

## Municipal Vulnerability Preparedness Program Action Grant Case Study

Municipality: Mashpee

Project Title: Watershed-based Solutions to Increase Resilience to Harmful Algal Blooms in Santuit Pond in a Warmer and Wetter Climate

Award Year (FY): 2022

Grant Award: \$131,691

Match: \$52,451

Match Source: In-kind and cash

One or Two Year Project: One

Municipal Department Leading Project: Department of Natural Resources

Project Website URL: <https://www.mashpeema.gov/natural-resources/mvp-grant-award-watershed-based-solutions-increase-resilience-harmful-algal-blooms>

### Community Overview:

Mashpee is a community of approximately 15,000 located in Barnstable County in Southeastern Massachusetts on Cape Cod. Mashpee's natural environment combines seashore with sandy beaches and majestic views of Nantucket Sound and Vineyard Sound with four of the largest freshwater ponds on Cape Cod. Environmental Justice populations, based on income (approximately 1431 households) and minority status (approximately 454 households) are located in Mashpee. In addition, the Centers for Disease Control (CDC) Social Vulnerability Index, which is useful for identifying climate vulnerable populations, indicates low to moderate vulnerability in the northern half of Mashpee, including Santuit Pond. The vulnerability is largely driven by the composition of the population in this area, specifically – individuals aged 65 or older, aged 17 or younger, older than age 5 with a disability, and single-parent households. Mashpee is also the home of the Mashpee Wampanoag Tribe, Native Americans who have lived on this land for thousands of years and for whom Santuit Pond holds an important place in their history and cultural traditions and continues to provide a food source for the tribe as well as recreational opportunities to the community and region as a whole.

### Project Description and Goals:

The project is located in the Santuit Pond watershed and focused on identifying watershed-based solutions to increase the pond's resilience to the long-standing issue of harmful cyanobacteria blooms (cyanoHABs) in Santuit Pond. Beginning in the 1980s, following a period of rapid residential growth in the watershed, substantial nutrient loading from both residential land use and nearby cranberry farming was introduced into the pond. Although cranberry farming in the immediate vicinity has ceased, the pond still experiences recycling of nutrients from phosphorus-rich bottom sediments, along with inputs from stormwater runoff and other external sources such as septic systems. CyanoHABs are anticipated to increase under a warmer and wetter climate due to a combination of factors including increased temperatures and more frequent and intense rainfall events, increasing the importance and urgency of reducing nutrient inputs to the pond.

The overall goal of the project is to reduce the external loading that is driven by stormwater runoff to make the pond more resilient and less susceptible to harmful algal blooms following rain events. The Town's primary objectives for the project are to:

- Identify opportunities and develop concept designs for sediment and nutrient pollution reduction at key wet weather input locations around Santuit Pond.
- Prepare a permit-level design and submit a permit application for one high-priority stormwater retrofit project.
- Recommend changes to municipal bylaws and regulations to reduce nutrient impacts to Santuit Pond from land use activities.
- Educate and engage the residents who live around Santuit Pond, in the pond's watershed, and the broader Mashpee community about their role in improving and protecting the water quality of Santuit Pond.

Following award of the FY22 MVP Action Grant, the Town of Mashpee retained Fuss & O'Neill to lead the technical aspects of this project. Fuss & O'Neill worked closely with Town staff from the Mashpee Natural Resources Department, the Department of Public Works, the Mashpee Conservation Agent, Natural Resources staff from the Mashpee Wampanoag Tribe and representatives of the Southeast New England Program Technical Network, Friends of Santuit Pond, and other members of the public.

The project involved the following major tasks:

- Review Existing Data and Characterize Watershed Pollutant Sources (Tasks 1 and 2)

Various existing available information and data sources were reviewed to summarize current water quality conditions in Santuit Pond, watershed characteristics and pollutant sources, and develop preliminary recommendations regarding measures to address watershed sources of nutrient and sediment contributions to the pond. Information sources included prior studies of the pond and watershed including the 2010 Santuit Pond Diagnostic Study, updated to reflect more recent water quality assessments, GIS land use and resource mapping, municipal drainage system mapping, and other information provided by Town staff.

Fuss & O'Neill also conducted field assessments of the Santuit Pond watershed in November 2021 to evaluate known or suspected watershed sources of sediment and nutrient inputs to Santuit Pond, potential stormwater retrofit and improvement opportunities, and target areas for non-structural source control measures and residential Low Impact Development (LID) practices. The field assessments identified 21 site-specific opportunities in the residential neighborhoods surrounding Santuit Pond to reduce stormwater-related sediment and nutrient loadings through stormwater

retrofits, drainage system improvements, and improved maintenance of the drainage system.

- Development of Stormwater Retrofit Concepts (Task 4)

Two of the high priority sites identified from the field assessments were selected by the Town of Mashpee for concept development. These included Timberlane Drive/Lantern Lane and Town Landing, both of which are sources of direct discharge of stormwater runoff to Santuit Pond.

- Permit-Level Design (Tasks 3 and 5)

The Town of Mashpee selected the Timberlane Drive/Lantern Lane retrofit concept for further design to a level of detail suitable for local permitting. Fuss & O'Neill prepared permit-level design plans, including a Stormwater Management Report. The Mashpee Conservation Agent field-delineated resource areas at the project site and prepared a Notice of Intent filing pursuant to the Massachusetts Wetlands Protection Act and the Mashpee Wetlands Protection Bylaw.

- Municipal Bylaw Review and Recommendations (Task 7)

Fuss & O'Neill reviewed the Town of Mashpee's existing bylaws, regulations, and policies to identify opportunities and recommendations for strengthening water quality protection and enhancing climate resilience of Santuit Pond and other ponds and surface waterbodies in Mashpee. The review focused on external sources of nutrient inputs to Santuit Pond (stormwater, fertilizer, and irrigation water usage, etc.), which are heavily influenced by land use activities within the watershed, and opportunities for improved nutrient source control, stormwater management, and water conservation through amended land use policy. Redline and strikeout version of the Town's existing bylaws and regulations were prepared to support adoption of the proposed land use policy changes, several of which are proposed to be included as Fall 2022 Town Meeting warrant articles.

- Public Involvement and Community Engagement (Tasks 6 and 8)

The project implemented a robust public involvement and community engagement program that targeted the residents of the neighborhoods surrounding Santuit Pond and the broader Mashpee and regional community and which incorporated the knowledge and perspective of the Mashpee Wampanoag Tribe (which served in a community liaison role on the project). The major public engagement, outreach, and educational components of the project included:

- Project Website
- Project Meeting Flyers and Announcements

- Educational signage for the proposed Santuit Pond Resilience Trail
- Mashpee Wampanoag Tribe Community Liaison Coordination
- Mashpee TV Documentary Videos
- Residential Lot Makeover Walkshop Event
- Residential LID Educational Materials (General and Tailored to Santuit Pond)
- GIS Story Map – Residential LID and Residential Lot Makeover
- Residential LID and Bylaw Workshop Presentations (Mashpee Ponds Workshop)

This project met or exceeded the goals established in the Town’s FY22 MVP Action Grant application.

- **Nature-Based Solutions:** The project resulted in the identification of numerous site-specific green stormwater infrastructure (GSI) retrofit opportunities in the Santuit Pond watershed, as well as the development of GSI concepts for two high-priority sites and development of a design and permit application for GSI retrofits at the Timberlane Drive/Lantern Lane site. The robust public outreach and education components of the project engaged numerous residents and the major pond neighborhood groups, not only for Santuit Pond but also other ponds in Mashpee, on the topics of residential Low Impact Development (LID) practices and related nature-based solutions to improved stormwater management on individual residential lots.
- **Equitable Outcomes and Partnerships:** The project directly engaged and involved residents of the Santuit Pond neighborhoods, who are considered climate vulnerable populations. The project also directly involved the Mashpee Wampanoag Tribe as a community liaison and key partner in the development of education and outreach materials and messaging related to the cultural significance of the pond to the Tribe and region.
- **Regional Benefits:** The project resulted in design concepts and a permit-level design that will reduce stormwater-related nutrient inputs, as well as other non-structural measures (bylaw/regulatory updates and residential LID practices) that will reduce fertilizer use, prohibit motorized boating, and provide other water quality benefits for Santuit Pond, which is a major recreational resource not only to the Town but to the region. Santuit Pond also holds an important place in the history and cultural traditions of the Wampanoag and continues to provide a food source for the tribe as well as recreational opportunities to the community and region as a whole.
- **Public Involvement and Community Engagement Plan:** The project implemented all of the proposed elements of the robust public involvement and community engagement plan outlined in the grant application, as described above. The project complemented the ongoing efforts by the Town of Mashpee, the Tribe, and other partner agencies and organizations (Southeast New England Program, Association to Preserve Cape Cod, etc.) and has built momentum for implementation of the key project recommendations as well as recommendations of the recently developed watershed-based plan for Santuit Pond, prepared by the Tribe and the SNEP Network.

- Project Deadlines: The project was completed on time, within the 1-year project timeframe, with the exception of final production of the documentary videos by Mashpee TV. An extension was requested to capture video of the upcoming Wampanoag 101<sup>st</sup> Annual Powwow to be held on July 1-3, 2022.

#### Results and Deliverables:

The following summarizes how the project addressed the metrics outlined in the FY22 MVP Action Grant application:

- Number of GI retrofits identified and implemented/constructed
  - Opportunities for GI stormwater retrofit sites were identified at 21 sites in the Santuit Pond watershed.
  - Retrofit concepts for multiple GI installations (approximately 8) were developed for the Town's two highest priority sites (Timberlane Drive/Lantern Lane and Town Landing).
  - Permit-level design and a Notice of Intent filing were prepared for Timberlane Drive/Lantern Lane.
  - The Town has applied for FY23 MVP Action Grant funding for construction of the Timberlane Drive/Lantern Lane retrofits and advancement of the Town Landing concept.
- Number of homeowners and properties around Santuit Pond and other waterbodies in Town that implement residential LID and non-structural controls
  - As a result of the completed public engagement and community involvement activities associated with this project, numerous homeowners have expressed interest in implementing residential LID practices on their own property, including one homeowner who volunteered his site for the residential lot makeover and plans to implement the full suite of recommendations made for his property.
- Bylaw amendments adopted, and projects reviewed under the amended bylaws
  - Numerous amendments to the Town's existing bylaws and regulations were recommended based on the Fuss & O'Neill review and input from Town staff and the public. The redline and strikeout versions are intended to support the Town of Mashpee with adoption of the proposed land use policy changes, several of which are proposed to be included as Fall 2022 Town Meeting warrant articles.
- Water quality improvements and a reduction in the occurrence of cyanoHABs in Santuit Pond, as measured through the Town's ongoing water quality monitoring program
  - Progress toward meeting this metric can only be measured over time as the recommendations from this project and related efforts are implemented. The Town and other organizations will continue to monitor the quality of water in Santuit Pond to assess progress of the implementation efforts.

Major project deliverables include the following documents, which are available on the Town of Mashpee project website at the following link: <https://www.mashpeema.gov/natural-resources/mvp-grant-award-watershed-based-solutions-increase-resilience-harmful-algal-blooms>

- Technical Memorandum, Characterization of Watershed Pollutant Sources
- Stormwater Retrofit Design Concept Summary Document (Timberlane Drive/Lantern Lane and Town Landing)
- Permit-Level Design for Timberlane Drive/Lantern Lane, including Stormwater Management Report and Notice of Intent
- Technical Memorandum, Future Precipitation Estimates
- Technical Memorandum, Bylaw Review and Recommendations including redline and strikeout versions of updated bylaws and regulations
- Project Meeting Flyers and Announcements
- Educational signage – Santuit Pond Resilience Trail
- Mashpee TV Documentary Videos
- Residential Lot Makeover Walkshop Event
- Residential LID Educational Materials (General and Tailored to Santuit Pond)
- GIS Story Map – Residential LID and Lot Makeover
- Residential LID Workshop (Mashpee Ponds Workshop)

#### Lessons Learned:

- The value of collaborative relationships to increase capacity and potential funding sources, as demonstrated by the effective partnership with the Mashpee Wampanoag Tribe and SNEP Network technical assistance provider. Because of the relationship with the tribe and their existing SNEP Network technical assistance, there was an opportunity to significantly broaden the knowledge base in both the Tribe and the Town related to stormwater and watershed management.
- The value of combining cultural context with environmental and resilience challenges. Adding the Wampanoag perspective on Santuit Pond created a larger and broader context for the benefits of improving water quality and increasing resilience.
- The project's broader applicability and benefit to the Town as a whole. While the project was focused on Santuit Pond, there was significant interest from homeowners and residents living and working around Mashpee's other ponds in the information and practices shared relative to Santuit Pond. One high profile project such as the Santuit Pond project can raise awareness broadly in the community about resource vulnerability and measures that the community and individual homeowners can take to affect change.

Other communities can learn from this project by involving project partners with a regional focus and reach in a meaningful way both during and after the project is completed. For example, the Mashpee Wampanoag Tribe, SNEP Network, APCC, and other regional organizations can point to the work done on Santuit Pond, including their own involvement in the project, as a model for addressing similar water quality issues in other waterbodies on Cape Cod and the region.

#### Partners and Other Support:

- Mashpee Town Staff – staff from the Natural Resources Department managed the project, oversaw the work of the project consultant, led the public outreach and engagement activities, interfaced with Mashpee TV in the filming and production of the documentary videos, and coordinated with other project partners.
- Mashpee Wampanoag Tribe – the Tribe’s Natural Resources staff and other tribal members participated in project meetings, provided input on project deliverables, and provided content for and participated in the development of the documentary videos and educational signage.
- Mashpee TV – Mashpee Community Television filmed and produced the documentary videos, working closely with other project partners.
- Fuss & O’Neill – Fuss & O’Neill served as the Town’s consultant on this project. Fuss & O’Neill led the technical aspects of the project (i.e., watershed pollutant characterization and field assessments, stormwater retrofit concept and design development, bylaw review and recommendations), as well as partnered with the Town on developing materials for and participating in many of the public engagement and outreach events, including the residential lot makeover workshop and residential LID educational materials.
- Southeast New England Program (SNEP) Network - Kimberly Groff, SNEP Network Massachusetts Liaison, and her team provided technical assistance to the Mashpee Wampanoag Tribe through a separate but parallel and related project. The SNEP technical assistance included a feasibility study of interim measures to address water column phosphorus, development of a Watershed Based Plan for Santuit Pond, and development of stormwater retrofit designs. Several meetings were held between the MVP and SNEP/Tribe teams to coordinate the efforts of both projects.
- Association to Preserve Cape Cod – staff from the Association to Preserve Cape Cod (APCC) participated in the production of one of the documentary videos on residential LID practices and rain gardens.
- Friends of Santuit Pond – Friends of Santuit Pond was actively involved in the public engagement and outreach activities, including participation in workshop meetings and the residential lot makeover workshop.

Project Photos: See photos attached to the electronic submission.