other nondiscrimination statute(s) which may apply to the application. Vendor shall comply with the Drug Free Workforce Act of 1988.

Discriminatory Vendor List

An entity or affiliate who has been placed on the discriminatory vendor list may not: obtain a order/contract to provide goods or services to a public entity; construct or repair of a public building or public work; lease real property to a public entity; award or perform work as a vendor, supplier, or consultant under contract with any public entity; nor transact business with any public entity. The Florida Department of Management Services is responsible for maintaining the discriminatory vendor list and intends to post the list on its website. Questions regarding the discriminatory vendor list may he directed to the Florida Department of Management Services, Office of Supplier Diversity at (850) 487-0915.

Drug Free Workplace

Drug-free workplace requirements in accordance with Drug Free Workplace Act of 1988 (Pub 1 100-690, Title V, Subtitle D). All contractors entering into Federally funded contracts over $150,000 must comply with the Federal Drug Free Workplace requirements and certify their compliance. (See Drug-Free Workplace Certification)

Equal Employment Opportunity (EEO)

During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

3. The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

4. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

5. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

6. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

7. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

8. The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance.

   Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States. (See EEO Certification)

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: Provided, That if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon

contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

Federal Criminal Law/False Statements Act

The False Statement Act sets forth liability for, among other things, any person who knowingly submits a false claim to the Federal government or causes another to submit a false claim to the government or knowingly makes a false record or statement to get a false claim paid by the government. 31 U.S.C. §§ 3729. For example, a false claim could include false billing documentation submitted by the Town received from a vendor or subcontractor under the contract.

Federal Water Pollution Control Act

1. The contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.
2. The contractor agrees to report each violation to the Town of Palm Beach and understands and agrees that the Town of Palm Beach will, in turn, report each violation as required to assure notification of the Federal Emergency Management Agency (FEMA), and the appropriate Environmental Protection Agency Regional Office.
3. The contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA.

Incorporation, Precedence, & Jurisdiction

This order/contract shall be included and incorporated in the award or resulting contract. Any and all legal action necessary to enforce the award or resulting contract shall be governed by the laws of the State of Florida. Any legal action necessary to enforce the award or the resulting contract shall be in a court of competent jurisdiction located in the County. The order of legal precedence is as follows: Laws passed by Congress,

which are codified in provisions of the United States Code (U.S.C.) applicable to the funding source for this order/contract; Rules or regulations adopted by a federal agency, which are codified in the Code of Federal Regulations(CFR) and applicable to the funding source for this order/contract; the federal award or funding document for this order/contract; the Super Circular, inclusive of 2 CFR Sections 200.317 – 200.326; and, order/contract.

Mandatory Standards & Policies Relating to Energy Efficiency
The Vendor is required to comply with mandatory standards and policies related to energy efficiency that are contained in the State energy conservation plan issued in accordance with the Energy Policy and Conservation Act (. L. 94–163, 89 Stat. 871) (42 U.S.C. 6201).

Non-Collusion
Vendor certifies that it has entered into no agreement to commit a fraudulent, deceitful, unlawful, or wrongful act, or any act that may result in unfair advantage for one or more vendors over other vendors. Conviction for the commission of any fraud or act of collusion in connection with any sale, quote, quotation, proposal or other act incident to doing business with the Town may result in permanent debarment. No premiums, rebates or gratuities are permitted; either with, prior to or after any delivery of material or provision of services. Any such violation may result in award cancellation, return of materials, discontinuation of services, and removal from the vendor list(s), and/ or debarment or suspension from doing business with the Town.

No Third-Party Beneficiaries
No provision of the order/contract is intended to, or shall be construed to, create any third-party beneficiary or to provide any rights to any person or entity not a party to the order/contract, including but not limited to any citizen or employees of the Town and/or vendor.

Non-Exclusive
As may be applicable, the Town reserves the right to acquire some or all of these goods and services through a State of Florida contract under the provisions of Section 287.042, Florida Statutes, provided the State of Florida contract offers a lower price for the same goods and services. This reservation applies both to the initial award of this solicitation and to acquisition after a term contract may be awarded. Additionally, the Town reserves the right to award other contracts for goods and services falling within the scope of this solicitation and resultant contract when the specifications differ from this solicitation or resultant contract, or for goods and services specified in this solicitation when the scope substantially differs from this solicitation or resultant contract.

Offer Extended to Other Governmental Entities
The Town encourages and agrees to the vendor extending the pricing, terms and conditions of this solicitation or resultant contract to other governmental entities pursuant to the requirements of the federal awarding agency.

Order/Contract
Vendor agrees that by submitting an offer, which is accepted by the Town, a binding contract is formed in accordance with the Town's terms, conditions and specifications as set forth in the purchase order, unless otherwise agreed by the Town and the vendor. The Vendor certifies that the offer has been made by an officer or employee having the authority to bind the vendor.

Payment
In order for the Town to make payment, the vendor's Legal Name; vendor's Address; must be exactly the same as it appears on the invoice.

Performance During Emergency
The vendor agrees and promises that, immediately preceding, during, and after a public emergency, disaster, hurricane, flood, or act of God, the Town shall be given "first priority" for all goods and/or services under

the contract. Vendor agrees to provide all goods and/or services to the Town immediately preceding, during, and after a public emergency, disaster, hurricane, flood, or act of God, at the terms, conditions, and prices as provided in this solicitation on a "first priority" basis. Vendor shall furnish a 24-hour phone number to the Town. Failure to provide the goods and/or services to the Town on a first priority basis immediately preceding, during, and after a public emergency, disaster, hurricane, flood, or act of God, shall constitute breach of contract and subject the vendor to sanctions from doing further business with the Town.

Program Fraud & False or Fraudulent or Related Acts (31 U.S.C. Chapter 38)
The vendor acknowledges that 31 U.S.C. Chapter 38 (Administrative Remedies for False Claims and Statements) applies to the vendor's actions pertaining to this order/contract.

Procurement of Recovered Materials for Goods Valued Above $10,000
Vendors are to provide the Town with those goods designated by the Environmental Protection Agency "(EPA"), at 40 CFR Part 247 – 247.17, that contain the highest percentage of recovered materials practicable while maintaining a satisfactory level of competition for goods valued above $10,000 or where the value of the goods procured during the preceding fiscal year exceeded $10,000. Categories of goods with the highest percentage of recovered materials include construction products; landscaping products; miscellaneous products; non-paper office products; paper and paper products; park and recreation products; transportation products; and, vehicular products.

Protest Procedure
Protests shall be submitted in writing, addressed to the Purchasing Manager, via hand delivery, mail, emailed to solicitations@townofpalmbeach.com, or fax to (561) 835-4688. The protest must identify the solicitation, specify the basis for the protest, and be received by the Purchasing Department within three (3) business days of the posting date of the recommended award. The protest is considered filed when it is received by the Purchasing Department.

Pricing

1. Prices offered must be the price for new merchandise and free from defect.
2. The price offered must be in accordance with the order/contract.
3. Vendor warrants that prices shall remain firm for the initial and any subsequent term unless modified by the Town and vendor.
4. If a sole source procurement or a procurement where there is no competition, profit must be negotiated as a separate element of price.

Prohibition of utilization of cost plus percentage contracts.
The Town of Palm Beach will not award Federally funded contracts on the basis of cost plus percentage.

Prohibition of utilization of time and material type contracts.

The Town of Palm Beach will not award Federally funded contracts on the basis of time and materials.

Public Entity Crimes
F.S. 287.133 requires the Town to notify all vendors of the following: "A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not obtain an order/contract for the construction or repair of a public building or public work, may not lease real property to a public entity, may not be awarded or perform work as a vendor, supplier, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in F.S. 287.017 for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list."

Public Records, Access, Audits & Retention:
The vendor agrees that copies of any and all property, work product, documentation, reports, computer systems and software, schedules, graphs, outlines, books, manuals, logs, files, deliverables, photographs, videos, tape recordings or data relating to the Contract which have been created as a part of the vendor's services or authorized by the Town as a reimbursable expense, whether generated directly by the vendor, or by or in conjunction or consultation with any other party whether or not a party to the Contract, whether or not in privity of contract with the Town or the vendor, and wherever located shall be the property of the Town. Any material submitted in response to this solicitation is considered a public document in accordance with Section 119.07, F.S. All submitted information that the responding vendor believes to be confidential and exempt from disclosure (i.e., a trade secret or as provided for in Section 119.07 and Section 812.081, F.S.) must be specifically identified as such. Upon receipt of a public records request for such information, a determination will be made as to whether the identified information is, in fact, confidential. The vendor shall maintain all records pertaining to the procurement of the goods or services paid with federal funds for a period of three (3) years from the date of submission of the final expenditure report for the entire federal allocation or, for federal awards that are renewed quarterly or annually, from the date of the submission of the quarterly or annual financial report, respectively, as reported to the federal awarding agency or pass-through entity. The Town shall have access to such records as required in this Section for the purpose of inspection or audit during normal business hours, at the vendor's place of business. Exceptions include:

1. If any litigation, claim, or audit is started before the expiration of the three (3) year period, the records must be retained until all litigation, claims, or audit findings involving the records have been resolved and final action taken.
2. When the Town has received written notification to extend the records retention period from the federal awarding agency, agency for audit, oversight agency for audit, agency for indirect costs, or pass-through entity.
3. Records for equipment acquired with federal funds must be retained for three (3) years after final disposition.

When records are transferred to or maintained by the federal awarding agency or pass-through entity, the three (3) year retention requirement is not applicable to the Town. Notwithstanding anything contained herein, as provided under Section 119.0701, F.S., if the vendor: (i) provides a service; and (ii) acts on behalf of the Town as provided under Section 119.011(2), F.S., the vendor shall comply with the requirements of Section 119.0701, Florida Statutes, as it may be amended from time to time. The vendor is specifically required to:

1. Keep and maintain public records required by the Town to perform services provided under the Contract.
2. Upon request from the Town's Custodian of Public Records ("Town's Custodian") or a Town representative/liaison, on behalf of the Town's Custodian, provide the Town with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided or as otherwise provided by law. The vendor further agrees that all fees, charges and expenses shall be determined in accordance with the terms and conditions set forth.
3. Ensure that public records that are exempt, or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of the Contract, if the vendor does not transfer the records to the public agency. Nothing contained herein shall prevent the disclosure of or the provision of records to the Town.
4. Upon completion of the Contract, the vendor shall transfer, at no cost to the Town, all public records in possession of the vendor unless notified by a Town's representative/liaison, on behalf of the Town's Records Custodian, to keep and maintain public records required by the Town to

perform the service. If the vendor transfers all public records to the Town upon completion of the Contract, the vendor shall destroy any duplicate public records that are exempt, or confidential and exempt from public records disclosure requirements. If the vendor keeps and maintains public records upon completion of the Contract, the vendor shall meet all applicable requirements for retaining public records. All records stored electronically by the vendor must be provided to the Town, upon request of the Town's Custodian or the Town's representative/liaison, on behalf of the Town's Custodian, in a format that is compatible with the information technology systems of the Town, at no cost to the Town. Failure of the vendor to comply with the requirements of this Section, and other applicable requirements of state or federal law, shall be a material breach of the Contract. The Town shall have the right to exercise any and all remedies available to it for breach of contract, including but not limited to, the right to terminate for cause.

Purchase Order Required
The Town will not accept any goods delivered or services performed unless a duly authorized purchase order has been issued for said goods and/or services. The purchase order number must appear on all invoices, packing slips and all correspondence concerning the order.

Quantities
Quantities specified in the order/contract cannot be changed without Town approval. Goods shipped in excess of quantity designated may be returned at vendor's expense.

Remedies
No remedy herein conferred upon any party is intended to be exclusive of any other remedy, and each and every such remedy shall be cumulative and shall be in addition to every other remedy given hereunder now or hereafter existing at law, or in equity, by statute or otherwise. No single or partial exercise by any party of any right, power, or remedy hereunder shall preclude any other or further exercise thereof.

Safety Data Sheets (SDS)
Any toxic substance provided to the Town as a result of this solicitation shall be accompanied by its SDS.

Sales Promotions/Price Reductions/Most Favored Customer
Should sales promotions occur during the term of the contract that lower the price of the procured item, the vendor shall extend to the Town the lower price offered by the manufacturer on any such promotional item. Additionally, any time after award, the vendor may offer a reduced price, which shall remain in effect for the duration of the contract. The vendor warrants that the price(s) shall not exceed the vendor's price(s) extended to its most favored customer for the same or similar goods or services in similar quantities, or the current market price, whichever is lower. In the event the vendor offers more favorable pricing to one of its customers, the vendor shall extend to the Town the same pricing or the then current market price, whichever is lower.

Scientific Research & Development & Copyright & Patent Rights
Those orders/contracts providing federal funds in support of scientific research and development must comply with the requirements of 37 CFR 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency. The Town shall be the exclusive owner of any patent rights arising as a result of any discovery or invention that arises or is developed in the course of or under this order/contract. The Town shall hold the copyright to works produced or purchased under this order/contract. The Federal Government holds a royalty-free, non-exclusive and irrevocable license to produce, publish, or to otherwise authorize others to use, for Federal Government purposes, copyrighted material that was developed under a Federal award or purchased under a Federal award.

Scrutinized Companies

When the contract value is greater than $1 Million, as provided in F.S. 287.135, by entering into a Contract or performing any work, the vendor certifies that it, its affiliates, suppliers, subcontractors and consultants who will perform hereunder, have not been placed on the Scrutinized Companies With Activities in Sudan List or Scrutinized Companies With Activities in The Iran Petroleum Energy Sector List created pursuant to F.S. 215.473, or on the Scrutinized Companies that boycott Israel List, or is engaged in a boycott of Israel, pursuant to F.S. 215.4725, or is engaged in business operations in Cuba or Syria. If the Town determines, using credible information available to the public, that a false certification has been submitted by vendor, the resulting Contract may be terminated and a civil penalty equal to the greater of $2 million or twice the amount of the Contract shall be imposed, pursuant to F.S. 287.135. (See Scrutinized Companies Certification)

Successors & Assigns

Neither the Town nor the vendor shall assign, sublet, convey or transfer its interest in the Contract without the prior written consent of the Town. The Town and the vendor each binds itself and its successors and assigns to the other party in respect to all provisions of the Contract.

Suspension and Debarment

1. This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, the contractor is required to verify that none of the contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).
2. The contractor must comply with 2 C.F.R. pt. 180, subpart C and2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.
3. This certification is a material representation of fact relied upon by the Town of Palm Beach. If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to Town of Palm Beach, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.
4. The bidder or proposer agrees to comply with the requirements of2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions. (See Debarment Form)

Town Office of the Inspector General Audit Requirements

The County's Office of Inspector General is authorized to review past, present and proposed Town contracts, transactions, accounts, and records. The Inspector General's authority includes, but is not limited to, the power to audit, investigate, monitor, and inspect the activities of entities contracting with the Town, or anyone acting on their behalf, in order to ensure compliance with contract requirements and to detect corruption and fraud. Failure to cooperate with the Inspector General or interfering with or impeding any investigation shall be a violation which could result in punishment pursuant to Section 125.69, Florida Statutes, in the same manner as a second-degree misdemeanor.

Use of Department of Homeland Security (DHS) Identifiers

The contractor is prohibited from using DHS's seal, logo, or flag without express, written permission.

Utilization of Minority and Women-Owned Firms

The contractor must take all necessary affirmative steps to assure that minority businesses (M), women-owned business enterprises (WBE), and labor surplus area firms are used when possible. Prior to contract award, the contractor shall document efforts (See Utilization of Minority and Women-Owned Firms Form under Required Forms) to utilize M/WBE firms including what firms were solicited as suppliers and/or subcontractors and submit this information with their bid submittal. Affirmative steps must include:

1. Placing qualified small and minority businesses and women's business enterprises on solicitation lists;
2. Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;
3. Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises;
4. Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises;
5. Using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce. (See DBE Form)

I have read and understand the above requirements and agree to observe the terms as set forth.

Firm:	Woods Hole Group, Inc.	**Date:**	April 27, 2022
Authorized Agent:	Robert P. Hamilton, Jr.	**Title:**	President
Email:	bhamilton@woodsholegroup.com	**Phone:**	508-540-8080
Signature:	R.P. Hamilton Jr.		

May 3, 2022

Town of Palm Beach
Attn: Ryan Canterbury, Senior Buyer
rcanterbury@townofpalmbeach.com
(561) 227-7002

Intent Letter – RFQ No. 2022-16 Coastal Resiliency Consultant for Town of Palm Beach

Dear Mr. Canterbury:

Woods Hole Group is pleased to offer this response to the subject RFQ. It is our purposeful intent to present sufficient information to be awarded a contract. We also made every effort to present a uniquely qualified full-service team lead by Woods Hole Group, and with support of exclusive partners GHD, Coastal Protection Engineering, SCAPE Landscape Architecture, and Sobis, that can address all aspects of the Scope of Work. In this regard, we request consideration of making a single award to our team, which we firmly believe is in the best interest of the Town from a quality, consistency, efficiency, timeliness, and budgetary combined perspective. We acknowledge the RFQ, fully understand the scope, and other RFP requirements, and acknowledge receipt of Amendments.

We hope the review committee find our response to be thorough and information, and we certainly welcome any questions or points of clarification. Many thanks for this opportunity.

Sincerely,

The Woods Hole Group, Inc.

Robert (Bob) P. Hamilton, Jr.
President / Coastal Engineer

TOWN OF PALM BEACH

Contact Information Form

Purchasing Division
951 Okeechobee Rd.
West Palm Beach, FL 33401
Phone: 561-838-5406
Fax: 561-835-4688
Web: www.townofpalmbeach.com

Please Take a Moment to Provide the following Company Information

Part 1 | Company Information

Company Name: Woods Hole Group, Inc.

DBA Name (If Applicable):

Physical Address (No P.O. Boxes): 107 Waterhouse Road

Mailing Address (If Different than Above):

City: Bourne State: MA Zip: 02532

Owner's Name(s): CLS

Part 2 | Contact Information

Main Office Phone: 508-540-8080 Office Fax: 508-540-1001 Web Site: www.whgrp.com

Primary Contact: Robert P. Hamilton, Jr.

Primary Contact Phone: 508-495-6229

Primary Contact Cell Phone: 508-564-0446

Primary Contact Email: bhamilton@woodsholegroup.com

Emergency After Hours Contact: Bob Hamilton

Emergency After Hours Phone: 508-564-0446

Alternate Contact: Nasser Brahim

Alternate Phone: 508-495-6237

Alternate Contact Cell Phone:

Alternate Email : nbrahim@woodsholegroup.com

Emergency After Hours Email: bhamilton@woodsholegroup.com

Part 3 | Purchase Orders

Contact for Issuing Purchase Orders: Nadine Sweeney

Contact Phone: 508-495-6207

Contact Email: nsweeney@woodsholegroup.com

Part 4 | Accounts Receivable

Accounts Receivable Contact: Seema Owen

Contact Phone: 301-925-4411

Contact Email: dcs@woodsholegroup.com

TOWN OF PALM BEACH

Bidder's Qualification Form

The Vendor, as a result of this bid proposal, must hold a County and/or Municipal Tax Receipt (Occupational License) in the area of their fixed business location. Each proposer must complete the following information and submit with their proposal in order to be considered:

1. Legal Name and Address:

   Name: Woods Hole Group, Inc.

   Address: 107 Waterhouse Road

   Email: bhamilton@woodsholegroup.com

   City, State, Zip: Bourne, MA 02532

   Phone/Fax: 508-540-8080/508-540-1001

2. Check One: Corporation (X) Partnership ( ) Individual ( )
3. If Corporation, state: MA

   Date of Incorporation: Aubrey Consulting, Inc. 5/1/1986; Woods Hole Group, Inc. 2/5/1998

   State in which Incorporated: MA
4. If an out-of-state Corporation, currently authorized to do business in Florida, give date of such authorization: 11/14/2013
5. Name and Title of Principal Officers: Date Elected:

Name and Title	Date Elected
Christophe Vassal - Chairman of the Board	11/30/2021
Robert P. Hamilton, Jr., - President	11/30/2021
Carine Foulquier - Secretary/Treasurer	11/30/2021

6. The Vendor's length of time in business: 36 years
7. The Vendor's length of time (continuous) in business as a service organization in Florida: 9 years
8. All bidders must disclose with their bid the name of any officer, director or agent who is also an employee of the Town. Further, all bidders must disclose the name of any Town employee who owns, directly or indirectly, an interest in the bidder's firm or any of its branches.

   Name: N/A

   Percentage of Interest: _____ %

Note: *Information requested herein and submitted by the proposers will be analyzed by the Town of Palm Beach and will be a factor considered in awarding any resulting contract. The purpose is to ensure that the Proposers, in the sole opinion of the Town of Palm Beach, can sufficiently and efficiently perform all the required services in a timely and satisfactory manner as will be required by the subject contract. If there are any terms and/or conditions that are in conflict, the most stringent requirement shall apply.*

TOWN OF PALM BEACH

LIST OF PROPOSED SUBCONTRACTORS FORM

The undersigned bidder hereby designates, as follows, all major subcontractors whom he/she proposes to utilize for the major areas of work for the project. The bidder is further notified that all subcontractors shall be properly licensed, bondable and shall be required to furnish the TOWN with a Certificate of Insurance in accordance with the contract general conditions. Failure to furnish this information shall be grounds for rejection of the bidder's proposal. (If no subcontractors are proposed, state "None" on first line below.)

Name and Address of Subcontractor	Scope of Work	License #
1. GHD Services, Inc.	Coastal Engineering	P.E., Brian Moore - PE64017
Michael R. Barnett, PE, D.CE - michael.barnett@ghd.com	Structural Engineering	FL Dept of State F03000005291
Senior Coastal Engineer, Associate - 251-300-1250	Storm Water/Drainage Engineering	Prof Geologist, Enos Gabriellem - PG605
3750 Airport Blvd.	Local Expertise	FL. Prof. Surveyor and Mapper - #LB8496
Mobile, AL 36608		
2. Coastal Protection Engineering, LLC	Coastal Engineering	Palm Beach County Small Business Enterprise (SBE) #VS0000014339
Thomas Pierro, PE, D.CE - 561-756-2535	Ecological Resources	
Principal Engineer - tpierro@coastalprotectioneng.com	Shore Protection Program	PE, Thomas Pierro - PE64683
5301 N. Federal Hwy, Ste 335	Local Expertise	FL Dept of State L19000166989
Boca Raton, FL 33487		FL DBPR No 33370
3. SCAPE Landscape Architecture, DPC	Landscape Architecture	Woman-owned Business Enterprise (WBE)
Pippa Brashear, RLA - pippa@scapestudio.com	Designing for Resilience	Register Landscape Architects
Resilience Principal - 212-462-2628	Rendering/Visualization	
277 Broadway Ninth Floor		
New York, NY 10007		
4. Sobis, Inc.	Economic Analysis	Small, Woman and Minority Owned 8(a) Business DUNS 079250053
William M. Bohn - bbohn@sobisinc.com	Climate Change Adaptations	
Risk Assessment Specialist - 540-424-9624		
11812 Arbor Glen Drive		
Fredericksburg, VA 22407		
5.		

Signature and Date R. P. Hamilton May 2, 2022

Title/Company President, Woods Hole Group

TOWN OF PALM BEACH

LIST OF CURRENT & PERTINENT PROFESSIONAL REFERENCE FORM

The following is a list of **at least FIVE (5)** current (within last three years) and pertinent professional references that the Town can contact in relation to Bidder's qualifications, financial stability, and experience. Failure to furnish this information may be grounds for rejection of the proposal.

1. Name and Address of Firm, City, County, or Agency	**Scope of Work:**	Coastal Resilience Support for Climate Ready Boston
City of Boston, Mayor's Office	**Date(s):**	2018-present
1 City Hall Square, Ste 500	**Amount:**	~$500,000
Boston, MA 02201	**Contact:**	Sanjay Seth, Climate Resileince
	Telephone No:	617-635-4000
	Email:	Sanjay.seth@boston.gov
For Town Use Only: Reference Verified: Yes ___ No___	Comments:	

2. Name and Address of Firm, City, County, or Agency	**Scope of Work:**	Coastal Resilience Support for DE Bay & Related Restoration Proj. Prioritation
National Fish and Wildlife Foundation	**Date(s):**	2019-present
1133 15th St, NW Suite 1100	**Amount:**	~$500,000
Washington, DC 20005	**Contact:**	Kristen Byler, Sr Scientist Marine Conservation
	Telephone No:	202-595-2445
	Email:	Kristen.Byler@nfwf.org
For Town Use Only: Reference Verified: Yes ___ No___	Comments:	

3. Name and Address of Firm, City, County, or Agency	**Scope of Work:**	Facility & Community Flood Risk Mgmt and Flood Vulnerability Assessment
Woods Hole Oceanographic Institution	**Date(s):**	2020-present
86 Water Street	**Amount:**	~$100,000
Falmouth, MA 02543	**Contact:**	Leslie-Ann McGee, Program Manager
	Telephone No:	508-289-2712
	Email:	lmcgee@whoi.edu
For Town Use Only: Reference Verified: Yes ___ No___	Comments:	

4. Name and Address of Firm, City, County, or Agency	**Scope of Work:**	Massachusetts Coast Flood Risk Modeling (MC-FRM)
Massachusetts Department of Transportation	**Date(s):**	2015-present
10 Park Plaza, Room 4260	**Amount:**	~$1,500,000
Boston, MA 02116	**Contact:**	Steven J. Miller
	Telephone No:	857-368-8809
	Email:	Steven.j.Miller@state.ma.us
For Town Use Only: Reference Verified: Yes ___ No___	Comments:	

5. Name and Address of Firm, City, County, or Agency	**Scope of Work:**	County-Wide Assessment of Low Lying Roadways
County of Barnstable, Cape Cod Commission	**Date(s):**	2020-present
3225 Main Street	**Amount:**	~$350,000
Barnstable, MA 02630	**Contact:**	Heather McElroy, Natural Resources Manager
	Telephone No:	508-744-1217
	Email:	hmcelroy@capecodcommission.org
For Town Use Only: Reference Verified: Yes ___ No___	Comments:	

Form **W-9**
(Rev. October 2018)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

▶ Go to *www.irs.gov/FormW9* for instructions and the latest information.

Give Form to the requester. Do not send to the IRS.

Print or type. See Specific Instructions on page 3.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.
The Woods Hole Group, Inc.

2 Business name/disregarded entity name, if different from above

3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only one of the following seven boxes.

☐ Individual/sole proprietor or single-member LLC ☑ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶

Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is **not** disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.

☐ Other (see instructions) ▶

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any)

Exemption from FATCA reporting code (if any)

(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.) See instructions.
107 Waterhouse Road

Requester's name and address (optional)

6 City, state, and ZIP code
Bourne, MA 02532

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number
☐☐☐ – ☐☐ – ☐☐☐☐

or

Employer identification number
0 4 – 3 4 0 8 8 0 1

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here Signature of U.S. person ▶ R.P. Hamilton Date ▶ 1/18/2022

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to *www.irs.gov/FormW9.*

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, *later.*

Florida Tentative Income / Franchise Tax Return and Application for Extension of Time to File Return

1019
F-7004
R. 01/17
Rule 12C-1.051
Florida Administrative Code
Effective 01/17

Information for Filing Florida Form F-7004

F-7004
R. 01/17

When to file - File this application on or before the original due date of the taxpayer's corporate income tax or partnership return. Do not file before the end of the tax year.
To file online go to **www.floridarevenue.com**

Penalties - If you are required to pay tax with this application, failure to pay will void any extension of time and subject the taxpayer to penalties and interest. There is also a penalty for late-file return when no tax is due.

Signature - A person authorized by the taxpayer must sign Florida Form F-7004. They must be an officer or partner of the taxpayer; a person currently enrolled to practice before the Internal Revenue Service (IRS); or attorney or Certified Public Accountant qualified to practice before the IRS under Public Law 89-332.

The Florida Form F-7004 must be filed - To receive an extension of time to file your Florida return, Florida Form F-7004 must be timely filed, even if you have already filed a federal extension request. A federal extension by itself does not extend the time to file a Florida return.

An extension for Florida tax purposes may be granted, even though no federal extension was granted. See Rule 12C-1.0222, F.A.C., for information on the requirements that must be met for your request for an extension of time to be valid.

A. If applicable, state the reason you need the extension:

_____

_____

B. Type of federal return filed: 1120
Contact person for questions: CHRISTOPHER ADOMANI
Telephone number: 508-540-8080
Contact Person email address: CFOULQUIER@GROUPCLS.

Extension of Time Request	Florida Income/Franchise Tax Due
1. Tentative amount of Florida tax for the taxable year	1. 1,000.00
2. LESS: Estimated tax payments for the taxable year	2. 0.00
3. Balance due - You must pay 100% of the tax tentatively determined due with this extension request.	3. 1,000.00

Transfer the amount on Line 3 to **Tentative tax due**.

Make checks payable and mail to:
FLORIDA DEPARTMENT OF REVENUE, 5050 W TENNESSEE STREET, TALLAHASSEE FL 32399-0135

144961
09-27-21

Florida Department of Revenue - Corporate Income Tax
Florida Tentative Income / Franchise Tax Return
and Application for Extension of Time to File Return

1019
F-7004
R. 01/17

FEIN 04-3408801
Taxable Year End 12/31/21
FILING STATUS Partnership ___ S-corporation ___
All other federal returns to be filed X
Tentative Tax Due $ 1,000.00

Name THE WOODS HOLE GROUP, INC.
Address 107 WATERHOUSE ROAD
City/State/ZIP BOURNE, MA 02532

Under penalties of perjury, I declare that I have been authorized by the above named taxpayer to make this application, that to the best of my knowledge and belief the statements herein are true and correct:

Sign Here: _____ Date: _____

043408801	0	0	0
3	0	0	0
20211231	0	0	0
0	0	0	0
101	0	0	0
0	0	0	0
0	0	0	0
0	0	0	100000

100000 8233 1 20211231 0002005030 7 3043408801 0000 1

Society of Wetland Scientists
Professional Certification Program, Inc

grants the designation

Professional Wetland Scientist

For

Adam Finkle, M.S.

In recognition of all the professional requirements approved by the Society of Wetland Scientists Certification Program, Inc. and verified by the Society's Certification Review Panel on 06/20/2018. Professional Wetland Scientist number 2960. Due to recertify by 06/20/2023.

Ben LePage, PWS
President

Robert D. Shannon, Ph.D., PWS
Review Panel Chair

COMMONWEALTH OF MASSACHUSETTS

DIVISION OF PROFESSIONAL LICENSURE

BOARD OF
ENGINEERING

ISSUES THE FOLLOWING LICENSE

REG/PROF CIVIL ENGINEER

KIRK F BOSMA
107 WATERHOUSE RD
BOURNE, MA 02532-3890

LICENSEE SIGNATURE

45849	06/30/2022	965011
LICENSE NUMBER	EXPIRATION DATE	SERIAL NUMBER

COMMONWEALTH OF MASSACHUSETTS

DIVISION OF PROFESSIONAL LICENSURE

BOARD OF

ENGINEERING

ISSUES THE FOLLOWING LICENSE

REG/PROF LAND SURVEYOR

JOEL R KUBICK
PO BOX 647
NORTH FALMOUTH, MA 02556-0647

LICENSEE SIGNATURE

LICENSE NUMBER	EXPIRATION DATE	SERIAL NUMBER
46712	06/30/2022	859217

COMMONWEALTH OF MASSACHUSETTS

DIVISION OF PROFESSIONAL LICENSURE

BOARD OF

ENGINEERING

ISSUES THE FOLLOWING LICENSE

REG/PROF CIVIL ENGINEER

JOEL R KUBICK
PO BOX 647
NORTH FALMOUTH, MA 02556-0647

LICENSEE SIGNATURE

LICENSE NUMBER	EXPIRATION DATE	SERIAL NUMBER
48092	06/30/2022	859212

Please visit our web site at http://www.mass.gov/dpl/boards/EN

MITCHELL BUCK
30 COLERIDGE DR
FALMOUTH, MA 02540

(EN)

Fold, Then Detach Along All Perforations

COMMONWEALTH OF MASSACHUSETTS
DIVISION OF PROFESSIONAL LICENSURE
BOARD OF
ENGINEERING
ISSUES THE FOLLOWING LICENSE
REG/PROF CIVIL ENGINEER

MITCHELL BUCK
30 COLERIDGE DR
FALMOUTH, MA 02540

Mitchell Buck
LICENSEE SIGNATURE

LICENSE NUMBER	EXPIRATION DATE	SERIAL NUMBER
51147	06/30/2020	494855

DELAWARE ASSOCIATION OF PROFESSIONAL ENGINEERS

92 Read's Way, Suite 208
New Castle, DE 19720
Phone: 302-323-4588
Email: office@dape.org

Professional Engineers

Person Information

Name:	Matthew F Shultz
Discipline:	Civil Engineering

Address Information

Address (City, State, Zipcode):	Marion, MA, 02738

License Information

License Number:	21748
License Status:	Active
License Expires:	06/30/2022

LOUISIANA PROFESSIONAL ENGINEERING AND LAND SURVEYING BOARD

As of 7/7/2021 the Louisiana Professional Engineering and Land Surveying Board (LAPELS) has the following information on file:

Mr. Matthew Frederick Shultz
107 Waterhouse Road
Bourne, MA 02532

Cut Here

LOUISIANA PROFESSIONAL ENGINEERING & LAND SURVEYING BOARD (LAPELS)
9643 Brookline Avenue, Suite 121
Baton Rouge, LA 70809
Phone (225) 925-6291
www.lapels.com

Mr. Matthew Frederick Shultz

License/Certificate Type - Number	Expiration Date
PE.0036650	03/31/2022

Status: ACTIVE

Fold Here

Please be advised that your license must be in "Active" status in order for you to (a) provide or offer to provide engineering or land surveying services in Louisiana or (b) use the words "engineer", "engineering", "land surveyor", "land surveying" or any modification or derivative thereof in your name or in connection with your business or activities in Louisiana. Licensees whose licenses are in "Retired", "Inactive", or "Expired" status are prohibited from engaging in the activities described above in items (a) and (b).

LA R. S. 37:689 requires firms practicing or offering to practice engineering or land surveying in the state of Louisiana to be licensed by the Board prior to offering such services.

Print and keep the following information for your record or verification. The pocket card may also be printed on card stock or laminated to keep with you as license/certificate verification.

Disclaimer
All information provided by LAPELS on this web page, and on its other web pages and internet sites, is made available to provide immediate access for the convenience of interested persons. While LAPELS believes the information to be reliable, human or mechanical error remains a possibility, as does delay in the posting or updating of information. Therefore, LAPELS makes no guarantee as to the accuracy, completeness, timeliness, currency, or correct sequencing of the information. Neither LAPELS, nor any of the sources of the information, shall be responsible for any errors or omissions, or for the use or results obtained from the use of this information. Other specific cautionary notices may be included on other web pages maintained by LAPELS.

If you need to make changes to your contact information, please choose one of the following options below:

Contact update for Individuals and Firms

License/Certificate Types:

EF = Engineering Firm VF = Land Surveying Firm

CPD = Continuing Professional Development Sponsor/Provider

*PE = Professional Engineer *PLS = Professional Land Surveyor

*EI = Engineer Intern *LSI = Land Surveyor Intern

*PE Discipline Codes

AG	Agricultural	ME	Mechanical
AR	Architectural	MI	Mining or Mineral
CH	Chemical	MT	Metallurgical
CE	Civil	MU	Manufacturing
CS	Control Systems	NV	Naval Architecture & Marine
EE	Electrical & Computer	NU	Nuclear
EV	Environmental	ST	Structural *
FP	Fire Protection	PT	Petroleum
IE	Industrial		
* An engineer that has passed the Structural I exam is listed as a Civil Engineer. An engineer that has passed both the Structural I and II exams is listed as Structural (ST) and a Civil (CE) Engineer.			

COMMONWEALTH OF MASSACHUSETTS
DIVISION OF PROFESSIONAL LICENSURE
BOARD OF
ENGINEERING
ISSUES THE FOLLOWING LICENSE
REG/PROF CIVIL ENGINEER

MATTHEW F SHULTZ
WOODS HOLE GROUP
107 WATERHOUSE RD
BOURNE, MA 02532

LICENSEE SIGNATURE

LICENSE NUMBER	EXPIRATION DATE	SERIAL NUMBER
47832	06/30/2022	901892

STATE OF CONNECTICUT
DEPARTMENT OF CONSUMER PROTECTION

PROFESSIONAL ENGINEER
MATTHEW F SHULTZ
15 Autumn Ln
Marion, MA 02738

License #	Effective	Expiration
PEN.0030884	05/06/2021	01/31/2022

SIGNED

COMMONWEALTH OF MASSACHUSETTS
DIVISION OF PROFESSIONAL LICENSURE
BOARD OF
ENGINEERING
ISSUES THE FOLLOWING LICENSE
REG/PROF CIVIL ENGINEER

MATTHEW F SHULTZ
WOODS HOLE GROUP
107 WATERHOUSE RD
BOURNE, MA 02532

LICENSEE SIGNATURE

LICENSE NUMBER	EXPIRATION DATE	SERIAL NUMBER
47832	06/30/2022	901892

STATE OF CONNECTICUT
DEPARTMENT OF CONSUMER PROTECTION

PROFESSIONAL ENGINEER
MATTHEW F SHULTZ
15 Autumn Ln
Marion, MA 02738

License #	Effective	Expiration
PEN.0030884	05/06/2021	01/31/2022

SIGNED

ASSOCIATION OF STATE FLOODPLAIN MANAGERS, INC.

CERTIFICATION BOARD OF REGENTS

HEREBY CERTIFIES THAT PURSUANT TO THE PROVISIONS OF THE CHARTER FOR THE CERTIFIED FLOODPLAIN MANAGER PROGRAM

M. Leslie Fields, CFM

IS DULY REGISTERED AS AN

ASFPM CERTIFIED FLOODPLAIN MANAGER

IN TESTIMONY WHEREOF THIS CERTIFICATE HAS BEEN ISSUED BY THE AUTHORITY OF THE CERTIFICATION BOARD OF REGENTS, CERTIFICATE NO. US-14-07618, ISSUED 4/17/2014. THIS CERTIFICATE SHALL EXPIRE 7/31/2022, UNLESS RENEWED ACCORDING TO THE RULES OF THIS BOARD.

CERTIFICATION BOARD OF REGENTS
PRESIDENT, LOUIS T. GREENWELL, GISP, CFM

ASSOCIATION OF STATE FLOODPLAIN MANAGERS
EXECUTIVE DIRECTOR, CHAD M. BERGINNIS, CFM

ASFPM CFM® CERTIFIED

State of Florida
Department of State

I certify from the records of this office that GHD SERVICES INC. is a Delaware corporation authorized to transact business in the State of Florida, qualified on October 16, 2003.

The document number of this corporation is F03000005291.

I further certify that said corporation has paid all fees due this office through December 31, 2021, that its most recent annual report/uniform business report was filed on February 15, 2021, and that its status is active.

I further certify that said corporation has not filed a Certificate of Withdrawal.

Given under my hand and the Great Seal of the State of Florida at Tallahassee, the Capital, this the Twenty-sixth day of April, 2021

Secretary of State

Tracking Number: 2941958311CU

To authenticate this certificate,visit the following site,enter this number, and then follow the instructions displayed.

https://services.sunbiz.org/Filings/CertificateOfStatus/CertificateAuthentication

Florida Department of Agriculture and Consumer Services
Division of Consumer Services
Board of Professional Surveyors and Mappers
2005 Apalachee Pkway Tallahassee, Florida 32399-6500
800HELPFLA(435-7352) or (850) 488-2221

March 23, 2022

GHD, INC.
320 GODDARD STE 200
IRVINE, CA 92618-4613

SUBJECT: Professional Surveyor and Mapper Business Certificate # LB8496

Your application / renewal as a professional surveyor and mapper business as required by Chapter 472, Florida Statutes, has been received and processed.

The license appears below and is valid through February 28, 2023.

You are required to keep your information with the Board current. Please visit our website at www.800helpfla.com/psm to create your online account. If you have already created your online account, you can use the website to maintain your license. You can also find other valuable information on the website.

If you have any questions, please do not hesitate to call the Division of Consumer Services, Board of Professional Surveyors and Mappers at 800-435-7352 or 850-488-2221.

Detach Here

Florida Department of Agriculture and Consumer Services
Division of Consumer Services
Board of Professional Surveyors and Mappers
2005 Apalachee Pkway Tallahassee, Florida 32399-6500

License No.: **LB8496**

Expiration Date February 28, 2023

Professional Surveyor and Mapper Business License

Under the provisions of Chapter 472, Florida Statutes

GHD, INC.
320 GODDARD STE 200
IRVINE, CA 92618-4613

Nicole Fried

NICOLE "NIKKI" FRIED
COMMISSIONER OF AGRICULTURE

This is to certify that the professional surveyor and mapper whose name and address are shown above is licensed as required by Chapter 472, Florida Statutes.

Licensee

Name:	**ENOS, GABRIELLE M**	License Number:	**605**
Rank:	**Professional Geologist**	License Expiration Date:	**07/31/2022**
Primary Status:	**Current**	Original License Date:	**01/04/1989**
Secondary Status:	**Active**		

Related License Information

License Number	Status	Related Party	Relationship Type	Relation Effective Date	Rank	Expiration Date
	Current	GHD SERVICES INC	Professional Geologist	10/01/2013	Geology Business Information	

Ron DeSantis, Governor

Halsey Beshears, Secretary

STATE OF FLORIDA
DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION

BOARD OF PROFESSIONAL GEOLOGISTS

THE PROFESSIONAL GEOLOGIST HEREIN IS LICENSED UNDER THE PROVISIONS OF CHAPTER 492, FLORIDA STATUTES

ENOS, GABRIELLE M

GHD SERVICES INC
5904 HAMPTON OAKS PARKWAY
SUITE F
TAMPA FL 33610

LICENSE NUMBER: PG605

EXPIRATION DATE: JULY 31, 2022

Always verify licenses online at MyFloridaLicense.com

Do not alter this document in any form.

This is your license. It is unlawful for anyone other than the licensee to use this document.

Licensee

Name:	**MOORE, BRIAN**	License Number:	**64017**
Rank:	**Professional Engineer**	License Expiration Date:	**02/28/2023**
Primary Status:	**Current**	Original License Date:	**02/06/2006**
Secondary Status:	**Active**		

Related License Information

License Number	Status	Related Party	Relationship Type	Relation Effective Date	Rank	Expiration Date
9931	Current	GHD SERVICES INC	Registry	09/12/2019	Registry	

Ron DeSantis, Governor

FBPE
FLORIDA BOARD OF PROFESSIONAL ENGINEERS

STATE OF FLORIDA

BOARD OF PROFESSIONAL ENGINEERS

THE PROFESSIONAL ENGINEER HEREIN IS LICENSED UNDER THE PROVISIONS OF CHAPTER 471, FLORIDA STATUTES

MOORE, BRIAN

13125 SANCTUARY COVE DRIVE
#104
TAMPA FL 33637

LICENSE NUMBER: PE64017

EXPIRATION DATE: FEBRUARY 28, 2023

Always verify licenses online at MyFloridaLicense.com

Do not alter this document in any form.

This is your license. It is unlawful for anyone other than the licensee to use this document.

Licensee Details

Licensee Information

Name:	**COASTAL PROTECTION ENGINEERING LLC (Primary Name)**
Main Address:	**5301 NORTH FEDERAL HWY** **SUITE 335** **BOCA RATON Florida 33487**
County:	**PALM BEACH**
License Mailing:	
LicenseLocation:	

License Information

License Type:	**Registry**
Rank:	**Registry**
License Number:	**33370**
Status:	**Current**
Licensure Date:	**09/12/2019**
Expires:	

Special Qualifications **Qualification Effective**

Alternate Names

View Related License Information

View License Complaint

State of Florida
Department of State

I certify from the records of this office that COASTAL PROTECTION ENGINEERING LLC is a limited liability company organized under the laws of the State of Florida, filed on June 25, 2019.

The document number of this limited liability company is L19000166989.

I further certify that said limited liability company has paid all fees due this office through December 31, 2021, that its most recent annual report was filed on April 22, 2021, and that its status is active.

Given under my hand and the Great Seal of the State of Florida at Tallahassee, the Capital, this the Fifteenth day of June, 2021

Secretary of State

Tracking Number: 0638592639CU

To authenticate this certificate,visit the following site,enter this number, and then follow the instructions displayed.

https://services.sunbiz.org/Filings/CertificateOfStatus/CertificateAuthentication

TOWN OF PALM BEACH

DRUG-FREE WORKPLACE CERTIFICATION FORM

Whenever two (2) or more bids/proposals, which are equal with respect to price, quality, and service, are received by the Town of Palm Beach for the procurement of commodities or contractual services, a bid/proposal received from a business that certifies that it has implemented a drug-free workplace program shall be given preference in the award process. In order to have a drug-free workplace program, a business shall:

(1) Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession or use of controlled substances is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.

(2) Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.

(3) Give each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in number (1).

(4) In the statement specified in number (1), notify the employees that as a condition for working on the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction on or plea of guilty or nolo contendre to any violation of Chapter 893, Florida Statutes or of any controlled substance law of the United States or any singular state, for a violation occurring in the workplace no later than five (5) days after such conviction.

(5) Impose a sanction on, or require the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee's community by any employee who is so convicted.

(6) Make a good faith effort to continue to maintain a drug-free workplace through implementation of Section 287.087, Florida Statutes.

This Certification is submitted by Robert P. Hamilton, Jr. **the**
(Individual's Name)

President **of** Woods Hole Group, Inc.
(Title/Position with Company/Vendor) **(Name of Company/Vendor)**

Who does hereby certify that said Company/Vendor has implemented a drug-free workplace program, which meets the requirements of Section 287.087, Florida Statutes, which are identified in numbers (1) through (6) above.

4/27/2022
Date

R.P. Hamilton Jr.
Signature

TOWN OF PALM BEACH

SCRUTINIZED COMPANIES

By execution of this Agreement, in accordance with the requirements of F.S. 287-135 and F.S. 215.473, Contractor certifies that Contractor is not participating in a boycott of Israel. Contractor further certifies that Contractor is not on the Scrutinized Companies that Boycott Israel list, not on the Scrutinized Companies with Activities in Sudan List, and not on the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or has Contractor been engaged in business operations in Syria. Subject to limited exceptions provided in state law, the Town will not contract for the provision of goods or services with any scrutinized company referred to above. Submitting a false certification shall be deemed a material breach of contract. The Town shall provide notice, in writing, to Contractor of the City's determination concerning the false certification. Contractor shall have five (5) days from receipt of notice to refute the false certification allegation. If such false certification is discovered during the active contract term, Contractor shall have ninety (90) days following receipt of the notice to respond in writing and demonstrate that the determination of false certification was made in error. If Contractor does not demonstrate that the Town's determination of false certification was made in error then the Town shall have the right to terminate the contract and seek civil remedies pursuant to Section 287.135, Florida Statutes, as amended from time to time.

This Certification is submitted by Robert P. Hamilton, Jr. **the**

(Individual's Name)

President **of** Woods Hole Group, Inc.

(Title/Position with Company/Vendor) **(Name of Company/Vendor)**

April 27, 2022

Date

Authorized Signature

TOWN OF PALM BEACH

CONFLICT OF INTEREST

Woods Hole Group, Inc. (Entity name) intends to do business with the Town of Palm Beach, whereby business will be awarded under a system of evaluation of sealed, competitive proposals.

I have reviewed Section 112.313(3) and (7), Florida Statutes ; and pursuant to the provisions therein, Woods Hole Group, Inc. (Entity name) doing business with the Town of Palm Beach :

[does not] impact any public officer or employee of the Town of Palm Beach ; or

does impact a public officer or employee of Palm Beach County; and

In compliance with Section 112.313(12) , Florida Statutes, the impacted public officer or employee of , prior to the submission of this bid, has filed a statement with the Town of Palm Beach, disclosing their interest, or the interest of their spouse or child, and the nature of the intended business, as set forth in Florida Commission on Ethics Form 3A, http://www.ethics.state.fl.us/Documents/Forms/Form3A.pdf?cp=202058.

As the person authorized to sign the statement, I certify that this firm complies fully with the above requirements.

Firm:	Woods Hole Group, Inc.	**Date:**	April 27, 2022
Authorized Agent:	Robert P. Hamilton, Jr.	**Title:**	President
Email:	bhamilton@woodsholegroup.com	**Phone:**	508-540-8080
Signature:	R.P. Hamilton Jr.		

TOWN OF PALM BEACH

DISADVANTAGE BUSINESS ENTERPRISE

To be completed by proposer of their attempt to contact DBE Firms:

Date	April 14, 2022	Firm	Sobis, Inc.
Contact	Bill Bohn	Email	bbohn@sobisinc.com
Phone	(703) 655-4071	Response	Agreed to join team
Action Taken	Obtained necessary materials for proposal		

Date	March 30, 2022	Firm	Coastal Protection Engineering
Contact	Lindino Benedet	Email	lbenedet@coastalprotectioneng.com
Phone	(561) 565-5100	Response	Agreed to join team
Action Taken	Exchanged materials to support proposal		

Date	April 4, 2022	Firm	SCAPE / Landscape Architecture, DPC
Contact	Pippa Brashear	Email	pippa@scapestudio.com
Phone	(212) 462-2628 ext. 123	Response	Agreed to join team
Action Taken	Obtained necessary materials for proposal		

Date		Firm	
Contact		Email	
Phone		Response	
Action Taken			

As the person authorized to sign the statement, I certify that this firm complies fully with the above requirements.

Firm:	Woods Hole Group, Inc.	Date:	May 2, 2022
Authorized Agent:	Robert P. Hamilton, Jr.	Title:	President
Email:	bhamilton@woodsholegroup.com	Phone:	(508) 495-6229
Signature:			

Certification Regarding
Debarment, Suspension, Ineligibility
And Voluntary Exclusion

Contractor Statements

(1) The prospective contractor, Woods Hole Group, Inc. of, the Sub-Recipient certifies, by submission of this document, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the Sub-Recipient's contractor is unable to certify to the above statement, the prospective contractor shall attach an explanation to this form.

CONTRACTOR

By R. P. Hamilton Jr.
Signature

Robert P. Hamilton, Jr., President
Name and Title

107 Waterhouse Road
Street Address

Bourne, MA 02532
City, State, Zip

April 27, 2022
Date

Town of Palm Beach
Sub-Recipient's Name

Certification Regarding Debarment, Suspension, Ineligibility And Voluntary Exclusion

Subcontractor Statements

(1) The prospective subcontractor, GHD Inc. of, the Sub-Recipient certifies, by submission of this document, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the Sub-Recipient's subcontractor is unable to certify to the above statement, the prospective subcontractor shall attach an explanation to this form.

SUBCONTRACTOR

By Dean Goodin Digitally signed by Dean Goodin Date: 2022.04.29 11:35:52 -04'00'

Signature

Dean Goodin, Ph.D., Business Group Leader

Name and Title

121 N. 20th Street, Suite A

Street Address

Richmond, VA 23223

City, State, Zip

April 29, 2022

Date

Town of Palm Beach

Sub-Recipient's Name

Certification Regarding
Debarment, Suspension, Ineligibility
And Voluntary Exclusion

Subcontractor Statements

(1) The prospective subcontractor, Coastal Protection Engineering LLC of, the Sub-Recipient certifies, by submission of this document, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the Sub-Recipient's subcontractor is unable to certify to the above statement, the prospective subcontractor shall attach an explanation to this form.

SUBCONTRACTOR

By _____
Signature

Thomas Pierro, PE, D.CE, Principal Engineer/AMBR
Name and Title

5301 N. Federal Hwy, Suite 335
Street Address

Boca Raton, FL 33487
City, State, Zip

4/28/2021
Date

Town of Palm Beach
Sub-Recipient's Name

Certification Regarding
Debarment, Suspension, Ineligibility
And Voluntary Exclusion

Subcontractor Statements

(1) The prospective subcontractor, SCAPE Landscape Architecture DPC of, the Sub-Recipient certifies, by submission of this document, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the Sub-Recipient's subcontractor is unable to certify to the above statement, the prospective subcontractor shall attach an explanation to this form.

SUBCONTRACTOR

By A Landes
Signature

Alexis Landes, Managing Principal
Name and Title

277 Broadway, Ninth Floor
Street Address

New York, NY, 10007
City, State, Zip

4/29/22
Date

Town of Palm Beach
Sub-Recipient's Name

Certification Regarding
Debarment, Suspension, Ineligibility
And Voluntary Exclusion

Subcontractor Statements

(1) The prospective subcontractor, Sobis, Inc. of, the Sub-Recipient certifies, by submission of this document, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the Sub-Recipient's subcontractor is unable to certify to the above statement, the prospective subcontractor shall attach an explanation to this form.

SUBCONTRACTOR

By William Bohn Digitally signed by William Bohn Date: 2022.04.27 20:51:46 -04'00'
Signature

William Bohn, COO
Name and Title

11812 Arbor Glen Drive
Street Address

Fredericksburg, VA 22407
City, State, Zip

April 27, 2022
Date

Town of Palm Beach
Sub-Recipient's Name

TOWN OF PALM BEACH

BYRD ANTI-LOBBYING CERFITICATION

APPENDIX A, 44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making ofany
2. Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

3. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

4. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

5. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

The Contractor, Woods Hole Group, Inc., certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. Chap.38, Administrative Remedies for False Claims and Statements, apply to this certification and disclosure, if any.

Firm:	Woods Hole Group, Inc.	**Date:**	April 27, 2022
Authorized Agent:	Robert P. Hamilton, Jr.	**Title:**	President
Email:	bhamilton@woodsholegroup.com	**Phone:**	508-540-8080
Signature:	R.P. Hamilton Jr.		

TOWN OF PALM BEACH

E-Verify Requirement

Proposer warrants and represents that it is in compliance with section 448.095, Florida Statutes, as may be amended, and that it: (1) is registered with the E-Verify System (E-Verify.gov), and beginning January 1, 2021, uses the E-Verify System to electronically verify the employment eligibility of all newly hired workers; and (2) has verified that all its proposer workers, subcontractors performing the duties and obligations of this CONTRACT are registered with the E-Verify System, and beginning January 1, 2021, uses the E-Verify System to electronically verify the employment eligibility of all newly hired workers.

Proposer shall obtain from each of its subcontractors an affidavit stating that the subcontractor does not employ, contract with, or subcontract with an Unauthorized Alien, as that term is defined in section 448.095(1)(k), Florida Statutes, as may be amended. CONSULTANT sball maintain a copy of any such affidavit from a subcontractor for, at a minimum, the duration of the subcontract and any extension thereof. This provision shall not supersede any provision of this CONTRACT which requires a longer retention period.

TOWN OF PALM BEACH shall terminate this CONTRACT if it has a good faith belief contractor has knowingly violated Section 448.09(1), Florida Statutes, as may be amended. If the TOWN OF PALM BEACH has a good faith belief that contractor's subcontractor has knowingly violated section 448.09(1), Florida Statutes, as may be amended, THE TOWN OF PALM BEACH shall notify contractor to terminate its contract with the subcontractor and contractor shall immediately terminate its contract with the subcontractor. If the TOWN OF PALM BEACH terminates this CONTRACT pursuant to the above, contractor shall be barred from being awarded a future contract by the TOWN OF PALM BEACH for a period of one (1) year from the date on which this CONTRACT was terminated. In the event of such contract termination, contractor shall also be liable for any additional costs incurred by the TOWN OF PALM BEACH as a result of the termination.

Company: Woods Hole Group, Inc. Name/Title: Robert P. Hamilton, Jr., President

Address: 107 Waterhouse Road, Bourne, MA Zip: 02532

Phone Number: (508) 540-8080 Fax: (508) 540-1001

Federal ID#: 04-3408801 Signature: R.P. Hamilton, Jr.

TRUTH-IN-NEGOTIATIONS CERTIFICATE

TOWN OF PALM BEACH, FLORIDA
COUNTY OF PALM BEACH, FLORIDA

Before me, the undersigned authority, personally appeared Affiant, Robert P. Hamilton, Jr., who being first duly sworn, deposes and says:

1. That the undersigned firm is furnishing this Truth-in-Negotiation Certification pursuant to Section 287.055(5)(a) of the Florida Statutes for the undersigned firm to receive an agreement for professional services with the Town of Palm Beach, Palm Beach County, Florida.
2. That the undersigned firm is a corporation which engages in furnishing professional engineering services and is entering into an agreement with the Town of Palm Beach to provide professional Continuing Consulting Services.
3. That the undersigned firm will furnish the Town of Palm Beach a detailed analysis of the cost of the professional services that will be required to perform various tasks as each work order is proposed.
4. That the wage rates and other factual unit costs supporting the compensation for this project's agreement will be accurate, complete and current at the time the undersigned firm and the Town of Palm Beach enters into the agreement for professional continuing consulting services and at the time of execution of each work order.
5. The undersigned firm agrees that the original agreement price and any additions thereto shall be adjusted to exclude any significant sums by which the Town of Palm Beach determines the agreement price was increased due to inaccurate, incomplete, or noncurrent wage rates and other factual unit costs. All such agreement adjustments shall be made within one (1) year following the end of the agreement. For the purpose of this certificate, the end of the agreement shall be deemed to be the date of final billing or acceptance of the work by the Town of Palm Beach, whichever is later.

Name of Firm/Consultant: Woods Hole Group, Inc.

By: R. P. Hamilton Jr. April 29, 2022
Authorized Signature Date

Title: President

Attest: Suzanne M. Gonsalves (Seal)
Notary

SUZANNE M. GONSALVES
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
February 3, 2023

The foregoing instrument was acknowledged before me by Robert P. Hamilton Jr who has produced MA drivers license as identification or is personally known to me.

WITNESS my hand and official seal in the State last aforesaid this 29th day of April, 2022.

2022 FOREIGN PROFIT CORPORATION ANNUAL REPORT

DOCUMENT# F13000005207

FILED
Jan 25, 2022
Secretary of State
8368512638CC

Entity Name: THE WOODS HOLE GROUP, INC.

Current Principal Place of Business:

107 WATERHOUSE RD
BOURNE, MA 02532

Current Mailing Address:

107 WATERHOUSE RD
BOURNE, MA 02532 US

FEI Number: 04-3408801

Certificate of Status Desired: No

Name and Address of Current Registered Agent:

REGISTERED AGENTS INC
7901 4TH STREET N,
SUITE 300
ST.PETERSBURG, FL 33702 US

The above named entity submits this statement for the purpose of changing its registered office or registered agent, or both, in the State of Florida.

SIGNATURE:

Electronic Signature of Registered Agent

Date

Officer/Director Detail :

Title	PRESIDENT	Title	TREASURER, SECRETARY
Name	HAMILTON, ROBERT P JR	Name	FOULQUIER, CARINE AUDREY
Address	107 WATERHOUSE RD	Address	107 WATERHOUSE RD
City-State-Zip:	BOURNE MA 02532	City-State-Zip:	BOURNE MA 02532

Title	CHAIRMAN
Name	VASSAL, CHRISTOPHE
Address	11 RUE HERMES
City-State-Zip:	RAMONVILLE 31520

I hereby certify that the information indicated on this report or supplemental report is true and accurate and that my electronic signature shall have the same legal effect as if made under oath; that I am an officer or director of the corporation or the receiver or trustee empowered to execute this report as required by Chapter 607, Florida Statutes; and that my name appears above, or on an attachment with all other like empowered.

SIGNATURE: CARINE FOULQUIER CFO 01/25/2022

Electronic Signature of Signing Officer/Director Detail

Date

WOODS HOLE GROUP, INC., THE

ALERT! This entity is only available FOR OFFICIAL USE ONLY.

DUNS Unique Entity ID	SAM Unique Entity ID	CAGE / NCAGE
026615208	**K6VQQ6Y73WE5**	**1GUW3**
Purpose of Registration	Expiration Date	Registration Status
All Awards	**Jun 22, 2022**	**Active**
Physical Address	Mailing Address	
107 Waterhouse RD **Bourne, Massachusetts 02532-3890** **United States**	**107 Waterhouse RD** **Bourne, Massachusetts 02532** **United States**	

Business Information

Doing Business as	Division Name	Division Number
(blank)	**(blank)**	**(blank)**
Congressional District	State / Country of Incorporation	URL
Massachusetts 09	**Massachusetts / United States**	**http://www.woodsholegroup.com**
MPIN		
*******4G69**		

Registration Dates

Activation Date	Submission Date	Initial Registration Date
Jun 23, 2021	**Jun 22, 2021**	**Oct 9, 2001**

Entity Dates

Entity Start Date	Fiscal Year End Close Date
Jan 1, 1998	**Dec 31**

Immediate Owner

CAGE	Legal Business Name
FALU1	**COLLECTE LOCALISATION SATELLITES**

Highest Level Owner

CAGE	Legal Business Name
(blank)	**(blank)**

Executive Compensation

In your business or organization's preceding completed fiscal year, did your business or organization (the legal entity to which this specific SAM record, represented by a DUNS number, belongs) receive both of the following: 1. 80 percent or more of your annual gross revenues in U.S. federal contracts, subcontracts, loans, grants, subgrants, and/or cooperative agreements and 2. $25,000,000 or more in annual gross revenues from U.S. federal contracts, subcontracts, loans, grants, subgrants, and/or cooperative agreements?

No

Does the public have access to information about the compensation of the senior executives in your business or organization (the legal entity to which this specific SAM record, represented by a DUNS number, belongs) through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986?

Not Selected

Proceedings Questions

Is your business or organization, as represented by the DUNS Number on this entity registration, responding to a Federal procurement opportunity that contains the provision at FAR 52.209-7, subject to the clause in FAR 52.209-9 in a current Federal contract, or applying for a Federal grant opportunity which contains the award term and condition described in 2 C.F.R. 200 Appendix XII?

Yes

Does your business or organization, as represented by the DUNS number on this specific SAM record, have current active Federal contracts and/or grants with total value (including any exercised/unexercised options) greater than $10,000,000?

No

Within the last five years, had the business or organization (represented by the DUNS number on this specific SAM record) and/or any of its principals, in connection with the award to or performance by the business or organization of a Federal contract or grant, been the subject of a Federal or State (1) criminal proceeding resulting in a conviction or other acknowledgment of fault; (2) civil proceeding resulting in a finding of fault with a monetary fine, penalty, reimbursement, restitution, and/or damages greater than $5,000, or other acknowledgment of fault; and/or (3) administrative proceeding resulting in a

finding of fault with either a monetary fine or penalty greater than $5,000 or reimbursement, restitution, or damages greater than $100,000, or other acknowledgment of fault?

Not Selected

SAM Search Authorization

I authorize my entity's non-sensitive information to be displayed in SAM public search results:

Yes

Entity Types

Business Types

Entity Structure	Entity Type	Organization Factors
Corporate Entity (Not Tax Exempt)	**Business or Organization**	**Foreign Owned**

Profit Structure
For Profit Organization

Financial Information

Accepts Credit Card Payments	Debt Subject To Offset	Department Code
Yes	**No**	**(blank)**
Agency Location Code	Disbursing Office Symbol	
(blank)	**(blank)**	

Electronic Funds Transfer

EFT Indicator	CAGE Code	
0000	**1GUW3**	
Financial Institution	Account Type	Lock Box Number
BANK OF THE WEST	**Checking**	**(blank)**
Routing Number	Account Number	
*******0782**	*******8945**	

Automated Clearing House

Financial Institution	Phone (U.S.)	Email
BANK OF THE WEST	**8004002781**	**(blank)**
Phone (non-U.S.)	Fax	
(blank)	**(blank)**	

Remittance Information

Merchant ID1	Merchant ID2	Accounting Station
(blank)	**(blank)**	**(blank)**

Remittance Address

THE WOODS HOLE GROUP, INC.
4300 Forbes BLVD., Suite 110
Lanham, Maryland 20706
United States

Taxpayer Information

EIN	Type of Tax	Taxpayer Name
*******8801**	**Applicable Federal Tax**	**WOODS HOLE GROUP INC THE**
Tax Year (Most Recent Tax Year)	Name/Title of Individual Executing Consent	TIN Consent Date
2015	**Accounting Director**	**Jun 22, 2021**

Address
107 Waterhouse RD
Bourne, Massachusetts 02532

Points of Contact

Accounts Receivable POC

Seema Owen
dcs@woodsholegroup.com
3019254411

Electronic Business

Seema Owen
sowen@woodsholegroup.com
2404921902

4300 Forbes BLVD., Suite 110
Lanham, Maryland 20706
United States

Carine Foulquier
cfoulquier@woodsholegroup.com
3019254411

4300 Forbes BLVD.
Suite 110
Lanham, Maryland 20706
United States

Government Business

Robert Hamilton, President
bhamilton@whgrp.com
5084956229

107 Waterhouse Road
Bourne, Massachusetts 02532
United States

Carine Foulquier
cfoulquier@groupcls.com
2404921931

4300 Forbes BLVD. Suite 110
Lanham, Maryland 20706
United States

Past Performance

Seema Owen
dcs@clsamerica.com
3019254411

4300 Forbes BLVD., Suite 110
Lanham, Maryland 20706
United States

Robert Hamilton, President
bhamilton@whgrp.com
5084956229

81 Technology Park DR
East Falmouth, Massachusetts 02536
United States

Security Information

Company Security Level
(blank)

Highest Level Employee Security Level
(blank)

Service Classifications

NAICS Codes

Primary	NAICS Codes	NAICS Title
Yes	**541620**	**Environmental Consulting Services**
	517410	**Satellite Telecommunications**
	518210	**Data Processing, Hosting, And Related Services**
	541330	**Engineering Services**
	541360	**Geophysical Surveying And Mapping Services**
	541380	**Testing Laboratories**
	562910	**Remediation Services**
	811219	**Other Electronic And Precision Equipment Repair And Maintenance**

Product and Service Codes

PSC	PSC Name
6655	**Geophysical Instruments**
B525	**Special Studies/Analysis- Natural Resource**
B526	**Special Studies/Analysis- Oceanological**
B529	**Special Studies/Analysis- Scientific Data**
C216	**Architect And Engineering- General: Marine Engineering**
F110	**Environmental Systems Protection- Development Of Environmental Impact Statements And Assessments, Technical Analysis And Environmental Audits**
J020	**Maintenance, Repair, And Rebuilding Of Equipment- Ship And Marine Equipment**
N020	**Installation Of Equipment- Ship And Marine Equipment**

Size Metrics

IGT Size Metrics

Annual Revenue (from all IGTs)
(blank)

World Wide

Annual Receipts (3 Year Average)	Number of Employees (12 Month Average)
$40,000,000.00	**650**

Location

Annual Receipts (3 Year Average)	Number of Employees (12 Month Average)
(blank)	**(blank)**

Industry-Specific

Barrels Capacity	Megawatt Hours	Total Assets
(blank)	**(blank)**	**(blank)**

Electronic Data Interchange (EDI) Information

This entity did not enter the EDI information

Disaster Response

Yes, this entity appears in the disaster response registry.

States	Counties	Metropolitan Statistical Areas
Any	**(blank)**	**(blank)**

TOWN OF PALM BEACH

Protest Procedure Acknowledgement

After the Town has made a determination of the intended award of a contract, Purchasing shall post a tabulation of the bid/proposal evaluation results with intended an award recommendation. Posting shall be made to the Town website under the heading, "Doing Business". All bidders, proposers, offerors, or contractors affected by the proposed award of contract shall be notified by the Purchasing Division, at the time of posting, via email or facsimile, of the intended award.

Procedure: Any person adversely affected by the decision of award may file a formal written protest within 72 consecutive hours (excluding Saturdays, Sundays and legal holidays) from the time of the initial posting by the Purchasing Division. Protestors shall file their written protests with the Town between the hours of 8:30 and 5:00p.m. Written protests shall include, at a minimum:

1. The name of the petitioner;
2. The petitioner's address, email address, phone number, and fax number;
3. The name of the petitioner's representative, if applicable;
4. The title and bid number of the solicitation;
5. A plain clear statement of the grounds on which the protest is based; and
6. Specific information regarding the relief to which the petitioner deems itself entitled and/or the remedy requested.

A written protest is deemed received by the Town of Palm Beach when it is delivered to and received by the Purchasing Division. Delivery to and receipt by any other Town of Palm Beach staff member is not valid. Formal written protests shall not exceed fifteen (15) type-written pages and in all other respects shall comply with the formatting requirements for an appellate brief as set forth in the Florida Rules of Appellate Procedure.

The Purchasing Manager shall review such protest and shall issue a written decision as soon as practicable after such review is completed. The decision of the Purchasing Manager may be appealed in writing to the Town Manager within three (3) calendar days after the date of the Purchasing Manager's written decision. The decision of the Town Manager shall be final. An appeal of the Town Manager's decision may be made to the appropriate court in the Fifteenth Judicial Circuit, Palm Beach County, Florida.

Stay of Procurement during Protest: Purchases which are the subject of a timely protest may be stayed until a final decision by the Town Manager regarding such Protest has been made. The Purchasing Manager shall not proceed further with the Invitation to Bid, RFP, or other purchasing solicitation or award which is the subject of the protest until all administrative remedies have been exhausted and a final decision of the Town Manager has been rendered, unless a determination is made that the continuation of the award process is in the best interest of the Town. In this case, the Town Manager must make a written determination that the execution of a contract without delay is necessary to protect substantial interests of the Town.

Filing Fees: In order to defray a portion of the administrative costs associated with a protest, all protests shall be accompanied by a filing fee in the form of a cashier's check or money order for an amount equal to ten percent (10%) of the total estimated contract value, but not less than $10,000. Failure to pay the filing fee shall result in a denial of the protest. In the event that a protest is upheld, the filing fee shall be refunded to the protestor.

I hereby acknowledge receipt of this Town of Palm Beach protest acknowledgement form:

Company Name: Woods Hole Group, Inc. Name: Robert P. Hamilton, Jr.

Date: April 27, 2022 Signature: R.P. Hamilton, Jr.

TOWN OF PALM BEACH

MINIMUM QUALIFICATIONS FORM

Contractors (Bidder) shall provide adequate information with its bid to demonstrate that it satisfies the following minimum as set forth below. The Town will consider what types of experience the Bidder has when making a determination of award. All decisions of the Town are final. Contractors, with its bid, must demonstrate successful performance and relevant experience and qualifications with respect to projects comparable in type, size, complexity, and scheduling as provided for in these bid documents.

Company: Woods Hole Group, Inc.	Solicitation: RFQ No. 2022-16 Coastal Resiliency Consultant for Town of Palm Beach
Part I— Contract Information	
Customer Name: Town of Falmouth	Contact Name: Jennifer Lincoln
Project Location: Surf Drive, Falmouth, MA	Contact Title:
	Contact Email: jennifer.lincoln@falmouthma.gov
	Contact Phone: 508-495-7446
Contract Identification Number: N/A	
Type of Contract:	Orignal Dollar Value: ~$95,000
Contract Start Date: August 1, 2019	Final Dollar Value: ~$95,000
Contract Completion Date: June 30, 2021	Estimated/Actual - Completion Date: June 30, 2021
Explanation of Cost Growth/Change Orders (if applicable): N/A	
Part II—Project Description and Relevance	
Relevancy: This project is relevant to Palm Beach because it specifically involves contracts with a municipality (Town of Falmouth) addressing coastal resilience in the midst of present flood risk that is increasing in the future with sea level rise and increasing storm intensity. In this case, the project is focused on protecting and potentially relocating an important low-lying road segment at risk, along with a bike path, and utility infrastructure. The project also involves shared grant funding from a state program, and depends on results from a high-resolution flood risk model.	
Specific Scope of Work Performed in Similar Areas: Woods Hole Group conducted a detailed town-wide climate change flood vulnerability assessment in 2020 which identified the Surf Drive area as one of the most vulnerable areas in town. Surf Drive is a well-traveled coastal roadway & bike path providing access to town beaches which also has a sewer main line & pump station running under/adjacent to the roadway. Surf Drive already experiences significant stressors (e.g., regulat inundation, erosion, overtopping, storm damage, etc.) under today's climet conditions. Climate change and sea-level rise will increase the frequency and severity of these stressors, resulting in increased vulnerability in the future. Woods Hole Group developed a plan to increase the coastal resiliency of the Surf Drive area incorporating phased management by identifying key time frames and sea level thresholds for action. The four themes used to develop potential actions to address the study area vulnerabilities included emphasis on 1) ecosytem health and resilience, 2) protection and maintenance of infrastructure, 3) maintenance of access transportation, and utiliey corridors, and 4) managed retreat of costly, at risk infrastructure.	

****Please only use one (1) form for each project reference being used****

TOWN OF PALM BEACH

MINIMUM QUALIFICATIONS FORM

Contractors (Bidder) shall provide adequate information with its bid to demonstrate that it satisfies the following minimum as set forth below. The Town will consider what types of experience the Bidder has when making a determination of award. All decisions of the Town are final. Contractors, with its bid, must demonstrate successful performance and relevant experience and qualifications with respect to projects comparable in type, size, complexity, and scheduling as provided for in these bid documents.

Company: Woods Hole Group, Inc.	Solicitation: RFQ No. 2022-16 Coastal Resiliency Consultant for Town of Palm Beach
Part I— Contract Information	
Customer Name: The City of Boston	Contact Name: Sanjay Seth
Project Location: Moakley Park, Boston, MA	Contact Title: Climate Resilience
	Contact Email: sanjay.seth@boston.gov
	Contact Phone: 617-635-4000
Contract Identification Number: BPR 1901	
Type of Contract: Fixed Fee	Orignal Dollar Value: ~$104,000
Contract Start Date: August 4, 2019	Final Dollar Value: ~$104,000
Contract Completion Date: Ongoing	Estimated/Actual - Completion Date: Ongoing
Explanation of Cost Growth/Change Orders (if applicable): N/A	
Part II—Project Description and Relevance	
Relevancy: This project is relevant to Palm Beach because it specifically involves contracts with a municipality (Town of Falmouth) addressing coastal resilience in the midst of present flood risk that is increasing in the future with sea level rise and increasing storm intensity. In this case, the project is focused on protecting and potentially relocating an important low-lying road segment at risk, along with a bike path, and utility infrastructure. The project also involves shared grant funding from a state program, and depends on results from a high-resolution flood risk model.	
Specific Scope of Work Performed in Similar Areas: Working with a multi-disiplinary team, Woods Hole Group provided climate change assessment, coastal engineering and design, and flood risk modeling services in the overall development of the Master Plan for Moakley Park. While Moakley Park itself is at potential flood risk in the future, it also represented a major flood pathway for the City of Boston, as flood water entering through Moakley Park extended to the north and south flooding major portions of the City. Therefore, the Master Plan for Moakley Park focused not only on improving the public amenities and recreational value of Moakley Park, but also building resilience for the Park and inland areas. Woods Hole Group provide sea level rise, storm risk assessment, and coastal expertise throughout the development of the vision plan and master plan process.	

****Please only use one (1) form for each project reference being used****

TOWN OF PALM BEACH

MINIMUM QUALIFICATIONS FORM

Contractors (Bidder) shall provide adequate information with its bid to demonstrate that it satisfies the following minimum as set forth below. The Town will consider what types of experience the Bidder has when making a determination of award. All decisions of the Town are final. Contractors, with its bid, must demonstrate successful performance and relevant experience and qualifications with respect to projects comparable in type, size, complexity, and scheduling as provided for in these bid documents.

Company: Woods Hole Group, Inc.	Solicitation: RFQ No. 2022-16 Coastal Resiliency Consultant for Town of Palm Beach
Part I— Contract Information	
Customer Name: Town of Braintree	Contact Name: Kelly Phelan
Project Location: Watson Park, Braintree, MA	Contact Title: Planning & Community Development
	Contact Email: kphelan@braintreema.gov
	Contact Phone: 781-794-8233
Contract Identification Number: BPR 1901	
Type of Contract: Fixed Fee	Orignal Dollar Value: ~$105,000
Contract Start Date: Sept 24, 2019	Final Dollar Value: ~$280,000
Contract Completion Date: Ongoing	Estimated/Actual - Completion Date: Ongoing
Explanation of Cost Growth/Change Orders (if applicable): N/A	
Part II—Project Description and Relevance	
Relevancy: This project is relevant to Palm Beach because it specifically involves contracts with a municipality (City of Boston) addressing coastal resilience in the midst of present flood risk that is increasing in the future with sea level rise and increasing storm intensity. In this case, the project focuses on protecting extensive landward infrastructure of East Boston. The project also involves shared grant funding from a state program, depends on results from a high-resolution flood risk model, and is part of the broader Climate Ready Boston initiative.	
Specific Scope of Work Performed in Similar Areas: Watson Park is an urban park located on the Weymouth Fore River in Braintree, MA. The park's shoreline had been experiencing significant erosion, which threatened existing coastal resource areas and recreational use of the park. Woods Hole Group has assisted the Town of Braintree in acquiring four years of CZM Coastal Resilience Grant funding to 1) conduct a feasibility study, 2) design and permit a living shoreline design to mitigate the ongoing erosion, improve the coastal resiliency of the property, and restore historic salt marsh habitat, 3) develop final construction drawings and bid documents in preparation for project implementation, and 4) construction The project is being constructed presently, and includes unique design aspects, such as: • Salt marsh sill, essentially restoring salt marsh on an unvegetated mud flat, for energy buffering capacity, to establish a baseline for more protection landward, and to incorporate a living shoreline approach. • Flood protection berm landward of restored marsh to mitigate flood risk up to 2070 flood horizon. • Rain gardens and drainage systems landward of the berm to accommodate storm water from precipitation and potential berm overtopping, and return flood waters back to the Fore River to prevent sustained upland flooding. • Long-term vision to even remove the berm and allow for natural wetland migration in the future should climate change eventually result in exceedance of the 2070 planning horizon.	

****Please only use one (1) form for each project reference being used****

TOWN OF PALM BEACH

MINIMUM QUALIFICATIONS FORM

Contractors (Bidder) shall provide adequate information with its bid to demonstrate that it satisfies the following minimum as set forth below. The Town will consider what types of experience the Bidder has when making a determination of award. All decisions of the Town are final. Contractors, with its bid, must demonstrate successful performance and relevant experience and qualifications with respect to projects comparable in type, size, complexity, and scheduling as provided for in these bid documents.

Company: Woods Hole Group, Inc.	Solicitation: RFQ No. 2022-16 Coastal Resiliency Consultant for Town of Palm Beach
Part I— Contract Information	
Customer Name: Town of Sandwich	Contact Name: David Decoto
Project Location: Sandwich, MA	Contact Title: Director, Dept of Natural Resources
	Contact Email: ddeconto@sandwichmass.org
	Contact Phone: 508-833-8054
Contract Identification Number: N/A	
Type of Contract: Fixed Fee	Orignal Dollar Value: ~$105,000
Contract Start Date: Oct 7, 2021	Final Dollar Value: ~$105,000
Contract Completion Date: Ongoing	Estimated/Actual - Completion Date: Ongoing
Explanation of Cost Growth/Change Orders (if applicable): N/A	
Part II—Project Description and Relevance	
Relevancy: This project is relevant to Palm Beach because it specifically involves contracts with a municipality (Town of Sandwich) addressing coastal resilience in the midst of present flood risk that is increasing in the future with sea level rise and increasing storm intensity. The project is focused on boosting coastal resilience on the exposed open-coast and back bay sides of the Town, much like Palm Beach. On the exposed coast, the program depends on a beach and dune restoration initiative. On the back bay side, various initiatives are being introduced to manage floodwaters. The project also involves shared grant funding from a state program, and depends on results from a high-resolution flood risk model. It is partly constructed, and partly in the planning and permitting stages. The work also involves collaboration with the US Army Corps of Engineers with adjacent federal channel and inlet system that interrupts natural sediment transport.	
Specific Scope of Work Performed in Similar Areas: Watson Park is an urban park located on the Weymouth Fore River in Braintree, MA. The park's shoreline had been experiencing significant erosion, which threatened existing coastal resource areas and recreational use of the park. Woods Hole Group has assisted the Town of Braintree in acquiring four years of CZM Coastal Resilience Grant funding to 1) conduct a feasibility study, 2) design and permit a living shoreline design to mitigate the ongoing erosion, improve the coastal resiliency of the property, and restore historic salt marsh habitat, 3) develop final construction drawings and bid documents in preparation for project implementation, and 4) construction The project is being constructed presently, and includes unique design aspects, such as: • Salt marsh sill, essentially restoring salt marsh on an unvegetated mud flat, for energy buffering capacity, to establish a baseline for more protection landward, and to incorporate a living shoreline approach. • Flood protection berm landward of restored marsh to mitigate flood risk up to 2070 flood horizon. • Rain gardens and drainage systems landward of the berm to accommodate storm water from precipitation and potential berm overtopping, and return flood waters back to the Fore River to prevent sustained upland flooding. • Long-term vision to even remove the berm and allow for natural wetland migration in the future should climate change eventually result in exceedance of the 2070 planning horizon.	

****Please only use one (1) form for each project reference being used****

TOWN OF PALM BEACH

MINIMUM QUALIFICATIONS FORM

Contractors (Bidder) shall provide adequate information with its bid to demonstrate that it satisfies the following minimum as set forth below. The Town will consider what types of experience the Bidder has when making a determination of award. All decisions of the Town are final. Contractors, with its bid, must demonstrate successful performance and relevant experience and qualifications with respect to projects comparable in type, size, complexity, and scheduling as provided for in these bid documents.

Company: Woods Hole Group, Inc.	Solicitation: RFQ No. 2022-16 Coastal Resiliency Consultant for Town of Palm Beach
Part I— Contract Information	
Customer Name: Town of Duxbury	Contact Name: Valerie Massard
Project Location: Duxbury, MA	Contact Title: Director, Dept of Natural Resources
	Contact Email: Massard@town.duxbury.ma.us
	Contact Phone: 781-834-1100
Contract Identification Number: N/A	
Type of Contract: Fixed Fee	Orignal Dollar Value: ~$132,000
Contract Start Date: July 29, 2019	Final Dollar Value: ~$132,000
Contract Completion Date: June 30, 2020	Estimated/Actual - Completion Date: June 30, 2020
Explanation of Cost Growth/Change Orders (if applicable): N/A	
Part II—Project Description and Relevance	
Relevancy:	
Specific Scope of Work Performed in Similar Areas: Woods Hole Group conducted a detailed vulnerability assessment for municipal infrastructure and natural resources for the Town of Duxbury, and private infrastructure in an important waterfront business district (Snug Harbor). The sea level rise and storm surge vulnerability assessment was funded by a Massachusetts Municipal Vulnerability Preparedness (MVP) Program Action Grant. The study prioritized high risk assets and provided recommendations for physical adaptations and regulatory changes. Additionally, Woods Hole Group used the Sea Level Affecting Marshes Model (SLAMM) to identify potential flooding impacts to natural resources and highlight opportunities to facilitate marsh migration. Wherever practicable, Woods Hole Group identified regional solutions using nature-based or hybrid solutions. Woods Hole Group worked closely with the Town's Steering Committee and Snug Harbor stakeholders to understand the importance of each asset to the Town's ability to provide municipal services and the operations of each Snug Harbor business or non-profit. Woods Hole Group developed a customized asset rating system that enabled Snug Harbor organizations to assess the economic, operational, and business planning impacts of asset flooding. Woods Hole Group also collaborated with the Metropolitan Area Planning Council on Snug Harbor resilience planning and public outreach.	

****Please only use one (1) form for each project reference being used****

ATTACHMENT E. DISADVANTAGED BUSINESS ENTERPRISES

Palm Beach County
Office of Equal Business Opportunity

Certifies That

COASTAL PROTECTION ENGINEERING LLC.

Vendor # **VS0000014339**

is a Small Business Enterprise (SBE) as prescribed by section 2-80.21 - 2.80.30 of the Palm Beach County Code for a three year period from

November 06, 2020 to November 05, 2023

The following services and/or products are covered under this certification:

Environmental Impact Studies; Geographic Information Systems (GIS); Hydrological and Oceanography Services; Ocean Engineering Services

Allen Gray, Manager
11/06/2020

Palm Beach County Board of County Commissioners

Dave Kerner, Mayor
Robert S. Weinroth, Vice Mayor
Gregg K. Weiss
Mary Lou Berger
Melissa McKinlay
Mack Bernard

County Administrator
Verdenia C. Baker

SCAPE is a certified Women-owned Business Enterprise (WBE). We strongly believe in fostering local partnerships and supporting the professional services of small, minority-owned, women-owned and veteran-owned businesses to serve local communities.

SOBIS, INC.

DUNS Unique Entity ID	SAM Unique Entity ID	CAGE / NCAGE
079250053	**XPYVU2NVK9G5**	**71RW9**
Purpose of Registration	Registration Status	Expiration Date
All Awards	**Active**	**Mar 4, 2022**
Physical Address	Mailing Address	
11812 Arbor Glen DR **Fredericksburg, Virginia 22407-8549** **United States**	**11812 Arbor Glen Drive** **Fredericksburg, Virginia 22407-8549** **United States**	

Business Information

Doing Business as	Division Name	Division Number
(blank)	**Sobis Inc**	**(blank)**
Congressional District	State / Country of Incorporation	URL
Virginia 07	**Virginia / United States**	**www.sobisinc.com**

Registration Dates

Activation Date	Submission Date	Initial Registration Date
Mar 4, 2021	**Mar 4, 2021**	**Jan 13, 2014**

Entity Dates

Entity Start Date	Fiscal Year End Close Date
Jan 10, 2014	**Dec 31**

Immediate Owner

CAGE	Legal Business Name
(blank)	**(blank)**

Highest Level Owner

CAGE	Legal Business Name
(blank)	**(blank)**

Executive Compensation

Registrants in the System for Award Management (SAM) respond to the Executive Compensation questions in accordance with Section 6202 of P.L. 110-252, amending the Federal Funding Accountability and Transparency Act (P.L. 109-282). This information is not displayed in SAM. It is sent to USAspending.gov for display in association with an eligible award. Maintaining an active registration in SAM demonstrates the registrant responded to the questions.

Proceedings Questions

Registrants in the System for Award Management (SAM) respond to proceedings questions in accordance with FAR 52.209-7, FAR 52.209-9, or 2.C.F.R. 200 Appendix XII. Their responses are not displayed in SAM. They are sent to FAPIIS.gov for display as applicable. Maintaining an active registration in SAM demonstrates the registrant responded to the proceedings questions.

Exclusion Summary

Active Exclusions Records?

No

SAM Search Authorization

I authorize my entity's non-sensitive information to be displayed in SAM public search results:

Yes

Entity Types

Business Types

Entity Structure	Entity Type	Organization Factors
Corporate Entity (Not Tax Exempt)	**Business or Organization**	**Subchapter S Corporation**
Profit Structure		
For Profit Organization		

Socio-Economic Types

Minority Owned Business
Self Certified Small Disadvantaged Business
Economically Disadvantaged Women Owned Small Business
Woman Owned Small Business
Woman Owned Business
Black American Owned

SBA Certified 8(a) Program Participant
Entrance Date: **Feb 17, 2021**
Exit Date: **Feb 16, 2030**

Check the registrant's Reps & Certs, if present, under FAR 52.212-3 or FAR 52.219-1 to determine if the entity is an SBA-certified HUBZone small business concern. Additional small business information may be found in the SBA's Dynamic Small Business Search if the entity completed the SBA supplemental pages during registration.

Financial Information

Accepts Credit Card Payments	Debt Subject To Offset
Yes	**No**
EFT Indicator	CAGE Code
0000	**71RW9**

Points of Contact

Electronic Business

Sonya M Ford, President and CEO
11812 Arbor Glen Drive
Fredericksburg, Virginia 22407
United States

William Bohn, Chief Operating Officer
11812 Arbor Glen Drive
Fredericksburg, Virginia 22407
United States

Government Business

Sonya M Ford, President and CEO
11812 Arbor Glen Drive
Fredericksburg, Virginia 22407
United States

William Bohn, Chief Operating Officer
11812 Arbor Glen Drive
Fredericksburg, Virginia 22407
United States

Past Performance

William Bohn, Chief Operating Officer
11812 Arbor Glen Drive
Fredericksburg, Virginia 22407
United States

Sonya M Ford, President and CEO
11812 Arbor Glen Drive
Fredericksburg, Virginia 22407
United States

Service Classifications

NAICS Codes

Primary	NAICS Codes	NAICS Title
Yes	**541990**	**All Other Professional, Scientific, And Technical Services**
	238210	**Electrical Contractors And Other Wiring Installation Contractors**
	541310	**Architectural Services**
	541330	**Engineering Services**
	541360	**Geophysical Surveying And Mapping Services**
	541370	**Surveying And Mapping (Except Geophysical) Services**
	541511	**Custom Computer Programming Services**
	541512	**Computer Systems Design Services**
	541611	**Administrative Management And General Management Consulting**

541618	**Services**
541620	**Other Management Consulting Services**
	Environmental Consulting Services
541690	**Other Scientific And Technical Consulting Services**
541930	**Translation And Interpretation Services**
561110	**Office Administrative Services**
561210	**Facilities Support Services**
561621	**Security Systems Services (Except Locksmiths)**
562112	**Hazardous Waste Collection**
562211	**Hazardous Waste Treatment And Disposal**
562910	**Remediation Services**
562998	**All Other Miscellaneous Waste Management Services**
611430	**Professional And Management Development Training**
811213	**Communication Equipment Repair And Maintenance**
924110	**Administration Of Air And Water Resource And Solid Waste Management Programs**

Disaster Response

Yes, this entity appears in the disaster response registry.

States	Counties	Metropolitan Statistical Areas
Any		

U.S. Small Business Administration

kenia.montano@sba.gov | 804-253-9087 | www.sba.gov/va
Richmond District Office| 400 N. 8th Street, Suite 1150 | Richmond, VA 23219

2/26/2021

SOBIS, INC (DUNS: 079250053)
Sonya Ford
11812 Arbor Glen Dr.
Fredericksburg, VA 22407

Dear 8(a) participant,

Congratulations on your certification for the 8(a) Business Development (BD) Program! We have received official notification that you are assigned to our office, the Richmond District Office (RDO). Kenia Montano is assigned as your Business Opportunity Specialist (BOS) and will be your dedicated point of contact to assist your firm during its participation in the 8(a) Business Development Program.

Here are your next steps:

1. **Participation Agreement**
   - Read, sign, and return the Participation Agreement to our office, as soon as possible, yet no later than 3/5/2021. SBA requires the 8(a) participant's President or Chief Executive Officer sign a Participation Agreement showing he or she understands the conditions of 8(a) BD program participation. If you have already submitted this to our office, please disregard.
2. **Business Plan**
   - Develop and submit your Business Plan. SBA requires certified firms to promptly submit a business plan which must be approved by the SBA before the firm is eligible to receive any 8(a) benefits – including 8(a) contacts. Once approved, the business plan will be reviewed annually and may be modified as needed. We offer an optional format for business plans.
   - To consider the optional 8(a) Business Plan Form 1010C, please go to our website and click on "forms". You can also utilize one of our free Resource Partners in order to assist you in developing your Business Plan. Their office locations can be found on our website by clicking "Local Assistance"
   - In addition, please see the attached page for additional resources in developing your business plan.
   - Please submit your Business Plan, as soon as possible, yet no later than 4/26/2021
3. **Orientation**
   - We hold orientation every quarter. Due to the current COVID-19 pandemic the Richmond District Office is working on an online orientation session. More details to follow. Please go to the following link in order to register for our next event (March 23, 2021): https://rd8aorientation.eventbrite.com.

Best wishes for success as your enjoy a challenging and rewarding tenure in the program! Any questions or concerns can be addressed to your Business Opportunity Specialist at the undersigned information.

Sincerely,

Kenia Montano
Business Opportunity Specialist
Business Plan Development Assistance

U.S. Small Business Administration

kenia.montano@sba.gov | 804-253-9087 | www.sba.gov/va
Richmond District Office| 400 N. 8th Street, Suite 1150 | Richmond, VA 23219

This list of resources may be overwhelming, but we encourage you to explore the links in order to produce a Business Plan that is clear and concise and one that is truly useful for you and your growing business. To reiterate the last link, take advantage of the many free resources available that can assist you further. These resources can be found online at: https://www.sba.gov/tools/local-assistance. Simply type your zip code into the search bar and you will find other resources near you.

BOS Questions or Comments	***Suggested Research***
Comprehensive Business Plan Development Assistance (step-by-step) tutorials	• https://www.sba.gov/writing-business-plan
Legal Name and Address Please verify your business address. The address listed on the 1010C is different than what we have on file and what is listed on your business card/website.	• State Corporation Commission ○ http://www.scc.virginia.gov/
Diversification Including Business Activity Targets	• https://www.sba.gov/category/navigation-structure/starting-managing-business/managing-business/growing-your-business
Marketing Plan Developing a Marketing Plan	• https://www.sba.gov/content/developing-marketing-plan • https://www.sba.gov/content/marketing-101-basics • https://www.sba.gov/content/marketing-201
Cash Flow Projections and Capture Management In addition, perform NAICS research	• https://www.sba.gov/blogs/projecting-your-business-cash-flow-made-simple • https://www.score.org/resources/financial-projections-template • https://www.score.org/search/apachesolr_search/cash%20flow • http://www.census.gov/eos/www/naics/ • http://dsbs.sba.gov/dsbs/search/dsp_dsbs.cfm • https://www.fpds.gov/fpdsng_cms/index.php/en/ • http://fbo.gov/ • http://smallbusiness.data.gov/
Web-based Branding Verify that you are consistent on the web i.e. name, address, contact information.	• www.sam.gov • http://dsbs.sba.gov/dsbs/search/dsp_dsbs.cfm
Capability Statement Produce and submit a capability statement including past performance history.	• https://www.hhs.gov/grants/contracts/get-ready-to-do-business/sample-capability-statement/index.html
Local Assistance Including Procurement & Technical Assistance Centers (PTACs)	• https://www.sba.gov/tools/local-assistance

ATTACHMENT F. LICENSES

Society of Wetland Scientists
Professional Certification Program, Inc

grants the designation

Professional Wetland Scientist

For

Adam Finkle, M.S.

In recognition of all the professional requirements approved by the Society of Wetland Scientists Certification Program, Inc. and verified by the Society's Certification Review Panel on 06/20/2018. Professional Wetland Scientist number 2960. Due to recertify by 06/20/2023.

Ben LePage, PWS
President

Robert D. Shannon, Ph.D., PWS
Review Panel Chair

COMMONWEALTH OF MASSACHUSETTS

DIVISION OF PROFESSIONAL LICENSURE

BOARD OF
ENGINEERING

ISSUES THE FOLLOWING LICENSE

REG/PROF CIVIL ENGINEER

KIRK F BOSMA
107 WATERHOUSE RD
BOURNE, MA 02532-3890

LICENSEE SIGNATURE

45849	06/30/2022	965011
LICENSE NUMBER	EXPIRATION DATE	SERIAL NUMBER

COMMONWEALTH OF MASSACHUSETTS

DIVISION OF PROFESSIONAL LICENSURE

BOARD OF

ENGINEERING

ISSUES THE FOLLOWING LICENSE

REG/PROF LAND SURVEYOR

JOEL R KUBICK
PO BOX 647
NORTH FALMOUTH, MA 02556-0647

LICENSEE SIGNATURE

LICENSE NUMBER	EXPIRATION DATE	SERIAL NUMBER
46712	06/30/2022	859217

COMMONWEALTH OF MASSACHUSETTS

DIVISION OF PROFESSIONAL LICENSURE

BOARD OF

ENGINEERING

ISSUES THE FOLLOWING LICENSE

REG/PROF CIVIL ENGINEER

JOEL R KUBICK
PO BOX 647
NORTH FALMOUTH, MA 02556-0647

LICENSEE SIGNATURE

LICENSE NUMBER	EXPIRATION DATE	SERIAL NUMBER
48092	06/30/2022	859212

Please visit our web site at http://www.mass.gov/dpl/boards/EN

MITCHELL BUCK
30 COLERIDGE DR
FALMOUTH, MA 02540

(EN)

Fold, Then Detach Along All Perforations

COMMONWEALTH OF MASSACHUSETTS
DIVISION OF PROFESSIONAL LICENSURE
BOARD OF
ENGINEERING
ISSUES THE FOLLOWING LICENSE
REG/PROF CIVIL ENGINEER

MITCHELL BUCK
30 COLERIDGE DR
FALMOUTH, MA 02540

Mitchell Buck
LICENSEE SIGNATURE

LICENSE NUMBER	EXPIRATION DATE	SERIAL NUMBER
51147	06/30/2020	494855

DELAWARE ASSOCIATION OF PROFESSIONAL ENGINEERS

92 Read's Way, Suite 208
New Castle, DE 19720
Phone: 302-323-4588
Email: office@dape.org

Professional Engineers

Person Information

Name:	Matthew F Shultz
Discipline:	Civil Engineering

Address Information

Address (City, State, Zipcode):	Marion, MA, 02738

License Information

License Number:	21748
License Status:	Active
License Expires:	06/30/2022

LOUISIANA PROFESSIONAL ENGINEERING AND LAND SURVEYING BOARD

As of 7/7/2021 the Louisiana Professional Engineering and Land Surveying Board (LAPELS) has the following information on file:

Mr. Matthew Frederick Shultz
107 Waterhouse Road
Bourne, MA 02532

Cut Here

LOUISIANA PROFESSIONAL ENGINEERING & LAND SURVEYING BOARD (LAPELS)
9643 Brookline Avenue, Suite 121
Baton Rouge, LA 70809
Phone (225) 925-6291
www.lapels.com

Mr. Matthew Frederick Shultz

License/Certificate Type - Number	Expiration Date
PE.0036650	03/31/2022

Status: ACTIVE

Fold Here

Please be advised that your license must be in "Active" status in order for you to (a) provide or offer to provide engineering or land surveying services in Louisiana or (b) use the words "engineer", "engineering", "land surveyor", "land surveying" or any modification or derivative thereof in your name or in connection with your business or activities in Louisiana. Licensees whose licenses are in "Retired", "Inactive", or "Expired" status are prohibited from engaging in the activities described above in items (a) and (b).

LA R. S. 37:689 requires firms practicing or offering to practice engineering or land surveying in the state of Louisiana to be licensed by the Board prior to offering such services.

Print and keep the following information for your record or verification. The pocket card may also be printed on card stock or laminated to keep with you as license/certificate verification.

Disclaimer
All information provided by LAPELS on this web page, and on its other web pages and internet sites, is made available to provide immediate access for the convenience of interested persons. While LAPELS believes the information to be reliable, human or mechanical error remains a possibility, as does delay in the posting or updating of information. Therefore, LAPELS makes no guarantee as to the accuracy, completeness, timeliness, currency, or correct sequencing of the information. Neither LAPELS, nor any of the sources of the information, shall be responsible for any errors or omissions, or for the use or results obtained from the use of this information. Other specific cautionary notices may be included on other web pages maintained by LAPELS.

If you need to make changes to your contact information, please choose one of the following options below:

Contact update for Individuals and Firms

License/Certificate Types:

EF = Engineering Firm VF = Land Surveying Firm

CPD = Continuing Professional Development Sponsor/Provider

*PE = Professional Engineer *PLS = Professional Land Surveyor

*EI = Engineer Intern *LSI = Land Surveyor Intern

*PE Discipline Codes

AG	Agricultural	ME	Mechanical
AR	Architectural	MI	Mining or Mineral
CH	Chemical	MT	Metallurgical
CE	Civil	MU	Manufacturing
CS	Control Systems	NV	Naval Architecture & Marine
EE	Electrical & Computer	NU	Nuclear
EV	Environmental	ST	Structural *
FP	Fire Protection	PT	Petroleum
IE	Industrial		
* An engineer that has passed the Structural I exam is listed as a Civil Engineer. An engineer that has passed both the Structural I and II exams is listed as Structural (ST) and a Civil (CE) Engineer.			

COMMONWEALTH OF MASSACHUSETTS
DIVISION OF PROFESSIONAL LICENSURE
BOARD OF
ENGINEERING
ISSUES THE FOLLOWING LICENSE
REG/PROF CIVIL ENGINEER

MATTHEW F SHULTZ
WOODS HOLE GROUP
107 WATERHOUSE RD
BOURNE, MA 02532

LICENSEE SIGNATURE

LICENSE NUMBER	EXPIRATION DATE	SERIAL NUMBER
47832	06/30/2022	901892

STATE OF CONNECTICUT
DEPARTMENT OF CONSUMER PROTECTION

PROFESSIONAL ENGINEER
MATTHEW F SHULTZ
15 Autumn Ln
Marion, MA 02738

License #	Effective	Expiration
PEN.0030884	05/06/2021	01/31/2022

SIGNED

COMMONWEALTH OF MASSACHUSETTS
DIVISION OF PROFESSIONAL LICENSURE
BOARD OF
ENGINEERING
ISSUES THE FOLLOWING LICENSE
REG/PROF CIVIL ENGINEER

MATTHEW F SHULTZ
WOODS HOLE GROUP
107 WATERHOUSE RD
BOURNE, MA 02532

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47832	06/30/2022	901892

STATE OF CONNECTICUT
DEPARTMENT OF CONSUMER PROTECTION

PROFESSIONAL ENGINEER
MATTHEW F SHULTZ
15 Autumn Ln
Marion, MA 02738

License #	Effective	Expiration
PEN.0030884	05/06/2021	01/31/2022

SIGNED

ASSOCIATION OF STATE FLOODPLAIN MANAGERS, INC.

CERTIFICATION BOARD OF REGENTS

HEREBY CERTIFIES THAT PURSUANT TO THE PROVISIONS OF THE CHARTER FOR THE CERTIFIED FLOODPLAIN MANAGER PROGRAM

M. Leslie Fields, CFM

IS DULY REGISTERED AS AN

ASFPM CERTIFIED FLOODPLAIN MANAGER

IN TESTIMONY WHEREOF THIS CERTIFICATE HAS BEEN ISSUED BY THE AUTHORITY OF THE CERTIFICATION BOARD OF REGENTS, CERTIFICATE NO. US-14-07618, ISSUED 4/17/2014. THIS CERTIFICATE SHALL EXPIRE 7/31/2022, UNLESS RENEWED ACCORDING TO THE RULES OF THIS BOARD.

CERTIFICATION BOARD OF REGENTS
PRESIDENT, LOUIS T. GREENWELL, GISP, CFM

ASSOCIATION OF STATE FLOODPLAIN MANAGERS
EXECUTIVE DIRECTOR, CHAD M. BERGINNIS, CFM

ASFPM CFM® CERTIFIED

State of Florida
Department of State

I certify from the records of this office that GHD SERVICES INC. is a Delaware corporation authorized to transact business in the State of Florida, qualified on October 16, 2003.

The document number of this corporation is F03000005291.

I further certify that said corporation has paid all fees due this office through December 31, 2021, that its most recent annual report/uniform business report was filed on February 15, 2021, and that its status is active.

I further certify that said corporation has not filed a Certificate of Withdrawal.

Given under my hand and the Great Seal of the State of Florida at Tallahassee, the Capital, this the Twenty-sixth day of April, 2021

Secretary of State

Tracking Number: 2941958311CU

To authenticate this certificate,visit the following site,enter this number, and then follow the instructions displayed.

https://services.sunbiz.org/Filings/CertificateOfStatus/CertificateAuthentication

Florida Department of Agriculture and Consumer Services
Division of Consumer Services
Board of Professional Surveyors and Mappers
2005 Apalachee Pkway Tallahassee, Florida 32399-6500
800HELPFLA(435-7352) or (850) 488-2221

March 23, 2022

GHD, INC.
320 GODDARD STE 200
IRVINE, CA 92618-4613

SUBJECT: Professional Surveyor and Mapper Business Certificate # LB8496

Your application / renewal as a professional surveyor and mapper business as required by Chapter 472, Florida Statutes, has been received and processed.

The license appears below and is valid through February 28, 2023.

You are required to keep your information with the Board current. Please visit our website at www.800helpfla.com/psm to create your online account. If you have already created your online account, you can use the website to maintain your license. You can also find other valuable information on the website.

If you have any questions, please do not hesitate to call the Division of Consumer Services, Board of Professional Surveyors and Mappers at 800-435-7352 or 850-488-2221.

Detach Here

Florida Department of Agriculture and Consumer Services
Division of Consumer Services
Board of Professional Surveyors and Mappers
2005 Apalachee Pkway Tallahassee, Florida 32399-6500

License No.: **LB8496**

Expiration Date February 28, 2023

Professional Surveyor and Mapper Business License

Under the provisions of Chapter 472, Florida Statutes

GHD, INC.
320 GODDARD STE 200
IRVINE, CA 92618-4613

Nicole Fried

NICOLE "NIKKI" FRIED
COMMISSIONER OF AGRICULTURE

This is to certify that the professional surveyor and mapper whose name and address are shown above is licensed as required by Chapter 472, Florida Statutes.

Licensee

Name:	**ENOS, GABRIELLE M**	License Number:	**605**
Rank:	**Professional Geologist**	License Expiration Date:	**07/31/2022**
Primary Status:	**Current**	Original License Date:	**01/04/1989**
Secondary Status:	**Active**		

Related License Information

License Number	Status	Related Party	Relationship Type	Relation Effective Date	Rank	Expiration Date
	Current	GHD SERVICES INC	Professional Geologist	10/01/2013	Geology Business Information	

Ron DeSantis, Governor

Halsey Beshears, Secretary

STATE OF FLORIDA
DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION

BOARD OF PROFESSIONAL GEOLOGISTS

THE PROFESSIONAL GEOLOGIST HEREIN IS LICENSED UNDER THE PROVISIONS OF CHAPTER 492, FLORIDA STATUTES

ENOS, GABRIELLE M

GHD SERVICES INC
5904 HAMPTON OAKS PARKWAY
SUITE F
TAMPA FL 33610

LICENSE NUMBER: PG605

EXPIRATION DATE: JULY 31, 2022

Always verify licenses online at MyFloridaLicense.com

Do not alter this document in any form.

This is your license. It is unlawful for anyone other than the licensee to use this document.

Licensee

Name:	**MOORE, BRIAN**	License Number:	**64017**
Rank:	**Professional Engineer**	License Expiration Date:	**02/28/2023**
Primary Status:	**Current**	Original License Date:	**02/06/2006**
Secondary Status:	**Active**		

Related License Information

License Number	Status	Related Party	Relationship Type	Relation Effective Date	Rank	Expiration Date
9931	Current	GHD SERVICES INC	Registry	09/12/2019	Registry	

Ron DeSantis, Governor

FBPE
FLORIDA BOARD OF PROFESSIONAL ENGINEERS

STATE OF FLORIDA

BOARD OF PROFESSIONAL ENGINEERS

THE PROFESSIONAL ENGINEER HEREIN IS LICENSED UNDER THE PROVISIONS OF CHAPTER 471, FLORIDA STATUTES

MOORE, BRIAN

13125 SANCTUARY COVE DRIVE
#104
TAMPA FL 33637

LICENSE NUMBER: PE64017

EXPIRATION DATE: FEBRUARY 28, 2023

Always verify licenses online at MyFloridaLicense.com

Do not alter this document in any form.

This is your license. It is unlawful for anyone other than the licensee to use this document.

Licensee Details

Licensee Information

Name:	**COASTAL PROTECTION ENGINEERING LLC (Primary Name)**
Main Address:	**5301 NORTH FEDERAL HWY** **SUITE 335** **BOCA RATON Florida 33487**
County:	**PALM BEACH**
License Mailing:	
LicenseLocation:	

License Information

License Type:	**Registry**
Rank:	**Registry**
License Number:	**33370**
Status:	**Current**
Licensure Date:	**09/12/2019**
Expires:	

Special Qualifications **Qualification Effective**

Alternate Names

View Related License Information

View License Complaint

State of Florida
Department of State

I certify from the records of this office that COASTAL PROTECTION ENGINEERING LLC is a limited liability company organized under the laws of the State of Florida, filed on June 25, 2019.

The document number of this limited liability company is L19000166989.

I further certify that said limited liability company has paid all fees due this office through December 31, 2021, that its most recent annual report was filed on April 22, 2021, and that its status is active.

Given under my hand and the Great Seal of the State of Florida at Tallahassee, the Capital, this the Fifteenth day of June, 2021

Secretary of State

Tracking Number: 0638592639CU

To authenticate this certificate,visit the following site,enter this number, and then follow the instructions displayed.

https://services.sunbiz.org/Filings/CertificateOfStatus/CertificateAuthentication

WOODS HOLE GROUP
A CLS COMPANY

Town of Palm Beach
RFQ No. 2022-16
Coastal Resiliency Consultant for Town of Palm Beach

May 2022

PREPARED FOR:
Town of Palm Beach
Purchasing Division
951 Okeechobee Road
West Palm Beach, FL 33401

GHD

COASTAL PROTECTION ENGINEERING

SCAPE

SOBIS
Reducing Risk. Building Resilience.

WOODS HOLE GROUP
A CLS COMPANY

PREPARED BY:
Woods Hole Group, Inc.
A CLS Company
107 Waterhouse Road
Bourne, MA 02532 USA

Town of Palm Beach
RFQ No. 2022-16

Coastal Resiliency Consultant for Town of Palm Beach

May 2022

Prepared for:
Town of Palm Beach
Purchasing Department
951 Okeechobee Road
West Palm Beach, FL 33401

Prepared by:
Woods Hole Group
A CLS Company
107 Waterhouse Road
Bourne, MA 02532 USA
(508) 540-8080

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1.0 SOLICITATION PACKAGE, FORMS AND EVALUATION FACTORS

1.1 Details of Solicitation

All components and related documents addressed and uploaded as required via Mercell

1.2 Required Forms and Acknowledgements

All forms and supporting documents addressed and uploaded as required via Mercell

1.3 Evaluation Factors

These elements are addressed directly in uploaded documents via Mercell for Sections 1.3.1, 1.3.2, 1.3.3, 1.3.4., and 1.3.6 individually. There is no response required for Section 1.3.5 per the Solicitation. These sections build on and reference each other naturally as one combined document to facilitate presentation and Town review of our offering.

1.3.1 Qualifications/Experience of Firm (30%)

Woods Hole Group is pleased to offer as the prime contractor to the Town of Palm Beach in response to RFQ No. 2022-16 for Coastal Resiliency Consulting services. As a current prime contractor to the Town for Coastal Engineering Services under RFQ No. 2014-04, and with a history of supporting the Town on various assignments since before the year 2000, Woods Hole Group fully understands the requirements and expectations of the Town. Our prior services to the Town traditionally focused on shore protection strategies, long-term coastal management planning, project-specific recommendations and refinements, performance analysis, and public engagement. Since 2017, our services to the Town have expanded directly toward coastal resiliency. We've worked with the Town to define present and future flood risk in a changing climate with sea level rise, identify assets and resources at risk now and increasingly in future, and formulate specific actions the Town can take to manage risk and build resiliency. We are proud to have worked closely with Town staff, officials, and the public to author Level-Up Palm Beach – the Implementation Plan upon which many of the scope items defined for this RFQ are based.

To date, our offering to the Town focused on what Woods Hole Group can provide exclusively with in-house resources. Given the breadth of potential activities needed to effectively serve the Town on this procurement for Coastal Resiliency Consulting, we are pleased to offer a wider range of services by building a team of like-minded and exclusively-committed partners. Our forthright approach is to offer this full-service team so the Town can confidently select one contractor in response to this RFQ. We believe it is in the best interest of the Town to have access to a single turnkey team to stay focused, consistently fulfill and advance Town objectives, build on the strong established trust earned between Woods Hole Group, these partners, and the Town to work as one unified team, and frankly to save time and money. The theme of our team is to be personal and locally-focused, while also offering national and global exposure and

creativity, and giving the Town access to a wider capacity of resources when needed to respond or accelerate work.

We are proud to offer the team illustrated by Figure 1.

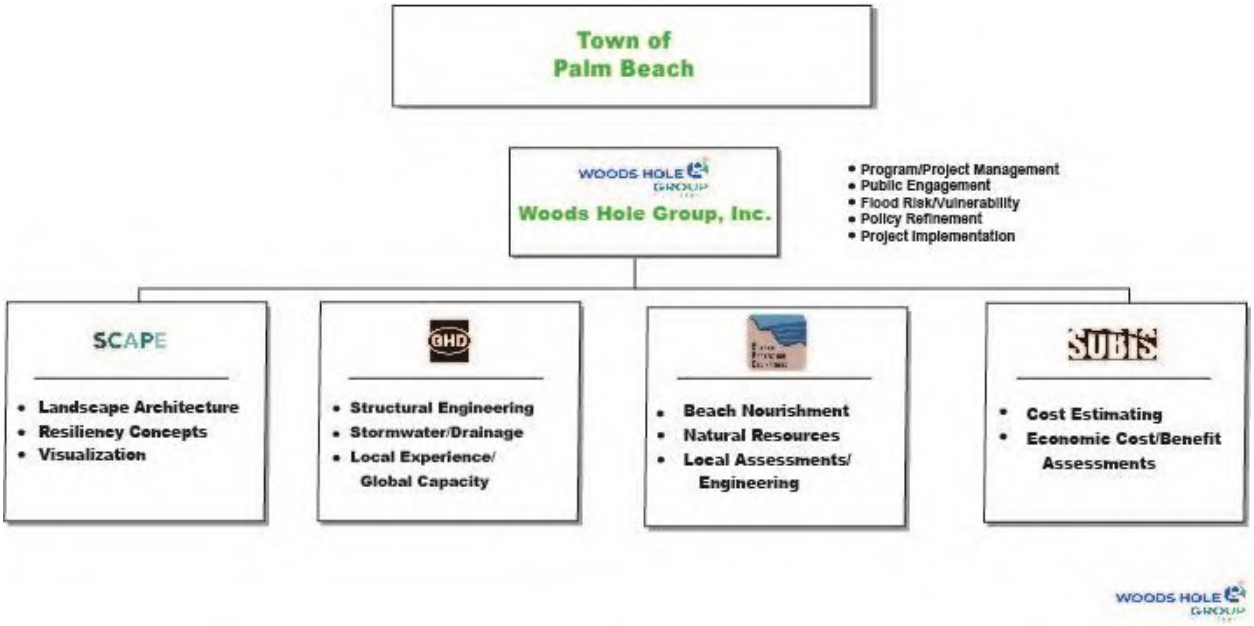


Figure 1. Team Organization Chart

Woods Hole Group (http://www.woodsholegroup.com/) will be the prime contractor and primary interface directly reporting to the Town. We are confident we can lead the majority of the work from a technical perspective, while effectively engaging our partners. Woods Hole Group is comprised of coastal engineers and scientists, and coastal resiliency experts, and we have unparalleled experience working with the Town on these matters, having formulated the Level-Up Palm Beach Plan.

GHD (https://www.ghd.com/en/) is our exclusive multi-service engineering partner, offering long-term Palm Beach specific experience via key personnel, as well as the resources of a global A&E firm. Bob Hamilton at Woods Hole Group and Mike Barnett at GHD have collaborated effectively on Palm Beach projects for more than 20 years, dating back to Woods Hole Group's review of the ATM Comprehensive Coastal Management Program update, and through current collaboration on design refinements for the Palm Beach seawall project. GHD will be a particularly strong partner for structural projects, as well as larger-scale flood control projects, and drainage engineering components, if needed.

Coastal Protection Engineering is also committed exclusively to the Woods Hole Group team and provides the valued presence of a locally focused coastal engineering and scientific firm. Coastal

Protection Engineering personnel Tom Pierro and Lindino Benedet are well-known to Woods Hole Group, including Program Manager Bob Hamilton, having directly collaborated on projects outside Palm Beach, and indirectly advancing Palm Beach coastal program interests while both actively working with the Town. Their recent expertise for Palm Beach relates to beach projects in the coastal program and natural resource assessments. Together with GHD, we offer solid engineering "boots on the ground."

Scape Studio (https://www.scapestudio.com) is an award-winning, design-driven landscape architecture firm with proven expertise creating coastal resilience design concepts and related visualizations. Woods Hole Group and Scape collaborate extensively on similar projects and are excited to bring this exclusive teaming arrangement to the Town of Palm Beach. Scape is a creative idea studio that will allow us to bring concepts from Level-Up Palm Beach to reality, such as flood protection strategies for the Lake Worth Shoreline and the neighborhood-scale projects. Public engagement and education also will be cornerstones of Scape's offering to the team. Their relevant experience spans Boston to Louisiana.

SOBIS (https://sobisinc.com/) is a small, woman and minority-owned 8(a) Certified business, focused on reducing risk and building resilience. They are exclusively committed to the Woods Hole Group team for Palm Beach, bringing a breadth of experience for hazard planning solutions for both government and commercial clients. A focus of their climate change adaptation planning services is consideration of economic impacts, cost estimating and approximation of potential economic losses from projected future flooding. Having this skillset at the disposal of the Woods Hole Group team on behalf of Town of Palm Beach will help with prioritization, as well as project planning, budgeting, and implementation.

1.3.1.1 Company Credentials

Woods Hole Group is a leading planning, engineering, and science firm working to build more resilient coastal communities and ecosystems. Specialty services include high resolution numerical flood modeling, climate change vulnerability assessments, adaptation planning, and resilient design of traditional and nature-based flood mitigation solutions. The company has supported a diverse government, private and industrial client base since 1986. We are based in Bourne, MA with client-centered offices in DC, DE, FL, and TX.

Woods Hole Group operates four Business Units:

- Environment & Climate – Consulting: This is the Unit that is focused on Coastal Environmental Scientific and Engineering Consulting services that will support Town of Palm Beach directly.
- Environment & Climate – Satellite Telemetry: This Unit is unlikely to be required by Town of Palm Beach and is largely focused on using space-based technologies to monitor the earth and telemeter data from remote locations.

- Energy & Infrastructure – Metocean Services: This Unit is mostly focused on making meteorological and oceanographic measurements to support offshore energy and port / harbor operations. Personnel from this team will support the Town if we proceed with the water level monitoring program.
- Sustainable Fisheries Management – This Unit helps fishers comply with federal and state regulations by providing hardware and software to track and manage fishing vessel movements and catch reports required by the government.

More information about Woods Hole Group's range of services and departments is provided in Attachment A.

Woods Hole Group will manage the project, lead the team's overall technical efforts, and support external engagement activities. Our role includes mapping built and natural assets and populations, modeling present and future flood risks, and carrying out the risk assessment. We will also lead the collaborative effort to develop implementable resiliency strategies with our proposed project partners, the Town, and stakeholders.

Woods Hole Group has been serving Palm Beach since 1997, starting with a review of the Comprehensive Coastal Management Plan Update prepared by ATM, continuing through multiple direct assignments, and multi-year contracts with the Town, and most recently through development of the Palm Beach Flood Risk Model, completion of the Coastal Flood Risk Vulnerability Assessment, publication of the Level-Up Palm Beach resiliency implementation plan, and successful grant applications to Resilient FL program. Through this work, we have developed a unique understanding of the existing coastal flooding hazards along the Atlantic Ocean and Lake Worth Lagoon, the Town's shoreline conditions and stabilization projects, and areas of potential flood exposure and pathways.

GHD is one of the world's leading professional services companies operating in the global market sectors of environment, energy and resources, water, property and buildings, and transportation. GHD provides engineering, environmental, and construction services to help clients create lasting community benefits. A 100 percent employee-owned company, GHD is rich in diversity of thought, background, and experience. GHD's more than 10,000 empowered people in 200+ offices on five continents collaborate seamlessly to understand our clients' objectives, help solve their problems as if they were our own and bring imaginative solutions to life. In North America, we have 4,000 people working as one team across 130 offices. A local office in Wellington, Florida has access to GHD's vast global resources to support the Town's projects with any specialized expertise and/or resources necessary.

GHD delivers projects with high standards of safety, quality, and integrity across the entire project lifecycle – from planning to design, to implementation and post-construction monitoring. GHD is one of the few engineering/consulting firms that have attained an International

Organization for Standardization (ISO) 9001:2015 Certification in Consulting, Engineering, Project Management, Design Services, and Materials Testing. GHD's adherence to the ISO 9001:2015 Quality System results in a high level of service and satisfied clients. GHD values a close working relationship with our key clients and become personally invested in developing environmentally responsive and cost-effective solutions to projects.

GHD's multidisciplinary team of professionals and support staff is uniquely qualified to provide all the professional services defined by the scope of this contract which requires coastal engineering design and modeling, planning, permitting, environmental resource considerations, and bid and construction phase services for the Town. GHD's key personnel have worked with the Town of Palm Beach for over 20 years. The GHD Team has a long history of serving the Town, and we value the opportunity to continue that service by supporting Woods Hole Group in the implementation of the Town's Coastal Resiliency Program. The GHD Team recognizes the importance of thoroughly understanding the Town's priorities and needs for project delivery and efficient communication under this contract. The GHD Team is fully committed to satisfying the requirements of each task order issued under this contract.

Identifying Needs. Understanding and managing the effects of an uncertain climate and ocean levels on shorelines and marine resources are critical for coastal communities to continue thriving. Detailed research and modeling of complex physical systems can point to the right solutions and help meet rigorous project demands and approvals. GHD has extensive experience in delivering coastal solutions to communities across the world, particularly in North America. This experience has given us a deeper understanding of the coastal environment, enabling us to develop a methodical, sensible, innovative, and dynamic approach to these projects.

Services. GHD's coastal services include background and baseline studies, strategic and planning studies, vulnerability assessments, and engineering. Comprehensive services span from feasibility through construction and post-construction monitoring, and include the following:

- Coastal and estuarine processes
- Hydrodynamic, sediment, and WQ modeling
- Living shoreline techniques
- Environmental permitting
- Sea level rise and wave run-up analysis
- Dredging studies and design
- Sediment management (incl. contaminants)
- Navigation engineering
- Community and stakeholder outreach
- GIS mapping
- Coastal geomorphology
- Shore protection and restoration
- Marsh/wetland protection and restoration
- Vulnerability and adaptation assessments
- Marine structural engineering
- Subsea pipeline/marine outfall design
- Waterfront and marina design
- Asset management
- Geotechnical investigation
- Traffic/transport planning and engineering

Benefits. GHD's coastal team will help you plan your future developments through an analysis of coastal processes and responses, consider gray and green solutions to coastal protection, and

identify potential source of funding thorough local, state, and federal grants unique to various coastal components of coastal projects. GHD will help to identify, define, and manage coastal zone impacts and draw on knowledge of biology, infrastructure, climate trends, and regulations to provide holistic solutions that are cost-effective, innovative, and sustainable.

What to expect. With a global network of more than 10,000 people, GHD will use a collaborative approach to address each challenge we encounter. You can expect solid, practical, and innovative advice that draws on a triple bottom line approach, providing successful project execution.

Coastal Protection Engineering LLC (CPE) is a forward-thinking coastal engineering firm founded for the direct purpose of serving coastal communities with beach restoration and coastal protection expertise. CPE differentiates ourselves through a steadfast commitment to our clients and an uncompromising focus on technical excellence, professional expertise, and consistent delivery of high-quality work products. CPE is a Palm Beach County, Florida, Certified Small Business Enterprise (SBE) specializing in coastal engineering, numerical modeling, environmental studies, biological monitoring, oceanography, marine geology, and GIS.

CPE is a multidisciplinary coastal engineering firm founded in 2019 by well-respected industry leading professionals with strong credentials, and decades of experience in coastal programs, and who have worked together for over 15 years to implement projects from concept through construction. As a highly specialized firm dedicated to coastal projects, CPE operates with a clear and direct focus on providing clients with expert consulting services specifically to support projects that restore, manage, and protect coastal resources and infrastructure.

CPE's range of service offerings include coastal engineering design, coastal program management, inlet management plans, numerical modeling of coastal processes, coastal geology, marine hydrographic, geotechnical, and geophysical services, state and federal permitting, project bidding and construction oversight, environmental evaluations, resiliency and sustainability assessments, physical and biological monitoring, and post-construction performance assessments.

Key CPE staff have worked with Town of Palm Beach staff on many projects over the last 15 years, including current work under two direct contracts CPE holds with the Town for coastal engineering and marine resource monitoring. These opportunities have provided us with direct experience and in-depth knowledge of the unique needs of the Town's coastal program. Our direct experience with the Town's program over the course of many years has resulted in a deep understanding of the Town's management objectives and their focus on shore protection. As a sub-consultant to the Woods Hole Group team for this contract, CPE will support the Town's resiliency needs in the context of a broader perspective on the Town's coastal program objectives and environmental setting. As a local small business, CPE's presence in Palm Beach County allows us to be on site quickly and provide the Town with rapid response time to time-sensitive matters

such as site assessments, public meetings, presentations, and to provide technical support to the WHG team.

SCAPE is a design-driven landscape architecture and urban design studio based in New York with offices in New Orleans and San Francisco. We believe landscape architecture can enable positive change in communities through the creation of regenerative living infrastructure and public landscapes. We work to integrate natural cycles and systems into environments across all scales, from the urban pocket-park to the regional ecological plan. We do this through diverse forms of landscape architecture – built landscapes, planning frameworks, research, books, and installations – with the ultimate goal of connecting people to their immediate environment and creating dynamic and adaptive landscapes of the future.

SCAPE's team of 87 staff is experienced in landscape architecture, architecture, urban design, and planning, and we integrate these skillsets to practice design as interpreters and synthetic thinkers. We lead and work with teams of engineers and architects on complex projects, from stormwater streetscapes to large public pedestrian infrastructure, translating technical expertise into legible and engaging public space. We also believe in working with communities and stakeholders to translate complex visions into realizable actions.

At SCAPE, we believe in a layered approach to waterfront resilience, where combinations of creative design and planning techniques enable communities to step down risk while also generating new opportunities for placemaking, education, and both economic and ecological activity. We know we need to think big and long-term but act now, developing implementable projects and policies that set us all on a path to a resilient future. This attitude, and a commitment to the realization and not just expression of these ideas, has put SCAPE at the forefront of creatively planning, designing, and implementing resilience.

Designing resilient landscapes and building resilient cities starts with clear and successful communication to visualize risk and engage communities; requires iterative science-driven design; means working not just with static infrastructure but with living, adaptive landscapes; and necessitates realizing resilience not only through design but through policy, regulation, and adaptive management. We bring this approach to design not only to identified "resilience" projects, but to all our work. We collaborate with multi-disciplinary teams to craft real resilience solutions. We are committed to working with public, private, and non-profit partners to design and implement projects that realize resilience: projects that reduce risk while achieving broader objectives, implementing great design, and increasing the adaptive capacity of both the place and people.

SCAPE's work and collaborations have led to several national awards, including the Buckminster Fuller Challenge Winner, two national American Society of Landscape Architects awards, and several NY American Society of Landscape Architects Awards. In 2017, founder and principal Kate

Orff was named a MacArthur Foundation Fellow, and in 2019 SCAPE was awarded the Cooper Hewitt National Design Award for Landscape Architecture. SCAPE was founded in 2007.

Sobis, Inc. is a small, woman and minority-owned business headquartered in Fredericksburg, Virginia with employees in Virginia, Florida, Maryland, and New Hampshire. We focus on providing climate change adaptation planning, hazard mitigation planning, risk assessments, and spatial solutions for clients, worldwide. Founded in 2014, Sobis planners, risk assessors, GIS specialists, developers, trainers, and project managers work together with our clients to create innovative and cost-effective reports, plans, tools, websites, databases, and maps. For this project, we have brought together a multi-disciplinary team of climate adaptation experts, planners, engineers, and GIS analysts.

Sobis Core Competencies

Climate Adaptation – Sobis risk modeling specialists understand where to obtain downscaled climate data and have developed an internal toolset to derive probabilities for future time horizons. Our technical experts have experience with both climate change data and hazard modeling which means they can be efficient and have a better understanding of what can be modeled. Our climate change team has experience identifying climate change impacts and adaptation strategies in North American, South American, Australia, Africa, and Middle East.

Disaster Management – Sobis offers experience working with clients in the development of short- and long-range program goals and related planning documents pertaining to the following mission areas of Emergency Management: Preparedness, Mitigation, Recovery, and Resilience. Sobis develops plans with the goal to reduce risk and provide maximum protection to people, physical assets, and economic well-being as well as to meet Federal requirements and funding eligibility.

Plans & Policies

- Emergency Operations Plans
- Business Continuity Plans
- Hazard Mitigation Plans
- Flood Mitigation Plans
- Continuity of Ops Plans

Analyses & Studies

- Threat and Hazard Identification
- Risk Assessments
- Post-Disaster Studies
- Strategic, Operational, And Function Specific Plans

Frameworks & Guides

- Plan Integration Guides
- Mitigation Guides/Books
- Long-Term Recovery Plans
- HEPRA Plan Development
- Disaster Preparedness Frameworks

Hazard Risk Assessment – Sobis risk assessment specialists have extensive experience quantifying risk using advanced models for local, state, national, and international clients. They have experience efficiently processing local geospatial and other data so that it may be used in hazard and climate assessments. Sobis has worked with data for cities and for rural counties and towns. They understand what is available and how it can be used to obtain the most useful results.

Geographic Information Systems (GIS) – The Sobis GIS team develops and delivers GIS and geospatial products and services that provide ongoing value to clients. The team of geospatial experts has nearly 60 years of collective professional experience providing geospatial services and has developed hundreds of custom map products for local, state, federal, and international clients over the last five years alone. The Sobis GIS program includes expertise in data conversion and integration, custom mapping, database management, visualization, and analytics. The GIS practitioners are experts in map production processes and ensure that deliverables exceed client specifications for attribution and metadata compliance.

Facilitation, Training, and Capacity Building – Nearly all the Sobis risk assessment specialists, GIS specialists, and application developers have experience with facilitation and training. This experience includes facilitating hazard mitigation meetings with jurisdictions, state experts, and the general public. Sobis trainers are authorized to teach all the Hazus and GIS courses for FEMA at the Emergency Management Institute and usually teach there eight to ten times a year. They have also developed training materials for risk assessment, mitigation planning, climate change adaptation, and GIS concepts.

1.3.1.2 Current Contracts

As explained in 1.3.1.1, Woods Hole Group operates four (4) Business Units (BU). The largest BU – Environment & Climate Consulting – is the Unit that primarily supports the Town of Palm Beach. This Unit represents just under 40% of the staff members and business activity (revenue) of the Woods Hole Group organization as a whole. At any given time, the consulting BU has approximately ~150 active projects. As of March 31, 2022, the top active projects include those listed in the Table below. These top 20 projects represent 58% of the business activity so far in 2022. As further explained in Section 1.3.2.1 and Section 1.3.4 below, Woods Hole Group has the capacity and resources to effectively manage the work envisioned under this contract for the Town of Palm Beach.

Project Name	Client Name
PWD Fiscal Year 2022 WQ Monitoring/Modeling	Philadelphia Water Department
Watson Park CZM Grant FY22 Coastal Resilience	Town of Braintree
MassDOT Flood Risk Assessment	MA - Dept of Transportation
Salem Climate Change Stormwater Management	City of Salem
Coastal Restoration Project Prioritization DE Bay	National Fish & Wildlife Foundation (NFWF)
Katama Bay Dredging	Town of Edgartown
Coastal Resilience Project Site Selection and Permit Scoping	University of Massachusetts Boston & Stone Living Laboratory
Resilient Woods Hole Phase 3	Woods Hole Oceanographic Institution (WHOI), NOAA, & U. Chicago Marine Biological Laboratory
Shoreline Surveying & Monitoring	Siasconset Beach Preservation Fund
Socio-Economic Monitoring for Coastal Resilience Projects	Industrial Economics, Inc. w/ NFWF
Eagle Neck Creek Tidal Restoration Design & Permitting	Fuss & O'Neill w/Town of Truro
Megansett /Squeteague Harbor Dredging Design/Permitting	Megansett / Squeteague Harbors Association
Snow's Creek Tidal Restoration Assessment	Town of Barnstable
DE Bay Dredge Assessment	Anchor/QEA, LLC w/ DE Department of Natural Resources
Ram Island Coastal Resilience & Restoration Project	MA Division of Fish & Wildlife
Belle Isle Marsh Phase I Salt Marsh Restoration and Resilience	Mystic River Watershed Association
Cape Cod Low Lying Roads-MVP-Flood Risk Assessment	Cape Cod Commission
Offshore Wind Development Ecological Monitoring / Compliance	Vineyard Wind
Ft Point Channel Environmental Assessment	Boston Planning and Development Agency
East Harbor Culvert Repair Design, Permitting & Construction	Town of Truro

1.3.1.3 Completed Commercial and/or Government Contracts

Following on Section 1.3.1.2 above, Woods Hole Group Environment & Climate BU, which will primarily support Town of Palm Beach on this contract, has completed more than 2,500 projects in over 30 years continuously operating as a Coastal Environmental Sciences and Engineering consulting business. As of December 31, 2021, the top projects completed are listed in the Table below. These top 20 projects represent 53% of the business activity completed in fiscal year 2021. As further explained in Section 1.3.2.1 and Section 1.3.4 below, Woods Hole Group has

the capacity and resources to effectively manage the work envisioned under this contract for the Town of Palm Beach.

Project Name	Client Name
PWD Fiscal Year 2021 WQ Monitoring/Modeling	Philadelphia Water Department
Marshfield & Duxbury Town Resilience Plan FY21	Town of Marshfield
Environment & Energy Dept Flood Risk Mapping	MA - Dept of Transportation
Coastal Restoration and Resilience Prioritization DE Bay	National Fish & Wildlife Foundation (NFWF)
Nauset Estuary Dredge Permitting	Town of Orleans
Blaney Pt Rock Revetment Construction	Private Land Owner (French)
Barrier Beach Resiliency Project	Duxbury Beach Reservation, Inc.
Argilla Road Resiliency Project	Town of Ipswich
Socio-Economic Monitoring for Coastal Resilience	Industrial Economics, Inc. w/ NFWF
Watson Park Permitting/Const Drawings	Town of Braintree
Falmouth Comprehensive Dredging Permits	Town of Falmouth Harbormaster
Duxbury Town-wide Coastal Vulnerability Assessment	Town of Duxbury
Beach Restoration and Resilience Planning at Coatue/Great Point	The Trustees of Reservations
Coastal Resilience Site Selection and Permit Scoping	University of Massachusetts Boston w/ Stone Living Laboratory
Sunrise Wind Offshore Sediment Transport Modeling	TRC Companies w/ Orsted
Level-Up Palm Beach Implementation Plan	Town of Palm Beach
Martha's Vineyard Resilience Project Intervention/Implementation	The Trustees of Reservations
Mill Pond Restoration Design & Permitting	MA-Div of Ecological Restoration
Truro Center Road Culvert Repair and Wetland Restoration Project	Town of Truro

1.3.1.4 Experience in Similar Jobs

This section presents a range of relevant experience from Woods Hole Group, as well as the project partners. Having completed more than 2,500 projects in more than 30 years of continuous business operations, it is always a challenge to present the breadth and depth of experience. Given the growth of coastal engineering, climate change and flood risk planning, and coastal resiliency recently, we decided to feature one dozen (12) relevant projects for Woods Hole Group specifically, along with a subset of relevant projects for each of our teaming partners. For Woods Hole Group, brief project capsules are presented in the main body of this proposal to facilitate review, and there is an Attachment with more detailed descriptions. The projects highlighted here also are consistent with five (5) client references provided on the Reference Form provided with the RFQ that was uploaded via Mercell. Some of these also overlap with the selection of active projects listed in 1.3.1.2 above. We also include a brief section describing our

past experience specifically for the Town of Palm Beach. We trust our experience with the Town, and that of teaming partners GHD and Coastal Protection Engineering, is familiar to the Town; however, understanding the proposal needs to stand on its own, we felt it important to at least highlight this experience upfront. Of course, more information can be provided upon request.

This section summarizes Woods Hole Group's experience with the Town of Palm Beach, followed by capsules on 12 relevant projects. Attachment B provides more details on a selection of these projects of interest.

Woods Hole Group, and specifically proposed Program Manager for this contract Bob Hamilton, have more than twenty (20) years of experience working with the Town of Palm Beach. Our role has consistently been to provide objective expert support, while collaborating with local partners where appropriate. This is exactly consistent with the approach here for the Coastal Resiliency contract. Our earliest work in the late 1990s was related to sand management at the inlet and collaborations (sometimes then controversial) with the USACE. Woods Hole Group reviewed relevant information, met with Town officials, and suggested a collaborative approach forward, which we hope at some level helped contribute to the substantial quantities of sand now placed on Palm Beach from federal maintenance of Lake Worth Inlet. Around that time, Woods Hole Group also was retained to review the Comprehensive Coastal Management Plan Update prepared by ATM under leadership of Mike Barnett. Bob and Mike worked together to refine a plan that in many ways formed the basis for the projects in the Coastal Management Program today. At that time, Woods Hole Group also advocated for dedicated Town staff to ensure projects would be successful, and to help generate matching funds, which have materialized. Since then, Woods Hole Group reviewed the 10-year CCMP again in 2014 and has provided independent review of project performance data. Around 2017, Woods Hole Group's work for the Town started to focus more on flood risk management, climate change planning, and coastal resiliency. We hope we helped position the Town proactively as the state program has taken off, now with Palm Beach as a leading community. This resiliency work included creating the Palm Beach Flood Risk Model (PB-FRM), conducting the Coastal Flood Vulnerability Assessment, and the Level-Up Palm Beach implementation plan. We are pleased to have worked so closely with the Town and welcome the opportunity to advance this work via this new contract, and with our exclusive project partners.

What follows are a series of project descriptions not related to Palm Beach to communicate to the Town the breadth and depth of our related experience.

Watson Park Shoreline Erosion Mitigation and Coastal Resiliency Project

Town of Braintree
Braintree, MA

Watson Park is an urban park located on the Weymouth Fore River in Braintree, MA. The park's shoreline had been experiencing significant erosion, which threatened existing coastal resource areas and recreational use of the park. Woods Hole Group has assisted the Town of Braintree in acquiring four years of CZM Coastal Resilience Grant funding to 1) conduct a feasibility study, 2) design and permit a living shoreline design to mitigate the ongoing erosion, improve the coastal resiliency of the property, and restore historic salt marsh habitat, 3) develop final construction drawings and bid documents in preparation for project implementation, and 4) construction.

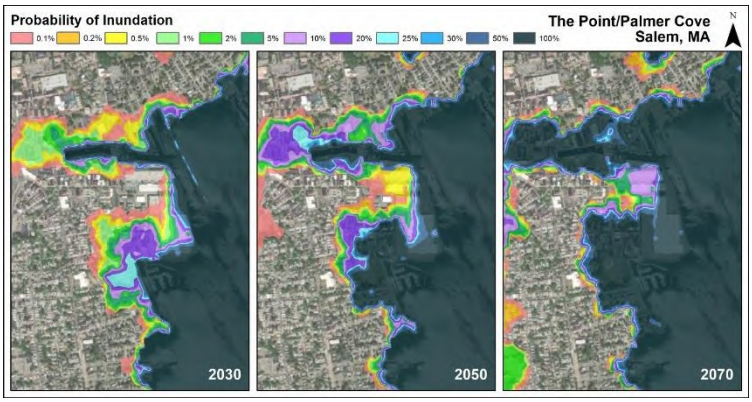
The project is being constructed presently, and includes unique design aspects, such as:

- Salt marsh sill, essentially restoring salt marsh on an unvegetated mud flat, for energy buffering capacity, to establish a baseline for more protection landward, and to incorporate a living shoreline approach.
- Flood protection berm landward of restored marsh to mitigate flood risk up to 2070 flood horizon.

- Rain gardens and drainage systems landward of the berm to accommodate storm water from precipitation and potential berm overtopping and return flood waters back to the Fore River to prevent sustained upland flooding.
- Long-term vision to even remove the berm and allow for natural wetland migration in the future should climate change eventually result in exceedance of the 2070 planning horizon.

Salem Climate Change Deep Dive

City of Salem
Salem, MA



Woods Hole Group is leading an inter-disciplenary team (including SCAPE for landscape architecture) to support the City of Salem in a City neighborhood pilot study involving a Climate Change Deep Dive modeling assessment and alternatives analysis together with targeted outreach & engagement. The Point ("El Punto")/Palmer Cove is a vibrant, diverse state-designated environmental justice community with unique assets that provide a strong foundation upon which to build resilience to climate change. However, climate change is posing a threat to these assets that can worsen or set back progress on ongoing struggles to improve equity and quality of life. This project is an opportunity to catalyze interest, bring the community together, and develop a technically-sound and community-based plan to build on existing neighborhood strengths, address persistent problems, and protect the most vulnerable and their support systems for the future. Unique to this project in assessing the flood risk to the community is the combined modeling assessment of coastal and precipitation effects on the stormwater system.

Key Services:

- Multi-lingual community outreach, education, and engagement plan
- Dynamic modeling of combined coastal and precipitation effects with stormwater piped infrastructure
- Alternatives analysis and phased implementation approach
- Policy reviews and recommendations

Coastal Resilience Decision Support System for Delaware Bay

National Fish and Wildlife Foundation (NFWF)
Delaware Bay, DE

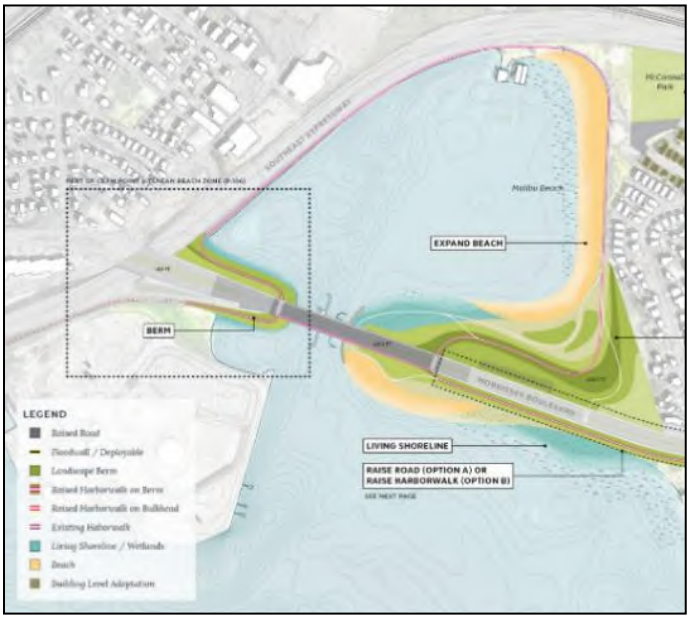
Woods Hole Group is leading a team collaborating with the National Fish and Wildlife Foundation to develop a spatially-explicit decision support system (DSS) to help prioritize coastal resilience investments in natural and nature-based features based on expected hazard mitigation and socio-economic benefits, starting with a regional pilot study for Delaware Bay. The DSS is designed to enable NFWF staff to quickly assess and estimate the impacts of proposed or hypothetical projects on coastal hazards such as flooding extent and depth, erosion, and wave energy. The DSS is a user-friendly, web-based application designed to support specific use cases, including project screening, project prioritization, and, in a future phase, portfolio planning and goal setting. A baseline of the physical characteristics of the Delaware Bay region (GIS Layers) was developed and incorporated into the tool as the foundation for all other functions, including topography, wave energy, water levels, currents, winds, sediments, shoreline type, and riverine discharge. The physical characteristics/hazard layers were then integrated with socio-economic data to formulate the basis for the DSS operations and functions.

Key Services:

- Coastal hazard assessment integrated with socio-economic factors
- Web-based project prioritization and decision support tool
- Living shorelines, offshore reefs, beach nourishment/dune restoration, aquatic connectivity, river, and wetland restoration
- Cost benefit analysis for Natural and nature-based features

Climate Ready Dorchester

City of Boston
Dorchester, MA



Woods Hole Group, working with SCAPE landscape architecture, developed a climate resilience plan for Dorchester, Massachusetts (a community within the City of Boston). The vision was to create a resilient, accessible, and connected shoreline in Dorchester that allowed connections to the waterfront while providing protection against current and future flood risks. The project developed near and long-term risk reduction strategies for coastal flooding and sea level rise specific to Dorchester's diverse shoreline and population. This included stratigies that equitably reduced coastal risk enhanced access and mobility, promoted the health of valuable ecosystems, and defined the character of the Dorchester waterfront. The project included a series of open houses, neighborhood meetings, and online surveys to ensure the proposed adapations were grounded in community priorities.

Key Services:

- Coastal modeling of adaptation measures
- Flood pathway analysis
- Development of design flood elevations (DFEs)
- Nature-based solutions for climate resiliency
- Public and stakeholder outreach

Master Plan for Moakley Park

City of Boston
Boston, MA

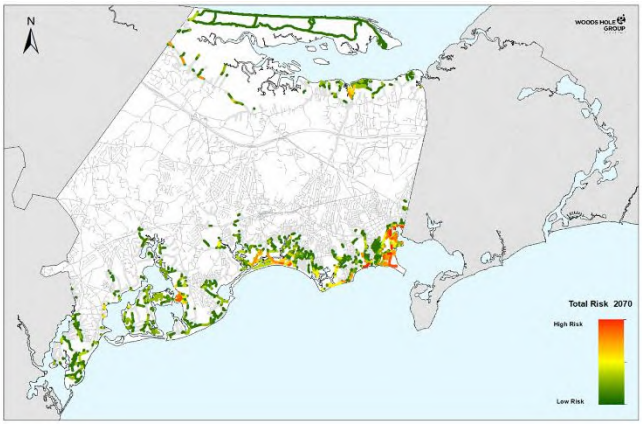
Working with a multi-disiplinary team, Woods Hole Group provided climate change assessment, coastal engineering and design, and flood risk modeling services in the overall development of the Master Plan for Moakley Park. While Moakley Park itself is at potential flood risk in the future, it also represented a major flood pathway for the City of Boston, as flood water entering through Moakley Park extended to the north and south flooding major portions of the City. Therefore, the Master Plan for Moakley Park focused not only on improving the public amenities and recreational value of Moakley Park, but also building resilience for the Park and inland areas. Woods Hole Group provide sea level rise, storm risk assessment, and coastal expertise throughout the development of the vision plan and master plan process.

Key Services:

- Modeling and assessment of proposed designs and concept performance
- Offshore wave attenuation and beach/dune restoration design
- Development of Design Flood Elevations (DFEs)
- Future marsh migration planning

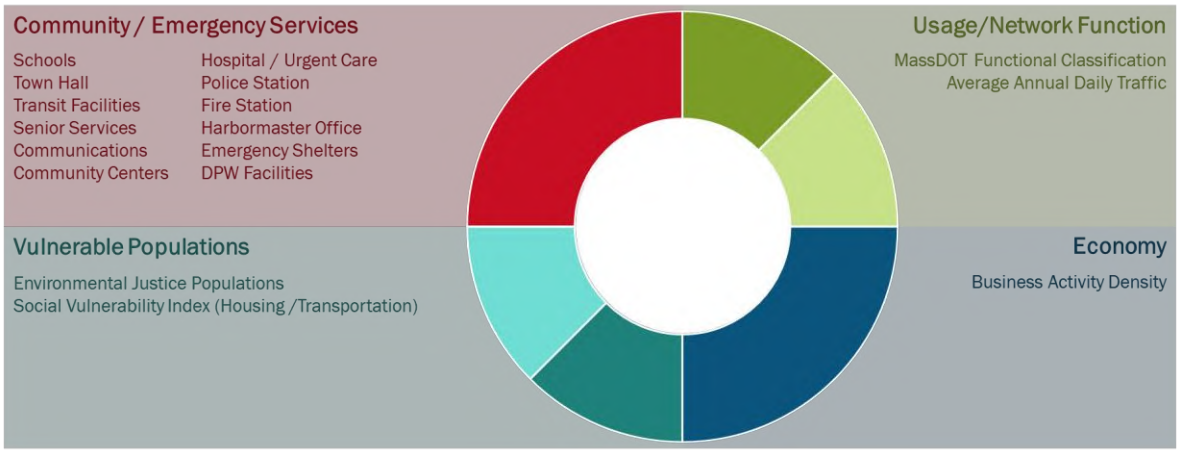
Cape Cod Low Lying Roads Project

Cape Cod Commission
Barnstable County, MA



Woods Hole Group is supporting the Cape Cod Commission in collaboration with ten (10) municipalities in Barnstable County to identify road network vulnerabilities to climate change and future flood risk, and to identify adaptaion alternatives. The U.S. Economic Development Administration is helping fund the program given importance to the regional economy and sustainability. The work includes a vulnerability assessment of roadway segments, bridges, and culverts to understand flood risk from the combination of sea level rise and storm surge, including future conditions. It is a 2-year project, and includes extensive community workshops and outreach. A detailed

webpage (https://www.capecodcommission.org/our-work/low-lying-roads-project/) with interactive materials for each Town provides ready access to the program overview, specific technical supporting materials, a map viewer, and identificatino of top road segments at risk. For each participating Town, the top two road segments at risk will be prioritized for action, and adaptive design solutions will be developed, specifically including three (3) concepts per prioritized roadway.

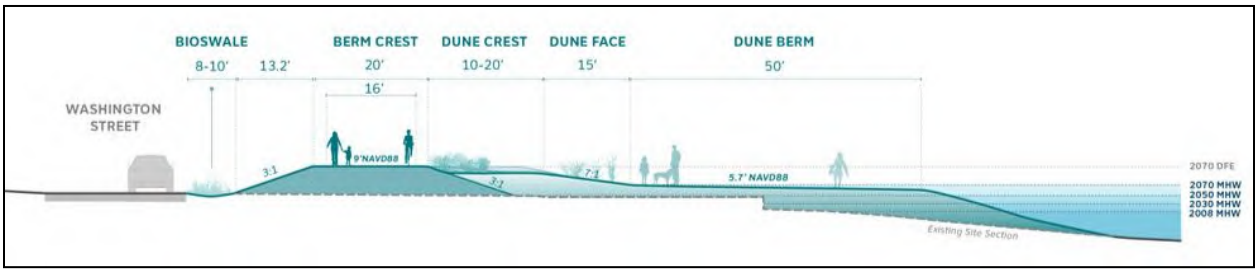


Coastal Resilience Planning for Island of Nantucket

Nantucket Island Land Bank

Nantucket, MA

Woods Hole Group, working with SCAPE landscape architecture, conducted a coastal resiliency evaluation and developed a suite of recommendations for Washington Street, one of the main transporation corridors on Nantucket, MA, to support the development of long-range planning for the properties owned by the Nantucket Land Bank (NLB). The present-day and future flood risk for this area were evalutated to identify any proactive coastal resiliency adaptation actions (e.g., green infrastructure projects) that could potentially reduce the flood risk to these properties, as well as to the surrounding buildings and homes, while also providing community co-benefits.



The study identified and considered a varied set of strategies that NLB may consider for future coastal resiliency including Transform (maintenance and use of existing features), Living with Water, and Habitat Creation (restoration and enhancement of natural systems) focused themes. A comprehensive list of recommended actions was developed to address NLB's goals today based

on presently available climate change projections and the feasibility and effectiveness of identified actions.

Coastal Resilience Planning for Surf Drive

Town of Falmouth
Falmouth, MA

Woods Hole Group conducted a detailed town-wide climate change flood vulnerability assessment in 2020 which identified the Surf Drive area as one of the most vulnerable areas in town. Surf Drive is a well-traveled coastal roadway & bike path providing access to town beaches which also has a sewer main line & pump station running under/adjacent to the roadway. Surf Drive already experiences significant stressors (e.g., regular inundation, erosion, overtopping, storm damage, etc.) under today's climate conditions. Climate change and sea-level rise will increase the frequency and severity of these stressors, resulting in increased vulnerability in the future. Woods Hole Group developed a plan to increase the coastal resiliency of the Surf Drive area incorporating phased management by identifying key time frames and sea level thresholds for action. The four themes used to develop potential actions to address the study area vulnerabilities included emphasis on 1) ecosystem health and resilience, 2) protection and maintenance of infrastructure, 3) maintenance of access, transportation, and utility corridors, and 4) managed retreat of costly, at-risk infrastructure.

Key Services:

- Long-term climate change and coastal resiliency planning
- Detailed asset-based flood vulnerability assessment
- Resiliency action alternatives development and analysis
- Development of flexible adaptation pathways and phased implementation
- Public outreach workshops and presentations

Climate Change Vulnerability / Risk Assessment and Adaptation Study

Town of Duxbury
Duxbury, MA

Woods Hole Group conducted a detailed vulnerability assessment for municipal infrastructure and natural resources for the Town of Duxbury, and private infrastructure in an important waterfront business district (Snug Harbor). The sea level rise and storm surge vulnerability


Municipal and private assets in Snug Harbor.

assessment was funded by a Massachusetts Municipal Vulnerability Preparedness (MVP) Program Action Grant. The study prioritized high risk assets and provided recommendations for physical adaptations and regulatory changes. Additionally, Woods Hole Group used the Sea Level Affecting Marshes Model (SLAMM) to identify potential flooding impacts to natural resources and highlight opportunities to facilitate marsh migration. Wherever practicable, Woods Hole Group identified regional solutions using nature-based or hybrid solutions.

Woods Hole Group worked closely with the Town's Steering Committee and Snug Harbor stakeholders to understand the importance of each asset to the Town's ability to provide municipal services and the operations of each Snug Harbor business or non-profit. Woods Hole Group developed a customized asset rating system that enabled Snug Harbor organizations to assess the economic, operational, and business planning impacts of asset flooding. Woods Hole Group also collaborated with the Metropolitan Area Planning Council on Snug Harbor resilience planning and public outreach.

Key Services:

- Climate change planning, sea level rise and storm surge vulnerability
- Customized infrastructure asset rating system
- Adaptation and resilience recommendations
- Municipal infrastructure & natural resources assessment
- Waterfront business district private infrastructure assessment

Climate Change Vulnerability / Risk Assessment and Adaptation Planning

Woods Hole Oceanographic Institution
Woods Hole, MA

Woods Hole, Massachusetts is home to world renowned scientific organizations, a vibrant business and residential community, and serves as a vital link to Martha's Vineyard. With a mission-focused need to be proximate to the water's edge, the Woods Hole campuses of the Woods Hole Oceanographic Institution (WHOI), the Marine Biological Laboratory (MBL), and the National Oceanic and Atmospheric Administration's Northeast Fisheries Science Center (NOAA) initiated the development of a long-range framework to prepare for sea level rise and increasing extreme weather events. A cooperative effort is underway to assess these threats and jointly develop solutions which frame a range of responses for the broader Woods Hole community.

Working with a Steering Committee comprised of this multitude of stakeholders, Woods Hole Group prepared the Woods Hole Climate Change Vulnerability Assessment and Adaptation Plan. The climate change vulnerability assessment considered both periodic and episodic impacts of sea level rise and coastal storms. Periodic impacts include nuisance flooding of developed areas and infrastructure due to the shifting tidal range, coastal wetlands migration/loss in undeveloped areas due to the shifting tidal range, and potential erosion of natural shorelines due to repetitive storm damage. Episodic impacts include risk of flooding to developed areas and infrastructure during more frequent and more intense coastal storms with greater potential for impact due to sea level rise.

The asset-specific vulnerability assessment process implemented a risk-based approach/framework and included 36 WHOI assets, 54 MBL assets and 28 NOAA assets (including buildings, parking lots, docks, docks, cranes, generators, fuel tanks and other equipment) and their critical thresholds for flooding impacts. Assets were then internally scored with a customized asset rating scheme to capture the organizational, financial and temporal impacts of flood loss as well as the relative importance of each institutional asset to achieving the mission objectives of each organization – Research & Applied Science, Operations & Economic Activity, and Education & Outreach.

Woods Hole Group prepared adaptation and resilience plans at the asset-level, district-level, and community level to facilitate planning for future conditions in Woods Hole. These adaptations spanned strategies to protect, migrate, and “design with nature”.

https://resilientwoodshole.org/

Key Services:

- Regional and asset-level flood mitigation design
- Institutional, private, and municipal infrastructure assessment
- Phased adaptation planning
- Design Flood Elevations (DFEs)
- Public and stakeholder engagement

Assessing the Vulnerability of MassDOT's Coastal Transportation Systems to Future Sea Level Rise and Coastal Storms, and Developing Adaptation Strategies

Massachusetts Department of Transportation
Commonwealth of Massachusetts

Woods Hole Group worked under contract to MassDOT to conduct a vulnerability assessment for all coastal transportation systems (roads, rail, airport, bridges, etc.) in the Commonwealth of Massachusetts. In order to determine the vulnerability of the systems, a highly resolved (less than 5 meters), numerical hydrodynamic model was developed to assess the combined impact of sea level rise, storm events (tropical and extra-tropical), winds, tides, river discharge, and waves. Tropical and extra tropical events were simulated using an ensemble Monte Carlo approach to develop probabilistic flooding distributions. Results from the model were used to assess risk for assets throughout the transportation systems of the Commonwealth and to determine appropriate regional and site-specific adaptation designs to build resilience for the transportation networks. Additionally, the results are being used by numerous other stakeholders (e.g., health care, universities, water commissions) and communities to assess risk and develop resilient solutions.

Key Services:

- Climate Change Assessment and Projections
- Development of Storm Climatology for 20th and 21st Centuries
- Coupled Wave and Hydrodynamic Modeling
- Combined Sea Level Rise and Storm Surge Risk to critical infrastructure and assets
- Cost Estimations for Engineering Alternatives
- Recommended, Phased Engineering Adaptations for Sea Level Rise

Climate Change Vulnerability / Risk Assessment and Adaptation Study

Town of Sandwich
Sandwich, MA


Potential flooding from 1% chance even in 2030 (and 2070).

Woods Hole Group conducted a detailed vulnerability assessment for municipal infrastructure and natural resources for the Town of Sandwich. The vulnerability assessment was funded by a Municipal Vulnerability Preparedness (MVP) Program Action Grant and focused on two top hazards identified in Sandwich's Community Resilience Building Workshop – sea level rise and storm surge. The study prioritized high risk assets and provided recommendations for physical adaptations and regulatory changes. Collaboration with the Town's Steering Committee was essential to understand the importance of each asset to the Town's ability to provide municipal services. Additionally, education and outreach were emphasized throughout the project, and laid the foundation for a follow-on MVP Action Grant to develop an ArcGIS StoryMap highlighting the Town's coastal resilience program and demonstrating the benefits of healthy and robust green infrastructure.

https://storymaps.arcgis.com/stories/0cc1b190abbc40058219d66b2f355eaa

Key Services:

- Town-wide vulnerability assessment
- Public & stakeholder engagement
- Recommended changes to bylaws and regulations
- Site-specific and regional adaptations

This section highlights some of GHD's relevant experience. More detailed project descriptions for GHD are provided in Attachment B.

MSC Cruises Terminal Expansion at Port Miami

Arquitectonica
Miami, FL

GHD was retained by Arquitectonica on behalf of MSC Cruises to provide a coastal and mooring basis of analysis report. The report included the development of site environmental conditions, underkeel clearance and scour potential during vessel arrival/departure, a dynamic mooring and berthing analysis that included a passing vessel study, a top of wall elevation assessment, and the recommendation of a minimum finished floor elevation for the terminal building based on storm surge, wave overtopping, and sea level rise projections. (full description in Attachment B)

City of Carlsbad Climate Adaptation Project

City of Carlsbad
Carlsbad, CA

Recent sea level rise planning work in the City identified a segment of Carlsbad Boulevard as being extremely vulnerable to existing and projected future coastal hazards (erosion and flooding). Several recent events exemplified this vulnerability and led to the closure of the roadway for several months during the winter of 2015/16. Construction of emergency repairs in the form of rock shoreline protection occurred immediately to stabilize the roadway base from undermining. These repairs were approved contingent of the development of a long-term resiliency plan for this roadway. The City is now undertaking a study to develop this plan – that both seeks to design a resilient roadway but also activates this valuable and underutilized coastal space with public amenities that can be adaptable over time. (full description in Attachment B)

General Environmental Engineering Services Continuing Contract

City of Ft. Lauderdale
Ft. Lauderdale, FL

GHD is currently supporting the City of Fort Lauderdale's Public Works, Environmental Compliance Department under an existing similar contract for general environmental engineering consulting services. Most of the projects are performed on an as-needed basis. Under the existing contract, GHD has completed several Phase I and II Environmental Assessments (ESAs), including ESA's at the following properties:

- Fort Lauderdale One Stop Shop,
- Sunnyland Homes Parcel A & B,
- 4201 N Ocean Blvd, and
- 1300-1350 W. Broward Blvd (Police Department HQs)

(full description in Attachment B)

Beach Boulevard Infrastructure Resiliency Project

City of Pacifica
Pacifica, CA

The 2,600 ft long Beach Boulevard seawall is located on the rugged Pacific Coast, approximately 10 miles south of San Francisco, in an area renowned for coastal erosion, with the City having already suffered significant property loss to the North of Beach Boulevard.

The purpose of the Beach Boulevard Seawall Replacement Project is to ensure public health and safety in the vicinity of Beach Boulevard, including the West Sharp Park downtown neighborhood, home to a thriving community of the City of Pacifica.

The seawall has continued to fail along the northern portion almost since construction completion in the mid-eighties. Waves crash over the seawall onto the road several times a year creating hazardous conditions for the general public and causing road closures along the northern portion of Beach Boulevard. This project aims to assess the risks, controlling factors and

reconstruction options for the seawall and promenade, considering environmental factors, stakeholder and community engagement, coastal, geotechnical, and economic impacts. (full description in Attachment B)

Humboldt County Resource Conservation district Salt River Ecosystem Restoration Project

Humboldt County Resource Conservation District
Eel River Estuary, CA

Since 2009, GHD has served as the prime environmental, engineering and construction management firm for the $34M Salt River Ecosystem Restoration Project for the Humboldt County Resource Conservation District. The project includes restoring fish passages to more than 15 miles of historic salmonid spawning tributaries and 300 acres of tidal wetlands to support a broad list of special status and native species. GHD has led this multi-phase ecosystem restoration encompassing 7.7 miles of stream restoration, 700,000 cy of cut/fill, and multiple in-stream habitat structures. The ultimate goals of the project are to: restore the Salt River channel and adjacent riparian floodplain by adding channel habitat complexity, increasing hydraulic conveyance, and constructing habitat features that re-establish ecological processes; and restore tidal connectivity to historic tidal wetlands to allow for the natural evolution of diverse and self-sustaining salt- and brackish-water tidal marshes, intertidal mudflat, and shallow water habitats. (full description in Attachment B)

City of Imperial Beach Bayshore Bikeway Resiliency Project

City of Imperial Beach
Imperial Beach, CA

The Bayshore Bikeway is a heavily used recreational corridor that fronts one of the lowest and most vulnerable segments of Imperial Beach to coastal flooding. Sea-level rise (SLR) will drastically increase the risk of flooding with 3.3 ft of SLR not only flooding the bikeway but also large portions of State Road 75 and the disadvantaged and severely disadvantaged communities of Imperial Beach. (full description in Attachment B)

Torrey Pines State Beach North Lot Redesign or Retreat Feasibility Study

Los Penasquitos Lagoon Foundation, California State Parks, and California State Coastal Conservancy
Cardiff by the Sea, CA

GHD in close partnership with the Los Penasquitos Lagoon Foundation, California State Parks and the State Coastal Conservancy is developing engineering concepts of a redesigned or retreated lot that achieves multiple benefits and is in line with project goals and objectives. GHD will prepare architectural sketches and renderings of the concepts to be presented and refined through a number of stakeholder and community engagement workshops. The alternatives will then be compared against various stakeholder and project team derived criteria to aide in the selection of a preferred concept. Data gathered and the selection process will be documented in

a feasibility study report. The preferred concept will then be developed to the 30% engineering design level. (full description in Attachment B)

Qatar Flood Study

Qatar Ministry of Municipalities and Environment
Qatar

GHD was engaged by the Qatar Ministry of Municipalities and Environment (MME) to undertake comprehensive flood study of the entire country of Qatar. (full description in Attachment B)

Vallejo Flood and Wastewater District (VFWD) Asset Management Program

VFWD
Vallejo, CA

GHD assisted the VFWD in developing and implementing an asset management program for the District's wastewater and stormwater assets. The District provides wastewater and stormwater services to 123,000 residents in the City of Vallejo and parts of Solano County. The District embarked on a multi-year, phased Asset Management Implementation Program to develop and implement leading AM principles and practices focused on improving the District's overall efficiencies and effectiveness in delivering stormwater and wastewater services to its customers. The first phase of the program focused on developing an asset management framework that defined how the District will do condition assessment, risk assessment and long-term financial planning (valuation). This involved the assessment of AM practices the District was already doing (i.e., gap analysis), development of the overall AM strategy, supporting improvement initiatives and a roadmap for implementation. Based on the implementation roadmap and the results from the pilot asset management plan (AMP), the District has decided to implement the AM framework across all classes of assets the District manages, including the development of a stormwater asset management plan. The District is also planning to initiate and complete the development of a Maintenance Master Plan (MMP), which will generate the input data and information for the District's new CMMS. (full description in Attachment B)

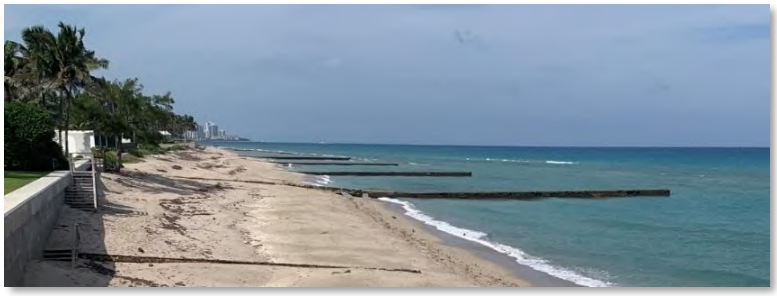
This section highlights a subsample of Coastal Protection Engineering's Related Experience

2020 Mid-Town Beach Nourishment Project, Town of Palm Beach, FL

Client Contact Information
Town of Palm Beach
Rob Weber, Coastal Program Mgr
Phone: 561-838-5440
RWeber@TownofPalmBeach.com

CPE staff have worked on the Town's coastal program for over a decade, including years of previous employment. Recently, CPE assisted the Town as a subconsultant with the construction of the 2020 Mid-Town project for the initial installment of the federal project under a 50-year partnership. The project placed ~700,000 cy of sand utilizing three hopper dredges and specialized screening equipment. CPE provided coastal engineering analyses, construction observations, project management oversight, permitting support, and environmental services. Under a new contract awarded to CPE by the Town in 2020, we also completed the post-construction engineering report and permit compliance for the project.

Town of Palm Beach Groin Rehabilitation Execution Plan, Town of Palm Beach, FL



Client Contact Information
Town of Palm Beach
Rob Weber, Coastal Program Mgr
Phone: 561-838-5440
RWeber@TownofPalmBeach.com

The Town's coastline has a total of 124 groins of multiple construction types that are in various states of functionality. The purpose of this execution plan is to update the groin inventory and set priorities for addressing those needing repair, rehabilitation or removal based on recent changes to beach and groin conditions. The evaluation provided an assessment of groin performance and the value of maintaining, modifying, or improving groins in Reaches 2-6 as they relate to the Town's Comprehensive Coastal Management Plan. The recommendations of the plan to maintain the Town's coastal structures were based on maintaining stabilization of the beach and avoiding nearshore hardbottom impacts, while providing storm protection consistent

with the Town's comprehensive plan. Concrete king pile and panel groin were recommended as the primary replacement type for continuity and to balance construction costs, permeability, and durability over the next 30 years. In addition, the modular nature of the king pile and panel groin allows the structure to be adjusted and customized to resemble the size and dimensions of the groins to be replaced. This has been viewed favorably by the regulatory agencies and facilitated the comprehensive permitting approach. The plan may be modified based on site condition changes, regulatory feedback, and other priorities during the course of implementation.

2021 Coquina Beach Storm Damage Restoration Project, Manatee County, FL

Coquina Beach Storm Damage Restoration Project, March 2021 (Photo credit: Cottrell Contracting, Inc.).

Client Contact Information
Manatee County
Charlie Hunsicker, Director
Phone: 941-742-5923, Ext. 6001
charlie.hunsicker@mymanatee.org

CPE staff have been providing coastal engineering services to Manatee County for nearly 20 years in support of their complex coastal management program, including years of previous employment. We have assisted the County with feasibility studies, engineering design, inlet management, numerical modeling, permitting, construction services, mitigation planning, biological and physical monitoring, and funding assistance. CPE was awarded a prime contract with the County in 2020 for services required for construction of their 2021 Coquina Beach storm repair project, designed to replace sand lost due to the impacts of Hurricanes Hermine and Irma with funding support from FEMA. The project placed ~ 98,300 cy of sand from maintenance dredging of Longboat Pass. Thomas Pierro served as Engineer of Record and CPE staff performed construction observations, collected sediment samples, prepared the post-construction engineering report, and is currently managing the post-construction monitoring phase.

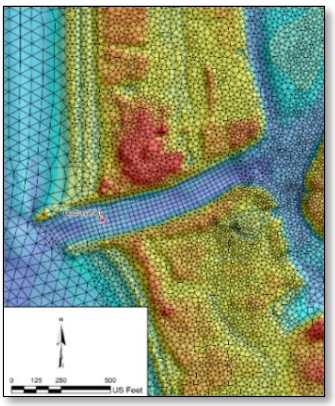
2021-2022 Collier County Beach Renourishments, Collier County, FL

2021 Truck Haul Beach Nourishment Project (Photo credit: T. Brenner).

Client Contact Information
Collier County
Andy Miller, PE, Principal Project Mgr
Phone: 239-252-2922
Andrew.Miller@colliercountyfl.gov

Since 2001 (including previous employment), CPE staff have assisted Collier County in design and implementation of a comprehensive countywide coastal program, including beach nourishment and inlet management. In 2021, CPE was awarded a prime contract with the County to provide design, engineering, permitting, and construction services for their 2021 projects, including placement of approx. 155,000 cy of sand along Naples, Vanderbilt, and Pelican Bay beaches using truck haul methods. As the Engineer of Record, Tara Brenner certified the project after its completion in January 2022.

Coastal Storm Risk Management (CSRM) Study – Hydrodynamic Modeling and Water Quality Evaluation, Collier County, FL



Client Contact Information
Florida International University
Carolyn J. Robertson, MS, CRA, Associate Director, Planning & Administration
Phone: 305-348-6057
crober@fiu.edu

Collier County and the Norfolk District of the U.S. Army Corps of Engineers (USACE) conducted a CSRM Feasibility Study to evaluate engineering alternatives to improve resiliency of Collier County by reducing flooding caused by storm surge. Proposed engineering alternatives include storm surge gates on major inlets, flood walls, beach and dune nourishment, and mangrove restoration. In response to concerns expressed by regulatory and resource agencies about potential impacts of the proposed storm surge gates on estuarine environments and nearshore water quality, Florida International University (FIU) and CPE were contracted by the USACE to conduct a numerical modeling study to evaluate the impact of the proposed flood control systems.

Client Contact Information

Lake Mattamuskeet Watershed Management - Hydrologic and Hydraulic Modeling Study, Hyde County, NC

Client Contact Information
NC Coastal Federation
Erin Fleckenstein, Coastal Scientist and Regional Manager
252-473-1607 ext 304
erinf@nccoast.org

CPE conducted a numerical modeling study to evaluate potential SLR adaptation strategies to reduce flooding in a coastal lake watershed that is plagued by frequent flooding. Lake Mattamuskeet is in the Mattamuskeet National Wildlife Refuge on the Albemarle-Pamlico Peninsula in Hyde County, and at 40,000-acres, it is North Carolina's largest natural lake. Currently, the Lake Mattamuskeet community faces frequent flooding issues and declining water quality, which is threatening the ecology of the lake system. The lake connects to the estuarine sound by four outlet canals, but the lack of water level gradient between the lake and the estuary is prohibiting effective drainage, which will worsen with SLR. CPE conducted a numerical modeling study utilizing Delft3D FM to evaluate engineering alternatives to actively manage the

lake water level and reduce flooding in the lake watershed. Engineering alternatives evaluated in this study consisted of deepening and widening existing outlet canals, dredging additional gravity flow canals, pump stations, and modifications to existing gravity gates. Out of the engineering alternatives evaluated, the gravity canals and pump stations proved to be the most efficient in managing lake water levels and reducing flooding on this coastal lake watershed.

SCAPE's design and landscape architectural experience qualifies as works of art. In our experience working together with SCAPE, engineering concepts for flood protection and coastal resilience evolve to community enhancement works considering aspects of practical flood protection, accommodating future conditions, and while enhancing community and recreational benefits, along with ecological resources, all while being cost effective and potentially providing an economic boost where desired. To encapsule their work takes away from the brilliance of their design features and visual representation thereof. This section highlights one particularly relevant project where Woods Hole Group and SCAPE collaborated for Climate Reach Boston; however, we strongly encourage the proposal review committee to review the selection of SCAPE experience in Attachment B where their work is best characterized in their creative fashion. It is this level of professionalism and creativity that the Town of Palm Beach will have access to if our team is selected with SCAPE as Woods Hole Group's exclusive partner. Attachment X has additional information on Climate Ready Boston, as well as a Living Breakwater Project in Staten Island, NY, a resiliency enhancement to China Basin Park in San Francisco, CA, and a Recreation and Recreation Plan for McCoy's Creek in Jacksonville, FL.

Climate Ready Dorchester, Boston, MA
City of Boston Mayor's Office
Peyton Siler Jones, Climate Resilience Program Coordinator
(828) 273-9979
Peyton.jones@boston.gov

SCAPE worked with the City of Boston and collaborated with different firms including Woods Hole Group to develop solutions to equitably reduce coastal flood risk in Dorchester, the largest and most diverse neighborhood in Boston. The Dorchester shoreline stretches 9.5 miles along Boston Harbor and the Neponset River. Climate Ready Dorchester expands the vision for the future of the Dorchester shoreline, offering strategies to adapt to coastal flood risk while also establishing a framework to connect the waterfront parks, beaches, and marshes in the neighborhood, transforming them into one accessible, continuous waterfront – The Dorchester Shoreway. The Shoreway consists of strategic flood protection interventions at critical flood pathways to protect from coastal flooding while increasing neighborhood access. They prioritize natural and nature-based features to reduce wave action and erosion while preserving or enhancing valuable ecosystems. To inform the decision-making process behind various resilience strategies, the SCAPE team held a series of community and stakeholder engagement sessions including two open houses and attendance to numerous existing neighborhood meetings, all designed to educate and involve attendees using custom models, 'scenarios,' and interactive engagement tools.

Coastal Resilience Vocabulary for public engagement

This section highlights a selection of relevant SOBIS project experience.

Client – Hawaii Department of Land and Natural Resources (DNLR)
Project – Sea Level Rise Vulnerability Assessment and Adaptation Report
POC – Sam Lemmo, Administrator, Hawai'i DLNR, sam.j.lemmo@hawaii.gov, 808-341-8967

As a subcontractor to Tetra Tech, Sobis supported the development of the Sea Level Rise Vulnerability Assessment and Adaptation Report completed in 2018. The Hawaii Climate Adaptation Initiative Act (Act 83) was signed into law in June 2014. Act 83 established an Interagency Climate Adaptation Committee (ICAC) to address the effects of climate change to protect the State's economy, health, environment, and way of life. The first task of the ICAC was to develop a statewide Sea Level Rise Vulnerability Assessment and Adaptation Report (SLR Report). Sobis supported Tetra Tech by leading the impact assessment which included:

- Modeling future flood conditions
- Integrating coastal erosion estimates developed by the University of Hawaii into the flood conditions
- Integrating sea-level rise scenarios into future 1% annual chance flood conditions
- Integrating sea-level rise scenarios into future nuisance flooding conditions
- Using Hazus to estimate the impacts of future flooding on existing and future buildings at the building site level
- Evaluating the vulnerable populations who may be impacted by sea-level rise
- Identify adaptation strategies

Sobis also supported Tetra Tech by helping to facilitate ICAC meetings on risk assessment, and addressing questions and concerns from DNLR and local stakeholders. Other support included identifying climate adaptation strategies using the risk assessment and developing the data for a NOAA website concerning climate change impacts.

https://climateadaptation.hawaii.gov/wp-content/uploads/2018/01/SLR-Report_-January-2018.pdf

Key Tasks

- Hazard Identification/Risk Analysis
- Advanced Hazus Modeling
- Plan Development
- Document Review

Client – Inter-American Development Bank (IDB)
Project – Climate Risk Assessment and Adaptation Report, Coastal Sites in Haiti, Jamaica, and Mexico
POC – Melissa Barandiaran, Senior Environmental Sector Specialist, IDB, doriss@iadb.org

Over the last five years, Sobis has supported the IDB's Environmental Safeguards Unit to guide the Bank's development financing and to assist its borrowers to reduce risks from natural hazards and climate change impacts. These projects involve completing a risk assessment for a proposed project the IDB wants to invest and then adding mitigation actions as a restriction for the borrower. Sobis also supported the IDB with developing a process and standards which the Bank uses internally to ensure their project investments are sustainable. The projects undertaken include:

- Climate Change Data and Risk Assessment Methodologies for the Caribbean. This project involved developing a climate change risk assessment process for the IDB to evaluate new and existing projects in the Caribbean region, conducting a pilot project to test the methodology, and facilitating a workshop with IDB stakeholders to launch the approach. Sobis helped develop a Technical Note: Climate Change Data and Risk Assessment Methodologies for the Caribbean, and accompanying fact-sheet to provide guidance on conducting a climate change risk assessment for the Bank and its borrowers.
- Addressing Climate Change within Disaster Risk Management, IDB. Sobis helped conduct an extensive desk-top review of best practices in climate change and disaster risk management. Sobis supported the development of a Technical Note: Addressing Climate Change within Disaster Risk Management: A Practical Guide for IDB Project Preparation, which identified climate change risk management strategies for several sectors. Factsheets were prepared for each of the targeted sectors, including for the agriculture, energy, tourism, water and sanitation, urban infrastructure, and transportation sectors.
- Disaster and Climate Change Risk Assessment for the Caracol Industrial Park and Limonade Development Site, Haiti, Inter-American Development Bank. Sobis assisted the IDB: (1) prepare a Disaster Risk Assessment for the Park that included climate change risk; (2) prepare a Disaster Risk Management Plan and Climate Change Adaptation Plan; and (3) Assist the Bank with implementation of the Plans.

Key Tasks

- Public Outreach and Education
- Plan Integration
- Hazard Identification/Risk Analysis
- Mitigation Planning
- Plan Development
- Document Review
- Implementation Planning

Client – Central Virginia Planning District Commission
Project – CVPDC Hazard Mitigation Plan Update 2020
POC – Kelly Hitchcock, Planning and Development Director, CVPDC, kelly.hitchcock@cvpdc.org

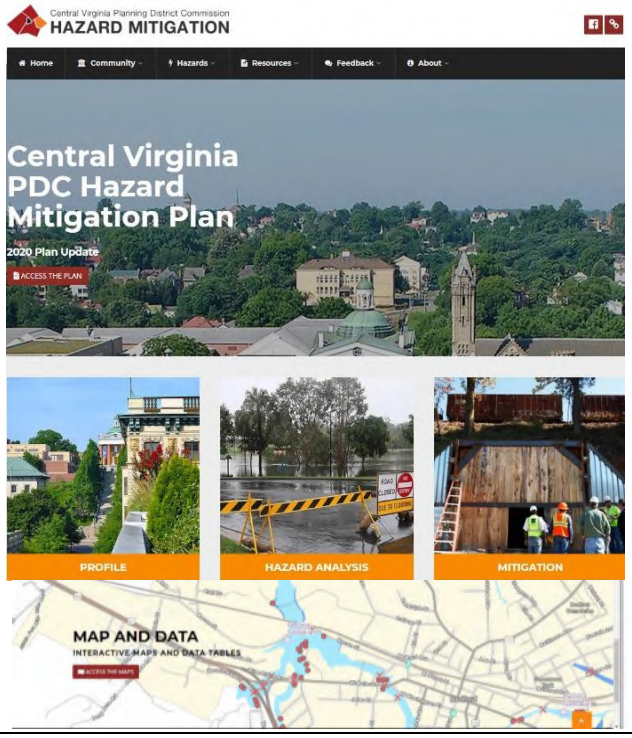
The CVPDC hired the Virginia Tech Center for Geospatial Information Technology (CGIT) to develop their Hazard Mitigation Plan in 2018. In 2019, CGIT hired Sobis to oversee the HMP risk assessment approach and conduct the Hazus implementation. In 2020, Sobis took the lead on the project and finalized the risk assessment; then conducted the capabilities assessment, mitigation strategy development, adoption and maintenance, and public meeting facilitation; and drafted the document for VDEM and FEMA Region III review. Sobis also supported the development of the CVPDC website providing content and feedback.

Sobis worked with DCR to collect high hazard dam Emergency Action Plans and inundation maps for all jurisdictions in the CVPDC, adapted a process created by the Oregon Department of Geology and Mineral Industries to assess dam failure using Hazus, and created loss estimates for the dam failure section.

Sobis provided inventory data and hazard data for the risk assessment, and reviewed all the risk assessment chapters. Sobis organized meetings with each jurisdiction to discuss their risks in detail and begin identifying mitigation actions. Regional mitigation actions for the PDC were also identified. Sobis developed a capabilities matrix for the jurisdictions to help them evaluate their planning, legal, administrative, fiscal, and technical capabilities.

The adoption and maintenance sections were written by Sobis with PDC and jurisdiction input. The CVPDC website will be used to help with maintenance and scheduling six-month HMP meetings between all the jurisdictions.

Sobis met (virtually) with all the jurisdictions to discuss their finalized mitigation actions, determine priorities, who would lead the effort and support it, and how it may be funded. Sobis also conducted the final public meeting, drafted the HMP for VDEM review, updated the HMP, and submitted it for FEMA Region III review and approval. The HMP and Hazus output are here:
https://www.cvhmp.org/



Key Tasks

- Advanced Hazus Modeling
- Public Outreach and Education
- Hazard Identification/Risk Analysis
- Meeting Facilitation
- Mitigation Planning
- Document Review
- HMP Website Development

Client – FEMA Headquarters Natural Hazards Risk Assessment Program (NHRAP)
Project – Hazus Technical Support (Under Risk MAP contract)
POC – Jesse Rozelle, NHRAP and Hazus Program Manager, FEMA Headquarters, Jesse.Rozelle@fema.dhs.gov

Sobis provides advanced technical support to FEMA for their Hazus software. Hazus provides loss estimates for earthquake, flood, tsunami, and hurricane hazards and it is currently developed under the Risk MAP Customer and Data Services (CDS) contract. Sobis was contracted to oversee the development, provide technical recommendations, test the software, review the technical guidance, and run the technical committees.

Due to the very technical nature of the software, FEMA uses Sobis technical experts to evaluate whether the programming has been conducted correctly. Our analysts are both GIS experts and technical experts understanding flood modeling, wind modeling, structural vulnerability, and database structures. We work with IBM throughout the application development process and act as a third party to assess their work on behalf of FEMA.

Sobis is involved with identifying technical committee members for FEMA for flood, hurricane, earthquake, software development, and data management. These members include experts and users from Federal, State, and local agencies; academia; and the private sector. Sobis solicits information from local users throughout the country to ensure the modernization process meets the needs of non-Federal users. Each committee meets two times a year to discuss the current software and discuss new ideas and methodologies for the software. All the training materials created to be taught to Hazus users is evaluated and quality controlled by Sobis before being deployed by FEMA.

Sobis completed these additional tasks for FEMA under this contract:

- Training Course Development. Sobis was the lead developer of the Advanced Hazus training course which focuses on advanced applications of the Hazus risk assessment software. These applications included updating building data using building footprint and local parcel data, altering previous hurricanes to create what if scenarios, creating flood depth grids for a series of flood events, developing realistic tsunami events, using satellite imagery to correct national databases, and developing surface roughness databases.
- Technical Manual Updates. Sobis supported FEMA by updating the Hurricane, Flood, and Tsunami Hazus Technical Manuals.
- Software Testing. Sobis tests the Hazus software along with the new open-source software: Flood Assessment Structure Tool (FAST) and the Hurricane Assessment Structure Tool (HAST).

Key Tasks

- Public Outreach and Education
- Hazard Identification/Risk Analysis
- Advanced Hazus Use
- Technical Document Writing
- Document Review

1.3.1.5 Understanding of the Town's Needs

Working so closely with the Town staff, elected officials, advisory boards, fellow consultants, and the public through the process of preparing the Palm Beach Flood Risk Model (PB-FRM), Coastal Flood Vulnerability Assessment, and Level-Up Palm Beach Implementation Plan has afforded Woods Hole Group deep understanding of the Town's needs and plans for coastal resilience. There are short-term needs we've been able to advance via recommended policy refinements and asset-specific upgrades in the existing capital plan (including supplemental funds from successful grant applications to Resilient FL), medium-term needs related to addressing primary flood risk pathways such as the Lake Worth Shoreline, and potential longer-term needs with neighborhood-scale solutions and managing source floodwaters through Lake Worth Inlet. We trust our experience demonstrates to the Town this understanding.

To accentuate this understanding, though, we also highlight practical experience our work has with ongoing coastal protection projects. For instance, we worked with Town staff and engineering consultants to suggest a plan for improving the bulkhead at the Town Docks project. For this, results from our flood risk modeling work were used to suggest a bulkhead elevation to mitigate increasing flood risk, as well as a plan to potentially scale the wall up in the future should the effects of climate change and sea level rise accelerate. This type of modular and scalable approach is exactly what we believe Town of Palm Beach needs when addressing coastal resiliency. We are currently collaborating with teaming partner GHD in similar fashion related to the Mid-Town seawall repair project. This type of partnership is exactly what we believe the Town needs, and why we've proposed the teaming approach we have. We believe our team can collectively meet the full range of needs the Town has for this contract.

Please refer to Section 1.3.2, specifically 1.3.2.2 below, for a deeper understanding of the actual scope of work in the RFQ. In section 1.3.2.3 below pertaining to the individual needs of the Town, we also intend to communicate our unique and unparalleled understanding of Town needs by suggesting specific next steps that can be accomplished.

1.1.1.6 Successful Use of Innovative Ideas

Woods Hole Group is committed to continuously advancing the state of the practice to ensure high quality products for our customers with more efficiency. Woods Hole Group was founded on this concept. Originally as a commercial spin-off from the famed Woods Hole Oceanographic Institution (WHOI), Aubrey Consulting (now Woods Hole Group) was created by David Aubrey as a practically-minded corporation with the purpose of fulfilling real-world client requirements leveraging some of the latest technologies and innovations arising from places like WHOI, Scripps, etc. That purpose remains a priority to this day. In fact, we have an Innovation Director (Kirk Bosma) for the company who is assigned to this project team. An example of an important innovations we've used for Palm Beach includes creation of the Palm Beach Flood Risk Model (PB-FRM) using award winning technology from US Federal Highway Authority, who termed the approach as a blueprint for national and international resiliency. We also worked with Town

consultants for the Docks project to bring a measure of resiliency to the new bulkhead that also will be scalable in the future depending on sea level rise and flood risk.

Woods Hole Group regularly seeks ways to use innovative technologies to connect with communities to effectively share information with the public and to solicit meaningful participation and public comments. One technology that has become effective for public engagement is the use of ESRI ARCGIS StoryMaps. StoryMaps developed for the Town of Sandwich public communication and outreach and for Nantucket Land Bank were extremely effective. Using this technology allowed us to communicate varied adaptation themes to the public, ranging from transformation of existing uses and facilities, accommodating a new landscape living with water, and creation of natural habitats to help protect and provide a buffer for the effects of coastal hazards in future sea levels. It was also complex, involving primary transportation corridors, recreational use, commercial buildings, and working waterfront industries. Below is a link to an example StoryMap for coastal resiliency, which also included collaborating with the USACE related to the effects of a major coastal inlet on adjacent shorelines:

https://storymaps.arcgis.com/stories/0cc1b190abbc40058219d66b2f355eaa

Some innovative ideas we envision should we be selected for the Coastal Resiliency contract include:

- Working with Terraquatics to perform a high-resolution swath survey of the Lake Worth shoreline as basis for a 3-D model.
- Incorporation of new, low-cost water level monitoring equipment
- Applying latest storm water and drainage analysis modules

Our project partners prioritize innovation as well. For the Mid-Town Seawall Replacement Project, there were numerous special consideration areas that GHD needed to take into account and innovate on design solutions. The iconic Worth Avenue Clock Tower, the Lifeguard bunker and public restrooms, the existing ocean outfall, and the provision of two openings in the seawall cap to allow for both emergency and construction vehicle and equipment access have all required additional design diligence to develop the appropriate replacement seawall section. Additionally, there were unique regulatory considerations. In close coordination with the Town and the Florida Department of Environmental Protection, GHD (with considerable assistance and external review provided by WHG) prepared and transmitted a variance petition to the state, to consider the resiliency elements of the replacement seawall. Since the existing seawall was constructed in 1929, simply designing a new wall now to the 'original level of protection' would be both fiscally and professionally irresponsible. The increased water surface elevation, increased storminess frequency and intensity, and future sea level projection warranted consideration for the project.

CPE designed and permitted modular pre-cast king pile and panel groins as a novel approach to rehabilitate aging coastal structures in the Town of Palm Beach to maintain effectiveness and

improve consistency, aesthetics, and safety in a Town-wide phased approach. They also utilize UAS (drone) technology combined with remote sensing image classification to assess project success for tidal wetland mitigation (e.g., project in the tidewater region of Virginia), and used a 3D laser scan and UAS (drone) photogrammetry to assess the condition of a jetty in Martin County, which provided a baseline for expedited post-storm impact analyses to the structure.

Likewise, our partners as Sobis focus on time-saving scripts. Sobis has created several scripting programs to reduce the time required to process the data for a risk assessment and benefit cost analysis. Detailed data is available for nearly every community in this country, but funding is often inadequate to perform detailed climate risk assessments. They have scripts to extract building characteristics from a community's parcel and footprint datasets, and scripts to create a flood depth grid using the latest National Flood Hazard Layer (NFHL) from FEMA. They also have internal tools to derive probabilities from downscaled climate data.

SCAPE is also constantly innovating, "unpacking the black box" of climate projections and hazard analyses and being transparent about the uncertainties inherent in climate projections and models. To assess the performance and efficacy of living green infrastructures, along with hardened infrastructure, there is a need to promote efforts to monitor and better understand the performance of such strategies. Our team is committed to ongoing research efforts that inform our design and planning practice and have integrated long term resilience and sustainable development planning into the services provided. Building on this, Woods Hole Group (Kirk Bosma specifically) is working with Stone Living Lab to field trial novel resiliency solutions that can be scaled-up to communities like Palm Beach. We will bring this experience and new technology to Palm Beach if selected.

1.3.1.7 Ability to electronically accumulate load ticket data and produce reports

Per Addendum #2 issued by the Town, no response is required.

The Next Generation of Science-Based Solutions

WOODS HOLE GROUP
A CLS COMPANY

Woods Hole Group solves environmental engineering problems worldwide with a focus on serving clients along the coast, in the ocean, and in wetland and terrestrial environments. Relying on service, excellence and leadership, Woods Hole Group employs experienced engineers, scientists, and technicians.

Initially formed in 1986, Woods Hole Group joined CLS in 2017; effective January 1, 2018 Woods Hole Group merged with two other CLS Group companies formerly known as CLS America and Horizon Marine. Together, the new Woods Hole Group has nearly 100 employees with corporate headquarters in Massachusetts and client-centered regional offices in Delaware, Maryland, and Texas. As part of the global CLS Group network, Woods Hole Group offers a broad range of services and expertise to benefit our clients and teaming partners.

Woods Hole Group brings over 30 years of experience, committed to exceeding client objectives while safeguarding the environmental health of our planet. We believe environmental leadership is defined by creativity and vision. Human and economic development are not separated, and can be achieved in harmony with a sustainable planet. We are solving today's problems with a view to future needs and impacts at local, regional, national and international levels. The global environment affects us all; how we leave it will be our most important legacy.

ENVIRONMENT & CLIMATE: CONSULTING & SATELLITE TELEMETRY

- Applied Ecology
- Climate & Sustainability
- Coastal Engineering & Modeling
- Coastal Sciences & Planning
- Coastal Measurement & Sediments
- Satellite (Argos & Iridium) Tracking for Wildlife & Oceanography

ENERGIES & INFRASTRUCTURES

- Metocean Consultancy Services
- Metocean Measurement Services
- Operational Metocean Forecasting Services: EddyWatch®, MoDUWatch℠, SurveyWatch℠, RouteWatch® & FAST Eddy℠
- Emergency Response Services
- Metocean Monitoring Systems

SUSTAINABLE FISHERIES MANAGEMENT

- Vessel Monitoring Systems
- Ocean Intelligence Solutions
- Catch and Data Management
- Federal, State, and Regional Fisheries

Consulting Services and Products Are Offered Through Our Three Business Units

CORPORATE HEADQUARTERS
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WOODS HOLE GROUP
FOR EARTH, FROM SPACE
A CLS COMPANY

ENVIRONMENT & CLIMATE

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COLLABORATE. INNOVATE. FORMULATE.

ENVIRONMENT & CLIMATE

From the open ocean to coastal, wetland and terrestrial environments, Woods Hole Group provides innovative solutions by leveraging applied science and forward-thinking engineering with advanced field measurement and satellite remote sensing capabilities.

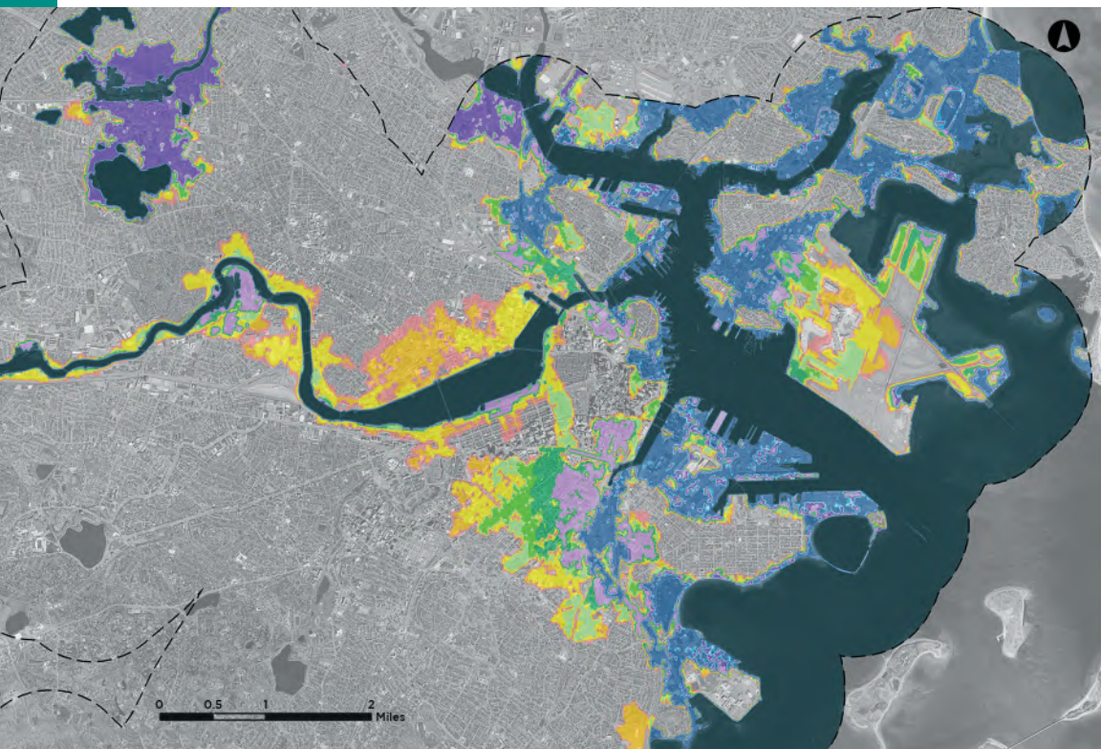
We apply cutting-edge approaches and interdisciplinary collaboration to monitor the environment, anticipate or respond to challenges, and guide our clients in the planning and implementation of strategic actions in a world where the only constant is change.

Woods Hole Group's team of consulting scientists, engineers, and permitting specialists will chart a course to success for your project, turning environmental challenge and uncertainty into opportunity.

Services include:

- Applied Ecology & Sustainability
- Coastal Engineering & Modeling
- Coastal Sciences & Planning
- Coastal Measurements & Sediments
- Satellite Tracking Services

PROVIDING SOLUTIONS TO MITIGATE RISK IN A CHANGING ENVIRONMENT



Applied Ecology & Sustainability

- Ecological risk assessment
- Environmental impact assessment
- Causal analysis
- Climate vulnerability assessment
- Sustainability planning
- Geographic information systems
- Wetland ecology/professional wetland scientist delineations

Coastal Engineering & Modeling

- Modeling of coastal and estuarine systems
- Water quality and ecological restoration
- Engineering design for coastal/civil infrastructure
- Professional land surveying services
- Designing coastal resilient solutions

Coastal Sciences & Planning

COASTAL DEVELOPMENT & RESILIENCY PROJECTS

Planning, coastal studies, design, alternatives and impact assessments, permitting for:

- Shore protection
- Dredging and beneficial reuse
- Flood mitigation
- Commercial redevelopment (e.g. wind power, ports, and harbors projects)
- Habitat restoration/enhancement
- Climate resiliency

PLANNING STUDIES

- Multi-hazard mitigation plans
- Beach management plans
- Risk and vulnerability assessments
- Flood hazard mapping

Coastal Measurements & Sediments

- Real-time and remote tide and water quality monitoring
- ADCPs for current and wave measurements
- Seafloor characterization
- Water quality measurement and assessments
- Environmental sample collection
- Sediment sampling and coring

Satellite Tracking Services

- Wildlife tracking (land, marine, and avian)
- Buoys and drifters
- Gliders, AUVs, and other vehicles
- Argos Doppler positioning
- Iridium services and products
- Argos integration kits
- Dedicated customer service teams on the East and West Coast

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ENERGY & MINING

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INTEGRATED METOCEAN SOLUTIONS

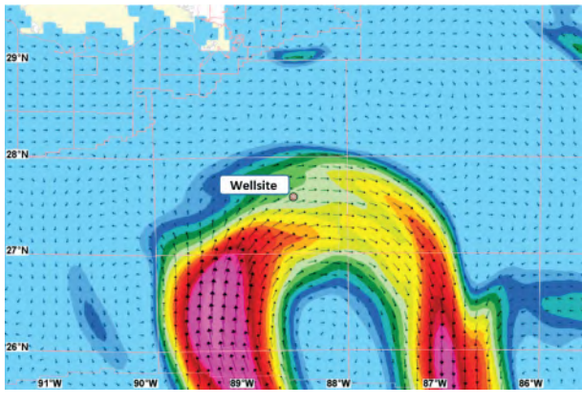
ENERGY & MINING

Woods Hole Group has the unique blend of multidisciplinary expertise required to support offshore operations and developments. In more than 30 years of business, the company has innovated in-house solutions, and transitioned latest technologies from leading manufacturers and research institutions, to solve real-world problems for industry and the private sector.

From the project planning and permitting phases, through construction, and into operational monitoring, forecasting, and compliance activities, Woods Hole Group provides actionable metocean intelligence on a worldwide basis to support a broad range of customers.

Services include:

- Metocean Consultancy Services
- Metocean Measurement Services
- Operational Metocean Forecasting Services
- Emergency Response Services
- Metocean Monitoring Systems



Proven Locally. Applied Globally.

Woods Hole Group provides integrated metocean solutions around the world.

METOCEAN CONSULTANCY SERVICES

Metocean design and operating criteria and site specific desk studies. Combining measured and modelled data sets with detailed statistical and extreme value analysis. We add value to the original data for use by engineers as a basis for design of offshore or coastal facilities and planning of offshore or coastal operations.

METOCEAN MEASUREMENT SERVICES

Undertaking site specific metocean measurement programs for a broad range of Clients. Woods Hole Group provides equipment and experience to collect data on waves, currents, seawater properties, wind and other meteorological conditions to characterize the marine environment. Programs can range from one month to multi-year in duration.

OPERATIONAL METOCEAN FORECASTING SERVICES

Providing ocean current forecast and advisory services to support offshore operations through our EddyWatch® and MoDUWatch℠ (for offshore operations), SurveyWatch® (for seismic and geophysical survey support) and RouteWatch® (for ocean transportation) services. These services are supplemented by data from our own drifting buoy programs, FAST Eddy℠ real-time vessel mounted current profiling survey systems and other buoy and platform-base realtime systems.

EMERGENCY RESPONSE SERVICES

We provide tracking beacons and emergency response beacons for offshore operations. Through our sister company Prooceano, we can also provide oil spill modeling and the PROSAR model, which provides simulations and forecasts for Search & Rescue Operations.

METOCEAN MONITORING SYSTEMS

The provision of real-time metocean monitoring systems on a leased or sold basis to Clients to provide real-time data in support of specific operations ranging from coastal navigation and port/harbor activities to ultradeep water oil and gas exploration and production, these include:

- Buoy-based metocean monitoring systems such as the WatchDog system
- Platform/facilities metocean monitoring systems deployed on drilling rigs, drillships, FPSOs, production platforms, offshore wind turbines, etc.
- Coastal Ports and Harbors metocean monitoring systems designed, built and operated to demanding NOAA PORTS® standards

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SUSTAINABLE FISHERIES MANAGEMENT

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SUPPORTING SUSTAINABLE FISHERIES

SUSTAINABLE FISHERIES MANAGEMENT

Woods Hole Group equips fishermen and authorities with integrated satellite technology for tracking & monitoring, catch & data management, and ocean intelligence. With over 25 years of consulting experience, we combine global marine expertise and technical solutions to provide high quality real-time data for sustainable marine resource management.

CORE SERVICES

Our commercial and small-scale fisheries Vessel Monitoring Solutions (VMS), sensors, and cameras cover all regulatory and operational monitoring needs. Our fishermen seamlessly report catch data through our mobile application and dedicated web interface. In addition, we support sustainable fishing operations with real-time ocean analytics and recommendations.

ENHANCED SERVICES

We facilitate real-time quota management and, fishing effort tracking, and fish habitat modeling with the best oceanographic data and forecasts. Additionally, we manage and support digital migrations from paper forms to integrate with any platform. Our fisheries intelligence solutions allow us to identify fishing hotspots through catch performance, oceanographic, data and machine learning.

PHOTO: JAY FLEMING

Tracking & Monitoring

VESSEL TRACKING

- Ruggedized industrial fishing beacon
- Hybrid small-scale fisheries tracking solution
- Affordable satellite service
- Comprehensive vessel management service
- Type-approved in US and Canada

ELECTRONIC MONITORING

- Partnership with leading edge EM provider Anchor Labs
- Wireless data transfer and live view
- Advanced catch analysis
- Robust and encrypted data

FISHERIES MANAGEMENT SOLUTIONS

- Complete Fishing Monitoring Center solution
- Quota management and catch analytics
- Detect and deter illegal, unreported, and unregulated fishing activities
- Habitat management with integrated ocean modeling

Ocean Intelligence

OCEAN ANALYTICS & RECOMMENDATIONS

- Best oceanographic data service to reduce search time and operating costs
- Near real time data for surface and subsurface conditions
- Weather forecast, catch module, buoy tracking
- Unique multi-criteria and gradient tools
- Dedicated fishing grounds analytics tools
- Personalized support from oceanographers
- Weekly fishing recommendations

FLEET DEPLOYMENT, CAMPAIGN ANALYSIS & FORECASTING

- Generate business insights by pairing catch data and oceanographic information
- Improve today's catches by understanding historic performance
- Identify dynamically best fishing zones for target species
- Understand underlying links and impact of catch hot spots

Catch & Data Reporting

CATCH REPORTING

- US and worldwide regulatory forms
- Updated via satellite in real time
- User-friendly Android application

VESSEL OPERATIONS REPORTING

- Ensure management of maintenance, safety and logistics events
- Receive alerts for vessel activities
- Customized operations reporting

CUSTOMIZED DATA SOLUTIONS & INTEGRATION

- Full paper-to-electronic workflow migration
- Full platform integration
- Advanced data visualization

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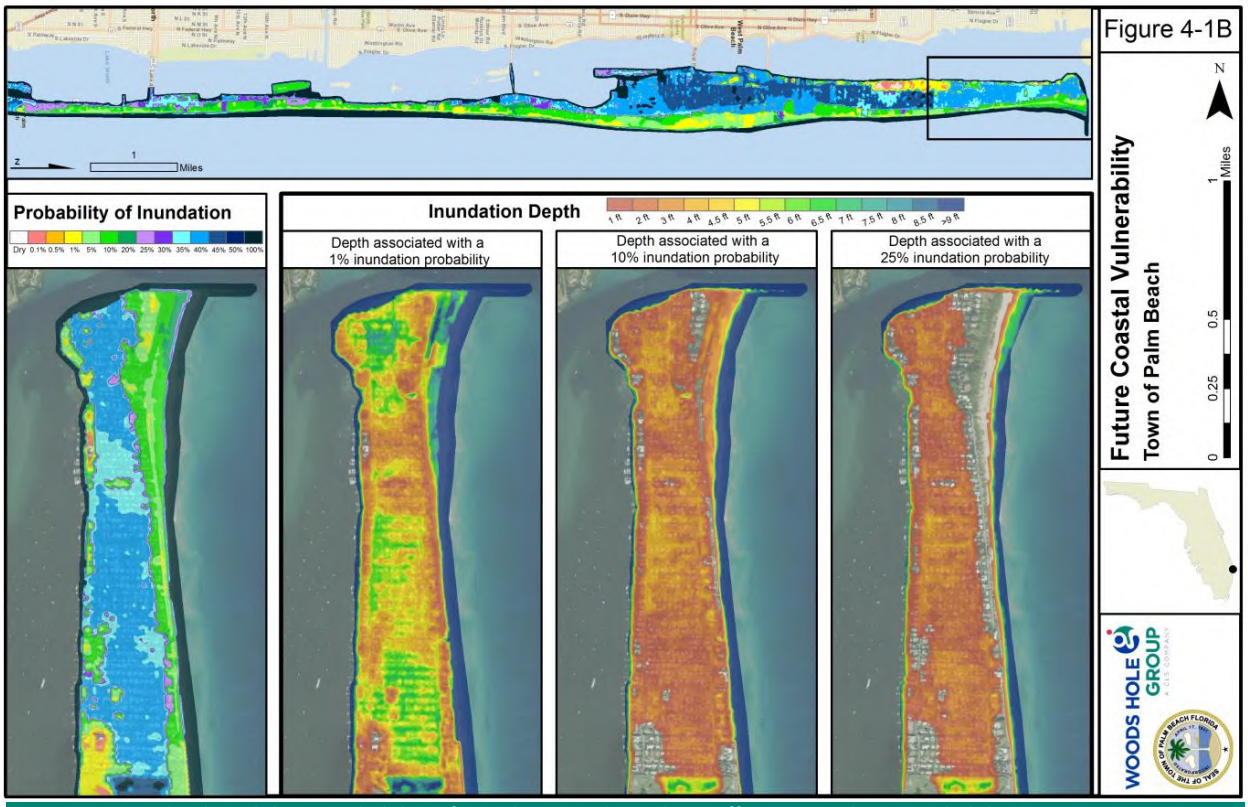
Coastal Flood Vulnerability Assessment
Town of Palm Beach, FL



Future Coastal Vulnerability – Probability of Inundation and Depth at Different Inundation Probabilities

PROJECT CHARACTERISTICS

- Combine the probability of inundation with the consequence score results in a coastal vulnerability index (CVI)
- Methods applied are based on an award-winning, innovative and quantitatively advanced probabilistic vulnerability model
- Customized the model to the Town of Palm Beach
- Designed to be integrated into the ongoing Town 10-Year coastal management program
- Evaluated vulnerability of more than 2,200 Town-owned buildings, streets, parks, beach access ways, sewer pump/lift stations, stormwater basins and stormwater pumps

The **Woods Hole Group (WHG)** worked with the Town of Palm Beach (TOPB) to evaluate the threat that projected future changes in storm intensity and sea water levels pose to infrastructure in the Town. The coastal vulnerability assessment is intended to provide guidance to the Town for prioritizing and planning future flood mitigation projects and adaptations to improve coastal resilience now and into the future. Ultimately, this assessment will help the Town improve its coastal resilience and help save money as projects are implemented to minimize costly flood damage and future repairs.

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See reverse side.

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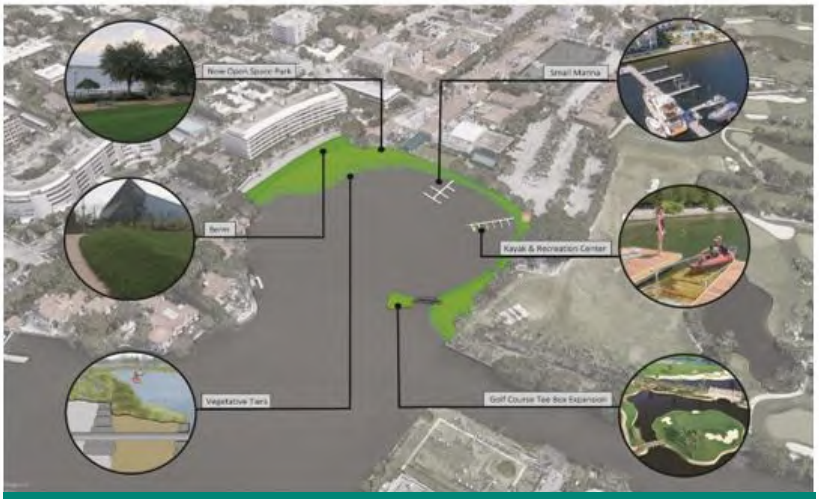
The assessment relied on a probabilistic, dynamic model developed specifically for the Town of Palm Beach. This Palm Beach Flood Risk Model (PB-FRM) is a physics-based coastal flood model developed to determine the probability of flooding based on hundreds to thousands of storm scenarios. The model outputs include the probabilities of inundation along with depth of flooding under present day conditions and a future scenario. The model also provides numerous other quantitative parameters, such as wave information, wind information, currents, and flooding times based on the passage of coastal storm events.



Evaluating Potential Adaptations for Vulnerable Embayments

The team evaluated the vulnerability of inundation for more than 2,200 Town-owned buildings, streets, parks, beach access ways, sewer pump/lift stations, stormwater basins and stormwater pumps. In a coastal vulnerability assessment, each asset considered is given a consequence score reflecting the value of an asset with respect to the impact on the community should it be damaged by flooding. A standardized scoring approach was developed using six (6) criteria to produce a total consequence score for each asset. The criteria utilized to determine the consequence score included: impacts to public health & environment, cost of damage, impacts to economic activities, impacts to public safety services, area of service loss and duration of service loss.
Each of the 2,200+ Town public assets has a CVI, and the assets can be ranked from largest (most valued and most vulnerable) to smallest CVI. With a comprehensive analysis of the probability of inundation for two time periods, depth of inundation for the same two time periods, standardized consequence scores for each asset and CVIs, the TOPB is positioned to make informed, defensible, efficient and effective decisions for managing risk to TOPB public assets during present and future flooding events.

Currently the Woods Hole Group Team is preparing an Implementation Plan to clearly define the path forward. The Plan will build directly off the coastal vulnerability assessment by using the output to define specific action items and timing to optimize resilience and cost-effectiveness. Implementation plans include both adaptations made in the short-term for particularly vulnerable and valued assets, as well as longer-term planning including monitoring, developing trigger points for action and conceptualizing future adaptations. An Implementation Plan also considers a range of possible adaptations at different scales.

More details can be found at:
www.woodsholegroup.com

LOCATION
Town of Palm Beach, Florida

CLIENT
Town of Palm Beach

CONTACTS
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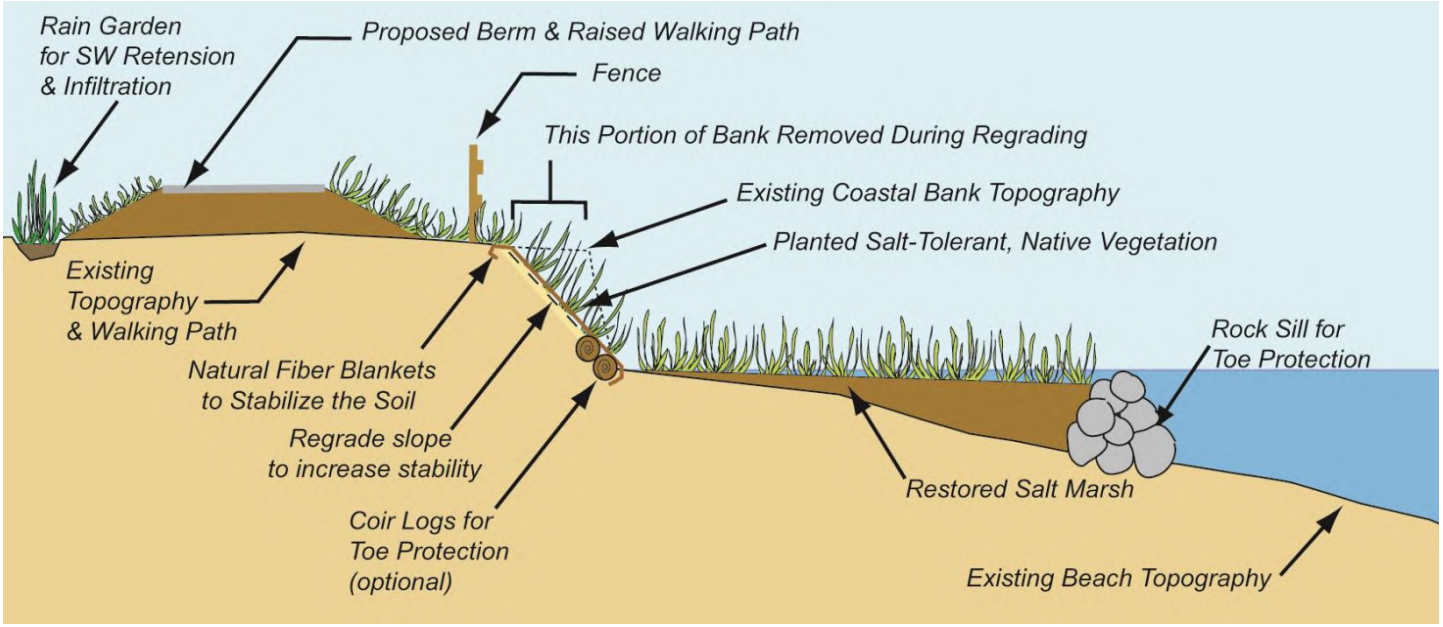
Watson Park Shoreline Erosion Mitigation and Coastal Resiliency Project



Conceptual diagram of the combined preferred alternative for Watson Park.

PROJECT CHARACTERISTICS

- Living shoreline design and salt marsh restoration
- Conceptual design development and alternatives assessment
- Local, state, and federal permitting and agency coordination
- Public outreach and education
- Construction drawings and bid documents

Watson Park is an urban park located on the Weymouth Fore River in Braintree, MA. The park's shoreline had been experiencing significant erosion, which threatened existing coastal resource areas and recreational use of the park. Woods Hole Group has assisted the Town of Braintree in acquiring four years of CZM Coastal Resilience Grant funding to 1) conduct a feasibility study, 2) design and permit a living shoreline design to mitigate the ongoing erosion, improve the coastal resiliency of the property, and restore historic salt marsh habitat, 3) develop final construction drawings and bid documents in preparation for project implementation, and 4) construction.

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Existing conditions (loss of salt marsh, damaged stormwater headwall).

Woods Hole Group conducted a Phase 1 feasibility assessment funded by a FY19 CZM Resilience Grant, which resulted in a matrix of options for increasing coastal resiliency along the park. Alternatives were scored based on multiple criteria. The analysis identified a preferred alternative, which will restore salt marsh, enhance existing rocky intertidal shore, and stabilize an eroding coastal bank to increase the resiliency along the shoreline, while also mitigating park flooding during storms through the installation of an earthen berm and increase stormwater infiltration with rain gardens.

As part of the initial feasibility study, Woods Hole Group also evaluated the long-term flood vulnerability of the park, as well as the potential for salt marsh migration as sea level rises. The results of the analysis showed that even under a high emissions scenario, water levels will not be high enough to promote salt marsh establishment on the recreational fields until approximately 2070. By 2070, the Town will have had time to explore options for alternative recreational facilities, and the lower elevation portions of the park can start to provide an opportunity for salt marsh habitat migration.

Proposed future salt marsh migration.

Town of Braintree was awarded follow up FY20 and FY21 CZM Resilience Grants to finalize the project design and prepare and submit environmental permits. Woods Hole Group maintained open communication with permitting agencies to refine the design and ensure the final plan would meet local, state, and federal permitting requirements.

Woods Hole Group prepared and submitted an Environmental Notification Form (ENF) to MEPA, two Notice of Intents (including an Ecological Restoration NOI) to the Braintree Conservation Commission, a Preconstruction Notification Application to the USACE, and a combined Chapter 91 / Water Quality Certification Application to the Department of Environmental Protection. All permits have been obtained, and our project partner, Fuss & O'Neill, has finalized construction drawings and bid documents for the project. The Town was awarded a fourth CZM grant for FY22 to support the construction of this project (scheduled for spring 2022), during which time Woods Hole Group will serve a construction oversight role.

LOCATION
Watson Park, Braintree, MA

CLIENT
Town of Braintree

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Climate-Ready Dorchester
City of Boston

Joseph Finnegan Park in Dorchester, MA along the Neponset River

PROJECT CHARACTERISTICS

- Dynamic, probabilistic sea level rise and storm surge modeling
- Modeling and assessment of proposed designs and concepts performance
- Development and design of nature-based solutions for climate resiliency
- Community outreach and engagement
- Flood pathway modeling and assessment
- Development of Design Flood Elevations (DFEs)
- Flood resiliency design

Woods Hole Group, working with SCAPE landscape architecture, developed a climate resilience plan for Dorchester, Massachusetts (a community within the City of Boston). The vision was to create a resilient, accessible, and connected shoreline in Dorchester that allowed connections to the waterfront while providing protection against current and future flood risks.

The project developed near and long-term risk reduction strategies for coastal flooding and sea level rise specific to Dorchester's diverse shoreline and population. This included strategies that equitably reduced coastal risk enhanced access and mobility, promoted the health of valuable ecosystems, and defined the character of the Dorchester waterfront. A range of adaptation strategies and solutions were developed by the Climate Ready Dorchester team, and Woods Hole Group provided coastal engineering and design, development of nature-based and green solutions, development of design standards, elevations, and parameters, and modeling the performance of the various adaptation measures.

The project included a series of open houses, neighborhood meetings, and online surveys to ensure the proposed adaptations were grounded in community priorities.

LOCATION
Boston, MA

CLIENT
The City of Boston

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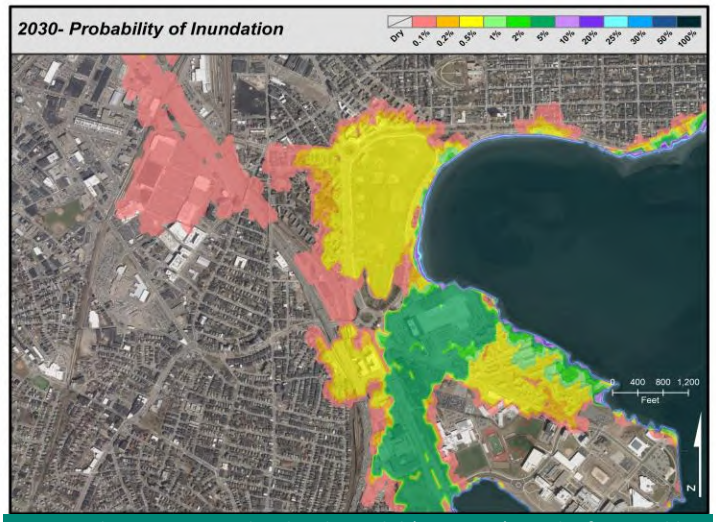
Moakley Park Master Plan
City of Boston



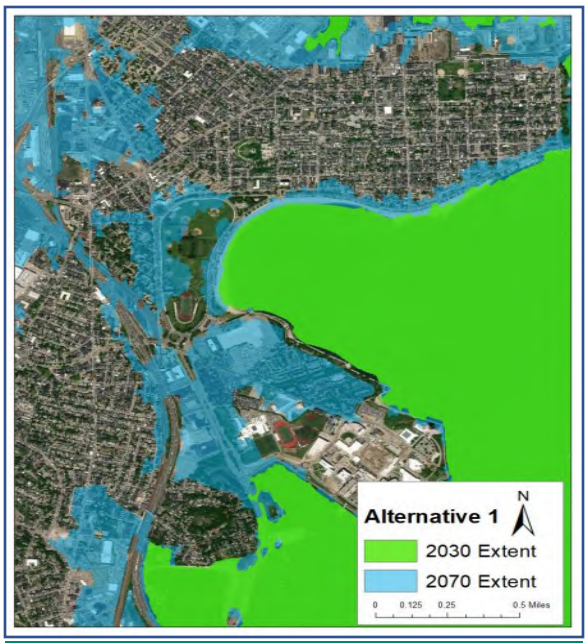
Massachusetts Coast Flood Risk Model (MC-FRM) results for Moakley Park in 2030 time horizon.

PROJECT CHARACTERISTICS

- Dynamic, probabilistic sea level rise and storm surge modeling
- Modeling and assessment of proposed designs and concepts performance
- Beach and dune restoration design
- Geographic Information System (GIS) analyses
- Offshore wave attenuation design
- Development of Design Flood Elevations (DFEs)
- Wave forces and erosion
- Flood resiliency design
- Future marsh migration planning

Working with a multi-disiplinary team, Woods Hole Group provided climate change assessment, coastal engineering and design, and flood risk modeling services in the overall development of the Master Plan for Moakley Park. Whle Moakley Park itself is a potential flood risk in the future, it also represented a major flood pathway for the City of Boston, as flood water entering through Moakley Park extended to the north and south flooding major portions of the City. Therefore, the Master Plan for Moakley Park focused not only on improving the public amenities and recreational value of Moakley Park, but also building resilience for the Park and inland areas.

Woods Hole Group provide sea level rise, storm risk assessment, and coastal expertise throughout the development of the vision plan and master plan process. This included performance modeling of the proposed design layouts within the park to assess the overall function against a variety of coastal storm risks, both now and into the future. Woods Hole Group also provided beach and dune restoration design, guidance on future marsh creation (i.e., letting future high tides encroach in certain areas of the park), and developing overall design parameters, standards, and guidance for future flooding conditions.



Example performance modeling results for Moakley Park alternative.

LOCATION
Boston, MA

CLIENT
The City of Boston

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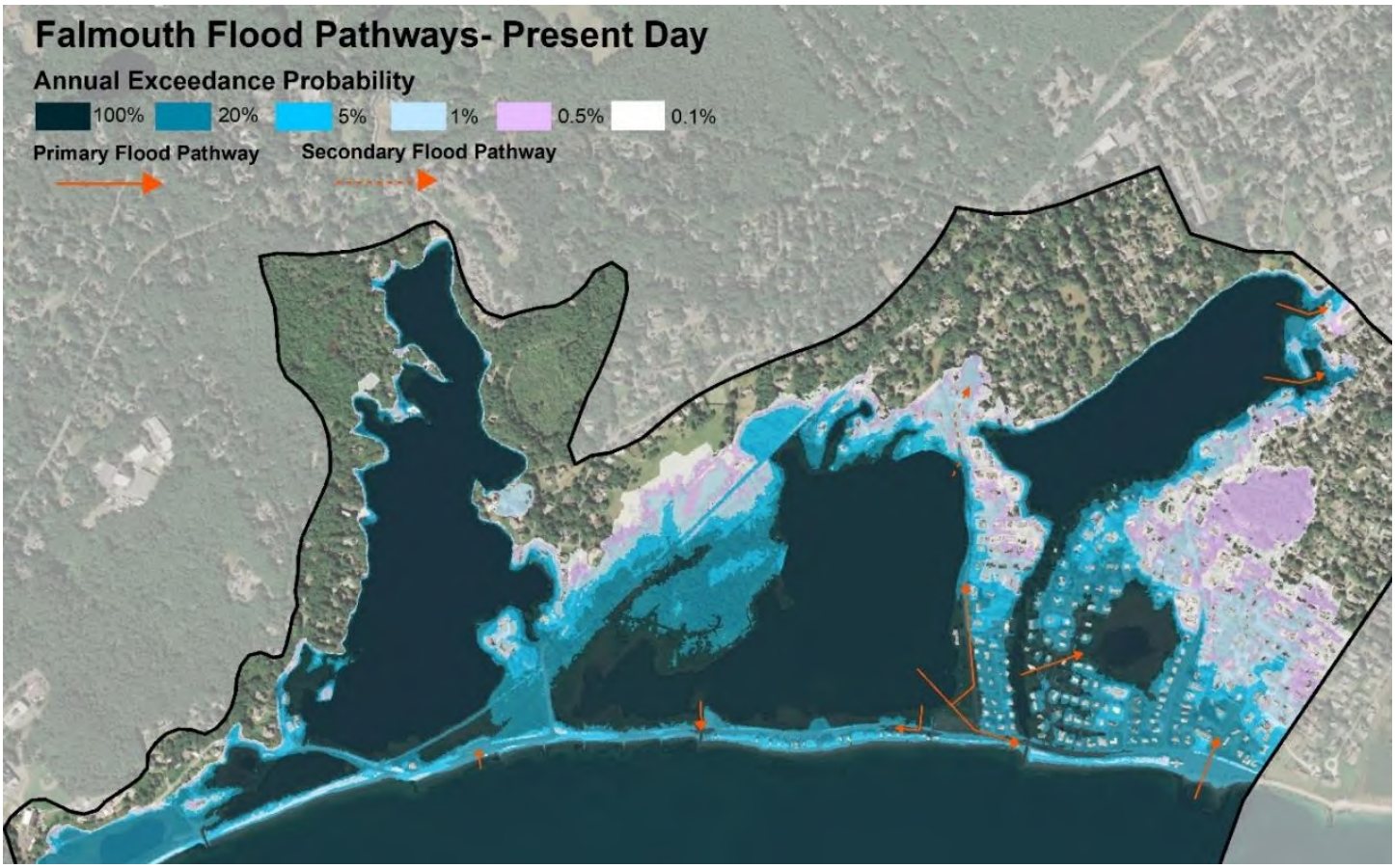
Coastal Resiliency Planning for the Surf Drive Area



PROJECT CHARACTERISTICS

- Long-term climate change and coastal resiliency planning
- Flood pathways assessment
- Detailed asset-based flood vulnerability assessment
- Resiliency action alternatives development and alternatives analysis
- Development of flexible adaptation pathways
- Public outreach workshops and presentations

To better understand the risk to individual municipal assets from flooding, the Town of Falmouth commissioned the Woods Hole Group to conduct a detailed town wide climate change flood vulnerability assessment, which was completed in January 2020. This prior study identified the Surf Drive area as one of the most vulnerable areas in town. Surf Drive already experiences significant stressors (e.g., regular inundation, erosion, overtopping, storm damage, etc.) under today's climate conditions. Climate change and sea-level rise will increase the frequency and severity of these stressors, resulting in increased vulnerability in the future.

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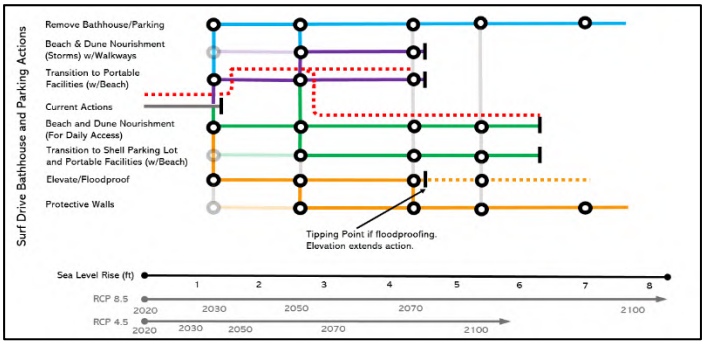


Example dynamic adaptation pathway for the Surf Drive beach site.

In order to develop a plan to increase the coastal resiliency of the Surf Drive area, this study provided a conceptual phased management, identifying key time frames and sea level thresholds for action. This process utilized a dynamic adaptation pathways approach, which involves the following key steps:

1. Identification of the problem
2. Identification of key assets at risk
3. Development of potential actions
4. Assess efficacy of actions
5. Develop implementation pathways
6. Develop phasing and implementation plan

After identifying all critical assets and evaluating their vulnerability to flooding, a full range of potential adaptation actions, which can help reduce or eliminate those vulnerabilities, were developed within discrete themes. The four themes used to develop potential actions to address the study area vulnerabilities are:

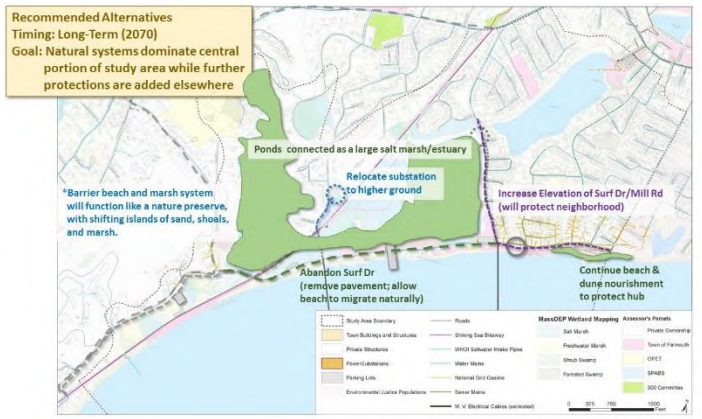
1. **Natural Resources** – emphasizing ecosystem health and resilience
2. **Protection** – emphasizing protection and maintenance of infrastructure
3. **Connection** – emphasizing maintenance of access, transportation, and utility corridors
4. **Managed Retreat** – emphasizing a balance of uses with increased costs and risks in the future

Potential actions were identified for each of the area's assets within each of the four themes. To aid in decision making, dynamic adaptation pathways were developed for each asset (see example figure to the left).

Dynamic adaptation pathways can provide a unique visualization of the potential adaptation actions and how they can fit together into an overall implementation strategy over time, highlighting key thresholds, dead ends, and opportunities to combine actions from different themes.

Based on the feasibility and effectiveness of the individual actions presented for the four themes, the water level and timing thresholds, and the estimated cost and effectiveness of each action, a recommended phased implementation plan was developed for the study area as a whole. The final recommendation included actions such as:

- Phasing out the barrier beach portion of the Surf Drive roadway in the long-term
- Elevating one section of the bikeway on piles and relocating another
- Relocating a section of the Woods Hole sewer main to a less vulnerable (i.e., more inland) location
- Elevating or floodproofing the Surf Drive sewer pump station
- Removing Mitchell Bathhouse and replacing it with portable facilities
- Protecting the adjacent low-lying neighborhood through the elevation of specific roadway sections and installation of a tide gate; and
- Restoring the barrier beach to a natural ecosystem (i.e., removing the existing roadway pavement, culverts, and shore protection structures).



LOCATION
Surf Drive, Falmouth, MA

CLIENT
Town of Falmouth

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Nature-Based Storm-Damage Protection Measures for the Duxbury Beach Reservation Property

PROJECT CHARACTERISTICS

- Living shoreline design and salt marsh restoration
- Conceptual design development and alternatives assessment
- Local, state, and federal permitting and agency coordination
- Public outreach and education

Duxbury Beach is a 7.5-mile-long barrier beach in Plymouth County, Massachusetts that extends from Marshfield in the north to Gurnet Point and Saquish Head in the south. Duxbury Beach is a dynamic environment with an ever-changing landscape, shaped by the wind, waves, currents, and tides that constantly impact the shoreline. The dynamic barrier beach structure and ecosystems of Duxbury Beach are directly threatened by future sea level rise and extreme storm events. Damages caused by natural hazards such as nor'easters, severe winter events, hurricanes, coastal erosion, and flooding are likely to be exacerbated by climate change in future years.

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The primary goal of this project was to address the ongoing coastal erosion and flood risks by building on the storm-damage protection measures recommended in the 2016 Coastal Processes Study and Resiliency Recommendations report and to develop a comprehensive management approach for the Duxbury Beach Reservation to proactively manage the beach and respond to changes incurred during storms. As a secondary goal, the Duxbury Beach Reservation wanted to maintain flexibility to implement future resiliency projects on an as needed basis.

Initial phases of the project focused on collecting data on existing conditions by delineating wetland resource areas, performing a topographic survey, conducting grain size analyses and a shellfish survey, and evaluating existing land uses and manmade infrastructure. Coastal processes were also analyzed, including sea level rise, wave action, shoreline change, and sediment transport. Results were used to develop a suite of potential resilience building alternatives and to complete an alternatives analysis to select the most appropriate storm-damage protection measures for each component of the project. The final preferred alternative involved four main components:
1) large-scale beach and dune nourishment on the ocean-facing beaches, 2) cobble berm nourishment along the bayside shoreline adjacent to a 2,000-foot section of vulnerable roadway, 3) flood risk reduction along the roadway through natural stormwater management actions and elevation of a low-lying section of Gurnet Road, and 4) cobble berm nourishment around the Powder Point Bridge abutment.

The oceanside beach and dune nourishment was a high priority recommendation from the 2016 report. The dune crest and beach berm elevation heights were chosen to be protective against a range of storm intensities. Cobble nourishments have also been designed to withstand the dynamic environment and swift tidal currents, utilizing a suitable grain size material to hold up well against strong currents.

Additionally, the proposed elevation of Gurnet Road to 9.0 feet (NAVD88) protects against sunny day flooding and minor storm events today and ensures the roadway will remain passible for some time into the future even with some sea-level rise.

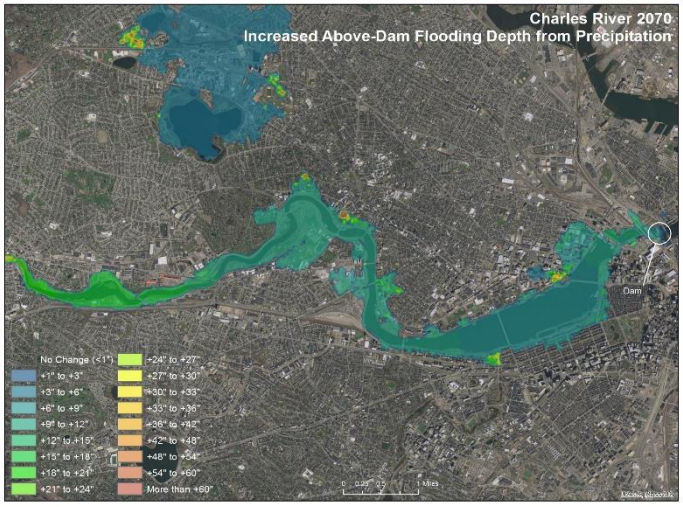
These four components have been advanced through the first stages of design and permitting. Both an Expanded Environmental Notification Form (EENF) and then a Single Environmental Impact Report (EIR) were submitted to the Massachusetts Environmental Protection Agency (MEPA), and a MEPA Certificate obtained. A local Order of Conditions was obtained from the Duxbury Conservation Commission for all components of the project. For the nourishment project components that will extend below mean high water (MHW), permit applications have been submitted to DEP Chapter 91 and the U.S. Army Corps of Engineers.

LOCATION
Duxbury Beach, Duxbury, MA

CLIENT
Duxbury Beach Reservation

WOODS HOLE GROUP
A CLS COMPANY

Assessing the Vulnerability of MassDOT's Coastal Transportation Systems to Future Sea Level Rise and Coastal Storms, and Developing Adaptation Strategies.



PROJECT CHARACTERISTICS

- Climate Change Assessment and Projections
- Development of Storm Climatology for 20th and 21st Centuries
- Coupled Wave and Hydrodynamic Modeling
- Combined Sea Level Rise and Storm Surge Risk to critical infrastructure and assets
- Cost Estimations for Engineering Alternatives
- Recommended, Phased Engineering Adaptations for Sea Level Rise

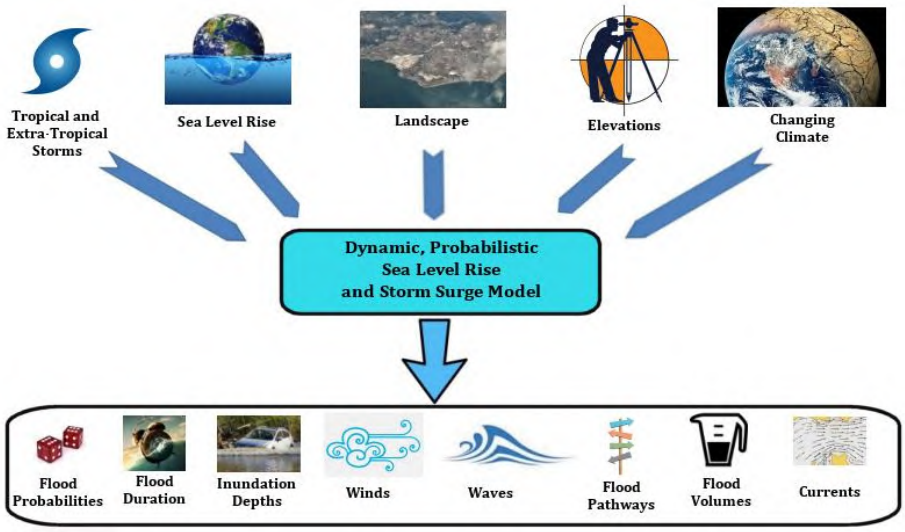
Woods Hole Group has supported vulnerability assessments by measuring, modeling, and forecasting flooding due to storms, sea level rise, climate change influences, and combined effects. A complete vulnerability assessment recognizes the dynamic physical processes and timing associated with storms, along with increasing risks of sea level rise and climate change. Woods Hole Group worked under contract to MassDOT to conduct a vulnerability assessment for all coastal transportation systems (roads, rail, airport, bridges, etc.) in the Commonwealth of Massachusetts. In order to determine the vulnerability of the systems, a highly resolved (less than 10 meters), numerical hydrodynamic model was developed to assess the combined impact of sea level rise, storm events (tropical and extra-tropical), winds, tides, river discharge, and waves. Tropical and extra tropical events were simulated using an ensemble Monte Carlo approach to develop probabilistic flooding distributions.

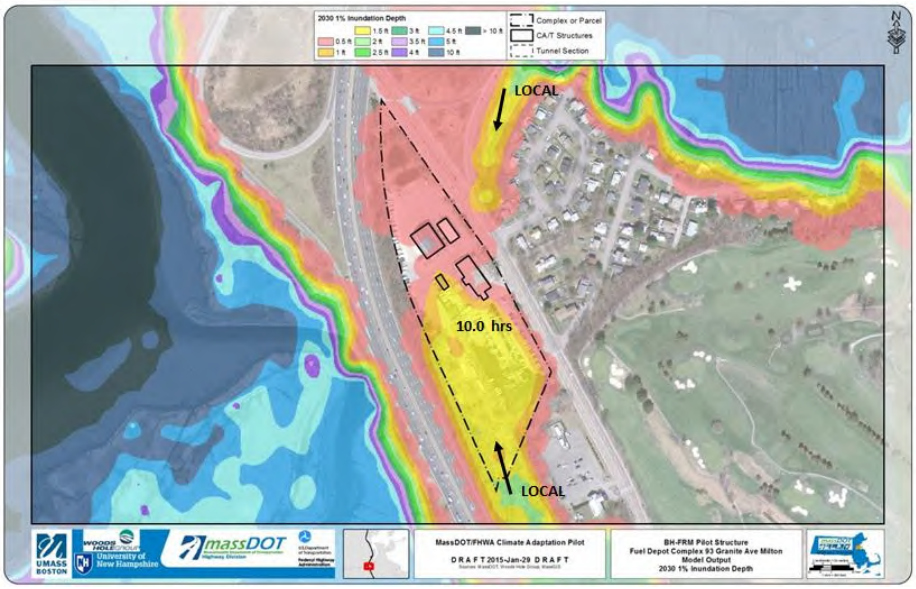
WOODS HOLE GROUP FOR EARTH, FROM SPACE
A CLS COMPANY

See reverse side.

WOODSHOLEGROUP.COM

Results from the model were used to assess risk for assets throughout the transportation systems of the Commonwealth and to determine appropriate regional and site-specific adaptation designs to build resilience for the transportation networks. Woods Hole Group designs coastal resiliency projects through an understanding of the storm surge that influences the site under both existing, and future, conditions. Important factors such as the inundation depth levels, wave impacts, flood pathways, flood volumes, and probability of occurrence are all key considerations for developing cost-effective design approaches expected to function for current conditions, and perhaps more importantly, conditions occurring in a changing climate. Additionally, the results are being used by numerous other stakeholders (e.g., health care, universities, water commissions) and communities to assess risk and develop resilient solutions.





LOCATION
Commonwealth of Massachusetts

CLIENT
MassDOT Highway Division
10 Park Plaza, Room 4260
Boston, MA 02116

CONTACTS
Mr. Steve Miller
(857) 368-8809

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Climate Change Vulnerability / Risk Assessment and Adaptation Study
Town of Sandwich, MA

IMG_0574.heic

Sandwich projected 2070 road segment inundation risk

PROJECT CHARACTERISTICS

- Climate change planning
- Sea level rise and storm surge vulnerability
- Adaptation and resilience recommendations
- Massachusetts Coast Flood Risk Model
- Sea Level Affecting Marshes Model
- Infrastructure assessment
- Natural resources assessment
- Municipal Vulnerability Preparedness Program

The **Woods Hole Group (WHG)** conducted a detailed vulnerability assessment for municipal infrastructure and natural resources for the Town of Sandwich. The vulnerability assessment was funded by a Municipal Vulnerability Preparedness (MVP) Program Action Grant, and focused on two top hazards identified in Sandwich's Community Resilience Building Workshop – sea level rise and storm surge. The study prioritized high risk assets and provided recommendations for physical adaptations and regulatory changes.

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See reverse side.

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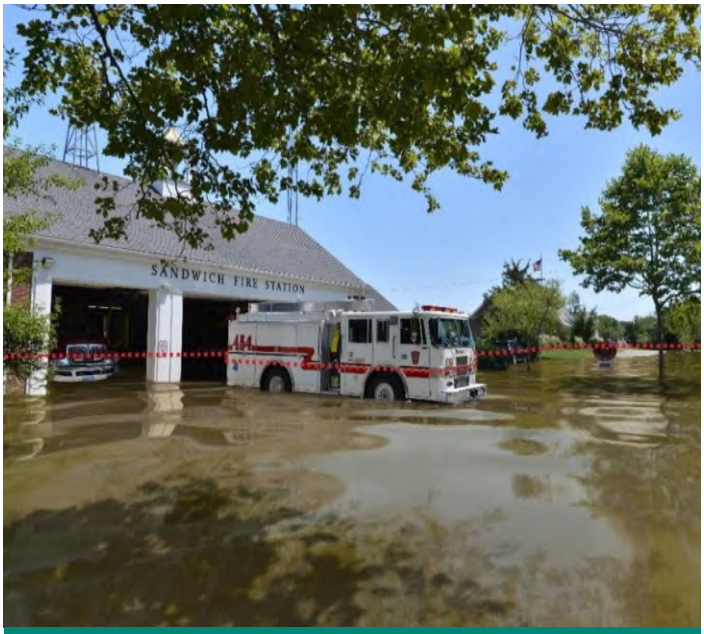

Potential flooding from 1% chance even in 2030 (and 2070).

Conceptual design for Sandwich Village regional resilience.

The Sandwich Climate Change Vulnerability / Risk Assessment and Adaptation Study leveraged the latest climate change projections for sea level rise and storm surge (the Massachusetts Coastal Flood Risk Model), records review, and detailed infrastructure surveys to provide data on likely future flooding scenarios and identify potential flooding impacts to municipally-owned infrastructure. Adaptation strategies for high priority assets, as well as recommended changes to local by-laws and regulations, were developed jointly by Woods Hole Group and engineering partner Kleinfelder.

Additionally, Woods Hole Group used the Sea Level Affecting Marshes Model to identify potential flooding impacts to natural resources and highlight opportunities to facilitate marsh migration. Wherever practicable, Woods Hole Group identified regional solutions using nature-based or hybrid solutions.

Woods Hole Group worked closely with the Town's Steering Committee to understand the importance of each asset to the Town's ability to provide municipal services. Additionally, education and outreach was emphasized throughout the project, and laid the foundation for a follow-on MVP Action Grant to develop a StoryMap highlighting the Town's coastal resilience program and demonstrating the benefits of healthy and robust green infrastructure.

More details can be found at:
https://storymaps.arcgis.com/stories/0cc1b190abbc40058219d66b2f355eaa
www.woodsholegroup.com

LOCATION
Sandwich, MA

CLIENT
Town of Sandwich, Department of Natural Resources

CONTACTS
David J. DeConto
16 Jan Sebastian Drive
Sandwich, MA 02563
508-833-8054

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F. EXAMPLE PROJECTS WHICH BEST ILLUSTRATE PROPOSED TEAM'S QUALIFICATIONS FOR THIS CONTRACT (Present as many projects as requested by the agency, or 10 projects, if not specified. Complete one Section F for each project.)	20. EXAMPLE PROJECT KEY NUMBER

21. TITLE AND LOCATION (City and State)	22. YEAR COMPLETED	
	PROFESSIONAL SERVICES	CONSTRUCTION (if applicable)
MSC Cruises Terminal Expansion at PortMiami	2019	2022 (est)

23. PROJECT OWNER'S INFORMATION		
a. PROJECT OWNER	b. POINT OF CONTACT NAME	c. POINT OF CONTACT TELEPHONE NUMBER
Arquitectonica	Mr. Charles Hugh Crain	(305) 372-1812 ext. 1024

24. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, cost, etc.)

PROJECT SUMMARY: GHD was retained by Arquitectonica on behalf of MSC Cruises to provide a coastal and mooring basis of analysis report. The report included the development of site environmental conditions, underkeel clearance and scour potential during vessel arrival/departure, a dynamic mooring and berthing analysis that included a passing vessel study, a top of wall elevation assessment, and the recommendation of a minimum finished floor elevation for the terminal building based on storm surge, wave overtopping, and sea level rise projections.

PROJECT RELEVANCE:

Hydrologic and Hydraulic Studies: Hydraulic analysis of Miami Harbor for wave, current, and water level analysis.

Flood Control: GHD completed a wave overtopping analysis to ensure that minimum specified seawall elevation met general safety and operational guidance limits during both present-day and future sea level rise scenarios.

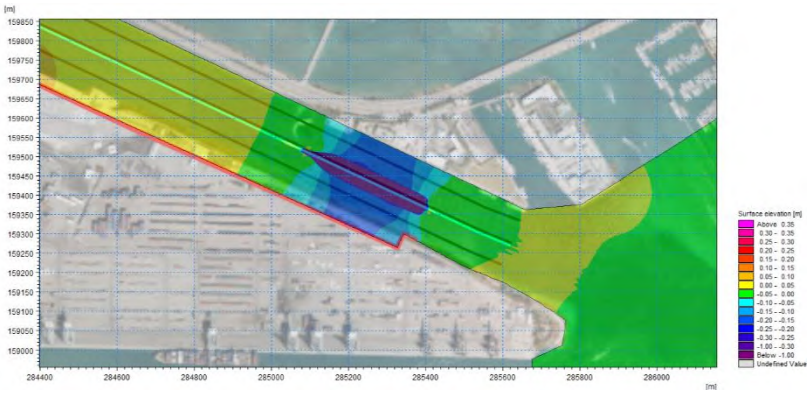
GHD also recommended a minimum finished floor elevation for the new terminal building and provided a statistical analysis of the total number of flood events expected over the project's design life. The analysis included a range of sea level rise scenarios for inclusion in the Owner's overall risk management strategy.

Coastal and Navigation Projects: GHD performed a dynamic mooring analysis for multiple floating bodies moored along PortMiami's cruise terminal Berth 8 and Berth 9 (MSC World Class & Liquefied Natural Gas (LNG) bunkering Vessel). The analysis included the effects from winds with magnitude and directional variability, a constant current, and a single passing vessel (Oasis of the Seas – stretch class) at multiple transit speeds and offset distances.

In addition, GHD analyzed the scour potential at the toe of the existing seawall due to propeller wash velocities generated by berthing and un-berthing cruise ships.

GHD also recommended a minimum underkeel clearance in the berth pocket based on an analysis of water levels, ship, bottom/bed factors, dredge tolerances and maintenance intervals, and risk levels.

Surface Water Modeling: GHD developed a hydrodynamic model of Miami Harbor to determine the draw down in water surface elevation and resulting forces that a passing vessel would have on a moored cruise ship and LNG bunkering vessel. GHD also developed a wave model to transform offshore waves into Miami Harbor.



ADDITIONAL RELEVANCE TO THIS CONTRACT:

- ✓ Coastal Resiliency
- ✓ Seawalls
- ✓ Relative Sea Level Rise
- ✓ Flood Control
- ✓ H&H Studies
- ✓ Coastal & Navigation Projects
- ✓ Surface Water Modeling

COST: $141,900 (Professional fee)

PERFORMANCE: GHD adhered to the tight schedule requirements for the initial assignment and provided a high quality deliverable that was rated a 10 out of 10 by the Client. Although the initial scope of services has been completed, GHD anticipates providing additional design services as the project moves towards construction.

WORKING RELATIONSHIPS:

Steven Davie, PE, D.CE (GHD)
Jesse Davis, PE, ENV SP (GHD)
Hugo Rodriguez, PhD, PE (GHD)
Michael Barnett, PE, D.CE (GHD)
Thomas Gillespie, CPEng (GHD)
Jose Morales, JD, PE (GHD)

25. FIRMS FROM SECTION C INVOLVED WITH THIS PROJECT			
	(1) FIRM NAME	(2) FIRM LOCATION (City and State)	(3) ROLE
a.	GHD	Miami, FL	Coastal engineering & design support services.

GHD Project

City of Imperial Beach Bayshore Bikeway Resiliency Project

Client: City of Imperial Beach, Public Works
Project Cost: $300,000
Dates: 2021 - ongoing
Client References:
Chris Helmer Environmental and Natural Resources Director, (619) 628-1370, chelmer@imperialbeachca.gov

GHD team Members: Brian Leslie, Aaron Holloway, Gillian Millar, Victor Tirado

Summary of Challenge

The Bayshore Bikeway is a heavily used recreational corridor that fronts one of the lowest and most vulnerable segments of Imperial Beach to coastal flooding. Sea-level rise (SLR) will drastically increase the risk of flooding with 3.3 ft of SLR not only flooding the bikeway but also large portions of State Road 75 and the disadvantaged and severely disadvantaged communities of Imperial Beach

Proposed Solution

The Bikeway alignment presents a unique opportunity to repurpose the existing path into a multi-benefit coastal resilience corridor that protects multiple vulnerable communities and key transportation infrastructure. Key features of the project include:

- **Living Levee** – ecotone slope to increase flood protection and ecosystem resilience
- **Coastal access trail enhancement** – improve mobility and safety for different user groups
- **Habitat enhancement** – tidal marsh restoration to improve hydraulic connectivity to degraded wetlands.
- **Stormwater treatment wetland** – increase resilience to flooding through use of detention pond and wetland system adaptable to SLR with the addition of a pump station.

The feasibility phase of the project was awarded funding from Ocean Protection Council Prop 68. The scope of the feasibility study includes:

- Concept Development and Feasibility
- Stakeholder and Community Outreach
- Preliminary Engineering Plans

GHD Project

Beach Boulevard Infrastructure Resiliency Project

Client, Date

City of Pacifica. May 2020 – Present

The Project

The 2,600 ft long Beach Boulevard seawall is located on the rugged Pacific Coast, approximately 10 miles south of San Francisco, in an area renowned for coastal erosion, with the City having already suffered significant property loss to the North of Beach Boulevard.

The purpose of the Beach Boulevard Seawall Replacement Project is to ensure public health and safety in the vicinity of Beach Boulevard, including the West Sharp Park downtown neighborhood, home to a thriving community of the City of Pacifica.

The seawall has continued to fail along the northern portion almost since construction completion in the mid-eighties. Waves crash over the seawall onto the road several times a year creating hazardous conditions for the general public and causing road closures along the northern portion of Beach Boulevard. This project aims to assess the risks, controlling factors and reconstruction options for the seawall and promenade, considering environmental factors, stakeholder and community engagement, coastal, geotechnical and economic impacts.

Scope

GHD is currently engaged by the City of Pacifica to develop a solution to replace the existing failing seawall, protecting critical public infrastructure and property. GHD's project scope include:

- comprehensive feasibility study,
- stakeholder & community outreach,
- design alternatives analysis,
- permitting & regulatory agency interfacing, and
- detailed design for construction.

GHD have assembled a team of professionals dedicated to an approach that will ensure the replacement of the Beach Boulevard Seawall meets the City and the Community's needs, objectives and budget and importantly will be supported by the California Coastal Commission and regulatory agencies, and aligns with the City's Local Coastal Land Use Plan.

GHD fee: $1.5M

Estimated Construction Cost $30M

Client Contact

Ryan Marquez, City of Pacifica
marquezr@ci.pacifica.ca.us

GHD Project

City of Carlsbad Climate Adaptation Project

Project

City of Carlsbad Climate Adaptation Project, Carlsbad, CA

Client

City of Carlsbad, Environmental Management Division; California State Coastal Conservancy

Date

June 2020 – Present

Challenge

Recent sea level rise planning work in the City identified a segment of Carlsbad Boulevard as being extremely vulnerable to existing and projected future coastal hazards (erosion and flooding). Several recent events exemplified this vulnerability and led to the closure of the roadway for several months during the winter of 2015/16. Construction of emergency repairs in the form of rock shoreline protection occurred immediately to stabilize the roadway base from undermining. These repairs were approved contingent of the development of a long-term resiliency plan for this roadway. The City is now undertaking a study to develop this plan – that both seeks to design a resilient roadway but also activates this valuable and underutilized coastal space with public amenities that can be adaptable over time.

Description

GHD, through close collaboration with the City and Project partners (i.e., California Coastal Conservancy and Coastal Commission, Scripps Institution of Oceanography) are realigning a one-mile segment of Carlsbad Boulevard from the coast in order to protect the roadway and re-vision acres of coastal land with multi-use trails, community spaces and environmental restoration areas. Central to the planning of this space and the future alignment of the road are projected future coastal hazards: specifically, cliff erosion, shoreline erosion and flooding.

The Project includes preliminary design of a new bi-directional roadway (a complete street – with various mobility improvements), a new 500' span bridge over Encinas Creek, a multi-use coastal trail with various community connections, new coastal parking areas, passive and active recreation areas intended to activate the space, and wetland enhancement and restoration of Encinas Creek.

Client Contact

Mike Grim
Senior Programs Manager
City of Carlsbad
1635 Faraday Avenue
Carlsbad, CA 92008
Mike.Grim@carlsbadca.gov
760.602.4623

Fee: $250,000

Vallejo Flood and Wastewater District (VFWD) Asset Management Program, Vallejo, CA

Date of Completion:
2018

Client Contact Information:
Johnson Ho
Director of Operations & Maintenance,
450 Ryder Street, Vallejo, California, 94590
707-644-8949
JHo@vallejowastewater.org

Project Budget/Performance:
Phase 1 – Asset Management Implementation Plan and Pilot AMP – 100% Complete (Total Budgeted and actual effort = $354,000)

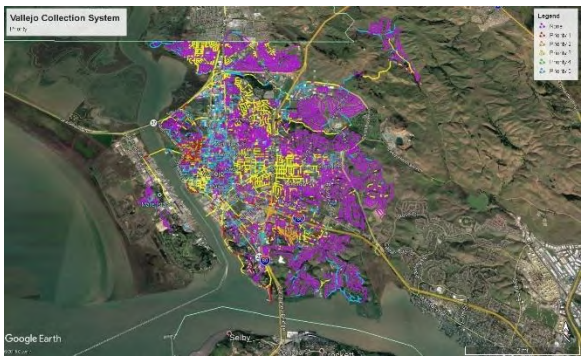
Phase 2 – WWTP AMP – 100% Complete (Total budgeted effort and actual effort = $271,000

Phase 3 – Collection System Asset Management Plan – 100% Complete (Total budgeted effort and actual effort = $233,000).

Project Description
GHD assisted the VFWD in developing and implementing an asset management program for the District's wastewater and stormwater assets. The District provides wastewater and stormwater services to 123,000 residents in the City of Vallejo and parts of Solano County. The District embarked on a multi-year, phased Asset Management Implementation Program to develop and implement leading AM principles and practices focused on improving the District's overall efficiencies and effectiveness in delivering stormwater and wastewater services to its customers. The first phase of the program focused on developing an asset management framework that defined how the District will do condition assessment, risk assessment and long-term financial planning (valuation). This involved the assessment of AM practices the District was already doing (i.e. gap analysis), development of the overall AM strategy, supporting improvement initiatives and a roadmap for implementation. Based on the implementation roadmap and the results from the pilot asset management plan (AMP), the District has decided to implement the AM framework across all classes of assets the District manages, including the development of a stormwater asset management plan. The District is also planning to initiate and complete the development of a Maintenance Master Plan (MMP), which will generate the input data and information for the District's new CMMS.

Assets managed by the District:

- 250 miles of storm drain pipes
- over 10,000 catch basins
- 376 miles of sewer collection pipeline
- 9,500 sanitary manholes
- one WWTP with an average daily flow of 10 MGD



GHD Project

Brisbane Citywide Creek and Overland Flow Path Modelling

Project

Brisbane Citywide Creek and Overland Flow Path Modelling

Client

Brisbane City Council

Date

September 2014 to 2017

Challenge

Brisbane City Council required new citywide overland flow path mapping to replace older mapping that was based on purely GIS or other non-hydrodynamic methods. The new mapping is to be based on a fully hydrodynamic numerical model, and must account for the effect of stormwater drainage on overland flow.

The primary challenge of this study is the large scale of the study area (> 1,000 km^2) and the required level of detail for urban environments (2 m grid cell size), which requires a highly innovative approach to deliver within the available timeframe and budget.

This project is likely one of the largest and most detailed of its kind anywhere in the world.

Description

The City of Brisbane is the most populous local government area in Australia, with over 1 million residents. Like many Australian towns and cities, Brisbane has a history of flooding from rivers, creeks and oceanic storm tide. In addition, due to the prevalence of intense, short-duration storm events, Brisbane is also subject to overland flow flooding. This flooding affects many properties that are lower-lying or located in sags or natural depressions.

Overland flow issues are exacerbated in older areas that were developed when contemporaneous drainage design standards made little or no allowance for major storm events.

Overland flow is particularly difficult to model, especially over large areas. A high level of detail (i.e. a small grid cell size) is required to resolve the hydraulics of key features such as road kerb and channel and flow paths within private property.

Brisbane City Council's stormwater drainage network consists over 200,000 pipe lines, 10,000 culverts and a large number of bridges. The stormwater network has typically been designed to cater for minor storm events in the range of 50% to 10% AEP. Accurate overland flow modelling requires an estimation of the capacity of these pipes. Given the scale of the project and the limitations of available data and software, an innovative approach was required.

Scope

GHD were awarded this project based on our extensive experience with overland flow modelling, our demonstrated capability to deliver a project of this scale, and our innovative and thoughtful methodology. The key aspects of this study are:

- Constructing a LIDAR-based DEM and landuse / roughness grid that represents the current state of the Brisbane City Council area.
- Developing hydrodynamic models of the entire BCC area using the TUFLOW GPU software. This state-of-the-art software enables GHD to model larger areas at a higher level of detail than possible in the past.
- Applying “direct rainfall” to the hydrodynamic models in lieu of traditional hydrograph-based inflows. This is required due to the fine-scale nature of overland flow paths, and gives results at a higher level of detail than otherwise possible.
- Testing and verification of a wide range of model parameters such as Manning’s n (including depth-varying values), loss rates, initial water levels, pre-filling of the DEM.
- Development of automated tools to filter and post-process the model results, drawing on our advanced knowledge of ArcGIS and scripting languages such as Python.
- Running all of the TUFLOW GPU models for all design storm events and durations, which will involve a total of ~ 200 days of simulation time. GHD will use our array of powerful GPU-based modelling PCs to expedite this step of the project.
- Delivery of a range of spatial data products to Council at the completion of the study for use in planning schemes, drainage investigations and many other potential end uses.

Outcomes

GHD has delivered the first revision of citywide modelling results and spatial data products (flood extents, levels, depths., velocities and hazards) and is currently working to update the models based on new LIDAR and stormwater data.

For more information please contact:

Ben Regan

T 07 3316 3639
E ben.regan@ghd.com

SCAPE

CLIMATE READY DORCHESTER

BOSTON, MA

SCAPE worked with the City of Boston to develop solutions to equitably reduce coastal flood risk in Dorchester, the largest and most diverse neighborhood in Boston. The Dorchester shoreline stretches 9.5 miles along Boston Harbor and the Neponset River. Climate Ready Dorchester expands the vision for the future of the Dorchester shoreline, offering strategies to adapt to coastal flood risk while also establishing a framework to connect the waterfront parks, beaches, and marshes in the neighborhood, transforming them into one accessible, continuous waterfront – The Dorchester Shoreway. The Shoreway consists of strategic flood protection interventions at critical flood pathways to protect from coastal flooding while increasing neighborhood access. They prioritize natural and nature-based features to reduce wave action and erosion while preserving or enhancing valuable ecosystems. To inform the decision-making process behind various resilience strategies, the SCAPE team held a series of community and stakeholder engagement sessions including two open houses and attendance to numerous existing neighborhood meetings, all designed to educate and involve attendees using custom models, 'scenarios,' and interactive engagement tools.

SIZE
7.39 square miles
8.4 linear miles (coastline)

CLIENT
City of Boston, Mayor's Office of Environment, Energy and Open Space

YEARS
2019 - 2020

SERVICES
Urban Planning and Design, Engagement

COLLABORATORS
Utile, Nitsch Engineering, Tetra Tech, All Aces, Inc., Woods Hole Group

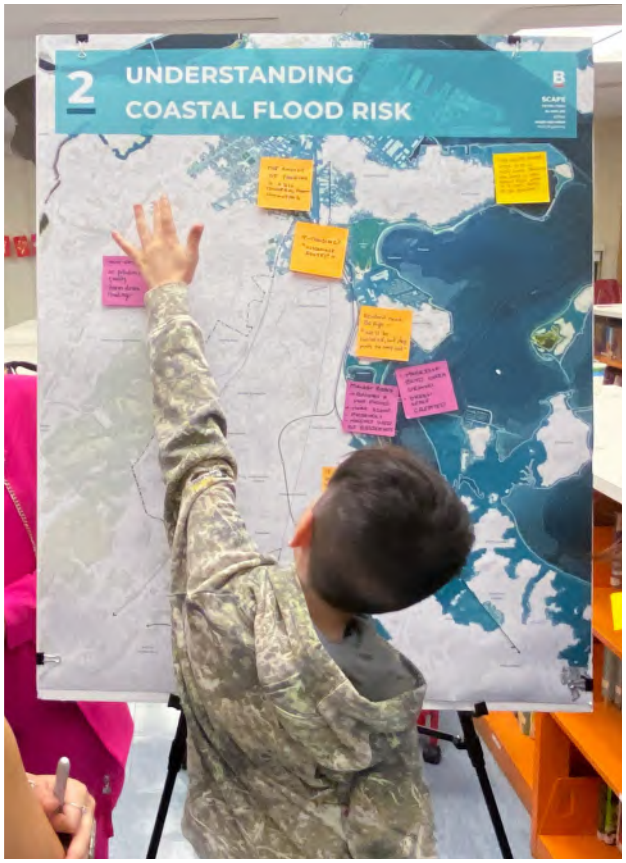
REFERENCE
Peyton Siler Jones
Climate Resilience Program Coordinator, City of Boston, Mayor's Office of Environment, Energy and Open Space
peyton.jones@boston.gov
(828) 273-9979

Engagement materials included models, boards, plans, and 'design scenario' flipbooks to illustrate trade-offs

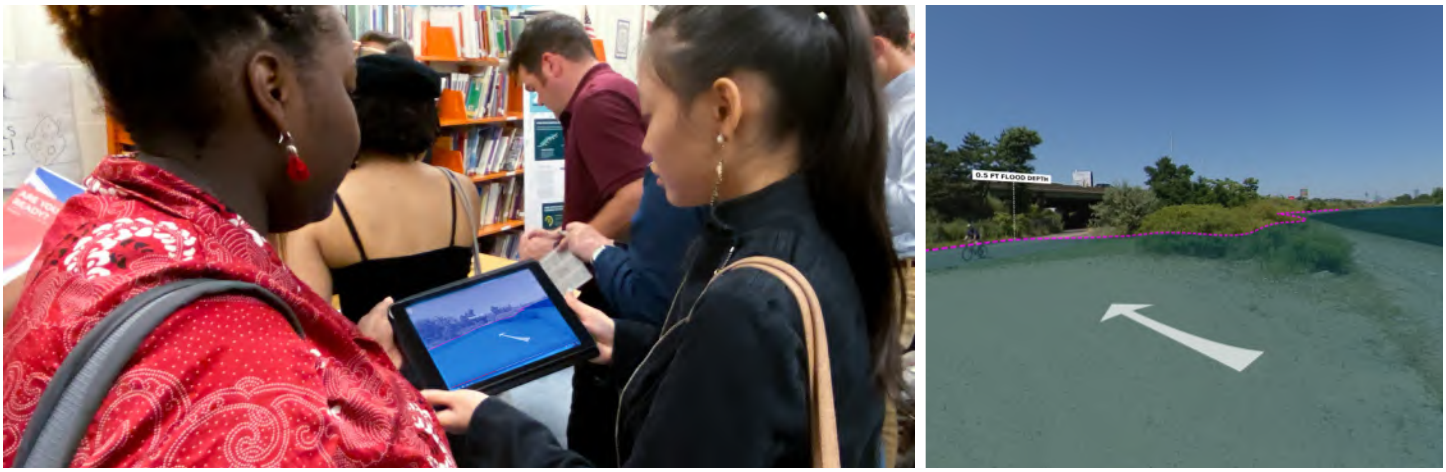
Tenean Beach

The Dorchester Shoreway and proposed catalytic projects

Neponset Circle and shoreline wetland restoration



Interactive mapping and informational boards at multilingual Open Houses



Virtual reality (VR) mapping tools showing flood pathways in Dorchester

Flood protection alignment at the shoreline along Morrissey Boulevard

Coastal Resilience Vocabulary for public engagement

SCAPE

MCCOY'S CREEK RECREATION & RESTORATION PLAN

JACKSONVILLE, FL

Today, much of the historic McCoy's Creek in Jacksonville, Florida is channelized, tucked underneath highways or hidden behind dense overgrowth, suffering from water quality and acute flooding issues. Through decades of disinvestment, safe access to the Creek has also been disconnected from the majority Black community of North Riverside – though it is one of few open spaces available. In collaboration with the City of Jacksonville and a range of local partners, stakeholders, and community members providing input throughout the planning process, the McCoy's Creek Recreation and Restoration Plan proposes a vision for the creek that aims to equitably reduce flooding, improve water quality, restore native ecosystems and habitats, expand recreational opportunities through a greenway and network of public destinations connecting communities along the Creek's edge; link into Jacksonville's regional Emerald Trail system with dedicated lanes for cyclists and pedestrians; and establish wayfinding that honors the Creek's rich social and cultural history.

SIZE
5 linear miles

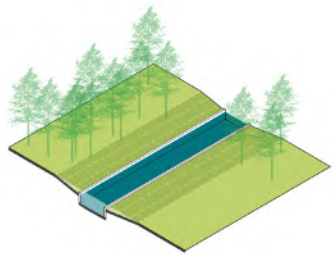
CLIENT
City of Jacksonville
Groundwork Jacksonville

YEARS
2018 - Ongoing

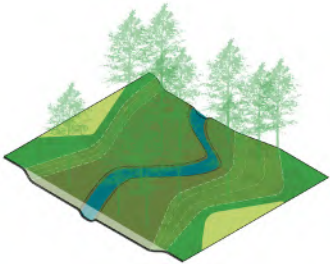
SERVICES
Environmental Planning,
Ecological Design,
Landscape Architecture

COLLABORATORS
Wood
CDM Smith

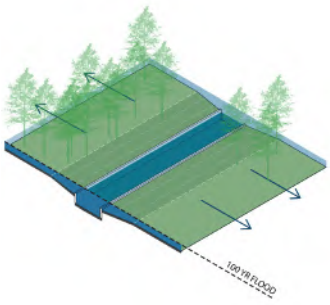
REFERENCE
Nikita L. Reed
Project Manager
City of Jacksonville
nreed@coj.net
(904) 255-8702



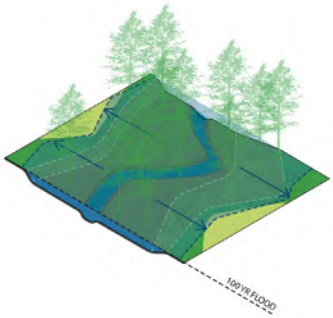
CURRENT CREEK CONDITION



FUTURE CREEK CONDITION



CURRENT CREEK CONDITION DURING FLOOD



FUTURE CREEK CONDITION DURING FLOOD

Overview of entire project area and priority open space projects

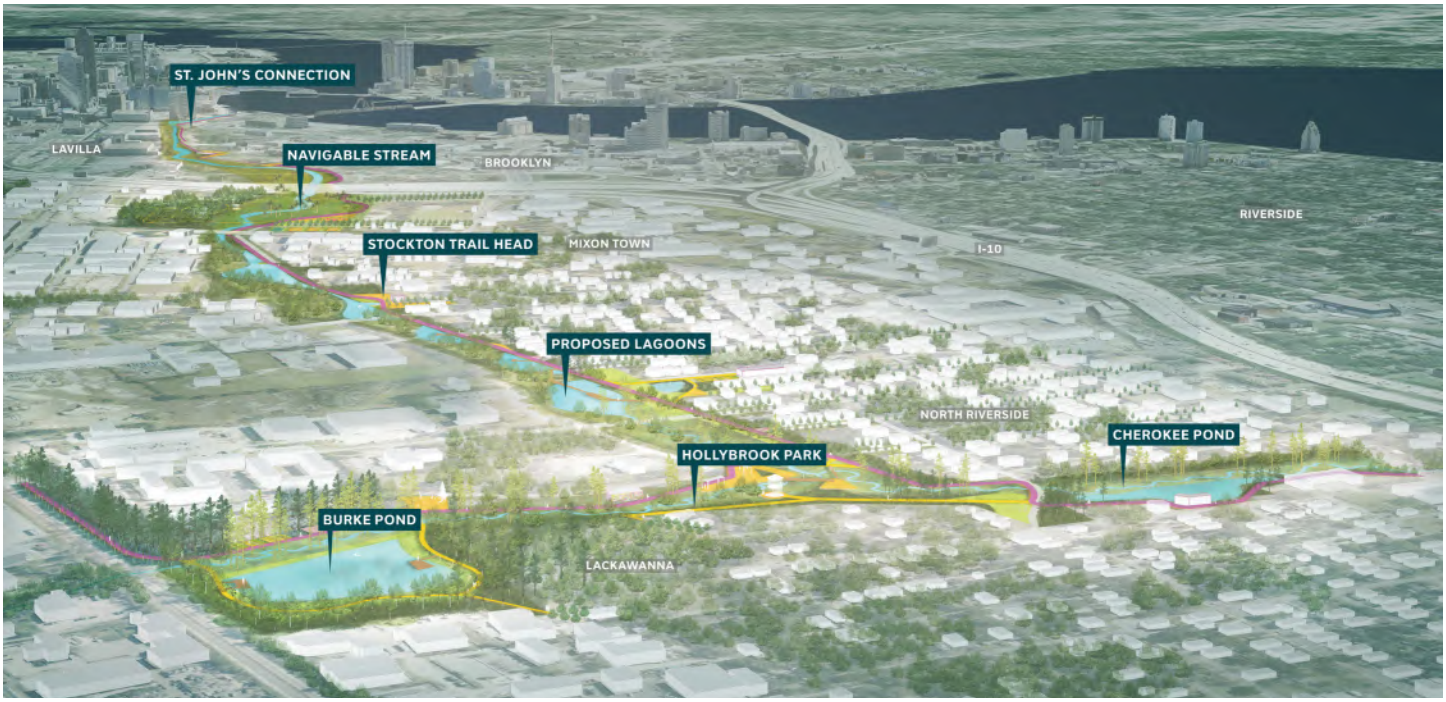
(From above to below) Multimodal path through Forest Park; Pedestrian and bike bridge over lagoon and cypress cove; Broward Bay overlook

Play area, pollinator meadow, seating grove and wetland overlook at Hollybrook Creek Park

McCoy's Creek Fest—a day of interactive outdoor activities along McCoy's Creek with area residents and stakeholders

Certain areas of the trail are restored as wet-bottom ecosystems, allowing water to flow from lagoons (left) into adjacent cypress coves (right)

The project circumnavigates existing infrastructure, restoring the historic creek while creating new access points in multiple neighborhoods



Looking toward St. Johns River and downtown Jacksonville with the 'branches' of a restored McCoy's Creek in the foreground

SCAPE

CHINA BASIN PARK

SAN FRANCISCO, CA

Bound by 3rd Street, McCovey Cove and the San Francisco Bay, China Basin Park is a 5-acre waterfront park intended to be the cultural and recreational centerpiece for the planned Mission Rock neighborhood—foregrounding the pulsing, living systems of the Bay.

Firmly rooted in the character of Bay Area neighborhoods and anchored by an open and generous lawn, China Basin Park also provides a future-ready intertidal landscape and beach. Tidal shelves carved into the park 'give back' to nature while creating a shifting, biodiverse intertidal landscape and water access point. The park's topography shapes diverse spaces—including an open lawn with expansive views of the Bay Bridge and Oracle Park; a central plaza and restaurant pavilion; and a lifted grove lit by catenary lights, designed for flexible programming and cultural events. A segment of the Bay Trail also runs directly through the site, linking it to a 500-mile regional trail network that connects 47 cities.

The park promises to condense the energy of the urban destinations surrounding it while offering unfettered access to the water's edge, showcasing the area's distinct history and ecology.

SIZE
5 acres

CLIENT
Mission Rock Partners
(The San Francisco Giants, Tishman Speyer and the Port of San Francisco)

YEARS
2018 - Ongoing

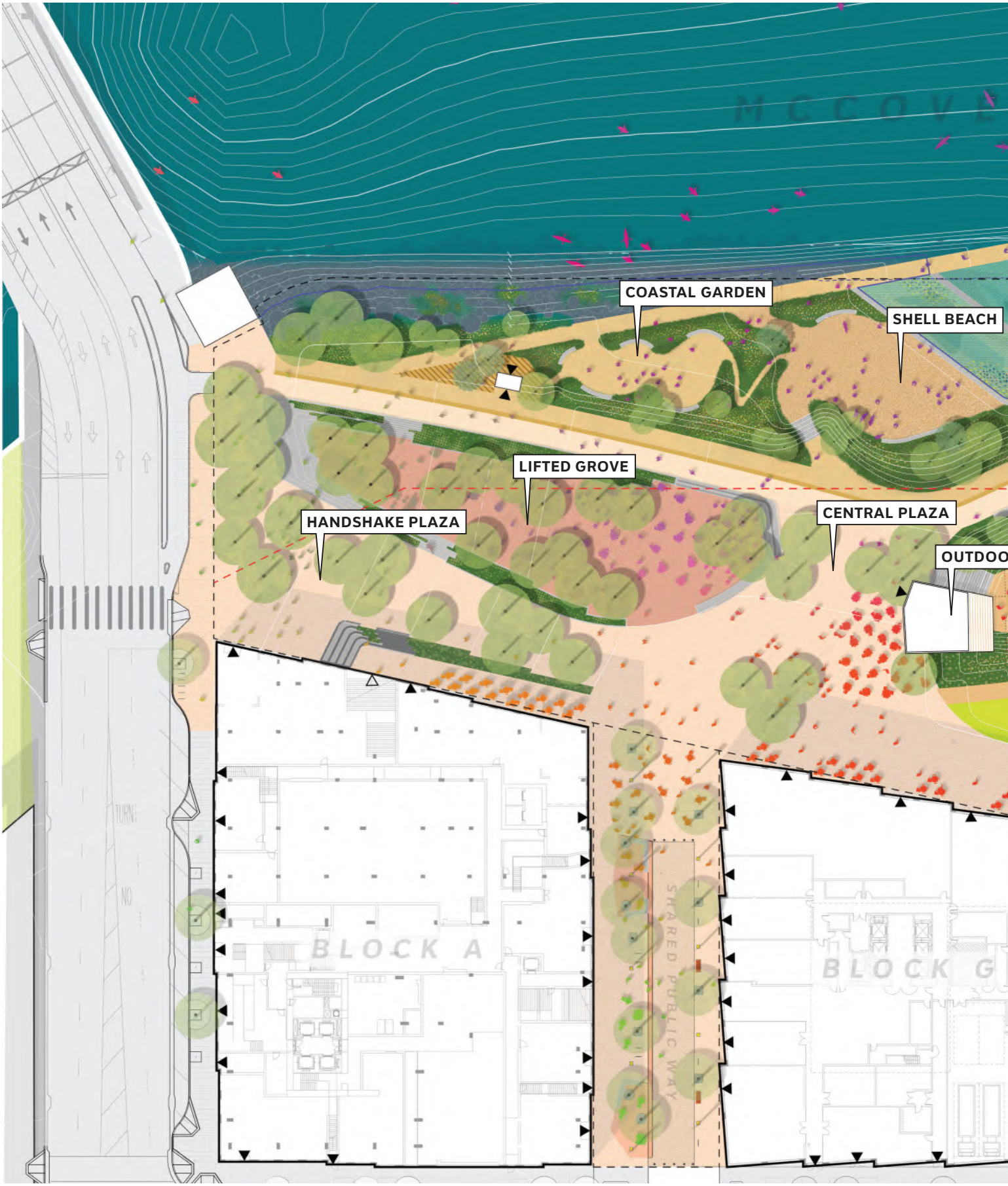
SERVICES
Landscape Architecture, Urban Design, Ecological Design

COLLABORATORS
Min Design
Miller Company
Pannu Larsen McCartney
MK Engineers
Abundant Playscapes

REFERENCE
Andre Krause
Director, Tishman Speyer
akrause@tishmanspeyer.com
(310) 594-2125

Tidal shelves at evening

(Above to below) Tidal shelves during daytime; lawn leading down to Bay overlook; central plaza, lifted grove and cafe bustling on game day


COASTAL GARDEN
SHELL BEACH
LIFTED GROVE
HANDSHAKE PLAZA
CENTRAL PLAZA
OUTDOO
BLOCK A
SHARED PUBLIC WAY
BLOCK G

Illustrative plan

SCAPE

LIVING BREAKWATERS

STATEN ISLAND, NY

Widely considered a model for climate-adaptive green infrastructure, Living Breakwaters is a $107 million project with a layered approach to risk reduction—enhancing physical, ecological and social resilience along the South Shore of Staten Island. The project consists primarily of 2,400 linear feet of near-shore breakwaters—partially submerged structures built of stone and ecologically-enhanced concrete units—that will break waves, reduce (and eventually reverse) erosion of the beach along Conference House Park, and provide a range of habitat spaces for oysters, fin fish and other marine species.

The Living Breakwaters concept was developed by a large, multi-disciplinary team led by SCAPE as part of a winning proposal for Rebuild By Design, the design competition launched by the U.S. Department of Housing and Urban Development (HUD) after Superstorm Sandy. The breakwaters are designed to reduce the impact of climate-intensified weather events on the low-lying coastal community of Tottenville, which experienced some of the most damaging waves in the region and tragic loss of life during Superstorm Sandy.

Informed by extensive hydrodynamic modeling, the breakwaters are also designed to slow and, eventually, reverse decades of beach erosion along the Tottenville shoreline. The breakwaters will also be constructed with “reef ridges” and “reef streets” that provide diverse habitat space, with live oyster installation expected to follow construction completion.

Beyond the physical breakwaters, the project aims to build social resilience in Tottenville through educational programs for local schools in partnership with the Billion Oyster Project (BOP). Construction on the breakwaters began in August 2021.

SIZE
350 acres (overall project)
8.73 acres (breakwaters)

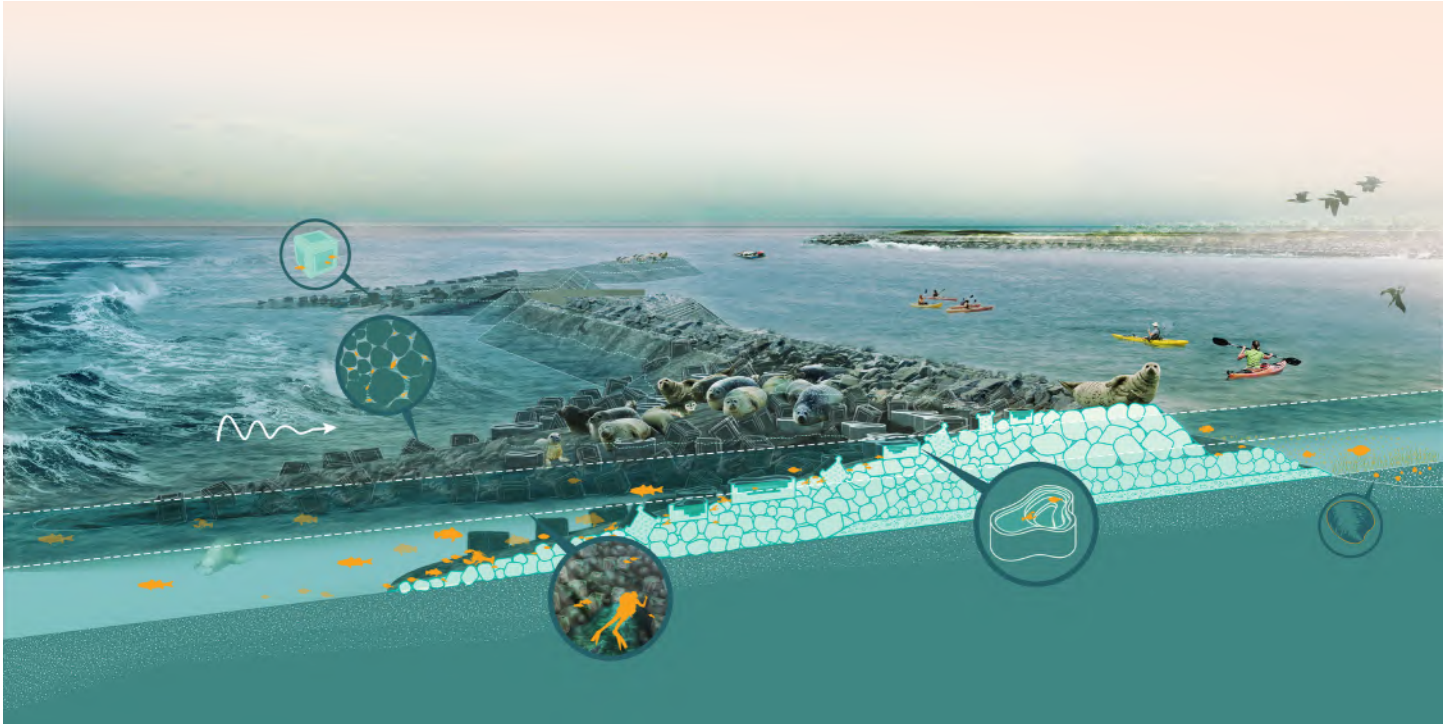
CLIENT
NYS Governor’s Office of Storm Recovery (GOSR)

YEARS
2014 - ongoing

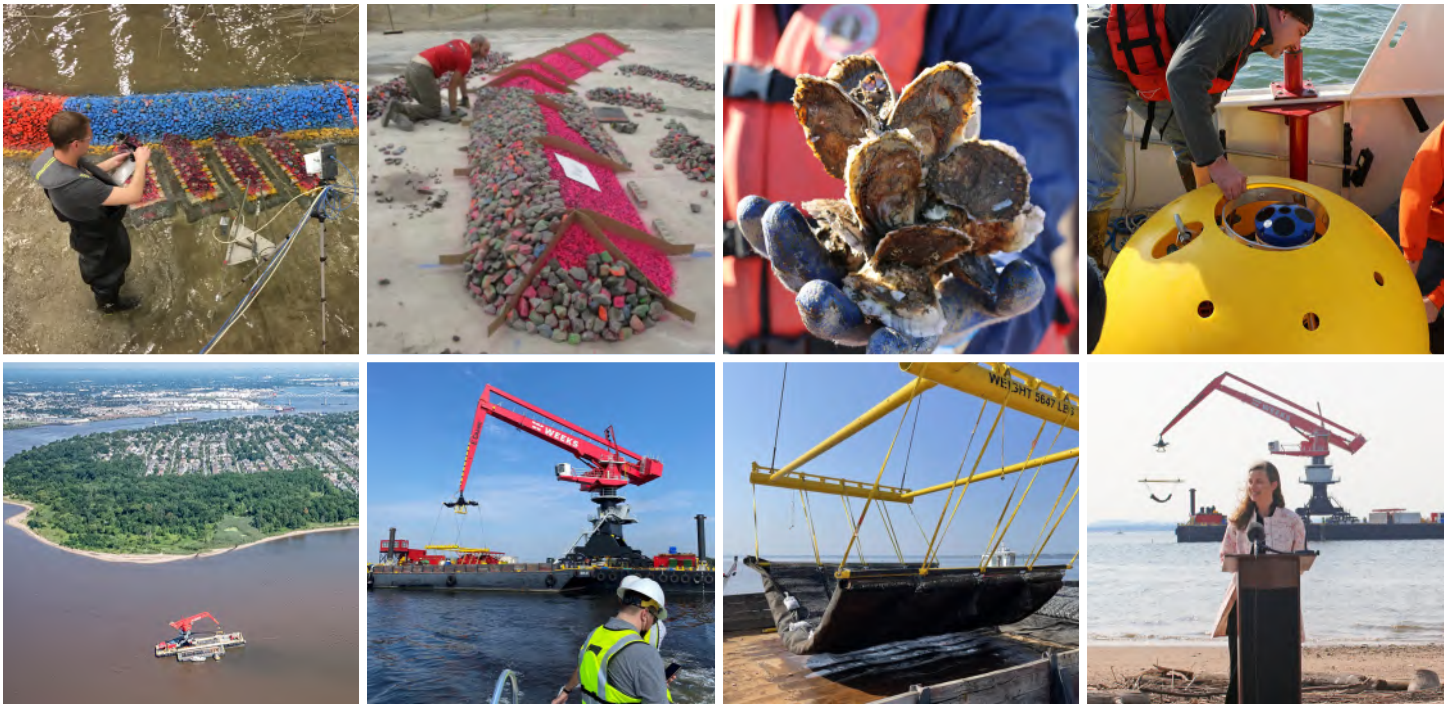
SERVICES
Infrastructure Design, Planning, Engagement

COLLABORATORS
COWI, Arcadis, SeArc Ecological Marine Consulting, WSP, MFS Engineers, Prudent Engineering, LOT-EK, The Billion Oyster Project, Weeks Marine, Ramboll, Baird, AKRF

REFERENCE
Scott Narod
Project Manager for Living Breakwaters, NYS Governor’s Office of Storm Recovery (GOSR)
scott.narod@nysandyhelp.ny.gov

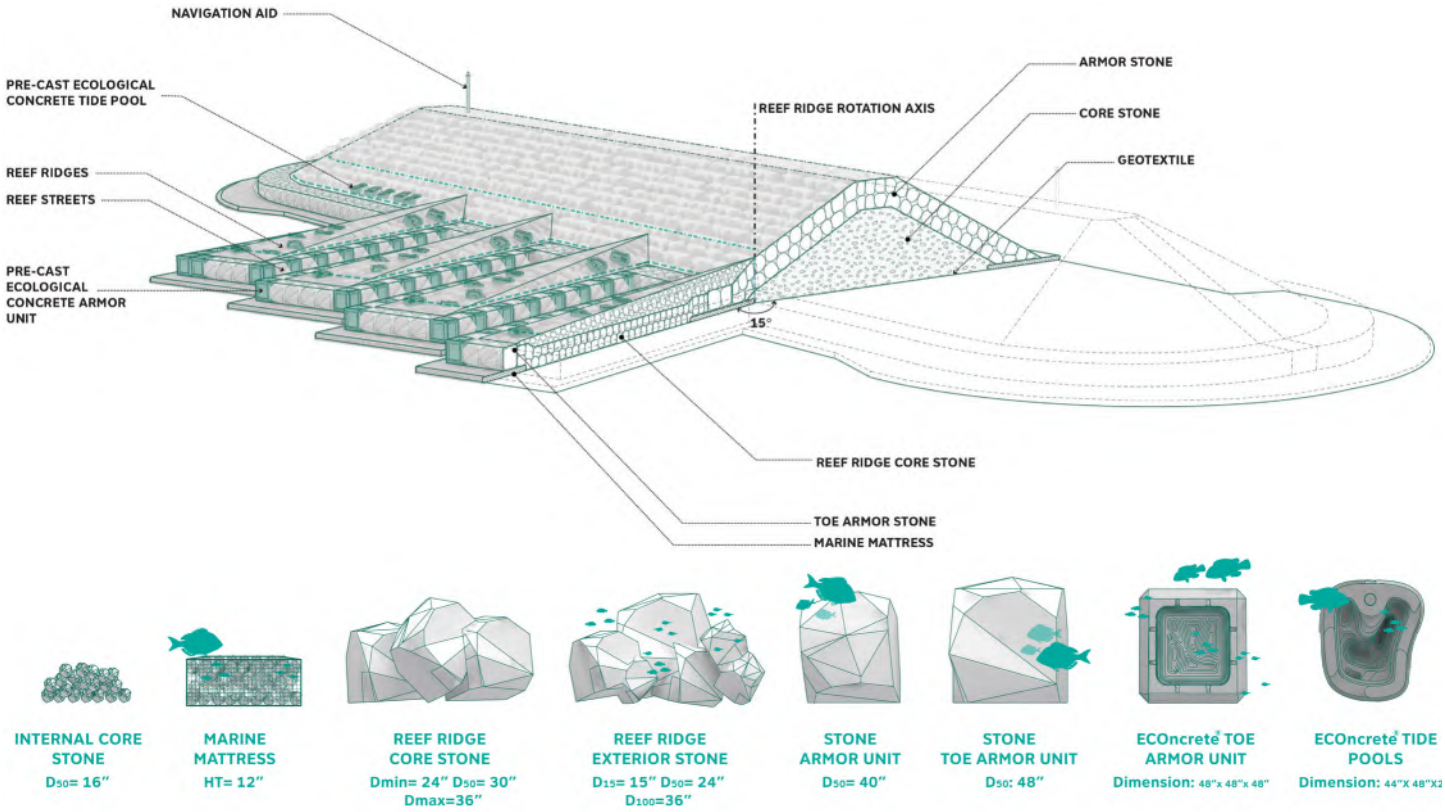


Breakwaters attenuating wave action and providing habitat space



(Above) Physical hydrodynamic modeling and public engagement; (Below) Construction kick-off and placement of marine mattresses below breakwaters

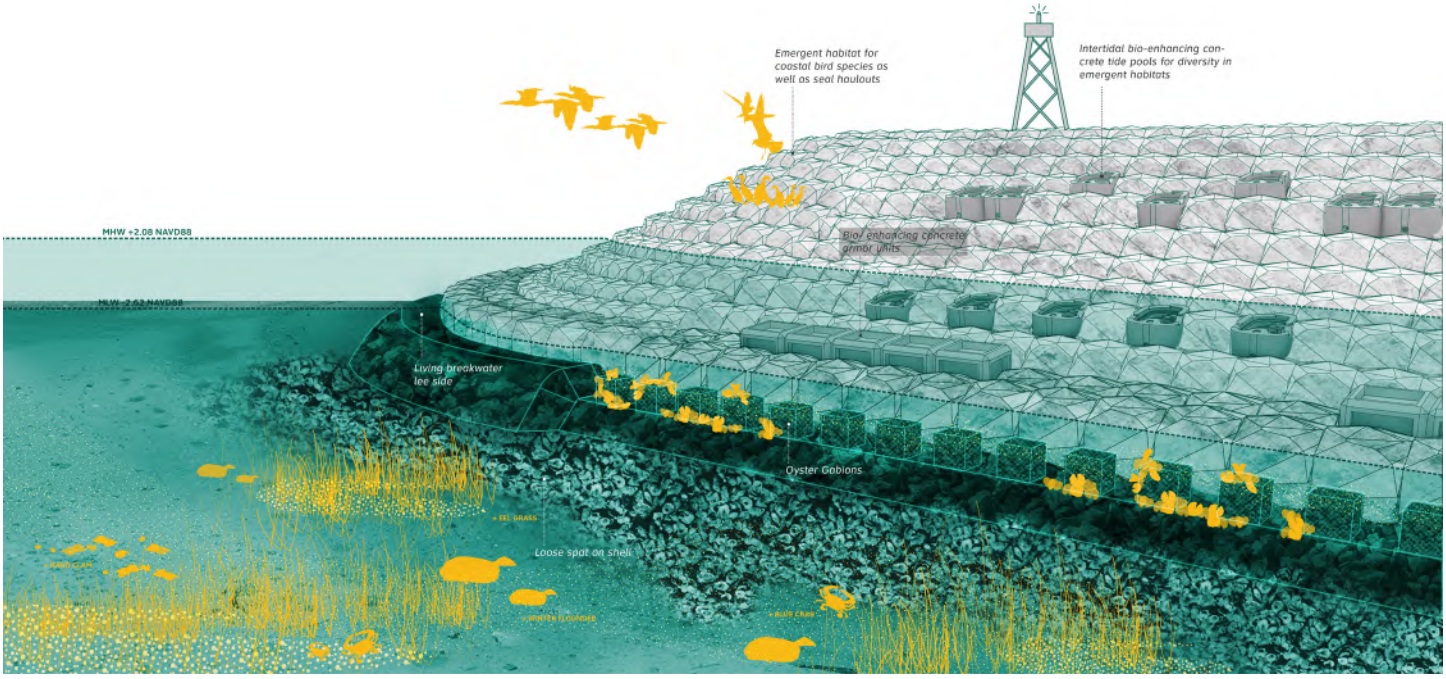
Overall Living Breakwaters project including in-water and on-shore restoration and educational partnerships with local public schools

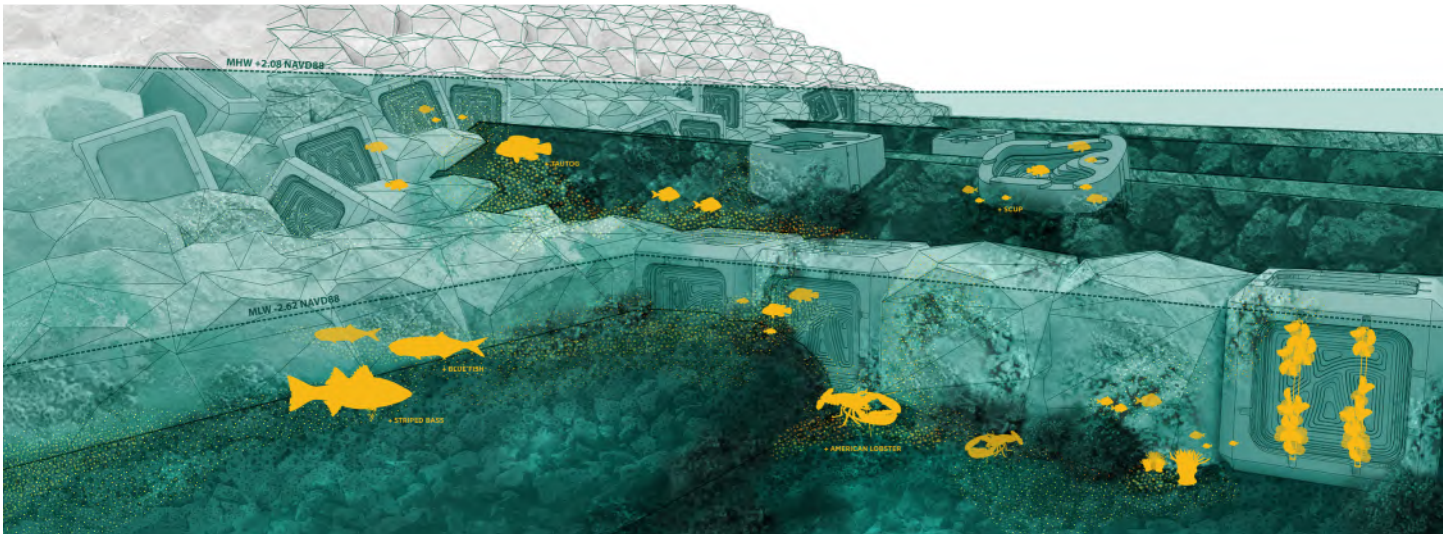


Materials and section perspective of a single breakwater

(Left) Living Breakwaters Curriculum co-developed with the Billion Oyster Project; (Right) Living Breakwaters habitat and species model

(Left) Living Breakwaters exhibit at the New York Historical Society; (Right) Installation at Staten Island Ferry Terminal





(Above) Small-grain intertidal habitat with flounder, crab and oysters; (Below) Rocky habitat with lobster and fin fish

SCAPE

HUDSON HIGHLANDS FJORD TRAIL

COLD SPRING & BEACON, NY

SCAPE is designing the master plan for a linear park and trail network along the Hudson River, providing safe access and reducing ecological stress to some of the Hudson Valley's most popular hiking destinations. The park will reconnect visitors to the river's edge, restore critical ecosystems, and create a choreographed experience of the Hudson Highlands while minimizing the impacts of heavy tourism on local communities.

Drawing inspiration from the material palette of the Hudson River School of painting, SCAPE designed an array of destinations along the Fjord Trail that foreground the area's inherent ecological diversity, encouraging restoration and stewardship along the river's edge, highlands, forest, and marsh.

Among these sites area family-friendly beach, interpretive archaeological sites, outdoor classrooms for school groups and adult classes, quiet spaces for contemplation and enjoyment of the scenery, and improved access to several trailheads within the Hudson Highlands State Park Preserve, including Breakneck Ridge—one of the top day hike destinations in the U.S.

SIZE
7.5 linear miles

CLIENT
Scenic Hudson

YEARS
2019 - 2020

SERVICES
Master Planning

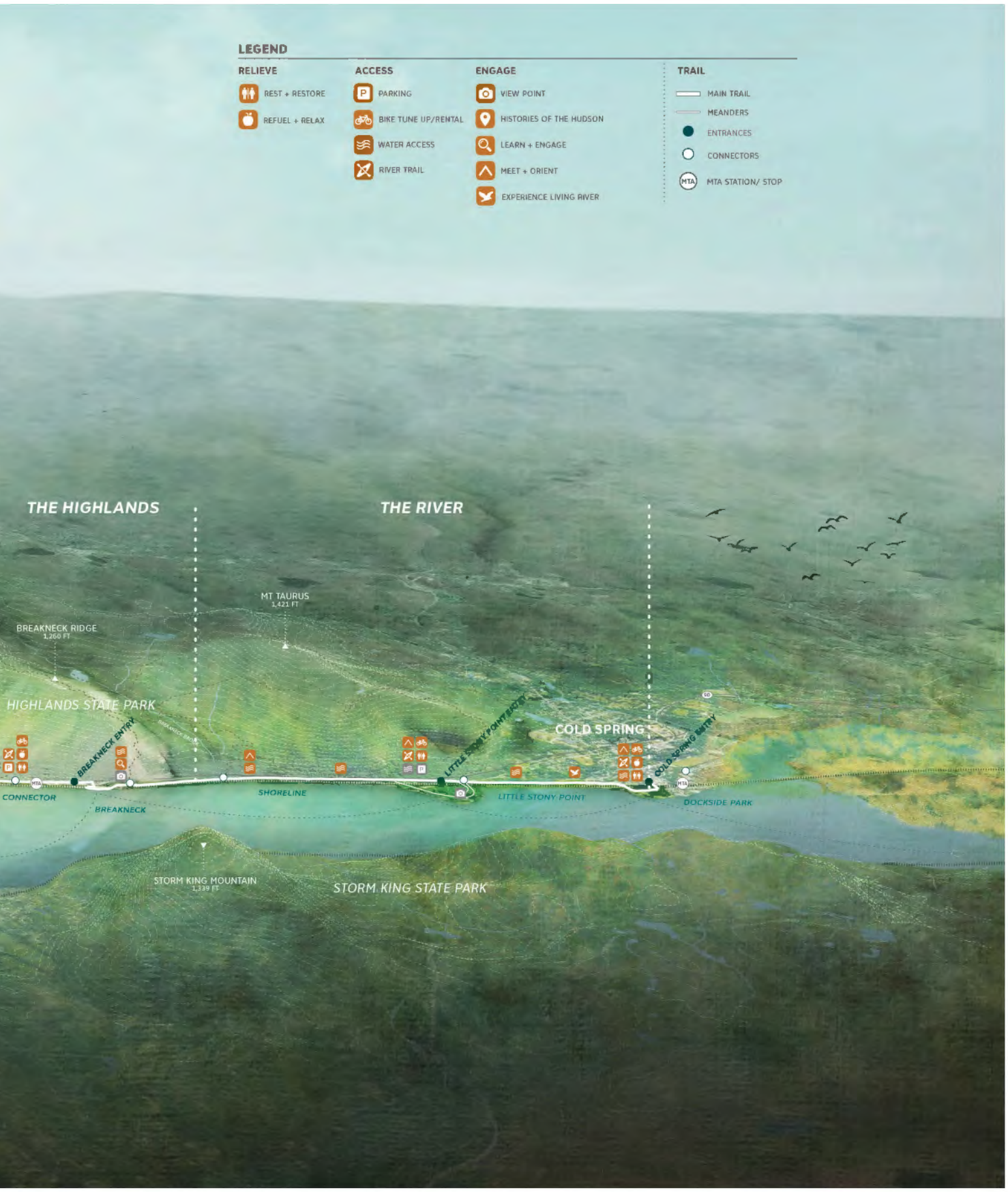
COLLABORATORS
Gray Organschi Architecture
Langan

REFERENCE
Amy Kacala
Executive Director, Hudson Highlands Fjord Trail
Scenic Hudson
akacala@scenichudson.org
(845) 473-3330 x 276

Fjord Trail zones from Cold Spring to Beacon along the Hudson River

Destinations and seasonal interest along the Fjord Trail

Overall plan of the linear park and trail network


LEGEND
RELIEVE
REST + RESTORE
REFUEL + RELAX
ACCESS
PARKING
BIKE TUNE UP/RENTAL
WATER ACCESS
RIVER TRAIL
ENGAGE
VIEW POINT
HISTORIES OF THE HUDSON
LEARN + ENGAGE
MEET + ORIENT
EXPERIENCE LIVING RIVER
TRAIL
MAIN TRAIL
MEANDERS
ENTRANCES
CONNECTORS
MTA STATION/ STOP
THE HIGHLANDS
THE RIVER
MT TAURUS
1,421 FT
BREAKNECK RIDGE
1,260 FT
HIGHLANDS STATE PARK
BREAKNECK ENTRY
COLD SPRING
COLD SPRING ENTRY
CONNECTOR
BREAKNECK
SHORELINE
LITTLE STONY POINT
DOCKSIDE PARK
STORM KING MOUNTAIN
1,339 FT
STORM KING STATE PARK

TOWN OF PALM BEACH

LIST OF PROPOSED SUBCONTRACTORS FORM

The undersigned bidder hereby designates, as follows, all major subcontractors whom he/she proposes to utilize for the major areas of work for the project. The bidder is further notified that all subcontractors shall be properly licensed, bondable and shall be required to furnish the TOWN with a Certificate of Insurance in accordance with the contract general conditions. Failure to furnish this information shall be grounds for rejection of the bidder's proposal. (If no subcontractors are proposed, state "None" on first line below.)

Name and Address of Subcontractor	Scope of Work	License #
1. GHD Services, Inc.	Coastal Engineering	P.E., Brian Moore - PE64017
Michael R. Barnett, PE, D.CE - michael.barnett@ghd.com	Structural Engineering	FL Dept of State F03000005291
Senior Coastal Engineer, Associate - 251-300-1250	Storm Water/Drainage Engineering	Prof Geologist, Enos Gabriellem - PG605
3750 Airport Blvd.	Local Expertise	FL. Prof. Surveyor and Mapper - #LB8496
Mobile, AL 36608		
2. Coastal Protection Engineering, LLC	Coastal Engineering	Palm Beach County Small
Thomas Pierro, PE, D.CE - 561-756-2535	Ecological Resources	Business Enterprise (SBE) #VS0000014339
Principal Engineer - tpierro@coastalprotectioneng.com	Shore Protection Program	PE, Thomas Pierro - PE64683
5301 N. Federal Hwy, Ste 335	Local Expertise	FL Dept of State L19000166989
Boca Raton, FL 33487		FL DBPR No 33370
3. SCAPE Landscape Architecture, DPC	Landscape Architecture	Woman-owned Business Enterprise (WBE)
Pippa Brashear, RI.A - pippa@scapestudio.com	Designing for Resilience	Register Landscape Architects
Resilience Principal - 212-462-2628	Rendering/Visualization	
277 Broadway Ninth Floor		
New York, NY 10007		
4. Sobis, Inc.	Economic Analysis	Small, Woman and Minority
William M. Bohn - bbohn@sobisinc.com	Climate Change Adaptations	Owned 8(a) Business DUNS 079250053
Risk Assessment Specialist - 540-424-9624		
11812 Arbor Glen Drive		
Fredericksburg, VA 22407		
5.		

Signature and Date R. P. Hamilton May 2, 2022

Title/Company President, Woods Hole Group

TOWN OF PALM BEACH

MINIMUM QUALIFICATIONS FORM

Contractors (Bidder) shall provide adequate information with its bid to demonstrate that it satisfies the following minimum as set forth below. The Town will consider what types of experience the Bidder has when making a determination of award. All decisions of the Town are final. Contractors, with its bid, must demonstrate successful performance and relevant experience and qualifications with respect to projects comparable in type, size, complexity, and scheduling as provided for in these bid documents.

Company: Woods Hole Group, Inc.	Solicitation: RFQ No. 2022-16 Coastal Resiliency Consultant for Town of Palm Beach
Part I— Contract Information	
Customer Name: Town of Falmouth	Contact Name: Jennifer Lincoln
Project Location: Surf Drive, Falmouth, MA	Contact Title: Conservation Commission Administrator
	Contact Email: jennifer.lincoln@falmouthma.gov
	Contact Phone: 508-495-7446
Contract Identification Number: N/A	
Type of Contract: Fixed Fee	Orignal Dollar Value: ~$95,000
Contract Start Date: August 1, 2019	Final Dollar Value: ~$95,000
Contract Completion Date: June 30, 2021	Estimated/Actual - Completion Date: June 30, 2021
Explanation of Cost Growth/Change Orders (if applicable): N/A	
Part II—Project Description and Relevance	
Relevancy: This project is relevant to Palm Beach because it specifically involves contracts with a municipality (Town of Falmouth) addressing coastal resilience in the midst of present flood risk that is increasing in the future with sea level rise and increasing storm intensity. In this case, the project is focused on protecting and potentially relocating an important low-lying road segment at risk, along with a bike path, and utility infrastructure. The project also involves shared grant funding from a state program, and depends on results from a high-resolution flood risk model.	
Specific Scope of Work Performed in Similar Areas: Woods Hole Group conducted a detailed town-wide climate change flood vulnerability assessment in 2020 which identified the Surf Drive area as one of the most vulnerable areas in town. Surf Drive is a well-traveled coastal roadway & bike path providing access to town beaches which also has a sewer main line & pump station running under/adjacent to the roadway. Surf Drive already experiences significant stressors (e.g., regulat inundation, erosion, overtopping, storm damage, etc.) under today's climet conditions. Climate change and sea-level rise will increase the frequency and severity of these stressors, resulting in increased vulnerability in the future. Woods Hole Group developed a plan to increase the coastal resiliency of the Surf Drive area incorporating phased management by identifying key time frames and sea level thresholds for action. The four themes used to develop potential actions to address the study area vulnerabilities included emphasis on 1) ecosytem health and resilience, 2) protection and maintenance of infrastructure, 3) maintenance of access transportation, and utiliey corridors, and 4) managed retreat of costly, at risk infrastructure. (See Section 1.3.1 and Attachment B).	

****Please only use one (1) form for each project reference being used****

TOWN OF PALM BEACH

MINIMUM QUALIFICATIONS FORM

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Company: Woods Hole Group, Inc.	Solicitation: RFQ No. 2022-16 Coastal Resiliency Consultant for Town of Palm Beach
Part I— Contract Information	
Customer Name: The City of Boston	Contact Name: Sanjay Seth
Project Location: Moakley Park, Boston, MA	Contact Title: Climate Resilience
	Contact Email: sanjay.seth@boston.gov
	Contact Phone: 617-635-4000
Contract Identification Number: BPR 1901	
Type of Contract: Fixed Fee	Orignal Dollar Value: ~$104,000
Contract Start Date: August 4, 2019	Final Dollar Value: ~$104,000
Contract Completion Date: Ongoing	Estimated/Actual - Completion Date: Ongoing
Explanation of Cost Growth/Change Orders (if applicable): N/A	
Part II—Project Description and Relevance	
Relevancy: This project is relevant to Palm Beach because it specifically involves contracts with a municipality (City of Boston) addressing coastal resilience in the midst of present flood risk that is increasing in the future with sea level rise and increasing storm intensity. In this case, the project focuses on protecting extensive landward infrastructure of East Boston. The project also involves shared grant funding from a state program, depends on results from a high-resolution flood risk model, and is part of the broader Climate Ready Boston initiative.	
Specific Scope of Work Performed in Similar Areas: Working with a multi-disiplinary team, Woods Hole Group provided climate change assessment, coastal engineering and design, and flood risk modeling services in the overall development of the Master Plan for Moakley Park. While Moakley Park itself is at potential flood risk in the future, it also represented a major flood pathway for the City of Boston, as flood water entering through Moakley Park extended to the north and south flooding major portions of the City. Therefore, the Master Plan for Moakley Park focused not only on improving the public amenities and recreational value of Moakley Park, but also building resilience for the Park and inland areas. Woods Hole Group provide sea level rise, storm risk assessment, and coastal expertise throughout the development of the vision plan and master plan process. (See Section 1.3.1 and Attachment B).	

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TOWN OF PALM BEACH

MINIMUM QUALIFICATIONS FORM

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Company: Woods Hole Group, Inc.	Solicitation: RFQ No. 2022-16 Coastal Resiliency Consultant for Town of Palm Beach
Part I— Contract Information	
Customer Name: Town of Braintree	Contact Name: Kelly Phelan
Project Location: Watson Park, Braintree, MA	Contact Title: Planning & Community Development
	Contact Email: kphelan@braintreema.gov
	Contact Phone: 781-794-8233
Contract Identification Number: N/A	
Type of Contract: Fixed Fee	Orignal Dollar Value: ~$105,000
Contract Start Date: Sept 24, 2019	Final Dollar Value: ~$280,000
Contract Completion Date: Ongoing	Estimated/Actual - Completion Date: Ongoing
Explanation of Cost Growth/Change Orders (if applicable): N/A	
Part II—Project Description and Relevance	
Relevancy: This project is relevant to Palm Beach because it specifically involves contracts with a municipality (Town of Braintree) addressing coastal resilience in the midst of present flood risk that is increasing in the future with sea level rise and increasing storm intensity. In this case, the project focuses on protecting landward infrastructure including roads, housing community, and recreational parks and fields. The project also involves shared grant funding from a state program, and depends on results from a high-resolution flood risk model. It is currently being constructed and includes a range of elements pertinent to Palm Beach including tidal wetland sill, flood protection berm, and innovative storm water management measures to retain and return water to the sea.	
Specific Scope of Work Performed in Similar Areas: Watson Park is an urban park located on the Weymouth Fore River in Braintree, MA. The park's shoreline had been experiencing significant erosion, which threatened existing coastal resource areas and recreational use of the park. Woods Hole Group has assisted the Town of Braintree in acquiring four years of CZM Coastal Resilience Grant funding to 1) conduct a feasibility study, 2) design and permit a living shoreline design to mitigate the ongoing erosion, improve the coastal resiliency of the property, and restore historic salt marsh habitat, 3) develop final construction drawings and bid documents in preparation for project implementation, and 4) construction The project is being constructed presently, and includes unique design aspects, such as: • Salt marsh sill, essentially restoring salt marsh on an unvegetated mud flat, for energy buffering capacity, to establish a baseline for more protection landward, and to incorporate a living shoreline approach. • Flood protection berm landward of restored marsh to mitigate flood risk up to 2070 flood horizon. • Rain gardens and drainage systems landward of the berm to accommodate storm water from precipitation and potential berm overtopping, and return flood waters back to the Fore River to prevent sustained upland flooding. • Long-term vision to even remove the berm and allow for natural wetland migration in the future should climate change eventually result in exceedance of the 2070 planning horizon. (See Section 1.3.1 and Attachment B)	

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TOWN OF PALM BEACH

MINIMUM QUALIFICATIONS FORM

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Company: Woods Hole Group, Inc.	Solicitation: RFQ No. 2022-16 Coastal Resiliency Consultant for Town of Palm Beach
Part I— Contract Information	
Customer Name: Town of Sandwich	Contact Name: David Decoto
Project Location: Sandwich, MA	Contact Title: Director, Dept of Natural Resources
	Contact Email: ddeconto@sandwichmass.org
	Contact Phone: 508-833-8054
Contract Identification Number: N/A	
Type of Contract: Fixed Fee	Orignal Dollar Value: ~$105,000
Contract Start Date: Oct 7, 2021	Final Dollar Value: ~$105,000
Contract Completion Date: Ongoing	Estimated/Actual - Completion Date: Ongoing
Explanation of Cost Growth/Change Orders (if applicable): N/A	
Part II—Project Description and Relevance	
Relevancy: This project is relevant to Palm Beach because it specifically involves contracts with a municipality (Town of Sandwich) addressing coastal resilience in the midst of present flood risk that is increasing in the future with sea level rise and increasing storm intensity. The project is focused on boosting coastal resilience. on the exposedopencoast and back bay sides of the Town, much like Palm Beach. On the exposed coast, the program depends on a beach and dune restoration initiative. On the back bay side, various initiatives are being introduced to manage floodwaters. The project also involves shared grant funding from a state program, and depends on results from a high-resolution flood risk model. It is partly constructed, and partly in the planning and permitting stages. The work also involves collaboration with the US Army Corps of Engineers with adjacent federal channel and inlet system that interrupts natural sediment transport.	
Specific Scope of Work Performed in Similar Areas: Woods Hole Group conducted a detailed vulnerability assessment for municipal infrastructure and natural resources for the Town of Sandwich. The vulnerability assessment was funded by a Municipal Vulnerability Preparedness (MVP) Program Action Grant and focused on two top hazards identified in Sandwich's Community Resilience Building Workshop – sea level rise and storm surge. The study prioritized high risk assets and provided recommendations for physical adaptations and regulatory changes. Collaboration with the Town's Steering Committee was essential to understand the importance of each asset to the Town's ability to provide municipal services. Additionally, education and outreach were emphasized throughout the project, and laid the foundation for a follow-on MVP Action Grant to develop an ArcGIS StoryMap highlighting the Town's coastal resilience program and demonstrating the benefits of healthy and robust green infrastructure.	

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TOWN OF PALM BEACH

MINIMUM QUALIFICATIONS FORM

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Company: Woods Hole Group, Inc.	Solicitation: RFQ No. 2022-16 Coastal Resiliency Consultant for Town of Palm Beach
Part I— Contract Information	
Customer Name: Town of Duxbury	Contact Name: Valerie Massard
Project Location: Duxbury, MA	Contact Title: Director, Dept of Natural Resources
	Contact Email: Massard@town.duxbury.ma.us
	Contact Phone: 781-834-1100
Contract Identification Number: N/A	
Type of Contract: Fixed Fee	Orignal Dollar Value: ~$132,000
Contract Start Date: July 29, 2019	Final Dollar Value: ~$132,000
Contract Completion Date: June 30, 2020	Estimated/Actual - Completion Date: June 30, 2020
Explanation of Cost Growth/Change Orders (if applicable): N/A	
Part II—Project Description and Relevance	
Relevancy: This is another project relevant to Palm Beach because it is direct work for a municipality (Town of Duxbury) addressing coastal risk and resilience through a detailed vulnerability assessment and adaptation study. This work was funded in part by a State grant program geared towards Municipal Vulnerability Preparedness similar to Resilient FL. Additionally, this study included an assessment of an important harbor business district including public and private infrastructure much like those found in Palm Beach. This involved working with the Town, a regional planning authority, and business owners to identify the importance of each infrastructure asset for providing municipal services to support operations and commercial activities within the harbor.	
Specific Scope of Work Performed in Similar Areas: Woods Hole Group conducted a detailed vulnerability assessment for municipal infrastructure and natural resources for the Town of Duxbury, and private infrastructure in an important waterfront business district (Snug Harbor). The sea level rise and storm surge vulnerability assessment was funded by a Massachusetts Municipal Vulnerability Preparedness (MVP) Program Action Grant. The study prioritized high risk assets and provided recommendations for physical adaptations and regulatory changes. Additionally, Woods Hole Group used the Sea Level Affecting Marshes Model (SLAMM) to identify potential flooding impacts to natural resources and highlight opportunities to facilitate marsh migration. Wherever practicable, Woods Hole Group identified regional solutions using nature-based or hybrid solutions. Woods Hole Group worked closely with the Town's Steering Committee and Snug Harbor stakeholders to understand the importance of each asset to the Town's ability to provide municipal services and the operations of each Snug Harbor business or non-profit. Woods Hole Group developed a customized asset rating system that enabled Snug Harbor organizations to assess the economic, operational, and business planning impacts of asset flooding. Woods Hole Group also collaborated with the Metropolitan Area Planning Council on Snug Harbor resilience planning and public outreach. (See Section 1.3.1 and Attachment B)	

****Please only use one (1) form for each project reference being used****

2022 FOREIGN PROFIT CORPORATION ANNUAL REPORT

DOCUMENT# F13000005207

FILED
Jan 25, 2022
Secretary of State
8368512638CC

Entity Name: THE WOODS HOLE GROUP, INC.

Current Principal Place of Business:

107 WATERHOUSE RD
BOURNE, MA 02532

Current Mailing Address:

107 WATERHOUSE RD
BOURNE, MA 02532 US

FEI Number: 04-3408801

Certificate of Status Desired: No

Name and Address of Current Registered Agent:

REGISTERED AGENTS INC
7901 4TH STREET N,
SUITE 300
ST.PETERSBURG, FL 33702 US

The above named entity submits this statement for the purpose of changing its registered office or registered agent, or both, in the State of Florida.

SIGNATURE:

Electronic Signature of Registered Agent

Date

Officer/Director Detail :

Title	PRESIDENT	Title	TREASURER, SECRETARY
Name	HAMILTON, ROBERT P JR	Name	FOULQUIER, CARINE AUDREY
Address	107 WATERHOUSE RD	Address	107 WATERHOUSE RD
City-State-Zip:	BOURNE MA 02532	City-State-Zip:	BOURNE MA 02532

Title	CHAIRMAN
Name	VASSAL, CHRISTOPHE
Address	11 RUE HERMES
City-State-Zip:	RAMONVILLE 31520

I hereby certify that the information indicated on this report or supplemental report is true and accurate and that my electronic signature shall have the same legal effect as if made under oath; that I am an officer or director of the corporation or the receiver or trustee empowered to execute this report as required by Chapter 607, Florida Statutes; and that my name appears above, or on an attachment with all other like empowered.

SIGNATURE: CARINE FOULQUIER CFO 01/25/2022

Electronic Signature of Signing Officer/Director Detail

Date