Coastal Resilience Grant PROGRAM RFR ENV 21 CZM 02

Applicant: Town of Oak Bluffs

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Type of Resilience Project: Detailed Vulnerability and Risk Assessments

Project Title: Mapping Storm Tide Pathways in the Six Towns of Martha's Vineyard: Assessing Coastal Resiliency to Storms and Sea Level Rise

Total Project Cost: $298,346

Match Amount (at least 25% of TOTAL project cost)**:** $74,866

Grant Amount Requested: $223,480

Project Summary

Coastal areas are subject to inundation from nuisance flooding, storm surge and sea level rise and island communities are particularly vulnerable to these growing threats. This project consists of two phases that will document the inundation vulnerability of the 6 towns on Martha's Vineyard as well as develop an inventory of low-lying roads and public infrastructure island wide. Phase 1 will identify and map storm tide pathways (direct hydraulic connections between coastal waters and low-lying inland areas) and develop associated GIS data for the 6 towns on Martha's Vineyard (Aquinnah, Chilmark, Edgartown, Oak Bluffs, Tisbury, and West Tisbury). Field work necessary to identify, locate and characterize pathways identified through spatial analysis will be conducted and incorporated into the project GIS. To maximize usability for town staff and the public, online and offline apps will be developed. Lastly, the storm tide pathway databases will be incorporated into the National Weather Service's *Coastal Flood Threat and Inundation Mapping* website that provides real-time total water level forecasting. Phase 2 will compile of low-lying roads and infrastructure to coastal flooding and sea level rise based in part on findings from phase 1. This island-wide assessment will include an inventory of low-lying roads and

infrastructure and a vulnerability assessment and visualizations to help town staff better understand the nature of the vulnerability and direct next steps.

1. Coastal Hazards Management

The island of Martha's Vineyard and its 6 towns (Aquinnah, Chilmark, Edgartown, Oak Bluffs, Tisbury, and West Tisbury) are vulnerable to a wide range of coastal hazards that threaten the resiliency of natural resources, private property, and public infrastructure. Recently completed MVP planning processes for 5 of the 6 towns (Aquinnah is currently completing its initial planning grant) consistently identified coastal flooding, storms, and sea level rise as their top three concerns.

Significantly, towns on Martha's Vineyard are beginning to experience more frequent impacts as a result of chronic inundation related to nuisance flooding, storm surge, sea level rise, and climate change. This project addresses those concerns with a simple, straightforward, and proven method to locate, identify, and characterize areas vulnerable to coastal flooding regardless of the cause of that flooding. To increase the coastal resiliency of their island the 6 towns have responded with several management strategies. For example:

- Development of adaptation plan for the island
- Catalog public and private infrastructure that might be at risk
- Develop better energy policy to reduce dependence on fossil fuels. Also make the island less dependent on off island energy transfer
- Develop forest management strategies that reduce fire
- Update hazardous mitigation plans on a regular basis incorporating new data and science

2. Climate Adaptation

The six towns on Martha's Vineyard have conducted many studies and assessments to better understand the impacts of climate change and sea level rise. Towns have also developed bylaws and regulations to increase the resiliency of their respective towns. This project will provide useful information of low-lying areas throughout the island at parcel scale that will enhance past efforts and aid the design and direction of future studies. Conducting an island-wide survey will provide all six towns with vital information that will encourage the cooperation needed to address damaging storms and sea level rise that do not respect municipal boundaries. Further, it will reduce the patchwork efforts that often see unnecessary redundancies and missed opportunities for effective and efficient regional coastal management. The six towns are actively working toward adapting to climate change via a number of different projects and initiatives:

Aquinnah

- Conducted CERT Training (Community Emergency Response Training) for emergencies including storms
- Instituted a Town Climate Committee Chilmark
- Abandoned an at-risk road and built a causeway at Squibnocket Beach for neighborhood access
- Instituted a Town Climate Committee

Edgartown

- Ongoing MVP Action grant to study downtown resiliency
- Conducts periodic beach nourishment projects to enhance recreational beaches and improve resilience of coastal areas.
- Restored salt marsh in Sengekontacket Pond with the Town Oak Bluffs and Felix Neck Wildlife Sanctuary

Oak Bluffs

- Updated floodplain bylaw and developed floodplain bylaw regs through the CZM StormSmart Coasts pilot program
- Moved and raised wastewater infrastructure
- CZM Coastal Resiliency grant to look at OB Harbor resiliency, including Lake Avenue (underway)
- New, higher seawall at North Bluff, beach nourishment, groin construction on beach (Seaport Council, DCR, for beach and groins MVP grant) to protect major transportation hub
- Major stormwater management project to manage rainwater ponding on County Road during heavy precipitation events
- Developed Coastal Climate Change Vulnerability Assessment and Adaptation Plan
- Conduct periodic beach nourishment projects to enhance recreational beaches and improve resilience of coastal areas.

Tisbury

- Ongoing CZM Coastal Resiliency grant to look at Vineyard Haven Harbor area resiliency
- EPA stormwater grant to study green infrastructure stormwater management

West Tisbury

- Instituted a Town Climate Committee

Wampanoag Tribe of Gay head (Aquinnah)

- Conducting salt marsh monitoring
- Conducted dune restoration, Lobsterville Beach
- Developed Hazard Mitigation Plan
- Developed Climate Adaptation Plan

3. Need for Assistance

The island of Martha's Vineyard is greatly impacted by flooding in general. The flooding directly impacts vital infrastructure that services health care, transport of goods and services from off island and power, water, and water quality infrastructure. With severe coastal storms and rising sea levels, these flooding impacts have become more pronounced and more frequent. Where before residents would occasionally wait for a few hours to access these facilities, the waiting is now happening more frequently, for longer periods of time, with road conditions deteriorating. Many of these resources are State owned and managed.

It is important for the island to respond with remedial action now. The island has developed several studies of flood impacts and was part of an EPA project to develop natural methods of runoff mitigation, but major gaps remain. This project is needed as it will identify where coastal flooding begins to move inland. Based on the information obtained from GPS surveys to verify locations and geospatial data layers covering the entire island, this project will advance ongoing efforts to develop island-wide adaptation and climate change impact plans

Martha's Vineyard has 4 Environmental Justice Neighborhoods (EJN) in 3 island towns (Aquinnah, Oak Bluffs, and Tisbury) that can be seen in MassGIS's Environmental Justice Viewer (http://maps.massgis.state.ma.us/map_ol/ej.php). Three types of EJNs occur on Martha's Vineyard and they include 'Income', 'Minority', and 'Income and English Isolation' (Figure 1).

4. Project Description

As discussed above, the proposed project will be completed in two phases consisting of four primary tasks. The first task to be completed in year one is the mapping of storm tide pathways island-wide, in all six towns. Storm tide pathways provide a direct hydraulic connection between coastal waters and low-lying inland areas. This project will locate, identify, and characterize storm tide pathways within the 6 towns starting at the elevation of the highest high tide of the year up through to the *storm of record* plus 6 feet in half-foot increments. This will enable the towns to respond to approaching storms while planning for longer term capital preparations in response to coastal storms in the context of rising sea levels. Further, shorter term planning and improvements for more chronic impacts such as increased frequency of nuisance flooding and/or sea level rise can also be undertaken using the results of the storm tide pathway mapping and low-lying roads inventory.

This project is organized around four primary tasks.

- Mapping of storm tide parthways for all six towns, island-wide.
- Partnering with the National Weather Service to host these data on their Coastal Flood Threat and Inundation Mapping website.

- Developing a standalone app for use by town staff and the public.
- Conducting an island-wide inventory of low-lying roads and associated infrastrucure.

Task 1: Mapping of Storm Tide Pathways

Sub Task 1.1: Storm Tide Research/ Tidal Profile

As the first step in assessing STPs on Martha's Vineyard, a general tidal elevation profile will be developed that characterizes both storm tides and nuisance flooding for the island. To establish maximum study elevations, research of historical archives, published records, and available journals will be conducted to determine datum-referenced (NAVD88) elevations of the coastal flood waters associated with significant coastal storms. Based on this research, a storm of record (i.e., the storm with the highest recorded water levels) will be selected for the island. A maximum project elevation calculated as the storm of record plus 6 feet will be used to ensure that the mapping captures conservative estimates of sea level rise.

In addition, up to date elevations of the more common tidal datums of mean higher high water (MHHW), mean high water (MHW), and mean sea level (MSL) will also be referenced to NAVD88, the project datum. Although Martha's Vineyard does not have a real-time tide gauge, the following short-term tidal stations were installed on the island by NOAA: Station 8448725 in Menemsha Harbor (09/01/2008 - 08/31/2010 and 05/01/2011 - 04/30/2012); Station 8448157 in Vineyard Haven Harbor (07/01/1994 - 08/31/1994); and Edgartown Harbor (08/06/2004 - 09/05/2004). Benchmarks established by NOAA to memorialize station datums for these locations will be occupied using the Center's Real-Time Kinematic GPS (RTK-GPS) to develop reliable conversions of local tidal data to the North American Vertical Datum of 1988 (NAVD88). To supplement and confirm this information, a water level (tide) recorder will be installed in Vineyard Haven Harbor for 30 days to obtain contemporary tidal readings for comparison with the older short-term data series. The three-dimensional position of water level loggers will be 'surveyed in' with a with accuracies of ~1 inch in vertical and horizonal planes. The 30-day series of tide readings will be correlated with the 1983-2001 National Tidal Datum Epoch (NTDE) to facilitate comparisons available local tidal information, historical information, and NOAA records.

With the profile referenced to NAVD88, the elevations of local tidal datums such as mean lower low water (MLLW), frequently referred to as *chart datum*, will be determined for use in GIS data interpretation. As discovered in completed storm tide pathway projects for Cape Cod Bay, this sub-task is important to be able to provide the Southern New England Weather Forecast Office of the National Weather Service (NWS) with information in a format that is spatially compatible with their modelling estimates of total water level.

Sub Task 1.2: Identification of Potential Storm Tide Pathways and the Development of Preliminary Maps

Preliminary maps of storm tide pathway locations will be created based on a desktop assessment using the most recent, high-resolution elevation data (the 2016 NOAA LiDAR data) state-of-the-art data visualization software (Fledermaus™) and the tidal profile created in sub task 1.1 to develop storm tide pathways maps and a project-wide GIS database for all six towns. This software is used to systematically raise water levels throughout the study area to identify hydraulic connections between the ocean and inland areas. The locations are logged in the GIS software and data added to the individual attribute tables within the software to facilitate prioritization based on field access, elevation, and other characteristics. This full dataset is overlaid on orthophotos and reviewed by all team members before a final preliminary map of STPs is developed. The preliminary maps and database are then used for further assessment in the field as described below. Methodology has evolved with each completed storm tide pathway project, and the ability to use existing data as part of a screening process to focus field analysis in an iterative process has proven to be an efficient and cost-effective means of identifying storm tide pathways .

Sub-Task 1.3: Conduct Area Specific GPS Surveys to Accurately Identify and Map Potential Storm Tide Pathways

Using the preliminary maps developed in Sub-task 2, area specific, datum referenced RTK-GPS surveys will be conducted to verify the existence of potential storm tide pathways. Where storm tide pathways are identified in the field, pathway map data is are updated to include the elevation at which water begins to flow over the pathway (activation level) and the extent of the associated potential flooding.

Based on previous STP mapping efforts, between 70-90% of potential pathways seen in the desktop analysis are re-located (>1m) or dismissed based on field surveys. The quality and cost-effectiveness of lidar data cannot be overstated, particularly its use as an initial screening tool. However, the field mapping of storm tide pathways in dynamic coastal settings using high-accuracy RTK-GPS field surveys has been found to be an important step to overcome uncertainties in lidar data, changing landscape conditions, and document the presence/absence of pathways and their activation level.

This fieldwork, in general, is a critical step for several reasons. First, post-processed lidar collected via low flying aerial surveys can introduce uncertainties that exaggerate or diminish three-dimensional data obscuring or conflating the presence and scale of a storm-tide pathway. This has been shown to be particularly evident in cases of 'bare earth' models where elevations tend to be "pulled up" in areas adjacent to removed buildings and "pulled down" in areas of bridges or elevated roads (Figure 2). Second, the use of an RTK-GPS instrument improves the accuracy of the 3-dimensional positional data for each storm tide pathways. In addition to

confirming the presence of STPs, recognizing the dynamic nature of coastal geography RTK-GPS field work often reveals STPs that were not visible in the lidar desktop analysis. Lastly, and also related to the ephemeral characteristics of shoreline areas, even the most current lidar can be rapidly out of date. Consequently, GPS fieldwork is critical to identify STPs that have disappeared or moved due to changes in landform as well as new pathways that have developed since the lidar data were captured.

Sub Task 1.4: Finalize Storm Tide Pathway Maps and GIS data.

Using the geospatial information developed in sub tasks 1-3 a dataset including the final maps of storm tide pathways will be produced. This GIS database will include the: 1) storm tide pathways; 2) the elevation planes in 6-inch increments; and 3) the on-the-ground water levels (inundation depths) for each elevation plane. For example, if the land elevation is 10.0 ft (MLLW) and the water level is projected to be 13.5 ft (MLLW) by the NWS then approximately 3.5 feet of water would be expected at that location.

All elevation planes will be edited to reflect the real-world hydraulic connectivity associated with the elevation of specific coastal flood events. Low-lying areas, below NWS's project water levels associated with approaching storms but without a hydraulic connection to the ocean, will not appear to be flooded until the STP's activation level has been reached and connection has been made with the flood waters. The appearance of low-lying areas with water in them but without a direct connection to ocean water is a common complaint of many online sea level rise viewers, this editing requires extensive work in a GIS environment, but has been important for visualizations to reflect real world conditions. Realistic visualization of NWS estimated water levels avoids potential confusion where first responders may respond to a low-lying area that appears to flood when in reality the flood waters have not reached the activation level of the relevant storm tide pathway(s). Upon completion, this dataset will represent the best available data for flooding pathways within all 6 towns on Martha's Vineyard.

Task 2: Integrate Storm Tide Pathway Data with the National Weather Service's Coastal Flood Threat and Inundation Mapping website

The Boston/Norton office of the NWS provides timely weather forecasts for both the marine and terrestrial environments for Southern New England. As part of its communication program the NWS has developed an experimental Coastal Flood Threat and Inundation Mapping webpage (http://www.weather.gov/box/coastal) that provides real time forecasts of water levels (predicted tide plus storm surge) associated with approaching coastal storms for multiple locations along the Massachusetts and Rhode Island coasts.

Task 2 focusses on working with the NWS, to provide emergency managers with the 6 towns area with information that can be used to depict real-time forecasts of the datum-referenced heights, locations, and pathways of coastal storm flooding. Storm tide pathway data layers for all

six towns will be incorporated into the NWS experimental website to achieve this objective. In addition, graduate students and/or GIS technicians from the School for the Environment within the University of Massachusetts-Boston (UMB) will work with CCS and NWS staff to incorporate datum referenced storm tide pathway data layers onto the website. Data sets will include the location of the STPs as well as the approximate extent of inundation associated with each STP in 0.5 ft increments.

The ½-foot inundation data will also be classified into the flooding categories used by NWS in its forecasts of coastal flooding: Action, Minor, Moderate, and Major. These data will be available via the NWS website to anyone with an internet connection and can be used by town staff, educators and the public to increase awareness of vulnerability and provide a better understanding of real-world implications of projections of increased storm intensity and sea level rise.

Task 3: Development of Online and Offline Data Visualization App

An interactive computer-based module currently in the last stages of development for an ongoing project to map storm tide pathways will be used to produce a standalone app for the 6 towns of Martha's Vineyard and the public. This app will feature the storm tide pathways, inundation planes and inundation depths in 6-inch vertical increments from the highest high tide of the year to the Storm of Record plus 6ft. As presently envisioned this app will come in two versions for online and offline use. The online version will interface with the real-time total water level projections issued by the NWS but will have features not common on websites maintained by the federal government. It will be housed and maintained on servers at the Center for Coastal Studies. The added flexibility and customizability will be added value to the NWS websites. A second version of the app will be designed to work offline on computers with no internet connection. The NWS website has been used for storm preparation hours before an approaching storm by town staff in Provincetown and Truro. The real-time total water level projections are online, but they are also available via radio and thus the app could be used on a laptop with a radio during power outages to provide first-responders, DPWs and other town staff with valuable information.

Task 4: Development of Storm Tide Pathway Maps, Project GIS, and Report

Using the geospatial information developed in Tasks 1-3, high resolution maps will be compiled in a geodatabase depicting storm tide pathways along with GIS data and delivered to the 6 towns for distribution to its DPW, Emergency Preparedness, Natural Resource and Coastal Managers. In addition, a report discussing the methodology and significant results, will be prepared to accompany and describe the geospatial data.

Task 5: Low-Lying Roads and Infrastructure Vulnerability Assessment

The work undertaken for the mapping of storm tide pathways in Phase 1 provides a unique opportunity for the 6 towns to develop an inventory of low-lying roads and infrastructure island-wide in phase 2. Presentations of previous mapping efforts have often prompted first-responders, resource managers and public works professionals to request that these data be used to aid them in better understanding risks associated with the their performance of their duties during a coastal storm or flood event. Due to geographic area, the functionality of Martha's Vineyard low-lying roadway systems and evacuation routes relies implicitly on a system of intra- and inter-municipal cooperation to protect the health, safety, and welfare of year-round and summer populations. Confronted with recent impacts of extreme coastal flooding events and the prospect of both more frequent coastal storms and nuisance tide flooding of roadways, spatial information that could be used to assist with short-term storm preparation and response and longer-term mitigation planning is critical.

This task will use the maps of storm tide pathways to develop an inventory of low-lying roads and infrastructure based on critical flooding elevations. This inventory will then be used to analyze the vulnerable locations to better understand the current state of the low-lying areas as well as to help visualize the critical weak spots, relevant coastal processes, and potential mitigation efforts. Finally, a ranking developed from the work completed for this project as well available existing data and studies will be used to categorize all the low-lying roads and infrastructure based on vulnerabilities to inundation resulting from nuisance flooding, coastal storms and sea level rise. This will primarily be a GIS-based analysis, though the field work completed for the mapping of storm tide pathways will be critical for the vulnerability assessment. Toward that end the following components will be developed.

- Low-lying Roads and Infrastructure Inventory: Based on data from the mapping of Storm Tide Pathway within the 6 towns an inventory of vulnerable low-lying roads and associated infrastructure will be created. Using methodology developed by CCS to evaluate STPs, as well as vulnerable areas and roads.

- Vulnerability Assessment: This parcel-scale assessment will be conducted at 6-inch water level intervals from the highest high tide of the year to the storm of record + 6 ft, with particular attention to the highest high tide of the year to the storm of record +1ft. This assessment will compile the relevant available data to determine the vulnerability of particular areas based on metrics including, but not limited to, characteristics such as: ability and/or space to relocate/migrate, underlying slope, adjacent area slopes, human-built structures/infrastructure, natural vs. armored shorelines, barriers to water flow, etc.

- Vulnerability Visualization: Based on the vulnerability assessment and the mapping of storm tide pathways a visualization of the top 3-5 sites will be developed to help town

staff better understand the nature of the vulnerability, and address possible mitigation efforts to better direct next steps.

Information created for these analyses will be incorporated into an ArcGIS Geodatabase as geospatial data layers (i.e. feature classes). Standalone map products to accommodate non-GIS users will also be available upon request. The results of this task will also be used to work with police, fire and DPWs to develop short-term planning measures to identify storm-based road closures and potential area specific evacuation routes. Using the information generated for this and Tasks 1-4, a GIS database and report discussing the methodology and results, will be prepared, and delivered to the 6 towns for distribution to its DPW, Emergency Preparedness, Natural Resource and Coastal Managers. This document will incorporate the year 1 report as well as year two results and will serve as the final project report to be delivered by June 30, 2022

Task 6: Public Informational Meetings, Outreach and Education.

Three informational meetings will be held during the project. The first will take place at the outset to inform the public and town staff of project objective and timelines and collect input and feedback. The second, will occur toward the end of year 1 and will inform the public and town staff of the results of the mapping of storm tide pathways. This will be done in an effort to incorporate any suggestions that may increase the usability of the data in the report and the visualization app. The third and final meeting will be used to present the findings of both phases of the project and demonstrate the app for the audience. In addition, a 2-hour workshop will be conducted late in year 2 to demonstrate for town staff use of the app and the GIS database in order to maximize familiarity and usability of the final datasets and products.

An educational component for Island 7th graders will also be added. For over forty years, the Center's education program has been engaging students and the public on coastal and ocean research topics. The education's primary function is to take the science and research being conducted at CCS and make it accessible for the public. For the past eleven years the program has worked closely with eight schools on Cape Cod with students representing thirteen of the fifteen towns on Cape Cod reaching over five hundred students annually. The program is progressive over time with the students engaging with CCS educators over multiple years. As part of this proposal, CCS education would develop a curriculum for seventh graders on the Island discussing coastal processes, storms, sea level rise and climate change all within the context of coastal resiliency, which fit into the Massachusetts State Standards for seventh grade science under Earth and Human Activity and Ecosystems, Interactions, Energy and Dynamics. Curriculum development would take place in year one. In year two, CCS education director would conduct in-class programs.

5. Public Benefits and Interests

This project builds on the successes and lessons learned from five recent efforts[1*] to map storm tide pathways in Provincetown[1], Nantucket[1], Truro[1], Little Beach in Chatham[2], Scituate/Cohasset as well as two on-going regional projects that will see storm tide pathways mapped in 10 other municipalities in Massachusetts. As a valuable component of the fieldwork, the public is encouraged to engage field crews in order to provide them with information about prior flooding events that could be mapped and incorporated into the GIS package. During every project and the vast majority of field surveys, a member of the public has approached the field team and have asked about their field objectives for the day. The field teams have used these opportunities to elicit anecdotal evidence to confirm the results of field data that has been incorporated into the respective study (e.g. high-water marks on structures from recent storms).

In addition, an educational component is included to teach island 7th graders about the science of coastal storms, sea level rise and climate change using examples from this project and from Martha's Vineyard as a whole. Examples using places students have or will visit provide a real-world connection to global phenomena that will profoundly affect their lives and educate and inform the next generation of residents, citizens and decisionmakers.

The visualization of scientific data has been shown to facilitate an understanding of, at times, complex data sets or ideas. The visualization app coupled with the online NWS webpage will allow users to become better informed about the risk to their areas of interest and engagement from coastal flooding as a result of nuisance flooding, storms, and sea level rise. When the data from Provincetown and Truro were incorporated into the NWS's Coastal Flood Threat and Inundation Mapping webpage the previous projects demonstrated that this unique synthesis of information not only provided local emergency responders with real time forecasts of the heights, locations and pathways of coastal storm flooding but provided the public with simple access to storm related hazard predictions and projections associated with storm surge and flooding. More than a dozen calls have been made from residents to the Center for Coastal Studies requesting help with navigating the NWS website. These unsolicited calls demonstrate a desire of Massachusetts residents to be better informed about issues that are of concern to them. We believe this project, these websites and visualization apps will improve public participation in coastal decision making at the local level and that a better-informed public will improve coastal resiliency throughout the region and the state.

6. Transferability

The utility of these projects was demonstrated when the STP mapping information for the Provincetown-Truro area of Cape Cod Bay, viewed on the NWS's Coastal Flood Threat and Inundation Mapping website, was used by the town of Provincetown to implement short-term measures to close identified storm tide pathways in response to the NWS estimate of coastal

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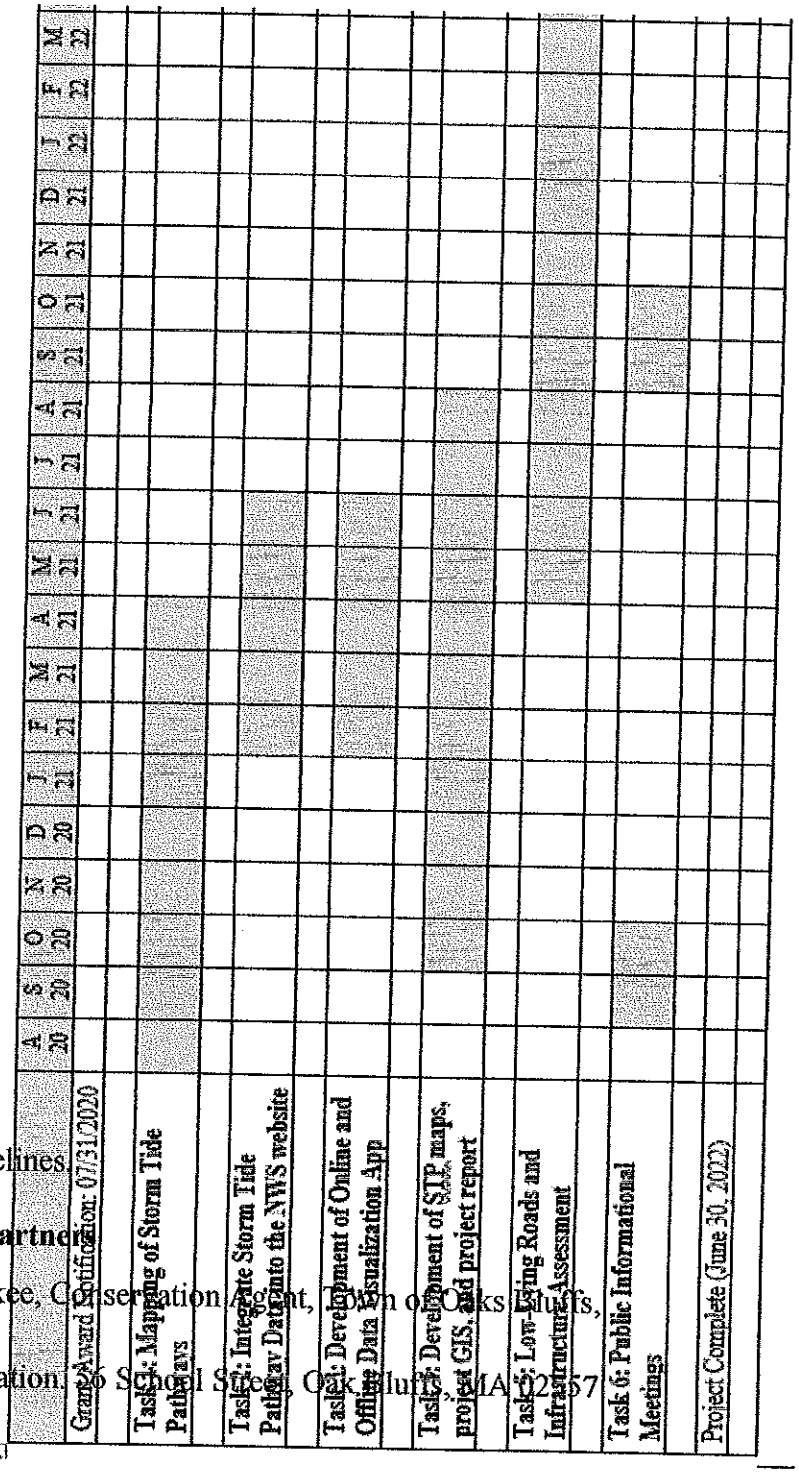
* [1] = funded through the MCZM Coastal Resiliency Grant Program, [2] = Town funded, [3] = funded through the MVP Grant Program.

storm flooding during the March storms of 2018. Using these data, the timely action by the town's emergency responders prevented downtown flooding while allowing most areas along the waterfront to return to normal operations soon after the storms moved offshore. Significantly, this same information is now being used to support longer-term solutions that will increase community awareness and coastal resiliency. In addition, similar projects have been undertaken in 2018 in the 'Little Beach' area of Chatham (town-funded) and throughout the towns of Scituate and Cohasset via an MVP grant FY21 (completion date: June 30, 2020). Ongoing projects to map storm tide pathways are occurring on the Cape Cod Bay shoreline from Sandwich to Wellfleet through a partnership with the Cape Cod Cooperative Extension and funded by the Seaport Economic Council (completion date March, 2021) and along the south coast of Cape Cod From Chatham to Barnstable, funded through the Cape Cod Commission (completion December 2021).

Further, with Lidar data now available for the entire coast this method can be applied to all coastal areas of the Commonwealth. Employing the method does, however, require the ability to: 1) manipulate and analyze very large, 3-dimensional spatial datasets; 2) conduct fieldwork with accurate GPS instruments; and 3) understand physical coastal processes and landforms. Reducing uncertainty associated with future storm events and their impacts will guide improved coastal planning as well as increase the confidence of the public regarding scientific data, and their comfort level with future projections of storms and sea level rise.

7. Timeline



8. Budget

See Attachment D per RFP guidelines.

9. Project Management and Partners

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Address: Department of Conservation, 56 School Street, Oak Bluffs, MA 02557

Partners

Martha's Vineyard Commission: Staff of the Martha's Vineyard Commission will provide staff support for this project. The MVC is the regional planning agency for the island. It also the primary staff to the Vineyard Climate Change Task Force. The Task Force has worked to developed policies in terms of energy use, adaptation, and hazardous mitigation. Commission staff will participate in this project and will assist in mapping, identification and development of background data, review of results, and will be a prime mover in terms of outreach. The MVC has developed an extensive climate change resource library with over 450 reports, presentation, statistics, or data. The MVC is also developing an Island Wide adaptation Plan which considers and makes provisions for infrastructure and other – caused by climate change. As flooding is a

major component in assessing potential impact and determining future action, the project proposed has great value for Martha's Vineyard.

The Town of Oak Bluffs: Insert brief description of project responsibilities.

The Center for Coastal Studies: The Center will co-lead efforts with project partners to develop tasks discussed above. Center staff has decades of experience conducting scientific studies on Cape Cod and working closely with Cape Cod municipalities to use those findings to develop better shoreline management practices.

- **Other Information**

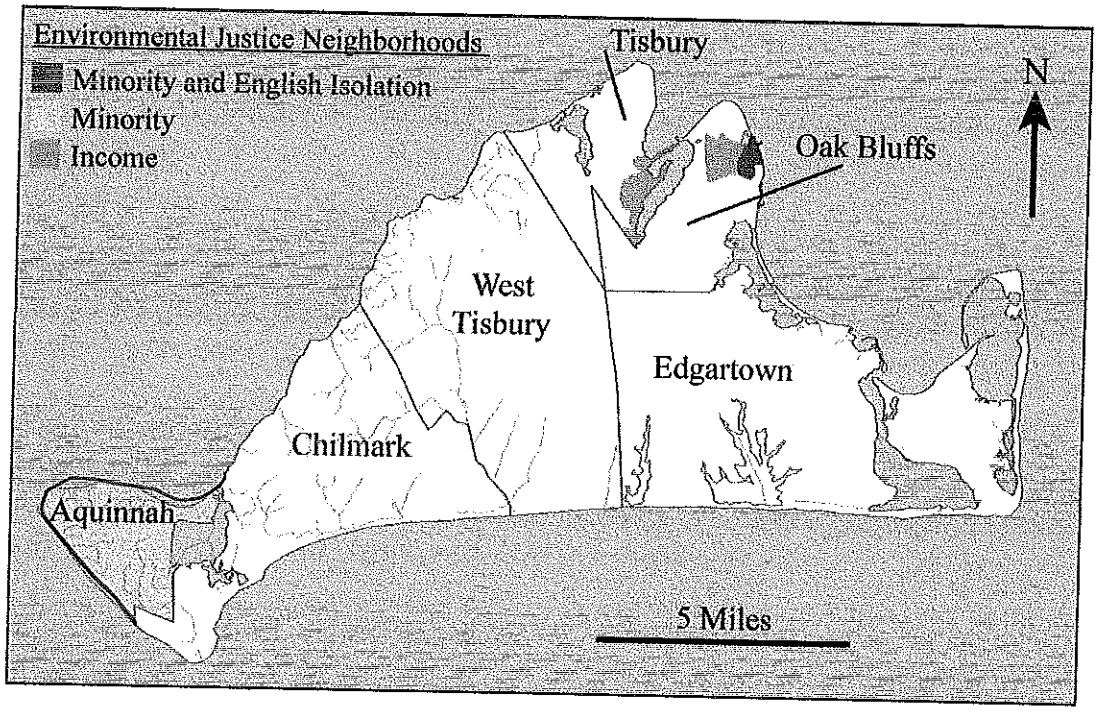

Figure 1. Location map and Environmental Justice Neighborhoods in Martha's Vineyard.

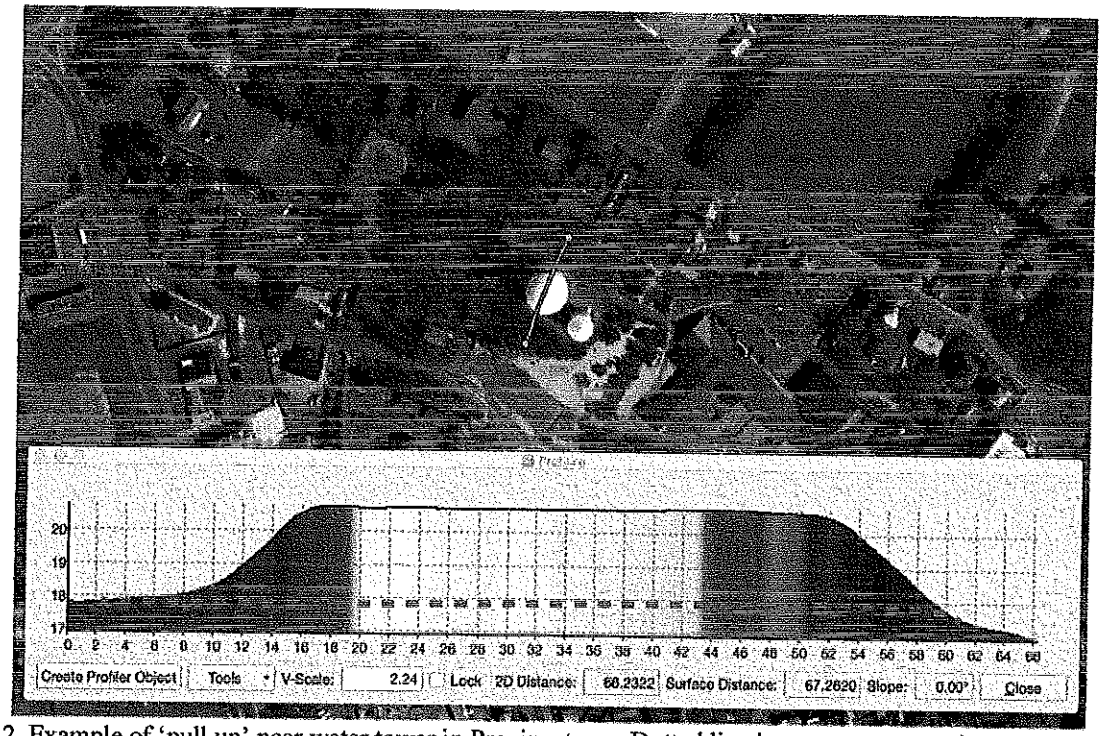

Figure 2. Example of 'pull up' near water tower in Provincetown. Dotted line is more representative of elevations at the water tower. Blue line in image is location in profile. Profile units = meters (Vert. NAVD88, Hor. NAD83).