Municipal Vulnerability Preparedness Program Action Grant Case Study

Municipality: Dennis
Project Title: Pound Pond Flood Mitigation and Storm Drainage Improvements
Award Year (FY): FY22
Grant Award: $ 120,001
Match: $ 40,000
Match Source: Town Cash
One or Two Year Project: One Year
Municipal Department Leading Project: Engineering Department
Project Website URL: www.town.dennis.ma.us/ Look for MVP Workshop under news

Community Overview:

- What is the population size of your community and where is it located?

  Dennis has a population of 14,674 according to the 2020 US Census and is located in the Mid Cape Area of Cape Cod, Massachusetts between Yarmouth, Brewster and Harwich.

- Do you have any Environmental Justice or other Climate Vulnerable communities? (Think about both those who live and work in your town.)

  The Project is located adjacent to five Environmental Justice (EJ) Designated Geographic Areas (DGA), made up of mostly older citizens living on fixed incomes in addition to younger working families. Dennisport is one of the poorest areas on Cape Cod and has income levels well below that of the County or other parts of Dennis. The population of South Dennis includes over 31% people over 65 years of age, more than double that of the national average, with the West Dennis census tract having over 40% of its population over 65 years of age. 11% of the households in West Dennis have no car. A total of 18% of the population of South Dennis also have disabilities.

  Providing improvements to Seaview Park, and Pound Pond will attract more residents to use the open space area for passive and active recreation, resulting in a healthier life style. The Dennis Head Start Program facilities are located on Depot Street within walking distance to the park. Improved access to the water, and educational interpretive elements planned for the project will benefit the Head Start program and other school classes that will use the area for field trips.

- Other unique traits of your municipality like who the top employers are, geography, history, etc.

  The Dennisport area, where the project is located includes seasonal and year round homes, a small downtown area on Route 28 and south facing beaches along Nantucket Sound. The Pound Pond receives stormwater runoff from the Dennisport drainage

system, draining approximately 43 acres including portions of Upper County Road, Route 28, Division Street, and Lower County Road through a series of catch basins, culverts, ditches and wetland areas. The pond currently discharges to Nantucket Sound via culverts, a one-way check valve and an armored outfall pipe.

Pound Pond was originally used for agricultural drainage but the exact origin of the pond itself is unknown. Flood plain geomorphology suggest the area may have been a coastal inlet, aerial photos from 1938 show a drainage ditch running through the area but no discernable pond outline. It was most likely that the pond was created by widening the agricultural drainage ditch in the 1950s. The site is located in the 100-year flood zone, and has flooded historically, including the 1938 Hurricane when the entire area was under water.

For over 50 years this area was the location of Sea View Play Land, a privately owned commercial recreational facility that included a main arcade, outdoor pitch and putt, housing, and a restaurant. The Town acquired the property in 2004 for open space and recreation. Several improvements were made to the present-day Sea View Park including maintenance and improvements to the drainage infrastructure, enhancements to the natural ecology, and installation of recreational park elements such as walking paths, community gardens and benches. The Town made additional drainage improvements to the drainage basin as well as the replacement of 420 feet of pipe south of Chase Avenue to the outfall and replacement of the check-valve above the outfall. In spite of the improvements, water quality impairments including algal blooms, odor and sedimentation persist, hindering enjoyment of the resource

Project Description and Goals:

- Where was the project located?

  The project is located at Seaview Park, bounded by Lower County Road to the north and Chase Avenue to the south, and to the east of Inman Road.

- What climate change impacts did the project address?

  The project addressed inland flooding from extreme precipitation and sea level rise to the extent possible given that there is a one-way check valve in the down stream culvert controlling backwatering due to high tide.

- What were the specific goals and tasks of the project as stated in your application?

  The project goals as stated in the application is to restore Pound Pond at Seaview Park in Dennis to provide water quality, habitat and flood plain improvements. The grant tasks included:

- Completing hydrologic and hydrologic modeling using climate change data, topographic and wetlands survey
- Ongoing public engagement with EJ community and local stakeholders
- Preparing permit level design and opinion of preliminary construction costs (OPCC)
- Preparing and submitting relevant local, state and federal permits
- Completing the wetland monitoring and site maintenance plan

- Did your project meet the goals set forth in your application in terms of:
    - Employing nature-based solutions

    The pond restoration design is l employing nature-based solution through the use of bio engineering for stream and bank stabilization, creation of wetlands and stream daylighting to improve water quality and flood mitigation in addition to overall habitat improvements.

    - Improving equitable outcomes for and fostering strong partnerships with EJ and other Climate Vulnerable Populations

    Public outreach and the workshop targeted EJ and climate vulnerable populations. Input from the workshop was used to improve the site design in particular providing user amenities that would enhance the community use of the area and providing settings to conduct environmental education for the head start program and others by establishing outdoor gathering areas and installing interpretative kiosks with graphics, text and audio information about the restoration project and how restoration elements provide resilience to the community.

    - Providing regional benefits

    Improvements to Pound Pond and the surrounding area will create a unique destination for neighboring communities and visiting tourists. Water quality improvements to stormwater discharge will benefit Nantucket Sound which is a regional resource.

    The project will protect, conserve and restore critical natural resources in a variety of ways:

- **Culvert Daylighting will allow a natural system to function again**. The current stormwater drainage system from Route 28 to Nantucket Sound is a combination of open channel and piped system. The open channel currently commences above Lower County Road through wetlands, passes through a culvert under Lower County Road and enters Pound Pond. The piped system begins again at southern end of the Pond though a culvert headwall. Daylighting the culvert from this point until the intersection with Chase Road

will improve habitat, flood storage and water quality by allowing a natural system to develop where there was once only darkness and pipe.

- **Wetlands Restoration design improves water quality and enhance habitat value.** The options for wetland restoration include potential instream channel modifications and instream planting. The concept plan includes construction of a wetland system in the upper reaches of Pound Pond, replacing the open water with a shrub wetland containing micro-pools and sinuous stream planforms. The setting is ideal for this type of improvement with existing shallow depth to water, an optimal watershed size and existing access for construction. The system will be designed to take advantage of the narrow configuration of the pond, provide uptake of nutrients and enhance aesthetics and habitat. Instream planting will stabilize areas with sediment accumulation, create habitat and encourage spawning. Rock riffles will be used to create additional water movement and aeration using scour pools, improving ecological uplift. Within the dredged, deep pool area, the Town may consider adding some natural benthic structures such as submerged cedar logs or exposed flat topped boulders, providing surfaces for the growth of micro fauna, hiding and resting spots for other aquatic species including minnows, frogs, turtles and birds.

- **Streambank Stabilization utilizing bioengineered soil lifts will prevent streambank erosion and preserve flood storage.** Areas along the eastern bank of the Pond are very steep, eroding in places and contributing to sediment loading in the pond. Encapsulated soil lifts incorporate natural coir fabric that are wrapped around each soil lift and will be set at packed one foot vertically and benched two feet horizontally and will start below the water line and transition to the upper bank elevation. Layers of live native cuttings will be utilized between lifts to establish early and quick rooted vegetation to the banks. Integrated structural components will be utilized where appropriate at the “toe” of the bank or shoreline to prevent higher velocity areas from erosion during the time vegetation takes foot. These living shoreline approaches will uplift the quality of aquatic habitat, promote access and interaction for a diversity of species between the aquatic-terrestrial continuum, and result in increased water quality. Vegetation is extremely important for the biological, chemical and physical health of the stream, wetland and pond systems as well as the stability of the entire system.

- **Design will improve aeration and protect public health.** Restricting the cross section within a stream channel will increase velocities under average flow conditions. The rock riffle will create turbulent movement of the water, entraining oxygen prior to entry into the deeper pool downgradient of the marsh. This movement will also discourage breeding of mosquitoes which will protect the health of adjacent residents on the eastern bank of the pond as well as those who visit Seaview Park.

- **Design will improve flood storage and retain sediment.** The design will allow flood bank overflow and storage within the shallow marsh system during extreme precipitation events. The stream will exit the marsh system by passing through a downgradient micro-pool and over a rock riffle into the deep water section. The micro-pool will retain sediment that may have been picked up in the marsh system.

- **Design will improve access to the pond.** Several features have been added to the design to allow the public to have safe access to observe the pond and the transition from a stagnant drainage ditch to vibrant wetlands. A bridge is proposed to cross the "creek" that will be created after daylighting the culvert and an overlook platform is proposed near the wetland area to observe the animals, plants and water functioning together as an ecological system.

    - Implementing the public involvement and community engagement plan set forth in your application

    As the project progresses to final design, the community will be engaged through follow-up public meetings and development of a project specific website. The website will be used to post project progress, provide a site for submittal of comments and provide other resources including an educational video about the project.

    - Finishing the project on time

    The Project was completed on June 30, 2020 meeting the MVP deadline.

Results and Deliverables:

- Describe, and quantify (where possible) project results (e.g. square footage of habitat restored or created, increase in tree canopy coverage, etc.). Report out on the metrics outlined in your application.

Enhancement will involve restoration of the existing pond through a variety of restoration components that include pond bathymetry reconfiguration, stream channel restoration including bordering wetland and riparian ecotone restoration.

The existing pond will be dredged to create bathymetric diversity. The lower end of the pond will be expanded below the existing outlet structure increasing wetted surface area by approximately 30%. The existing outlet structure and 640-feet of piped stream will be daylighted creating an additional 310-feet stream habitat. New resource area improvements include:

- 27, 470 sf of pond expansion and stream channel creation
- 18,810 sf of additional Land Under Water ("LUW")
- 525 lf of restored channel creation
- 310 lf of daylighted stream channel

In addition to LUW improvements, the shoreline will be stabilized and planted to encourage elevation dependent zones from the lower water edge up through the upland.

Floodplain areas will be enhanced with native plantings with coir logs and/or blankets in some areas to improve the habitat structure in the inner berm area and capture sediments

in the stream channel portions of the Pound Pond. Above the low water surface elevation, the creation of a diverse wetland complex utilizing native vegetative community structure that is designed to provide improved habitat and additional nutrient up-take.

- Provide a brief summary of project deliverables with web links, if available.

Task 1: Kick-off	**Summary**	**Web Link**
Kick-off meeting with Town, EEA, and Consultant	Meeting notes, sign-in sheet were provided with progress report #1	**N/A**
Task 2: Surveys and Modeling		
Wetlands Delineation	Wetlands flagging, notes and forms were provided with progress report #2	**N/A**
Site Survey and Existing Conditions Plan	Existing conditions plan is included on the design set	**LINK**
Modeling	Hydrologic and Hydraulics Report	**LINK**
Task 3: Landscape Design Alternatives		
Alternatives	Three iterations of conceptual layouts were reviewed, The final alternative and preliminary costs estimates were summarized in the Landscaping Memo along with Town Comments	**LINK**
Review	Initial town and public comments on LA elements	**LINK**
Design Drawings	The final Pound Pond site improvements LA graphic renderings is provided i	**LINK**
Task 4: Public Outreach		
Public Outreach	Emails and outreach contacts were provided in progress report #6	**N/A**
Pre-Design Workshop Materials	Pound Pond restoration concepts brochure is provided as a link	**LINK**
Workshop	Power-point and sign in from public workshop	**LINK**
Task 5: Preparation of 50% Design		
Draft Design	Digital copy of the 30% draft design for review	**LINK**
Technical Review	Summary of Town Recommendations on Draft- provided as email attachment	**N/A**
Design	50% permit level design and pdf	**LINK**
Calcs and Costs	Opinion of probable construction costs	**LINK**
Task 6: Permitting		
Pre-permit Meeting	Summary report of pre-permitting meeting is provided as a link to the right and was included as an attachment in progress report #7	**LINK**
MEPA Submittal	Digital copy of ENF submittal	**EENF** **Proposed EIR**

Permit Application Submittal	Digital copies of all submitted permits	**LINKS** PCN- MHC Dennis Conservation Commission NOI NOI Stormwater Report Section 401 Water Quality Certification Section 404 USACE PNF Chapter 91
Site Visits, Meetings and Hearings	Summary emails to Town included in monthly progress reports	**N/A**
Monitoring and Maintenance Plan	Draft Wetlands Monitoring and Maintenance plan is provided as a link. The Wetlands Monitoring and Maintenance Plan will be finalized after OCC and PNF are completed.	**LINK**

Lessons Learned:

- What lessons were learned as a result of the project? Focus on both the technical matter of the project and process-oriented lessons learned.

  The lesson learned on the permitting tasks for Pound Pond was the continued importance of interagency communications. Coordination between MEPA, MassDEP, the US Coast Guard, and the Army Corps of Engineers should have been initiated earlier in the process Changes to MEPA regulations could have been problematic, but the MVP grant requirements for the EJ outreach put the Town in an excellent position for the MEPA filing to have provided advanced notification of the project to EJ stakeholders. MEPA also made administrative changes for restoration project that were subject to mandatory EIR review solely due to proximity to a Designated Geographic Area for EJ populations to submit a combined Expanded Environmental Notification Form ("EENF") and Proposed Environmental Impact Report ("EIR"). This new process was not clearly defined by MEPA staff and resulted in an extension of the MEPA review to resubmit the forms correctly to allow a rollover of the Proposed EIR to a Final EIR. In addition, initial project delays on survey due to labor shortages and internal staff changes added unforeseen challenges for completion of the job.

- What is the best way for other communities to learn from your project/process?

  The Town is planning to expand their website to a dedicated page for the project. Communities can learn more about the project by visiting that website. The site will include educational narrative video about the restoration process, resiliency design elements and how the community benefits. Communities can also learn more by

visiting the site once it is constructed. Kiosks are planned for the final project that will provide graphic, text, and QC codes to scan with relevant audio describing the restoration elements closest to each kiosk.

Partners and Other Support:

- Include a list of all project partners and describe their role in supporting/assisting in the project.

  The project is supported by many Town department staff and members of the community who provided letters of support and got the word out about the Public Workshop including the Board of Selectmen, Dennisport Revitalization Committee, , Southshore Acton Council (Head Start Program), Dennis Chamber of Commerce.

  The project team is especially grateful to the guidance provided by Courtney Rocha, Southeast MVP Coordinator. Courtney provided ongoing advice, attended site visits, progress meetings and provided ongoing critical input to improve public outreach and project deliverables.

  Special thanks to the Dennis Department of Public Works, the Engineering Department and the Dennis Planning Department.

  Tom Andrade, PE, Town Engineer was the project and community lead for the MVP grant. Tom provided many hours of his time as well as time from his staff to support the concept designs, field work, public meetings, permit level design work, local, state and federal permitting meetings in addition to the administrative duties of the project.

  Dan Fortier, AICP, Town Planner was involved with the project since the Town began to raise funds for the acquisition of the parcel. Dan provided valuable knowledge with the site history, community challenges, public outreach and help in refining the landscape design amenities.

Project Photos:

- In your electronic submission of this report, please attach (as .jpg or .png) a few high-resolution (at least 300 pixels per inch) representative photos of the project.

North end of Pound Pond Inlet

South end of Pound Pond looking north