COASTAL RESILIENCE GRANT PROGRAM FY20
RFR ENV 20 CZM 02

Applicant: **The Town of Tisbury**

Address: **51 Spring Street**
Tisbury, MA 02568

Project Manager:

Name: **John W. Grande**
Department: **Town Administrator**
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Type of Resilience Project:

1. Detailed Vulnerability and Risk Assessments
2. Public Education and Communication
3. Local Bylaws, Adaptation Plans, and Other Management Measures

Project Title: ***Evaluation of Coastal Processes and Storm Impacts to Support Resilient Planning and Mitigation Strategies for the Vineyard Haven Harbor Shoreline***

Total Project Cost: $173,546

Match Amount: $43,595

Grant Amount Requested: $129,951

Project Summary: The Town of Tisbury is requesting funding assistance through the *FY20 Coastal Resilience Grant Program* to develop an understanding of coastal processes and storm flooding to support a detailed analysis of potential shoreline management strategies that will provide resiliency for the Vineyard Haven Harbor shoreline over the next 50 years. To provide a more detailed quantitative assessment of both the risks and potential mitigation strategies, an evaluation of coastal processes and potential storm damage related to infrastructure in Vineyard Haven Harbor is proposed. This analysis would include an evaluation of tidal, wave, and sediment transport dynamics within the harbor system, including the Lagoon Pond shoreline in the vicinity of Beach Road. The evaluation also will incorporate a quantitative assessment of severe storms as it relates to both tidal flooding (storm surge "pathways") and wave overtopping/damage along the district referred to as the "Harbor/Lagoon Pond/SSA Triangle". The storm assessments will include present conditions, as well as anticipated sea-level rise over the next 30-to-50 years. The overall study area will extend along the Vineyard Haven Harbor shoreline from the breakwater protecting the inner harbor to Eastville Beach. The

overall goal of the planning analysis is to produce a "roadmap" that the Town can utilize to proactively plan for projects that will improve the resiliency of the harbor area.

PROJECT PROPOSAL

EVALUATION OF COASTAL PROCESSES AND STORM IMPACTS TO SUPPORT RESILIENT PLANNING AND MITIGATION STRATEGIES FOR THE VINEYARD HAVEN HARBOR SHORELINE

TISBURY, MA

SECTION 1. COASTAL HAZARDS MANAGEMENT

One of the primary issues facing the Town is the sustainability of the Vineyard Haven Harbor area, which represents the transportation hub for nearly all services to the island. The harbor shoreline has been extensively developed with port facilities for the Steamship Authority (SSA), fuel, and freight. The Tisbury harbor contains one of the island's larger industrial and commercial areas. Most of this development is situated on a barrier beach and on former wetlands that were filled in the 1920's. Because this commercial area is extremely low lying and poorly drained, coastal wave action, storm surge, and surcharged stormwater drainage cause severe flooding. This flooding, which has become progressively worse in recent years, severely limits access to critical public facilities within the waterfront, including the Steamship Authority Terminal, US Post Office and police station. Flooding also places Town infrastructure, including roads, sewer and water, at risk.

The harbor is unprotected and extremely vulnerable to storms from the north and northeast. Increased wave action on the harbor creates dangerous working conditions along the industrial section of the harbor, reducing work days for waterfront businesses. During Nor'easters, waves regularly top Beach Road, a major connector between Tisbury and Oak Bluffs. Erosion is undermining the road in several locations and requires continued beach nourishment to protect it.

SECTION 2. CLIMATE ADAPTATION

Based on information from the 2014 Island-wide Hazard Mitigation Plan and the 2018 Tisbury Municipal Vulnerability Plan (MVP), it is clear that the low-lying harbor area is susceptible to impacts associated with climate change. These two studies, taken together, provide generalized guidance about critical infrastructure vulnerabilities in Town. With the understanding that environmental conditions related to coastal storms and sea-level rise will make the low-lying portions of downtown increasingly vulnerable, combined with increased development pressures within this downtown area, the Town finds itself without the proper tools to plan mitigation efforts or to advise/permit/restrict development in this area.

Through the MVP process, several action items were recommended specifically within the vulnerable downtown area including:

- Evaluate extending the Eastville Beach breakwater to help protect Beach Road
- Consider additional shore protection along Beach Road
- Initiate roadway improvements (i.e. raising of roads) to improve resiliency to coastal flooding, storm surge, and sea-level rise including, but not limited to Water Street from 5 Corners to Union street, Beach Road from 5 Corners to the Bridge, and Lagoon Pond Road to Hines Point
- Evaluate beach nourishment utilizing local dredged material

Figure 1. Map illustrating the Vineyard Haven Harbor shoreline area where the coastal processes analysis is proposed.

Within the context of the proposed analysis of coastal processes, flooding impacts, and shoreline management strategies, all of the above concerns will be assessed as part of the overall analysis. The results of the proposed project will provide the scientific basis for the Town to move proactively forward with the climate adaptation techniques recommended through the MVP process.

SECTION 3. NEED FOR ASSISTANCE

Tisbury recognizes the importance of our harbor to the entire island and seeks to gain a better understanding of the current harbor conditions and the likely changes in this critically important area of our town. As the island's only bulk and freight shipping terminal and year-round deepwater port of call, our harbor serves not only the Steamship Authority, but also shipyards, marinas, tug and

barge terminals, and an active shellfishing and processing industry, as well as many local businesses. The entire island is dependent on the maintenance and integrity of Vineyard Haven Harbor.

Beach Road, a major connector route passes through the harbor industrial district and is a primary means of island access to the Martha's Vineyard Hospital. Wave overtopping and flooding regularly closes the road during [a] storms or major wind events. Flood induced road failure and consequent loss of immediate access to the hospital could result in a catastrophic event.

Important connecting neighborhood roads, which could serve to by-pass flooded areas, are themselves regularly inaccessible due to flooding; a condition that will impede evacuation of residential neighborhoods in a major storm. The harbor and surrounding residential neighborhood have been designated as a social justice neighborhood based on income levels (see Figure 2 for a map of these neighborhoods in the study area). The people who live these neighborhoods include some of the town's most vulnerable residents. They are already challenged by increasing insurance costs and will be least able to recover after a storm.

Maintaining Town infrastructure including roads, sewer and water is already a challenge. Roads are undermined by the continued flooding and over wash. A stormwater drainage system that is now lower than the tidal surge increases rather than discharges flood water. The primary sewer pump station and individual home grinder pumps in the waterfront district will also be at risk with increased flooding and wave action.

Recently, the town has received development proposals for industrial, commercial and residential projects in the waterfront district. Our current zoning limits much, but not all, of this district to waterfront dependent uses. As development proceeds in this particularly vulnerable area it is imperative that the town consider the long term impacts, vulnerabilities and financial pressures that this development will place upon the Town as it plans for adaptation to the changing climate.

SECTION 4. PROJECT DESCRIPTION AND PUBLIC BENEFIT

Project Approach

To provide a more detailed quantitative assessment of both the risks and potential mitigation strategies, an evaluation of coastal processes and potential storm damage related to infrastructure in Vineyard Haven Harbor is proposed. This analysis would include an evaluation of tidal, wave, and sediment transport dynamics within the harbor system, including the Lagoon Pond shoreline in the vicinity of Beach Road. The evaluation also will incorporate a quantitative assessment of severe storms as it relates to both tidal flooding (storm surge "pathways") and wave overtopping/damage along the district referred to as the "Harbor/Lagoon Pond/SSA Triangle". The storm assessments will include present conditions, as well as anticipated sea-level rise over the next 30-to-50 years. The overall study area will extend along the Vineyard Haven Harbor shoreline from the breakwater protecting the inner harbor to Eastville Beach.

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Ongoing efforts to address upland stormwater issues, planned for completion in the fall of 2019, will be integrated into the understanding of flooding concerns within the study area, as appropriate. The results of the quantitative coastal processes analysis (and information gathered from other Town efforts) will form the basis for developing specific mitigation strategies to address both flooding and erosion concerns within the study area. In addition, it is anticipated that results from this evaluation can be used to inform future zoning strategies to ensure long-term coastal resiliency for the Vineyard Haven Harbor region.

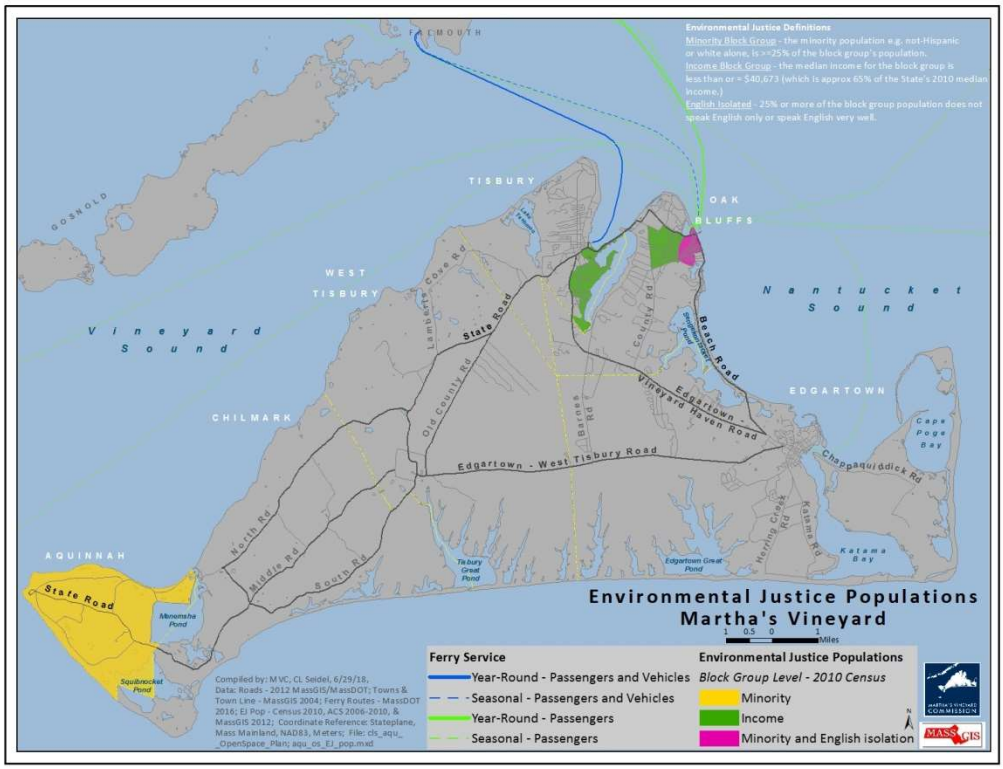

Figure 2. Environmental Justice Populations on Martha's Vineyard indicating the community along the western shore of Lagoon Pond in the study area.

Overall, the approach can be divided into four (4) major tasks, which are described in more detail in the "Approach" section:

1. Site-Specific Analysis of Overtopping and Coastal Flooding
2. Quantitative Analysis of Coastal Change and Sediment Transport Processes
3. Initial Engineering Analysis to Screen Potential Alternatives
4. Prioritize Shore and Flood Protection Strategies

Project Goals & Objectives

The overall goal of the planning analysis is to produce a "roadmap" that the Town can utilize to proactively plan for projects that will improve the coastal resiliency of the downtown Vineyard Haven

community. By basing future shore protection decisions on a quantitative analysis of coastal processes, the Town of Tisbury anticipates more cost-effective and sustainable solutions in the long-term. The proposed project is intended to meet the following goals and objectives:

- Utilize existing tidal, bathymetric, and environmental information to inform development of the baseline models needed to support the project.
- Utilize numerical tidal hydrodynamic, wave, and sediment transport models to quantitatively evaluate coastal processes along the Vineyard Haven Harbor shoreline between the breakwater protecting the inner harbor to Eastville Beach. This modeling will be performed for existing conditions, as well as anticipated sea-level rise over the next 30-to-50 years.
- Perform a screening analysis of various engineering and/or management alternatives that can be used to improve sustainability of the Vineyard Haven shoreline between the breakwater protecting the inner harbor to Eastville Beach.
- Develop recommended alternatives for potential shore protection and flood management options, where evaluation criteria will be focused on both long-term sustainability, as well as overall protection of the coastal environment.
- Promote transferability of the project through development of a clear concise summary report that demonstrates the steps taken to support the alternatives evaluations and derive a recommended shoreline management approach.

Project Tasks

The following Tasks are proposed to accomplish these planning goals:

Task 1: Site-Specific Analysis of Overtopping and Coastal Flooding

An evaluation of the existing storm surge risk for the project area will be performed, specifically for the dominant nor'easters. At the base level, it is important to understand how frequently these types of storms can be expected and how frequently damage may occur at the present sea-level conditions. To accomplish this task, Applied Coastal will evaluate existing LiDAR data to determine the combined influence of "stillwater" coastal flood levels combined with the influence of wave set-up within the subject area. The assessment of flood levels will be based on available historical tide data for both Nantucket and Woods Hole augmented with local information (e.g. tide data available for Vineyard Haven Harbor and Lagoon Pond), as well as more recent modeling efforts by the U.S. Army Corps of Engineers. Once existing coastal flooding conditions are established, likely sea-level rise scenarios for the next 10, 25, and 50 years were developed from the best available data and projections. Information used to develop these scenarios was based on the most defensible scientific information available including (a) historical relative sea-level trends for southeastern Massachusetts, as well as longer-term records from the region (likely New York City and Boston), and (b) assessments utilized as the basis for the International Panel on Climate Change (IPCC) and information contained within the Massachusetts Climate Change Clearinghouse. Once the most likely sea-level rise scenarios have been developed, an evaluation of relative flood risk determined for each area of a specific land elevation will indicate the increase in flooding frequency associated with each timeframe.

Task 2: Quantitative Analysis of Coastal Change and Sediment Transport Processes

The glacially-derived Vineyard Haven Harbor shoreline, between the breakwater protecting the inner harbor to Eastville Beach, consists of a man-modified shoreline of relatively narrow coastal beaches and coastal armoring, where port facilities have been developed to service island needs. In addition, major offshore coastal engineering structures anchor the two ends of the study area (the inner harbor and Eastville Beach breakwaters), where the overall wave climate and associated sediment transport dynamics are governed by the influence of these structures. Understanding the geologic nature of the beach/shoreline system, as well as the strong anthropogenic influences, allows determination of the limits of the local "littoral system". In this manner, determinations can be made regarding potential future sources of natural littoral sediments (i.e. beach nourishment) to the Vineyard Haven Harbor shoreline. This evaluation also will include how anthropogenic changes may have altered the natural sediment transport processes and the influence of sea-level rise upon the long-term stability of the harbor coastline.

An initial evaluation of both long-term and short-term shoreline change is planned to provide site-specific analyses of observed sediment migration along the shoreline. The analysis will incorporate available information from any relevant beach nourishment projects placed along the shoreline, as well as other available information. It is anticipated that a shoreline survey of the observed high water line will be performed to evaluate recent changes in shoreline position. Comparison of the 2019 surveyed shoreline position with historic shorelines developed as part of this project will provide needed information for the evaluation of sediment movement in this region.

A quantitative analysis of coastal processes will be required to develop a defensible evaluation of sediment transport along the harbor shoreline that can provide the basis for development of shoreline management strategies. Three numerical models are proposed to evaluate coastal processes: a wave refraction model, a longshore sediment transport/shoreline change model, and a tidal hydrodynamic model. The wave refraction modeling is required to estimate the driving forces governing longshore transport. Since the local bathymetry and breakwater structures modify the wave directions and heights, this model will be used to determine how local changes in wave conditions modify sediment transport potential along the beach. The wave analysis will be based upon Nantucket Sound waves that control local coastal processes. The study will incorporate state-of-the-art wave refraction analysis techniques to transform the offshore waves to the shoreline for long-term sediment transport calculations. Once wave heights and directions for various conditions have been determined, a sediment transport model will be employed to estimate the annual longshore sediment transport rate along the shoreline region depicted in Figure 1. Sediment transport direction and rate are important parameters that characterize the stability of the nearshore system. In the longshore direction, a system in equilibrium will have a small net transport along the length of the shoreline due to balanced wave and current forces. The equilibrated shoreline may experience high wave energy conditions; however, there will be an overall balance in transported sediment volume in both longshore directions. Utilizing a combination of the wave model information and existing historical shoreline change data, a predictive model of longshore sediment transport will calibrated to observed conditions. Once the shoreline change model has been calibrated, it can be utilized to simulate the longevity and migration of

potential beach nourishment projects, as well as the influence of sand-trapping structures. This aspect of the modeling effort is critical for assessing the viability of potential shore protection alternatives.

Due to the low-lying nature of the Vineyard Haven Harbor shoreline, it also is anticipated that the planning evaluation will benefit from a hydrodynamic analysis of storm-induced flow. A hydrodynamic evaluation of storm surge dynamics will be developed to not only indicate water elevations, but also flow patterns through specific upland areas during severe events. The specific model will be calibrated based upon data from previous modeling efforts for Vineyard Haven Harbor and Lagoon Pond, where the model extent will allow assessment of flooding impacts along the Vineyard Haven Harbor shoreline, as well as within Lagoon Pond. Once calibrated for existing conditions, various storm surge scenarios will be evaluated, including appropriate sea-level rise scenarios for the approximate 50-year timeframe of the assessment. Within the context of ongoing coastal evolution, the influence of relative sea-level rise also will be accounted for within the analysis. In this manner, quantitative information can inform the evaluation of engineering alternatives for appropriate time horizons.

Task 3: Initial Engineering Analysis to Screen Potential Alternatives

Combining the results developed in Tasks 1 and 2, as well as the extent of existing coastal armoring along the Vineyard Haven Harbor shoreline, an engineering analysis of potential shore and flood protection options will be developed based upon shoreline 'reach'. Results from the sediment transport analyses will inform the viability of different shore protection strategies at meeting the long-term sustainability goals of the project. Specifically, the alternatives evaluation will assess the relative role of existing armoring, land elevation, and "sediment starvation" to overall mitigation needs. This will include an evaluation for enhancing sediment supply to provide additional coastal resiliency for appropriate areas.

Once alternatives are evaluated relative to their applicability to shoreline and flood damage protection, screening of these options will be performed to determine the most appropriate alternatives. In general, both exclusionary and discretionary criteria will be utilized to assess the applicability of different options, considering aspects of each alternative including engineering, economics, and potential environmental impacts. Once the alternatives screening process is completed, a matrix of potential shore protection options will be developed for each shoreline 'reach'.

Task 4: Prioritize Shore and Flood Protection Strategies

Once potential shore and flood protection options, along with potential infrastructure improvement costs, have been identified for each of the shoreline reaches along the study shoreline, an assessment of vulnerability and "need" will be developed based on the overall economic parameters. While it is important to protect all vulnerable coastal properties to the extent practical, the Town realizes that developing a proactive plan for addressing coastal hazards in the most critical areas needs to be the priority.

Utilizing the coastal processes, engineering alternatives, and economics data developed from the above tasks, a prioritization scheme for shore and flood protection within the study limits will be developed. This scheme likely will include both 'hard' and 'soft' shore protection measures, based on project need

within each of the reaches identified. In general, economic drivers will be critical to this prioritization process; however, coastal resiliency also will need to be addressed, as future shore protection expenditure planning will require that a sustainable outcome will be achieved based upon a 50-year planning horizon.

Finally, a critical aspect of the overall prioritization plan for shore protection is public "buy-in" regarding both the process and the findings of this planning effort. It is anticipated that several (a minimum of three) public presentations will be needed, as stakeholder input is critical to the overall process of coastal planning efforts. Two community "working sessions" are planned to initially present draft alternatives and then the final findings of the report.

Public Benefit

The overall return on investment to improving/sustaining coastal resiliency along the Vineyard Haven Harbor shoreline can be depicted in both a direct benefit and the opportunity cost of not implementing the project. The cost for not addressing the shore protection and flooding issues, as well as the associated reduced resiliency of the Vineyard Haven Harbor shoreline is the eventual loss of public infrastructure, coastal resource areas, access to private and public docking/marina facilities, commercial properties, and private residences. Further, the series of low-lying roads that connect to 5 corners provide critical emergency egress to portions of downtown, as well as the main route to the Island hospital.

A more proactive approach to shoreline stabilization and coastal flood mitigation is warranted to ensure the long-term viability of the Vineyard Haven Harbor shoreline, the SSA and other port facilities, and the critical roadway infrastructure along the shoreline. This effort is aimed at developing an overall coastal shore protection and flood mitigation strategy for a 50-year timeframe to improve the sustainability and resiliency of the Vineyard Haven Harbor shoreline. Although shoreline stabilization and flood protection are the primary goals, it also is critical to ensure that any potential solution to maintain the shoreline also considers the long-term natural functions of the beach system. To this end, the analysis of shore protection alternatives will consider management of the regional littoral system that benefits these public resources.

SECTION 5: TRANSFERABILITY

An integral part of this effort will be public outreach and education as Community "buy-in" is crucial to the overall prioritization assessment for shore protection and flood mitigation needs. It is anticipated that the project will include two public presentations and workshops, as stakeholder input is critical to the overall process of coastal planning efforts. This is especially critical for the Town due to the level of potential local funding required to address the on-going issues associated with coastal storm damage mitigation. For coastal resiliency to be maximized, the Town recognizes that it will require a public-private partnership from the onset, understanding that shore protection needs along the Vineyard Haven Harbor shoreline will require that private and public (both the Town and the Commonwealth) entities team together to develop the most pragmatic proactive approach to shoreline sustainability.

This project will provide an approach that attempts to simplify the difficult and complex issues of sea level rise, climate change and coastal adaptation for the public and Town officials. The topics presented will include the science of coastal processes and sea level rise, adaptation strategies and recommended actions, costs and benefits, and overall sustainability of existing coastal infrastructure. The project approach proposed is transferrable to other low-lying port communities faced with similar issues of shoreline protection and coastal resiliency, in particular, many of the seaside Towns along Buzzards Bay and the South Coast of Cape Cod, Martha's Vineyard, and Nantucket. Many of these regional communities are facing very similar challenges as many of their harbor shorelines also include low-lying infrastructure within the 100-year flood plain and man-manipulated shorelines that prevent the natural function of coastal resources.

SECTION 6: PROJECT TIMELINE

The Town anticipates that the proposed project will be completed by June 30, 2020 and within the timeframe allotted under the FY20 Coastal Resilience Grant Program. Presented below is the anticipated project timeline for the proposed project:

WORK TASK	ESTIMATED COMPLETION DATE
Award to Consultant	**September 1, 2019**
Task 1a: Kick-Off Meeting	**September 15, 2019**
Task 1b: Site-Specific Analysis of Coastal Flooding	**September 1, 2019 – February 28, 2019**
Task 2: Quantitative Analysis of Coastal Change And Sediment Transport Processes	**October 1, 2019 – March15, 2020**
Task 3: Initial Engineering Analysis to Screen Alternatives	**January 1, 2020 – April 30, 2020**
Task 4a: Working Session #1	**April 15, 2020**
Task 4b: Prioritize Shore and Flood Protection Strategies	**March 15, 2020 – May 15, 2020**
Task 4c: Working Session #2	**May31, 2020**
Task 4d: Draft Report	**May 1, 2020 - June 1, 2020**
Task 4e: Final Report	**June 15, 2020 – June 30, 2020**
Completed Project	**June 30, 2020**

SECTION 7: PROJECT BUDGET

The project budget has been included as **Exhibit A** and follows the form provided in the RFR. Based upon the total budget required for the project, the Town respectfully submits this grant application, herein, requesting a total of $129,951 (75% of total project cost) in state funding assistance. The Town fully understands that if selected to receive state funds under this program that a 25% local match consisting of cash, in-kind services or a combination of both is required. The Town further understands that state funding will be provided on a reimbursement basis. An authorized statement signed by the Town Administrator acknowledging the grant program requirements is provided in **Exhibit B**.

SECTION 8: PROJECT MANAGEMENT

The Town of Tisbury will be responsible for leading the Project Team that will be assembled for this project. The Town has strategically formulated this team to consist of municipal experts in the fields of planning, as well as coastal and environmental resources. The Town has previously and successfully managed dozens of coastal projects which received funding assistance from the following state and federal agencies: Massachusetts Office of Energy and Environmental Affairs (EEA), Department of Fish and Game – Division of Ecological Restoration (DER), the US Environmental Protection Agency, U.S. Army Corps of Engineers, Federal Emergency Management Agency (FEMA), and Massachusetts Emergency Management Agency (MEMA). The Town plans to hire the Applied Coastal Research and Engineering, a group of experienced coastal experts, scientists and engineers that are specifically proficient in performing the quantitative analysis of coastal change and sediment transport processes, assessing and designing shore protection measures including beach nourishment, and planning/developing strategic coastal management practices that will result in sustainable, long-term coastal resiliency along the Vineyard Haven Harbor shoreline. The Project Team will be responsible for the overall management of the project and the consultants will be responsible for the scientific and engineering analysis, and also take the lead in public outreach efforts. Presented below are the key members that have been selected to lead the Project Team. The resumes of key Town and Consultant personnel are provided in **Exhibit C**.

PROJECT TEAM QUALIFICATIONS

John Crocker, Harbormaster

John Crocker Harbormaster will be the overall program manager for the Town on this project. As Harbormaster, he has jurisdiction, duties and responsibilities over waterways. For the overall grant process, he will be responsible providing day to day contact with the consultant on grant administration related activities on the waterways and harbor related questions. Mr. Crocker has over 11 years of experience in waterways enforcement and public safety. In addition, he has a proven track record of working with boaters, contractors, marina owners, public safety officials, various Town departments, and outside consultants.

John (Jay) Grande, Town Administrator

Mr. Grande will be focused on the administrative aspects of the project coordinating communications between consultant and town officials and this project. He has served as Town Administrator since 2013.

John Ramsey, P.E., Principal Coastal Engineer (Applied Coastal)

Mr. Ramsey is a co-founder and Principal Coastal Engineer at Applied Coastal and has served as Project Manager and/or Principal Investigator for coastal embayment restoration projects, regional shoreline management plans, beach nourishment and coastal structure designs, estuarine water quality/flushing studies, geotechnical engineering, hydrodynamic and sediment transport evaluations, and environmental studies required for permitting of coastal projects. He has co-authored several papers related to littoral processes analysis and has employed innovative numerical methods to develop alternative solutions for complex coastal engineering problems. Mr. Ramsey is well-versed in modern analytical and numerical techniques for evaluating coastal, estuarine, and salt marsh processes. In addition, he is responsible for oversight of engineering services at Applied Coastal

Hugh (Trey) Ruthven, Senior Coastal Engineer (Applied Coastal)

Mr. Ruthven is a senior coastal engineer at Applied Coastal Research and Engineering, Inc. specializing in the measurement and modeling of coastal processes. His past modeling work includes the application of state-of-the-art wave, hydrodynamic, and sediment transport models in a broad range of coastal engineering and analysis projects. This experience includes the determination of coastal structure design criteria, the design of beach nourishments, and the analyses of tidal hydrodynamics and storm surge.

SECTION 9: PARTNERS

The Town of Tisbury has successfully implemented many coastal restoration projects through committed partnerships. For example, the community routinely works with our regional planning agency, the Martha's Vineyard Commission to evaluate appropriate measures to ensure long-term resiliency for our vulnerable storm damaged coast on both public and private shoreline issues. It is vital to our success to collaborate with local, state, and federal partners in making important decisions due to our present and future shoreline conditions. Letters of Support for this project from key Departments, Committees, and Stakeholder Groups are provided in **Exhibit D**.

A. Budget

FY20 Coastal Resilience Grant - Evaluation of Coastal Processes and Storm Impacts to Support Resilient Planning and Mitigation Strategies for the Vineyard Haven Harbor Shoreline

Project Task Description	Deliverables	Deliverable Due Date	Invoice Due Date	Grant	Match	Total
Task 1: Site -Specific Analysis of Overtopping and Coastal Flooding						
Sub-task 1.1 - Kick-Off Meeting	Sign In Sheet and Meeting Notes	October 15, 2019	November 15, 2019	$ 2,964	$ 970	$ 3,934
Sub-task 1.2 - Analysis of Overtopping and Coastal Flooding	Technical Memorandum	February 28, 2020	March 30, 2020	$ 10,950	$ 3,650	$ 14,600
Total Task 1 Cost				$ 13,914	$ 4,620	$ 18,534
Task 2: Quantitative Analysis of Coastal Change and Sediment Transport Processes						
Sub-task 2.1 Shoreline Change Analysis				$ 8,424	$ 3,140	$ 11,564
Sub-task 2.2 - Lonshore Sediment Transport Model				$ 22,200	$ 7,400	$ 29,600
Sub-task 2.2 - Hydrodynamic and Storm Surge Model	Technical Memorandum	March 15, 2020	April 15, 2020	$ 18,195	$ 6,065	$ 24,260
Total Task 2 Cost				$ 48,819	$ 16,605	$ 65,424
Task 3: Initial Engineering Analysis to Screen Potential Alternatives						
Sub-task 3.1 - Alternatives Analysis				$ 8,220	$ 2,740	$ 10,960
Sub-task 3.2 - Screening of Alternatives	Technical Memorandum	April 30, 2020	May 31, 2020	$ 4,680	$ 1,560	$ 6,240
Total Task 3 Cost				$ 12,900	$ 4,300	$ 17,200
Task 4: Prioritize Shore and Flood Protection Strategies						
Sub-task 4.1 - Working Session #1	Powerpoint Presentation	April 30, 2020	May 31, 2020	$ 7,329	$ 2,425	$ 9,754
Sub-task 4.2 - Prioritize Shore and Flood Protection				$ 16,230	$ 5,410	$ 21,640
Sub-task 4.3 - Working Session #2	Powerpoint Presentation	May 31, 2020	June 30, 2020	$ 7,329	$ 2,425	$ 9,754
Sub-task 4.4 - Draft Report	Draft Report	June 1, 2020	June 30, 2020	$ 16,710	$ 5,570	$ 22,280
Sub-task 4.5 - Final Report	Final Report	June 30, 2020	June 30, 2020	$ 6,720	$ 2,240	$ 8,960
Total Task 4 Cost				$ 54,318	$ 18,070	$ 72,388
TOTAL PROJECT COST				$ 129,951	$ 43,595	$ 173,546

FY20 Coastal Resilience Grant - Evaluation of Coastal Processes and Storm Impacts to Support Resilient Planning and Mitigation Strategies for the Vineyard Haven Harbor Shoreline

	GRANT												Total Task (Grant)	IN-KIND / CASH MATCH											Total Task (Match)	Total Project Cost
	Project Team Hours								Direct Costs					Project Team Hours							Direct Costs					
	Principal Engineer		Senior Engineer		GIS Specialist		Coastal Engr/Scientist		Unit	Quanity	Unit Cost	Total		Principal Engineer		Senior Engineer		GIS Specialist		Coastal Engr/Scientist		Unit	Quanity	Unit Cost	Total		
Hourly Rate	$265.00		$185.00		$115.00		$110.00		X	X	X	X		$265.00		$185.00		$115.00		$110.00		X	X	X	X		
Task 1: Site -Specific Analysis of Overtopping and Coastal Flooding	Hours	Total	Hours	Total	Hours	Total	Hours	Total						Hours	Total	Hours	Total	Hours	Total	Hours	Total						
Sub-task 1.1 - Kick-Off Meeting	6	$1,590.00	0	$0.00	0	$0.00	12	$1,320.00	Travel	1	54	$54.00	**$2,964.00**	2	$530.00	0	$0.00	0	$0.00	4	$440.00				$0.00	**$970.00**	**$3,934.00**
Sub-task 1.2 - Analysis of Overtopping and Coastal Flooding	6	$1,590.00	18	$3,330.00	18	$2,070.00	36	$3,960.00				$0.00	**$10,950.00**	2	$530.00	6	$1,110.00	6	$690.00	12	$1,320.00				$0.00	**$3,650.00**	**$14,600.00**
Total Task 1 Cost													**$13,914.00**													**$4,620.00**	**$18,534.00**
Task 2: Quantitative Analysis of Coastal Change and Sediment Transport Processes																											
Sub-task 2.1 Shoreline Change Analysis	3	$795.00	15	$2,775.00	36	$4,140.00	6	$660.00	Travel	1	54	$54.00	**$8,424.00**	1	$265.00	5	$925.00	12	$1,380.00	2	$220.00	RTK	1	$350.00	$350.00	**$3,140.00**	**$11,564.00**
Sub-task 2.2 - Lonshore Sediment Transport Model	15	$3,975.00	45	$8,325.00	0	$0.00	90	$9,900.00				$0.00	**$22,200.00**	5	$1,325.00	15	$2,775.00	0	$0.00	30	$3,300.00				$0.00	**$7,400.00**	**$29,600.00**
Sub-task 2.2 - Hydrodynamic and Storm Surge Model	15	$3,975.00	30	$5,550.00	18	$2,070.00	60	$6,600.00				$0.00	**$18,195.00**	5	$1,325.00	10	$1,850.00	6	$690.00	20	$2,200.00				$0.00	**$6,065.00**	**$24,260.00**
Total Task 2 Cost													**$48,819.00**													**$16,605.00**	**$65,424.00**
Task 3: Initial Engineering Analysis to Screen Potential Alternatives																											
Sub-task 3.1 - Alternatives Analysis	6	$1,590.00	18	$3,330.00	0	$0.00	30	$3,300.00				$0.00	**$8,220.00**	2	$530.00	6	$1,110.00	0	$0.00	10	$1,100.00				$0.00	**$2,740.00**	**$10,960.00**
Sub-task 3.2 - Screening of Alternatives	6	$1,590.00	6	$1,110.00	0	$0.00	18	$1,980.00				$0.00	**$4,680.00**	2	$530.00	2	$370.00	0	$0.00	6	$660.00				$0.00	**$1,560.00**	**$6,240.00**
Total Task 3 Cost													**$12,900.00**													**$4,300.00**	**$17,200.00**
Task 4: Prioritize Shore and Flood Protection Strategies																											
Sub-task 4.1 - Working Session #1	9	$2,385.00	12	$2,220.00	6	$690.00	18	$1,980.00	Travel	1	54	$54.00	**$7,329.00**	3	$795.00	4	$740.00	2	$230.00	6	$660.00				$0.00	**$2,425.00**	**$9,754.00**
Sub-task 4.2 - Prioritize Shore and Flood Protection	18	$4,770.00	24	$4,440.00	18	$2,070.00	45	$4,950.00				$0.00	**$16,230.00**	6	$1,590.00	8	$1,480.00	6	$690.00	15	$1,650.00				$0.00	**$5,410.00**	**$21,640.00**
Sub-task 4.3 - Working Session #2	9	$2,385.00	12	$2,220.00	6	$690.00	18	$1,980.00	Travel	1	54	$54.00	**$7,329.00**	3	$795.00	4	$740.00	2	$230.00	6	$660.00				$0.00	**$2,425.00**	**$9,754.00**
Sub-task 4.4 - Draft Report	12	$3,180.00	30	$5,550.00	12	$1,380.00	60	$6,600.00				$0.00	**$16,710.00**	4	$1,060.00	10	$1,850.00	4	$460.00	20	$2,200.00				$0.00	**$5,570.00**	**$22,280.00**
Sub-task 4.5 - Final Report	9	$2,385.00	9	$1,665.00	6	$690.00	18	$1,980.00				$0.00	**$6,720.00**	3	$795.00	3	$555.00	2	$230.00	6	$660.00				$0.00	**$2,240.00**	**$8,960.00**
Total Task 4 Cost													**$54,318.00**													**$18,070.00**	**$72,388.00**
TOTAL PROJECT COST													**$129,951.00**													**$43,595.00**	**$173,546.00**

25.12% (Note: Match mus

B. Letter of Commitment

Town of Tisbury
Office of the Town Administrator
51 Spring Street, P.O. Box 1239
Vineyard Haven, MA 02568
(Tel. 508-696-4203)

May 30, 2019

Patricia Bowie, Coastal Resiliency Specialist
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

Dear Ms. Bowie,

The Town of Tisbury is submitting the attached Application under the Coastal Resiliency Grant Program FY20.
As required by the Application I acknowledge:

1. A Town commitment of 25% match ($43,595) that will be provided in the form of cash, in kind services, or a combination of both. And that the necessary funds will be available for the Project.

2. That funding is provided on a reimbursement basis.

Our team of elected officials and professional staff will work together, with the larger community, to bring local knowledge to the planning process to develop priority actions to improve the Town's resiliency to climate related hazards.

If you have any questions regarding the foregoing, please contact me at 508-696-4203 or jgrande@tisburyma.gov

Sincerely,

JOHN W. GRANDE
Town Administrator

C. Resumes

John Crocker

71 Old Purchase Road, PO Box 816, Edgartown, MA 02539
617-803-4760
johncrocker71@comcast.net

Harbormaster with 11 years of experience in waterways enforcement and public safety. Proven track record of working with boaters, contractors, marina owners, public safety officials and various Town departments.

PROFESSIONAL EXPERIENCE

Interim Harbormaster Town of Tisbury April 2016 – Present
Responsible for management and operation of the Vineyard Haven Harbor and all waterways within the Town of Tisbury; monitoring of all activities connected with boating and navigation, scheduling and coordinating of repairs, construction projects and inspections. Responsible for 9 part time seasonal employees and emergency response.

Assistant Harbormaster Town of Tisbury July 2007 – April 2016
Assisted Harbormaster with enforcement and public safety matters. Involved in mooring permit billing, collections, assignments, and inspections. Communicated effectively with all stake holders verbally and in writing. Wrote approved grants of $25,000 to purchase web cams and $250,000 to purchase patrol boat.

Assistant Emergency Management Director Town of Tisbury July 1, 2015 - present
Assisted Director as requested. Responsible during tropical storm Hermine when Director was off island.

Jean Marie Fishing Charters 2005 – present
Owner, operator of successful charter fishing business. Responsible for all facets of operation including customer service, marketing, passenger safety, vessel operation, and maintenance of a 33' Crowley-Beal downeaster. This experience is helpful working with charter and commercial fishermen, vessel maintenance and operation.

Education, Current Licenses and Certificates

50 ton USCG Master's License with commercial towing endorsement.
Basic life support certificate.
Safety at sea training certificate.
FEMA certificates IS00001.a, IS-00056, IS-00100.b, IS-00120.b, IS00230.d, IS-00241.b, IS-00454, IS-00546.a, IS00700.a, IS-00720, IS-800.b
Two day grant writing workshop.
Small boat & marina fires & emergency fireboat operations certificate.
Currently participate in Drug Testing Consultants drug & alcohol testing program.
University of New Haven 1973-1975
Castleton State College 1972-1973
Hamden Hall Country Day School, diploma 1969-1972

RESUME

John W. Grande
jgrande@tisburyma.gov • P.O. Box 4053, Vinyard Haven, MA 02568 • Tel. (508)-696-4203
www.tisburyma.gov

Education

Marist College, Poughkeepsie, New York
Master of Public Administration

West Virginia University, Morgantown, West Virginia
Master of Arts and Graduate Certificate in Gerontology

Villanova University, Villanova, Pennsylvania
Bachelor of Arts

Experience

Town of Tisbury, 51 Spring Street, March 2013 to Present
PO Box 1239, Vineyard Haven, MA 02568

Town Administrator/Personnel Director/

The position is responsible for the management of staff and the day to day operations of the Town. I serve also as the Chief Procurement Officer and certified as an Associate Massachusetts Certified Procurement Officer. I am an active member of the Massachusetts Municipal Association. I serve on various advisory committees, such as Vineyard Transportation Authority, Joint Transportation Committee, Joint Housing Advisory Committee and Cable Advisory Committee.

Town of Framingham December 1996 to February 2013
150 Concord Street, Framingham, MA 01702

Planning Board Director

The Planning Board Director is responsible for the Planning Board Department and provides technical planning assistance to the Planning Board, other town officials and citizens. The Director was responsible for the development review processes for large scale residential and commercial developments and for overseeing large infrastructure projects. The Director also promulgates new regulations and planning studies for the town. Past member of: the American Planning Association, the Massachusetts Association of Planning Directors and the American Institute of Certified Planners.

City of Gloucester May 1994 to November 1996
22 Popular Street, Gloucester, MA 01930

Planning Director

The Director is responsible for the Planning Division and provides technical assistance to city officials in all areas of community development.

Director of Planning and Zoning — August 1990 to April 1994
Town of Gorham
270 Main Street, Gorham, ME 04038

The Director is responsible for the Planning Department and provides technical assistance in all areas of community development and zoning.

Town of Wareham — March 1989 to July 1990
54 Marion Road, Wareham, MA 02571

Town Planner

The Town Planner is responsible for providing technical assistance to town officials in all areas of community development.

Town of Harwich — August 1987 to July 1987
Brooks Academy, Harwich, MA 02645

Assistant Town Planner/Grant Writer

The Assistant Town Planner/Grant Writer is responsible for providing administrative and technical assistance to the Town Planner and Planning Board.

Region VI Planning & Development Council — October 1985 to July 1987
and Area Agency on Aging
200 Adams Street, Fairmont, WV 26554

Project Administrator

The Project Administrator is responsible for flood damage assessment and inventory records for the Federal Emergency Management Administration, labor compliance for federally funded projects, grants and loans.

Geology and Geography Department — June 1983 to August 1985
West Virginia University, Morgantown, WV 26505

Graduate Research Assistant/Teaching Assistant

Research assistant for National Science Foundation Grant to West Virginia University and Virginia Polytechnic Institute, "Multi-Scale Analysis of United States Elderly Population" and Robert Wood Johnson Foundation Grant for "West Virginia Atlas on Aging."

Honors

- Delaware Geographical Association Award for Academic Achievement
- President, Villanova University Geographic Society
- National History Honor Society

John S. Ramsey, PE, D.CE

Principal Coastal Engineer

Evaluation and design of coastal structures and beach nourishment
Numerical modeling of estuarine hydrodynamics and water quality
Analysis of tidal inlet dynamics and sediment transport
Evaluation and design of coastal structures and beach nourishment
Coastal processes analysis

YEARS OF EXPERIENCE

32 (20 with Applied Coastal; 12 with others)

EDUCATION

M.C.E., Civil (Coastal) Engineering, University of Delaware, 1991
B.S., Civil and Environmental Engineering, Cornell University, 1985

REGISTRATION

Professional Engineer:
Commonwealth of Massachusetts #38532
State of Connecticut #27392
State of Louisiana #38818

AFFILIATIONS

American Society of Civil Engineers
- Coastal Zone Management Committee
- Coastal Engineering Practice Committee

Association of Coastal Engineers
- President (2006-2014)
- Vice-President (2004-2006)

Florida Shore and Beach Preservation Association
American Shore & Beach Preservation Association

PROFILE

Mr. Ramsey is a co-founder and Principal Coastal Engineer at Applied Coastal Research and Engineering, Inc. (Applied Coastal) and has served as Project Manager and/or Principal Investigator for coastal embayment restoration projects, regional shoreline management plans, beach nourishment and coastal structure designs, estuarine water quality/flushing studies, geotechnical engineering, hydrodynamic and sediment transport evaluations, and environmental studies required for permitting of coastal projects. He has co-authored several papers related to littoral processes analysis and has employed innovative numerical methods to develop alternative solutions for complex coastal engineering problems. Mr. Ramsey is well-versed in modern analytical and numerical techniques for evaluating coastal, estuarine, and salt marsh processes. In addition, he is responsible for oversight of engineering services at Applied Coastal.

RELEVANT EXPERIENCE

Massachusetts Department of Ecological Restoration, Parkers River, Yarmouth, MA

Mr. Ramsey was the Project Manager and Principal Engineer for the hydrodynamic and flooding analysis of Parkers River. The purpose of this analysis was to select optimum channel dimension for a new Route 28 bridge to minimize tidal attenuation, determine how the new channel would affect the highest tide elevations and evaluate storm conditions to address flood risk concerns. Once the channel was sized, the engineer requirements associated with the widening and redesign of the Route 28 bridge were evaluated, a MassDOT analysis of the hydraulic impacts and scour potential for the design of the bridge foundations, as well as the intern conditions which will be encountered along the river during construction when the waterway will be partially obstructed with cofferdams.

Saugus Marsh, Saugus, MA (MA DCR, under Parsons Brinkerhoff, Inc., 2015).

Mr. Ramsey was the Principal Engineer for the evaluation and design of proposed tidal restoration of a 57-acre salt marsh. The evaluation incorporated hydrodynamic modeling using CMS-Flow to simulate several proposed channel and hydraulic structure alternatives for the restoration. The design process involved collaboration with local, state, and federal regulators. The analysis included the development of extreme upland runoff events for the area watersheds. The engineering team under Mr. Ramsey's supervision was able to develop a design that met tidal restoration goals while providing adequate management of storm runoff, while minimizing the excavation volume required to construct the restored marsh.

Chatham Embayments Water Quality Analysis, Chatham, Massachusetts

Mr. Ramsey served as project manager and lead coastal engineer/modeler for a project that incorporated numerical modeling to evaluate tidal hydrodynamics and water quality (total nitrogen) within a series of estuarine systems in Chatham. In support of the Chatham Comprehensive Wastewater Management Planning (CWMP), an evaluation of tidal flushing was been performed for the coastal embayments within the Town Limits of Chatham, Massachusetts, on Cape Cod. The field data collection and hydrodynamic modeling efforts for this project provided the first step towards evaluating the water quality of these estuarine systems, as well as understanding nitrogen loading thresholds. The hydrodynamic modeling effort served as the basis for the total nitrogen (water quality) model, which incorporated upland nitrogen load and benthic regeneration within bottom sediments. In addition to the tidal flushing evaluation for these estuarine systems, alternatives analyses of tidal flushing improvement strategies were performed for selected sub-embayments. Numerical models provided a cost-effective method for evaluating tidal hydrodynamics, as they required limited data collection and could be utilized to numerically assess a range of management alternatives. Once the hydrodynamics of an estuary system were understood, computations regarding related coastal processes became relatively straight-forward extensions to the hydrodynamic modeling.

Muddy Creek Hydrodynamic and Scour Evaluation, Pleasant Bay, MA.

A hydrodynamic and flooding analysis of Muddy Creek was performed to determine the impacts and engineer requirements associated with the widening of the inlet channel under Route 28. An existing stone culvert structure connects Muddy Creek to Pleasant Bay restricts tidal exchange between the creek and the Bay, which has a direct effect on water quality, habitat, and salt marsh coverage above the Route 28 dike. The proposed bridge would significantly increase the hydraulic beneath the roadway, restoring tidal flow to the upper reaches of the system, which required a quantification of the proposed tidal hydraulics, flooding response and magnitude, scour potential associate with the new bridge structure, and an evaluation of the outer channel and ebb shoal to determine the extents which the increase tidal prism could alter the barrier beach form. *Performed for the Division of Ecological Restoration through CDR Maguire.*

Pleasant Bay Alliance, Muddy Creek, Pleasant Bay, Massachusetts

A hydrodynamic and scour analysis of Muddy Creek was performed to determine the optimal width of the inlet channel under Route 28 to restore the upstream salt marsh and to support the engineering design of the bridge foundation. The existing stone structure that connects Muddy Creek to West Pleasant Bay restricts tidal exchange between the creek and the Bay and had a direct effect on water quality in the creek. Widening the channel under Route 28 significantly improved tidal flushing and lowered nitrogen concentrations in the creek. Resulting is the improvement and restoration of the local salt marsh vegetative and aquatic resources.

Design and Permitting of Dead Neck/Sampson's Island (DNSI) Restoration and Management Project, Barnstable, MA.

Mr. Ramsey provided the engineering design and permitting services to Three Bays Preservation, Inc. for the back-passing of dredged material from the western end of Sampson's Island to the eastern end of Dead Neck for the purposes of constructing a beach and dune nourishments. DNSI provides protection of wildlife habitat and nesting habitat for coastal waterbirds of high conservation Priority. In addition, DNSI provides flood control and storm damage protection for the bays and estuaries to the north. Applied Coastal provided quantitative assessment of the potential impacts associated with proposed dredging activities in the Cotuit entrance channel, the following analyses were performed: a) An historical analysis of shoreline; b) a numerical modeling assessment of the alterations to tidal hydrodynamics as well as the influence coastal erosion potential; c) the influence of the existing barrier beach spit on preventing flood protection and/or storm damage prevention for properties landward of the barrier beach system; and d) permitting and engineering support through the MEPA and subsequent Local, State, and Federal permitting process.

Design and Permitting of Flow Control Weir and Jetties for Trunk River Inlet, Falmouth, MA

As part of a pond restoration effort, a hydrodynamic model of the existing Oyster Pond/Trunk River system was developed. The modeling results were utilized as the basis for designing an adjustable weir that limited the influx of seawater into Oyster Pond. By "tuning" the weir seasonally to variations in freshwater recharge, the Pond salinity can be managed between 2 and 4 ppt. By allowing limited saltwater into the system through the weir, the "shock" to Pond ecology resulting from storm overwash is reduced. The weir was constructed in 1997 and 1998. As the second phase of the project, the jetties protecting the Trunk River entrance were re-designed, repaired, and the entrance channel was dredged. Repair of the inlet will allow the upstream weir to become the flow control structure within the system, rather than the sill that has developed within the entrance channel. Reconstruction of the jetties reduced maintenance requirements following significant easterly storm events. The hydrodynamic modeling, weir design, jetty design, and environmental permitting were performed by John Ramsey at Aubrey Consulting and Applied Coastal.

Hydrodynamic and Water Quality Modeling Study for Great, Green, and Bournes Ponds, Falmouth, MA

Mr. Ramsey served as project manager and lead coastal modeler for the hydrodynamic and water quality analyses of three tidal ponds (Great, Green, and Bournes Ponds) located in Falmouth, MA. The study was initiated to determine the water quality impacts of a septic nutrient plume propagating from the Massachusetts Military Reservation (MMR) on Cape Cod. A concurrent evaluation of nutrient loading to each of the ponds was performed by SMAST. This evaluation showed that the greatest contributions to nutrient loading of the ponds were septic tank loads and lawn fertilizers. The water quality was calibrated based on existing information and then used to predict levels of total nitrogen within the various sections of Great, Green, and Bournes Ponds. Additional model scenarios were run to determine effects of build-out in the pond watersheds, as well as removing all nitrogen from on-site septic disposal of wastewater from the watersheds of each Salt Pond.

Hugh E. Ruthven III, M.C.E., B.S.

Senior Coastal Engineer

Numerical modeling of estuarine hydrodynamics and water quality
Analysis of tidal inlet dynamics and sediment transport
Coastal processes analysis

YEARS OF EXPERIENCE

21 (16 with Applied Coastal; 5 with others)

EDUCATION

M.S.E., Naval Architecture and Marine Engineering, University of Michigan, 1997
B.S., Civil and Environmental Engineering, Purdue University, 1996

REGISTRATION

Engineer in Training, State of Indiana

AFFILIATIONS

Association of Coastal Engineers
American Shore & Beach Preservation Association

PROFILE

Mr. Ruthven is a coastal engineer specializing in numerical modeling of hydrodynamics, nearshore coastal dynamics, coastal structures, and physical modeling. He is experienced in hydrodynamic modeling, wave and sediment modeling, inlet processes, hydrographic analysis, coastal mitigation, and the design and rehabilitation of shore protection structures. Mr. Ruthven is skilled in the application of computer programs for two-dimensional hydraulic and hydrologic modeling, and has performed numerous two-dimensional analyses to characterize hydrodynamics, sediment transport, littoral transport, harbor agitation, and nearshore contaminant trapping, as well as inland waters.

RELEVANT EXPERIENCE

Little Parkers Pond Restoration, Osterville, MA

Mr. Ruthven has led the design and permitting of the restoration of Little Parkers Pond, a 1.4-acre Salt Pond. The purpose of the project is to restore natural conditions and improve water quality, habitat, and ecological functions by restoring historic depths and increasing the range and frequency of tidal flushing. The project includes the removal of 4,300 cy of sediment and replacement of the 18-inch diameter pipe between Little Parkers Pond and the downstream East Bay estuary with a 4-ft high by 6-ft wide box culvert to improve tidal exchange. The project will provide a total of 8,600 square feet (sf) of salt marsh restoration around the perimeter of the pond.

Muddy Creek Hydrodynamic and Scour Evaluation, Pleasant Bay, MA.

A hydrodynamic and flooding analysis of Muddy Creek was performed to determine the impacts and engineer requirements associated with the widening of the inlet channel under Route 28. An existing stone culvert structure connects Muddy Creek to Pleasant Bay restricts tidal exchange between the creek and the Bay, which has a direct effect on water quality, habitat, and salt marsh coverage above the Route 28 dike. The proposed bridge would significantly increase the hydraulic beneath the roadway, restoring tidal flow to the upper reaches of the system, which required a quantification of the proposed tidal hydraulics, flooding response and magnitude, scour potential associate with the new bridge structure, and an evaluation of the outer channel and ebb shoal to determine the extents which the increase tidal prism could alter the barrier beach form. *Performed for the Division of Ecological Restoration through CDR Maguire.*

Round Hill Marsh Restoration, Dartmouth, MA.

Conducted a wave transformation study along the shoreline fronting Round Hill Marsh for **NOAA,** to examine the sediment transport characteristics along the shoreline. The goal of the study was to assess the impacts that the existing offshore breakwater and groins

have upon the inlet to the marsh system and to examine alternative to improve the inlet stability for an ongoing marsh restoration project within Round Hill Marsh. The inlet is unconstrained and migrates along the beach face requiring periodic relocation of the inlet to avoid impacts to downdrift properties and improve the flushing within the marsh system. *The work was performed for NOAA under a contract with Louis Berger Group.*

Sesuit Marsh Restoration, Dennis, MA

Sesuit Marsh is located along the southern coastline of Cape Cod Bay the upper portion of the system was divided from the lower marsh by a roadway embankment and connected through a small culvert resulting in very limited tidal exchange. The health of the upper marsh system suffered significantly, to address the problem a data collection program was conducted followed by a hydrodynamic and water quality study to examine various alternatives for restoring the natural tidal exchange to the upper marsh in order to assist in the restoration of the marsh system. The developed model provided the necessary tools for evaluating the impacts to the system and ensuring the restoration of the marsh was successful. The project was awarded the 2008 Coastal America Partnership Award. *The work was performed for Town of Dennis and NOAA.*

Green Harbor Marsh Restoration, Marshfield, MA.

A preliminary hydrological and ecological study of the tidally restricted region of the Green Harbor River ecosystem was undertaken for the Massachusetts Wetland Restoration Program. This work was undertaken in collaboration with The Louis Berger Group Inc. This focus of this study considered the impacts of altering the flow through the tide gates located on Dike Road (Route 139) at the mouth of the Green Harbor River marsh system in Marshfield. The present tide gates configuration limits tidal exchange flow between upper and lower Green Harbor River, a major estuary discharging to Cape Cod Bay. The study aimed to identify if the opening of additional tide gates would improve tidal excursion and water quality. Also of major importance is the impact that raised water levels might have on neighboring developments. Of particular concern is the Marshfield Municipal Airport along the northwest edge of the system and the residential neighborhoods adjacent to Bass Creek along the northeast edge of the system. The overall study included field data collection and modeling to support analysis of potential changes within the tidal river and to the historical emergent tidal marsh areas, which now exist mainly as low lying forest, fields and fresh and brackish water wetlands.

Design and Permitting of Dead Neck/Sampson's Island (DNSI) Restoration and Management Project, Barnstable, MA.

Mr. Ruthven has been conducting the monitoring of the DNSI shoreline since 2005 as part of the restoration project to enhance and protect wildlife habitat and nesting habitat for coastal waterbirds of high conservation Priority. The monitoring involves cross-shore profile measurements along the eastern 2,400 feet of the island to document the erosion of the island and loss of Piping Plover habitat. The western end of the island is being monitored to focus on management of sediment migrating toward the west end of the barrier beach system and the impacts to the navigational channel. Mr. Ruthven has also developed the Pre- and Post-Construction monitoring protocols as well as supporting the engineering and permitting associated with backpassing dredged material from the western end of the island and using the material to maintain the integrity of the barrier beach/dune system adjacent to the eastern end. The restoration of the eastern end of the island will restore and protect essential shorebird and wildlife habitat.

D. Letters of Support

The Commonwealth of Massachusetts
House of Representatives
State House, Boston 02133-1054

May 30, 2019

Patricia Bowie, Coastal Resiliency Specialist
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

Re: **EVALUATION OF COASTAL PROCESSES AND STORM IMPACTS TO SUPPORT RESILIENT PLANNING AND MITIGATION STRATEGIES FOR THE VINEYARD HAVEN HARBOR SHORELINE**

Dear Patricia Bowie,

We strongly support the above referenced application of the Town of Tisbury for a Coastal Resilience Grant from the Office of Coastal Zone Management. We are very familiar with the challenges of sea-level rise, storm surge, and flooding faced by coastal towns, especially Vineyard Haven, which serves as the gateway to Martha's Vineyard. As the only year-round port providing Steamship Authority service for the island, Tisbury must sustain and protect valuable infrastructure for passenger and freight transport as well as all bulk material for the island. Their low-lying and poorly drained harbor district, vulnerable to storms from the northeast, is home to important commercial infrastructure and marine-related businesses that the island depends on.

We applaud Tisbury for having undertaken and completed the Municipal Vulnerabilities Program and being part of the Martha's Vineyard Commission's Hazard Mitigation Study. These have highlighted in a general way the infrastructure that must be protected and/or adapted to ensure sustainability of the island's supply chain.

Now Tisbury hopes to commission a more detailed study of the impacts of storm surge, coastal processes, flooding, and erosion to better plan and prioritize projects needed, and to make the most economic use of the town's resources. The planning grant will provide the town with a roadmap to achieve these goals and the ability to apply for future funding support.

At present, there are several large-scale proposals for commercial and residential development in Tisbury's coastal district. The town would be better situated to manage development in a sustainable way after having completed this more detailed study.

We appreciate that the Baker-Polito Administration is encouraging forward-looking planning efforts for our coastal communities. We feel that this proposal strongly deserves consideration and funding support.

Martha's Vineyard Commission

OLD STONE BUILDING • 33 NEW YORK AVENUE
P.O. BOX 1447, OAK BLUFFS, MASSACHUSETTS, 02557
PHONE 508-693-3453 • FAX 508-693-7894
INFO@MVCOMMISSION.ORG • WWW.MVCOMMISSION.ORG

Patricia Bowie, Coastal Resiliency Specialist
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114
patricia.bowie@mass.gov
617-626-1186

May 30, 2019

Dear Ms. Bowie:

The Town of Tisbury is presently applying to the Massachusetts Division of Coastal Zone Management (CZM) for funding for a Coastal Resiliency project. Tisbury is home to the island's main protected harbor and most passengers and freight enter and exit from that location. Coastal flooding, which has become progressively worse in recent years, severely limits access to critical public facilities within the waterfront, including the Steamship Authority Terminal, US Post Office and Tisbury police station. Flooding also places Town infrastructure, including roads, sewer and water, at risk.

The Town has worked hard on planning for the Harbor coastal district and proposes to develop additional data about the potential impact of sea-level rise, coastal storms and wave action on Town vulnerable land uses and infrastructure.

The Town has completed their initial study as part of the MVP program and also was part of the Hazard Mitigation Plan of the MVC. Both of these studies laid the groundwork for this next step.

The Town is seeking funding to complete a comprehensive evaluation of the conditions of the downtown waterfront area and develop a series of strategies for protecting these important locations. As this section of Town contains much of the island important infrastructure, this is an important project. Completion of this effort will allow the Town to establish priorities and determine a path forward. We strongly support this project for funding and will assist in any way possible.

Sincerely,

Adam Turner
Executive Director

Vineyard Conservation Society
EST. 1965 CONNECT PROTECT REFLECT

P.O. Box 2189, Vineyard Haven, MA 02568
Phone (508) 693-9588 | Fax (508) 693-0683
www.vineyardconservation.org
info@vineyardconservation.org

May 25, 2019

Patricia Bowie, Coastal Resiliency Specialist – via email <patricia.bowie@mass.gov>
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

RE: Support for Town of Tisbury application – Vineyard Haven Shoreline Resiliency Grant

Dear Patricia,

The Vineyard Conservation Society (VCS) is a non-profit environmental advocacy and education organization representing more than 1,000 year-round and seasonal residents of Martha's Vineyard Island. I write to offer support for the Town of Tisbury's shoreline resiliency planning grant request.

The VCS mission encompasses outreach and public policy advocacy around a range of sustainability issues including climate action, resiliency planning, and managed retreat. Vineyard Haven provides the Island's primary transportation link with the mainland. That infrastructure is vulnerable to the predicted increased frequency of higher-energy storm events, exacerbated by sea level rise. Understanding and building coastal resiliency in the area subject to this grant is therefore timely and critical.

Infrastructure in the harbor area and Beach Road corridor includes commercial fuel storage and access to our hospital facility. Also, proposals for new development in this repeat-storm-impact area are occurring, including provision of affordable housing. Solid data to help craft responsible land use policy and storm water management recommendations are therefore essential.

Thank you for the opportunity to register support.

Sincerely,

Brendan O'Neill

Executive Director

May 30, 2019

Patricia Bowie, Coastal Resiliency Specialist
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114
patricia.bowie@mass.gov (Email preferred)

Re: **EVALUATION OF COASTAL PROCESSES AND STORM IMPACTS TO SUPPORT RESILIENT PLANNING AND MITIGATION STRATEGIES FOR THE VINEYARD HAVEN HARBOR SHORELINE**

Dear Ms. Bowie:

We are writing to support the above referenced application of the Town of Tisbury for a Coastal Resilience Grant from the Office of Coastal Zone Management.

Martha's Vineyard Hospital, the island's only critical access health care facility, depends upon the viability of the island's roadways to enable access. This is of special concern during storm events – even modest ones - when roadways carrying traffic to and from the Steamship Authority's Vineyard Haven terminal and much of the western part of the island and the Hospital become impassible. In October through May, Vineyard Haven is the island's sole steamship port.

MV Hospital transports via ambulance patients with critical needs for medical treatment at off-island facilities. We have as many as five (?) ambulance trips daily during our high season. Detours and delays have genuine consequences for our island patients.

Thus, we applaud the Town for undertaking steps to study and protect or adapt the key infrastructures in the harbor front area. We hope the grant is awarded to Tisbury because we across the island depend upon the success of the town in protecting its key port facilities.

Sincerely,

Denise Schepici
President and CEO
Martha's Vineyard Hospital

MARTHA'S VINEYARD SHIPYARD, INC.

P.O. BOX 1119, 164 BEACH ROAD, VINEYARD HAVEN, MASSACHUSETTS 02568
TELEPHONE: 508-693-0400 • FAX 508-693-4100
www.mvshipyard.com

PHILIP P. HALE, President

May 23, 2019

Ms. Patricia Bowie, Coastal Resiliency Specialist
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

Dear Patricia:

I write to you today as President of the Martha's Vineyard Shipyard, in support of the Town of Tisbury's grant application for the EVALUATION OF COASTAL PROCESSES AND STORM IMPACTS TO SUPPORT RESILIENT PLANNING AND MITTIGATION STRATEGIES FOR THE VINEYARD HAVEN HABOR SHORELINE.

The Vineyard Haven Harbor has been the center of marine transportation for hundreds of years. In fact, the first reliable tide book was ELDRIDGE TIDE AND PILOT as written and published for Vineyard Sounds and Vineyard Haven. Additionally, before the development of the train Vineyard Sound was the second busiest waterway in the world behind the English Channel. During the Second World War, Vineyard Haven employed 300 people who were directly building boats for the war effort. Over the last 40 years the zoning and regulations of the Town has made a strong and clear effort to maintain Vineyard Haven as a working waterfront, and today is one of the few working waterfronts in the State.

A little background on the Martha's Vineyard Shipyard, It was formed in 1856 and is the third oldest continuous running business on Martha's Vineyard. It has been in the same family since 1961 with the third generation running the business today. The Shipyard is a good sized employer on the Vineyard with a staff of 27. We offer 52 weeks of employment, vacation, health insurance, holidays, 401K; and we plan to continue operating for many years in the future.

Our company and the town are in the forefront of climate change, and as a boatyard owner who has been working on this water front for 40 years, here are some of my observations. We see sea level rising in the following ways: tides are higher by 6 inches or so over the last 8 years. Our lowest boat storage building is now flooded once a month. Fifteen years ago it was flooded once every other winter. More severe weather is affecting us with more north east storms and with higher tides the wave action is frequently over our lowest harbor dock. This contributes to more frequent days, or multiple days in a row, when we cannot launch boats in the inner harbor or work on boats at our main dock.

The impact is so great that we are working with the town to move some of our operations from Vineyard Haven Harbor to the more protected Lagoon Pond in Tisbury. This will require 2 years of permitting and a huge financial investment on the part of my company.

Therefore, any assistance you can give the Town of Tisbury and Vineyard Haven Harbor to provide the resources to help plan and mitigate sea level rise and climate change would be invaluable. This is also important as we are in an era when we see access to the water is limited, challenging, and disappearing. I urge you to approve the Towns application to help maintain one of the last remaining working waterfronts in the state of Massachusetts.

Sincerely,

Philip P. Hale, President

James L. Hale, Vice President

PLANNING BOARD

TOWN OF TISBURY
P.O. BOX 602
TOWN HALL ANNEX
VINEYARD HAVEN, MASSACHUSETTS 02568
(508) 696-4270 X1122
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May 24, 2019

Patricia Bowie, Coastal Resiliency Specialist
Executive Office of Energy & Environmental Affairs
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

Re: Town of Tisbury, Coastal Resiliency Grant

Dear Ms. Bowie,

I am writing on behalf of the Tisbury Planning Board to share our support for the Town's application to the CMZ Coastal Resilience Grant Program. In Vineyard Haven, Martha's Vineyard's year round port and the location of one of the island's largest commercial and industrial districts, we are experiencing the hazards of rising sea level, storm surge and coastal wave actions. To give one example: Beach Road, a major island connector road has been undermined by erosion. Town infrastructure is at risk.

This past fall the town completed its Municipal Vulnerability Preparedness Workshop. The proposed planning project will enable the town to address several of the priority actions identified in that workshop. Meanwhile, the town continues to receive development proposals for industrial, commercial, and residential projects in the harbor district. As development proceeds in this particularly vulnerable area the planning board must consider the long term impacts, vulnerabilities and financial pressures arising from the hazards of a changing climate.

This project will document harbor conditions, coastal processes and flood inundation and thereby provide the analysis we need to plan for the future.

Our Planning Board will play an active role collaborating with project partners, and consultants. We have established a process for convening community members and to engage them in ongoing planning activities. We intend to host educational sessions that will build public understanding of climate change impacts on the harbor and develop local support for the recommendations resulting from this study.

The members of our Planning Board are in full support of this important project.
Sincerely,

Daniel Seidman

Daniel Seidman, Chairman
Tisbury Planning Board

TOWN OF TISBURY
office of
THE BOARD OF HEALTH
PO Box 666, 66 High Point Lane
Vineyard Haven, Massachusetts 02568
Telephone (508) 696-4290 *Fax (508) 696-7341*

May 28, 2019

Patricia Bowie, Coastal Resiliency Specialist
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

RE: Evaluation of Coastal Processes and Storm Impacts to Support Resilient Planning and Mitigation Strategies for the Vineyard Haven Harbor Shoreline

Dear Ms. Bowie:

As the Board of Health Agent for the Town of Tisbury I strongly support the town's application for the Massachusetts Division of Coastal Zone Management Coastal Resiliency grant.

Over the years the Board of Health has worked diligently to protect and improve the water quality of both the Vineyard Haven Harbor and Lagoon Pond. The quality of both water bodies can be adversely affected by road runoff caused by coastal flooding as well as the possibility of tidal surges compromising both the primary sewer pump station and individual grinder pumps in the area.

In addition to addressing the sustainability of the Vineyard Haven Harbor area, a plan to improve coastal resiliency of the downtown area will strengthen our public health infrastructure and assist the town in preventing wastewater system failure and excessive stormwater discharge into the waterbodies within the Town of Tisbury.

Sincerely,

Maura Valley
Health Agent

TOWN OF TISBURY
Police Department
32 Water Street • P. O. Box 426
Vineyard Haven, Massachusetts 02568
508-696-4240 • Fax 508-693-5543

Mark G. Saloio
Chief of Police

Patricia Bowie, Coastal Resiliency Specialist
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, Massachusetts 02114

RE: Town of Tisbury Coastal Resiliency Grant

May 21, 2019

Dear Ms. Bowie,

I am writing you to express my enthusiastic support for the Town of Tisbury's efforts in seeking a Coastal Resiliency Grant. As you may know, our local Vineyard Haven port area, in conjunction with the Steamship Authority Terminal, is the main conduit of food, commerce, medical supplies, tourism and commuter-related traffic to and from Martha's Vineyard. As such, our port area is extremely congested with a wide array of pedestrian and vehicular traffic twelve months per year; not just during the summer season.

In addition to the high volume of traffic our downtown port area sustains, its' geographical layout makes it particularly vulnerable to present day weather-related conditions, specifically flooding. This flooding regularly becomes significantly problematic to our community's infrastructure, which includes our roads, sewers and water. Additionally, some of the main and most critical governmental entities have locations in our downtown Vineyard Haven Port area, specifically, our Police Department, Post Office, main supermarket, and of course the Steamship Authority's main Terminal. Once the main volume of commerce comes onto the Island via the Steamship Vineyard Haven Terminal, the large commercial vehicles then disperse out to various points on the Island of Martha's Vineyard utilizing Water Street, Beach Road and State Road – all major and critical roadways through our small community, and all directly and particularly vulnerable to weather-related flooding. Also, the main route to our Martha's Vineyard Hospital goes directly via Beach Road through our community. This Coastal Resiliency Grant will directly and significantly assist our community in planning, to the best extent possible, mitigation efforts for weather-related flooding of our major roadways. These roadways, quite literally, are the lifelines to other parts of, and other communities on, our Island. As a Public Safety Professional, I am very aware of this each day.

Please accept my sincere appreciation for your time and consideration in reviewing and considering my letter of support. Should you need any additional material or information, please do not hesitate to contact me.

Yours in Safety,

Mark G. Saloio
Chief of Police