

EPA Southeast New England Program Watershed Grant
Stormwater Management at Cape Cod Public Boat Ramps

2021-2023

Association to Preserve Cape Cod

FINAL REPORT

Executive Summary



Waquoit Bay Landing (or Seapit Landing) in July 2022. Photo credit: APCC.

The Cape Cod Public Boat Ramp Stormwater Project was supported by Southeast New England Program (SNEP) Watershed Grants. SNEP Watershed Grants are funded by the U.S. Environmental Protection Agency (EPA) through a collaboration with Restore America's Estuaries (RAE). For more on SNEP Watershed Grants, see www.snepgrants.org

Executive Summary

Project Background & Goals

Freshwater ponds and coastal embayments across Cape Cod are significantly degraded by nutrient and bacteria impairment. Land uses, including stormwater runoff and fertilizer use, contribute 20 percent (on average based on the Cape Cod Commission 208 Plan) of the controllable nitrogen load that leads to algal blooms and lethal hypoxic (low oxygen) conditions within our coastal watersheds. Additionally, bacterial contamination in stormwater discharge regularly causes closures of shellfish areas and beaches across Cape. This EPA SNEP-funded project aimed to address this issue through green stormwater infrastructure (GSI) control measures at public boat ramps. Boat ramps are often locations of direct discharge with little to no treatment of stormwater, but by implementing GSI systems in these areas, the natural processes of soil infiltration and plant nutrient uptake can treat and control the runoff at these sites before it enters the waterbody.



Figure 1: Ockway Bay Boat Ramp in Mashpee. The Town's shellfish propagation operation is located under the dock at the end of the boat ramp. Photo credit: APCC.

The short-term objectives of this project were to 1) complete a regional assessment and prioritization of public boat ramps on Cape Cod based on stormwater improvement needs, 2) develop conceptual designs for twenty high priority boat ramps, and 3) advance designs to permit-ready level at up to five priority boat ramp sites. The long-term objectives involve permitting, final design, and implementation of the stormwater retrofits which reached permit-ready designs as well as securing funds to finish design, permitting, and construction for the other boat ramp sites.

Project Results

The Association to Preserve Cape Cod (APCC) collaborated with ten towns on Cape Cod and the MA Department of Fish and Game Office of Fishing and Boating Access (OFBA) to develop a list of twenty priority boat ramp sites where improved stormwater management would mitigate impacts from nutrient and bacteria impairment. Sites were selected based on one or a combination of the following factors: known impairments to the adjacent waterbody, poor condition of the parking area or ramp that necessitated maintenance in the near-term, and/or lack of sufficient stormwater control either through observed failure of current infrastructure or lack thereof. Boat ramp sites from Barnstable, Bourne, Brewster, Dennis,

Falmouth, Harwich, Mashpee, Orleans, Sandwich, and Yarmouth, and OFBA were used to develop the list of twenty priority sites.



Figure 2: Horsley Witten meets project team members at Oak Crest Cove Boat Ramp for initial site investigation. Photo credit: APCC.

APCC contracted Horsley Witten Group in March 2022 to complete onsite inspections and concept designs for the stormwater retrofits at all twenty boat ramp sites. See Figure 3 for a map of all twenty sites. The field investigations were completed in July 2022 and the concept designs were completed in October 2022.

The concept designs were ranked based on a previously agreed-upon set of criteria, were reviewed by the project team, and were reexamined with the local community, including representatives of non-profit and

tribal stakeholder groups, through two public meetings in November 2022.

Based on the rankings and the feedback received through the review process, APCC selected an initial set of four public boat ramps sites for Horsley Witten to continue stormwater designs to permit-ready (75%) level. APCC and Horsley Witten continued to meet with respective project teams for each site throughout 2023 to achieve the permit-ready designs. Permit-ready designs were successfully completed for all four SNEP-funded sites in November 2023. Furthermore, with additional grant funds awarded through the MA Office of Coastal Zone Management, APCC selected another three sites to move forward to permit-ready designs. See Figure 3 for a map of all twenty sites which received concept designs as well as the seven sites which advanced to 75% designs.

Project Impacts

Utilizing green stormwater infrastructure (GSI) design, Horsley Witten developed conceptual plans for all twenty sites. These plans were informed by drainage area, general site characteristics (soil types, known utilities and other infrastructure), and area of impervious surface. After the selection of high priority sites, the respective plans were advanced using additional information gathered during the site surveys (groundwater depth, elevation, and GPS coordinates of all utilities and other infrastructure). Pollutant removal was modeled for each of the seven high priority sites.

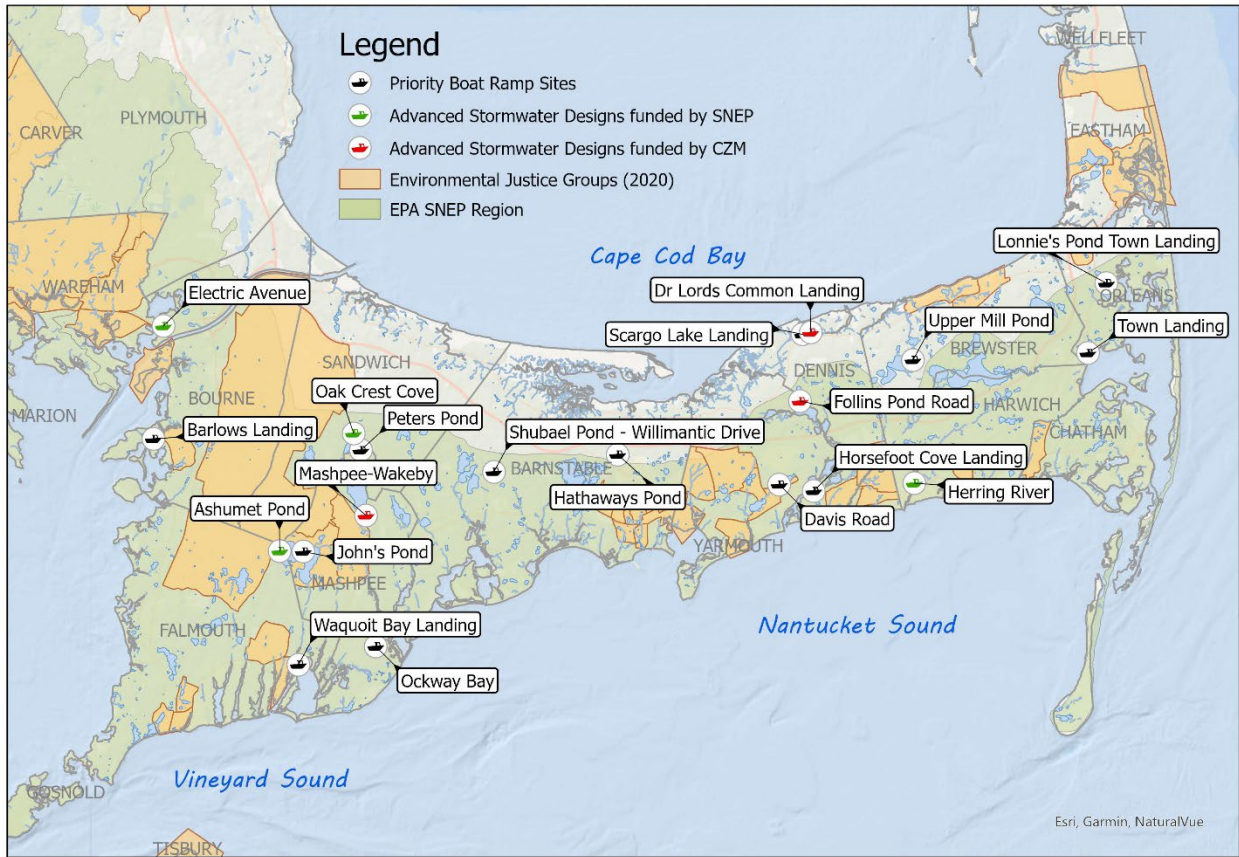


Figure 3: Map of priority public boat ramps selected for green stormwater infrastructure planning and design.

The table below (Table 1) provides conservative estimates of improvement to stormwater management at the four SNEP-funded sites, Ashumet Pond, Electric Avenue, Herring River, and Oak Crest Cove boat ramps, based on Horsley Witten’s design modeling. At all of the sites, the green stormwater infrastructure retrofits will remove some percentage of Total Suspended Solids (TSS), Total Phosphorus (TP), Total Nitrogen (TN), and Bacteria. Horsley Witten proposed some kind of bioretention area at all of the high priority sites. A bioretention area is a shallow depression used to treat stormwater runoff using a specific planting soil and plants to filter runoff. The method combines physical filtering and adsorption with biogeochemical processes to remove pollutants. The system consists of an inflow component, a pretreatment element, a shallow ponding area planted with appropriate native plant species (tolerant to both wet and dry periods as well as other site conditions such as wind, salt, shade, etc.), an overflow structure, and an emergency overflow weir.

Table 1: Conservative estimates of improvement to stormwater management at subset of priority public boat ramps on Cape Cod. Results are based on green stormwater infrastructure design and modeling by the Horsley Witten Group.

Boat Ramp Site	Town	Existing Drainage Area	Existing Impervious Area	Proposed Impervious Area	WQv Provided	Runoff Depth Treated	TSS Removal	TP Removal	TN Removal	Bacteria Removal
		(ac)	(ac)	(ac)	(cf)	(in)	(%)	(%)	(%)	(%)
Ashumet Pond	Falmouth	1.53	0.77	0.59	2,003.76	1.0	89%	98%	100%	100%
Electric Avenue	Bourne	2.00	1.00	0.85	2,874.96	0.9	82%	90%	92%	91%
Herring River	Harwich	0.38	0.24	0.23	348.48	0.5	44%	37%	23%	41%
Oak Crest Cove	Sandwich	9.42	1.45	0.94	3,876.83	0.7	63%	73%	73%	73%

The greatest reductions will likely be at Ashumet Pond in Falmouth where the full one inch of stormwater runoff will be treated to nearly 100% pollutant removal. The proposed retrofits for Ashumet Pond included the following: resurfaced parking lot and boat ramp access road to better direct runoff while maintaining current parking spaces and required drive aisle and parking space dimensions; GSI including two bioretention areas and porous asphalt; reduction in overall impervious cover; buffer restoration; and protection of as many existing mature trees as possible. Pretreatment will be provided with sediment forebays, and overflows from large storm events will flow out of the stormwater control measure inlets and/or an overflow structure.



Figure 4: Ashumet Pond Boat Ramp parking lot looking east. Photo credit: APCC.

Conversely, Herring River in Harwich shows the lowest percent removal of pollutants due to the limitations in space for treatment practices and the close proximity to the groundwater table. However, this site floods during most spring high tides, so there are additional benefits to the proposed practices in stabilizing sediment and providing salt marsh habitat that are not reflected in the stormwater modeling results. In total, the Herring River proposed retrofits consist of resurfaced entrance/exit driveways and parking lot to better direct runoff while maintaining current parking spaces, adequate drive aisle and required parking space dimensions, traffic flow, and stabilization of the parking lot surface; GSI including two wet



Figure 5: Herring River Boat Ramp in Harwich from the parking lot facing west. Photo credit: APCC.

bioretention areas; reduction in overall impervious cover through permeable paver system; and revegetation and protection of salt marsh areas to promote regrowth.

At most of the boat ramp sites, the volume of stormwater runoff is reduced in the proposed retrofit designs by removing some area of impervious surface. The greatest reduction in impervious surface will be at Oak Crest Cove where roughly 0.37 acres and 0.17 acres are proposed as porous pavement in the upper parking lot and the basketball court, respectively. Reducing the volume of stormwater discharge by removing impervious surface area improves the water quality in the adjacent waterbody by increasing the proportion of precipitation that percolates into the soil, a process that helps remove nutrients and bacteria before the water reaches the groundwater table. Additional stormwater improvements in the retrofit proposal include a bioretention area, a surface infiltration basin, and underground infiltration. Pretreatment will be provided with sediment forebays, and overflows from extreme events will flow through structures and spillways. These practices, if implemented, will improve slope stabilization on the existing eroded steep slope and reduce pollutants from entering Peters Pond by treating roughly 3,900 cubic feet of stormwater.



Figure 6: Oak Crest Cove basketball court and upper part of boat ramp (top) and lower boat ramp and dock (bottom). Photo credit: APCC.

Lastly, the retrofits proposed at Electric Avenue Boat Ramp will treat roughly 2,800 cubic feet of stormwater through a large bioretention area and underground infiltration trench. Pretreatment will be provided with proprietary water quality units, and overflows from extreme events are designed to bypass catch basin grates and flow down the boat ramp. Additional benefits of this design include resurfaced boat ramp access road to better direct runoff, formal sidewalk to improve pedestrian access to boat



Figure 7: Electric Avenue Boat Ramp and Buttermilk Bay. Note failed stormwater drain in foreground. Photo credit: APCC.

ramp dock; coastal bank planting for stabilization and resiliency; and reduction in overall impervious cover.

In addition to the site designs, other significant project impacts included: 1) network building through meetings with the town staff, the Office of Fishing and Boating Access, the Natural Resources Conservation Service (NRCS), and the Cape Cod Conservation District; 2) transferring knowledge regarding the benefits of green stormwater infrastructure to the project team, general public, pond associations, and other partners; and 3) leveraging this initial SNEP award to obtain \$143,552.25 in additional funds from the Massachusetts Office of Coastal Zone Management (CZM). The CZM funds were applied towards supplementing funding gaps in outreach, assessment, and design and towards completing permit-ready (75%) designs for three additional high priority boat ramps (Dr Lords Common Landing in Dennis, Mashpee-Wakeby Boat Ramp in Mashpee, and Follins Pond Boat Ramp in Yarmouth).

Challenges & Lessons Learned

Challenges: APCC and Horsley Witten encountered a few minor challenges as part of the prioritization process. First, the group had to discuss how to apply valuation of the estimated construction costs for a site as part of the ranking criteria. It was unclear whether the towns and state would benefit more from placing higher value on smaller projects which would be easier to implement (“low hanging fruit”) or larger, more expensive projects that would remove a greater percentage of the pollutants entering the waterbody (“best bang for your buck”). In the end, the team chose to place lower value on higher costs but gave more weight to the potential pollutant removal category.

Second, the team had to grapple with how to rank existing stormwater infrastructure that was functioning poorly. For example, at the Follins Pond Boat Ramp in Yarmouth, the existing infrastructure was theoretically reducing the drainage area of runoff to the ramp (Figure 8). However, in actuality, the catch basins were not effectively intercepting the runoff due to the steep slope of the roadway. The team discussed and agreed that it was important to address the failing infrastructure. In the Follins Pond case, changing the drainage area to address these poorly functioning catch basins pushed the site from near the bottom of the list into the one of the highest ranked spots.

Lessons Learned: APCC realized early on that the proposed budget would not adequately meet the needs of the project.



Figure 8: Follins Pond Road Boat Ramp in Yarmouth. Arrow indicates existing catch basin. Photo credit: APCC.

Although APCC had experience managing grants for greens stormwater infrastructure projects through the EPA SNEP Barnstable Three Bays Stormwater Project, the added logistics and coordination required for a regional project across ten towns (versus one) added more time and expense to the project than anticipated. Moreover, the original budget for the site survey and development of Existing Condition Plans was based on several assumptions: 1) multiple site assessment activities could be scheduled for one or more sites in a day, 2) smaller drainage areas with fewer utilities and other infrastructure to survey, and 3) fewer meetings for coordination of town and state partners. However, due to the complexity of the project and working with multiple partners, site assessments had to be scheduled site by site. Additionally, the survey and assessment efforts were more extensive due to the large area of each site selected, and more meetings were required to coordinate with the team and partners.

Through careful planning and coordination, APCC was able to overcome the budget shortages by seeking and securing additional funds from the Massachusetts Office of Coastal Zone Management to fill these funding gaps and expand the project scope to address three additional priority sites. The process provided a valuable lesson that project management logistics do become more time consuming the larger the extent and scale of the project. Also, design budgets do not extend as far across stormwater improvement sites with very large drainage areas because of the additional onsite survey work required. In the future, APCC will take these factors into consideration when planning and prioritizing a regional-scale project with finite resources for design.

Recommendations & Next Steps

The long-term goals of the project are to implement the proposed stormwater retrofits by developing final designs, acquiring permits, and completing construction. For a few high-ranking sites that were not selected in November 2022 for 75% designs, APCC secured \$73,800 in private foundation funds to move the Waquoit Bay Landing (or Seapit Landing) in Falmouth, Willimantic Drive on Shubael Pond, and Scargo Landing on Rout 6A in Dennis from concept designs to 25% designs by spring 2024. APCC contracted Horsley Witten to continue these designs and tasks include site surveys, existing condition plans, and 25% design.

For the sites with 75% (permit-ready) designs, the next step is to secure funding to finalize designs, apply for permits, and subcontract a construction company to make the plans a reality. APCC applied to funding opportunities through Southeast New England Program (SNEP) Watershed Implementation Grant administered by Restore America's Estuaries and the SNEP Stormwater Infrastructure Grant administered U.S. Environmental Protection Agency during the summer of 2023 in order to complete permitting and construction for a subset of the priority sites, but neither application was accepted. However, APCC secured

\$36,936 in private foundations to meet the permitting objective for all four SNEP-funded sites (Electric Ave in Bourne, Ashumet Pond in Falmouth, Herring River in Harwich, and Oak Crest Cove in Sandwich) by May 2024 and will continue to pursue funding opportunities to meet the long-term construction objective.

For the three CZM-funded sites (Follins Pond Road in Yarmouth, Dr Lords Common Landing in Dennis, and Mashpee-Wakeby Pond in Mashpee), an FY24 CZM Coastal Habitat and Water Quality grant of \$761,137 was awarded to APCC in October 2023 to complete permitting, final design, and construction for Dr Lords Common Landing and the Scargo Landing on Route 6A as well as to complete permitting for Follins Pond and Mashpee-Wakeby. The CZM sites also required an additional \$15,000 to finish out 75% designs for Dr Lords and Follins Pond, and this supplemental funding was also provided through a private foundation.

One significant challenge to future progress for the Ashumet Pond and Oak Crest Cove sites is the limited number of funding opportunities for isolated freshwater ponds in this area. While the CZM grants are available for systems with coastal connections, like Herring River and Electric Avenue, SNEP funding is one of the few options to acquire construction funding for the other two locations.



Figure 9: Ashumet Pond Boat Ramp in Falmouth.

Compliance

Since the project was funded through an EPA SNEP grant, the required Quality Assurance Project Plan (QAPP) was developed by Horsley Witten with support from APCC. Horsley Witten submitted the QAPP in May 2022 for review and it was approved by EPA in June 2022. Horsley Witten also coordinated with respective town Conservation Commissions regarding permitting requirements for soil test pits. The soil test pits (up to 10ft deep) were necessary for the soil evaluation which will inform the existing conditions documentation and 25% designs. In all cases, the town staff agreed to assist with filing any approval requests. Where necessary, the Director and Chief Engineer for the Office of Fishing and Boating Access submitted a letter to the Massachusetts Historical Commission (MHC) inquiring as to potential historical or archeological assets within the respective project areas. MHC determined that no archeological assets would be disturbed during survey or construction of the stormwater infrastructure.

Project Partners

The following people were involved in the project meetings and design review and were considered key points of contact for each town, organization, or agency: Amanda Lima (Yarmouth, Town Engineer); Amber Unruh (Barnstable, Senior Project Manager – Special Projects); Ashley Fisher (Mashpee, DNR Director); Chris Miller (Brewster, DNR Director), David Deconto, DNR Director, and Paul Tilton, Town Engineer (Sandwich); Doug Cameron (MA DFG Office of Fishing and Boating Access Doug Cameron, Director); Gregg Fraser (Falmouth, Director of the Marine and Environmental Services Department); Heinz Proft (Harwich, DNR Director) and John Rendon (Harwich, Harbormaster); Tim Lydon (Bourne, Engineering Department); Tom Andrade (Dennis, Town Engineer); Tom Daley (Orleans, DPW Director); Michelle West (Project Manager) and Gemma Kite (Horsley Witten Group).

Additionally, members of the Natural Resources Conservation Service (NRCS), the Cape Cod Conservation District, the Mashpee Wampanoag Tribe and several pond associations were invested in the project, attending the larger public meetings and the more focused design review meetings. Those participants, whom we referred to as key stakeholders, included: Donald Liptack, Stormwater Specialist, Cape Cod Conservation District; Martha Craig, Program Director, Cape Cod Conservation District; Lisa Petruski, NRCS; Steve Spear, NRCS; Debra and Paul Hennessey, Friends of Ashumet Pond; Susan Dangel, President of Save Mashpee Wakeby Pond Alliance; Christine Dennis, Friends of Peters Pond; and Dale Oakley, Assistant Director of Natural Resources, Mashpee Wampanoag Tribe. APCC developed strong collaborative relationships with each of the stakeholder groups that will be vital in moving the projects into the next stages of permitting, construction, and ongoing maintenance.

Outreach & Public Involvement

APCC hosted a public meeting to introduce the project to the community and potential stakeholders on June 9th, 2022, via Zoom; 23 people participated. There was also strong community involvement in the regional public meetings held virtually via Zoom on November 1, 2022, and November 3, 2022. APCC provided these latter public meetings to receive feedback from stakeholders on 10% concept designs. The feedback for the project was overwhelmingly supportive. The total number of attendees at the November public meetings was roughly 82 (42 participants on Nov. 1 and ~40-45 on Nov. 3). Additionally, we received written comments from another ten stakeholders, including members from respective pond associations, abutting homeowners, and owners of local businesses).

Outreach Materials: APCC developed a fact sheet regarding stormwater management at boat ramps and distributed it with the announcements for the public meeting held on June 9,

2022. APCC also developed outreach materials (meeting registration webpage, announcement flyer and letter to abutters) for the public meetings held on November 1 and November 3, 2022. At least two weeks before each of the aforementioned meetings, the meeting announcements and other associated materials were shared with the project team partners (state and town staff), posted on the APCC e-newsletter for two weeks preceding the meeting, and posted on the APCC social media pages (Facebook and Instagram). Municipal and state staff were encouraged to share the announcement with other departments and post it as desired in town halls and/or social media outlets. Direct invites were also sent electronically via email to key stakeholders including regional entities, such as the Cape Cod Commission, the Cape Cod Conservation District, and the Waquoit Bay National Estuarine Research Reserve, as well as local pond associations and coalitions, tribal communities, and other affiliated groups. Lastly, the announcement materials were shared with Restore America's Estuaries and EPA SNEP communications staff.

In summer of 2022, APCC developed a website for the project. It included a registration portal for stakeholders and members of the public to sign up for notifications regarding public meetings and other project updates. Prior to the public meetings held in November, the website also provided a means to register and gain access to the Zoom meeting links. In December, APCC updated the website with the final sites selected to advance to 75% (permit-ready) stormwater designs. <https://apcc.org/stormwater-management-at-public-boat-ramps/>

Following the public meeting, APCC was interviewed by Jamie Costa of Sandwich Enterprise and a short article about the project ran in the Sandwich, Mashpee, Bourne, and Falmouth news outlets on June 17, 2022. APCC was also interviewed by Sam Houghton of WCAI regarding the boat ramp project and a short summary of the project aired on the radio in mid-to-late June 2022. Lastly, APCC provided a press release to local and regional news organizations regarding the November public meetings on October 14, 2022. In addition to the press release that APCC submitted, there was coverage of the public meetings in Cape News.

Presentations: APCC provided presentations to the Mashpee Environmental Coalition and the Falmouth Water Quality Management Committee in October 2022 to update members on the public boat ramp project and encourage attendance at the November public meetings. APCC also attended the Cotuit Library Harvest Festival on October 8th to educate the public on green infrastructure stormwater best management practices as well as spread the word about the public boat ramp project and upcoming public meetings.

In collaboration with Horsley Witten, APCC developed a Restore America's Estuaries (RAE) Summit presentation entitled "How to choose: criteria for selecting stormwater remediation

sites when there is overwhelming need and finite resources.” Ms. Mora provided the in-person presentation at the RAE Summit in New Orleans in December 2022.

Lastly, APCC provided a presentation as part of the Land to Sea Series organized by Clean Ocean Access in Rhode Island on February 21, 2023. The presentation covered the ecological benefits of green system infrastructure stormwater design, methods for building a stormwater master plan, as well as a brief overview of the Public Boat Ramp project and lessons learned.

Budget

Of the initial \$148,871 awarded to APCC under the SNEP21 grant, \$148,863.83 was spent. The funds covered APCC personnel and expenses (supplies and travel) for project management as well as an engineering subcontract to develop conceptual (10%) green stormwater infrastructure (GSI) designs for twenty public boat ramps on Cape Cod as well as permit-ready (75%) GSI designs and associated materials for four of the top-ranking sites. APCC was also awarded an FY23 Coastal Zone Management Coastal Habitat and Water Quality grant (\$143,552.25) which provided additional support for project management and design development in 2022 through January 2024. The CZM funds also provided support to expand the number of boat ramps advancing to 75% designs by an additional three sites for a total of seven sites receiving permit-ready designs.

The combined match exceeded the original SNEP21 budgeted amount of \$49,185 by roughly \$114,000. The CZM grant provided approximately \$142,318.75 in match as of December 2023. APCC provided \$3,176.28 in match related to staff, GIS consultant time, and indirect costs. The state and staff team members tracked \$17,697.05 of in-kind match for the project prior to August 2022.

In total, the SNEP21 and the CZM grants along with in-kind match, provided by APCC and partners, contributed \$312,055.91 to the first phase of the project, “Stormwater Management at Cape Cod Public Boat Ramps,” between November 2021 to December 2023. For the next phase of the project, \$125,736 was secured through private foundation funds to complete 25% designs for three sites (Waquoit Bay Landing, Willimantic Drive on Shubael Pond, and Scargo Landing on Route 6A), final 75% designs for two sites (Follins Pond Road and Dr Lords Common Landing), and permitting for four sites (Electric Avenue, Ashumet Pond, Herring River, and Oak Crest Cove). Also, \$761,137 was awarded by CZM through the FY24 Coastal Habitat and Water Quality grant to complete permitting, final design, and construction for two sites (Dr Lords and Scargo Landing) as well as permitting for Mashpee-Wakeby Pond and Follins Pond. All combined, \$1,198,929 has been allocated through this project towards improving stormwater management at Cape Cod’s public boat ramps.

EPA Southeast New England Program Watershed Grant
Stormwater Management at Cape Cod Public Boat Ramps
2021-2023
Association to Preserve Cape Cod
FINAL REPORT



Waquoit Bay Landing (or Seapit Landing) in July 2022. Photo credit: APCC.

The Cape Cod Public Boat Ramp Stormwater Project was supported by Southeast New England Program (SNEP) Watershed Grants. SNEP Watershed Grants are funded by the U.S. Environmental Protection Agency (EPA) through a collaboration with Restore America's Estuaries (RAE). For more on SNEP Watershed Grants, see www.snepgrants.org

SNEP21 FINAL REPORT

1. Cover Information

Date: January 17, 2024

Project Name: Cape Cod Stormwater Management at Public Boat Ramps

Subaward Number: SNEPWG21-14-APCC3

Subaward Period: November 23, 2021 through December 31, 2023

Subawardee Organization: Association to Preserve Cape Cod (APCC)

Report Contact Person & Project Leader:

Jordan Mora

jmora@apcc.org

207-650-1231

482 Main St., Dennis, MA, 02638

Reporting Period: November 23, 2021 through December 31, 2023

Report Type and Number: Final Report

2. Project Report Narrative

Freshwater ponds and coastal embayments across Cape Cod are significantly degraded by nutrient and bacteria impairment. Land uses, including stormwater runoff and fertilizer use, contribute 20 percent (on average based on the Cape Cod Commission 208 Plan) of the controllable nitrogen load that leads to algal blooms and lethal hypoxic (low oxygen) conditions within our coastal watersheds. Additionally, bacterial contamination in stormwater discharge regularly causes closures of shellfish areas and beaches across Cape. This EPA SNEP-funded project aimed to address this issue through green stormwater infrastructure (GSI) control measures at public boat ramps. Boat ramps are often locations of direct discharge with little to no treatment of stormwater, but by implementing GSI systems in these areas, the natural processes of soil infiltration and plant nutrient uptake can treat and control the runoff at these sites before it enters the waterbody. APCC collaborated with eleven towns on Cape Cod and the MA Department of Fish and Game Office



Figure 1: Ockway Bay Boat Ramp in Mashpee. The Town's shellfish propagation operation is located under the dock at the end of the boat ramp. Photo credit: APCC.

of Fishing and Boating Access (OFBA) to develop a list of twenty priority boat ramp sites where improved stormwater management would mitigate impacts from nutrient and bacteria impairment (see Figure 2 for a map of the priority sites). Photos of all twenty sites are available in the Supporting Materials section.

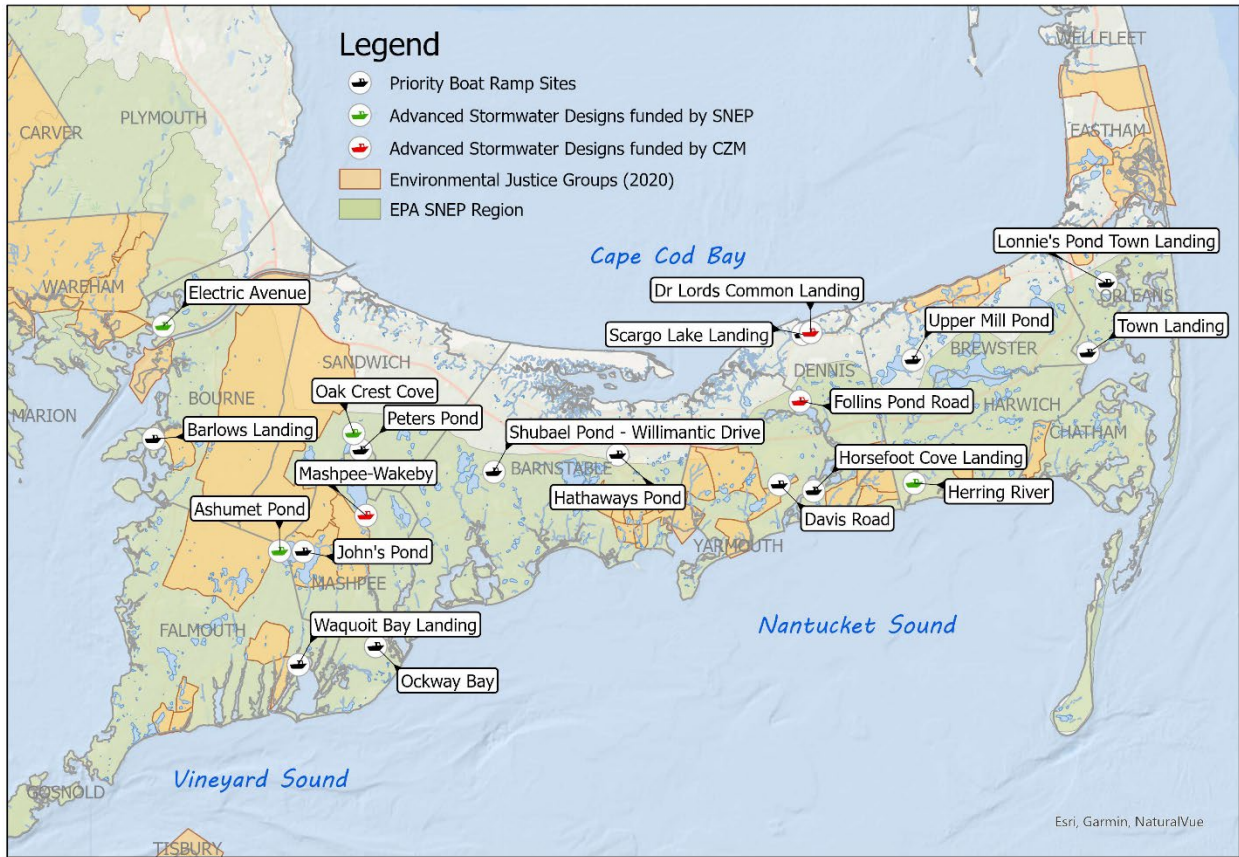


Figure 2: Map of priority public boat ramps selected for green stormwater infrastructure planning and design. Photos of sites can be found in Supporting Materials in the Field Forms document.

2.A. Project Results

Project Goals and Objectives

The goal of this project was to assist municipalities and state government agencies in designing green stormwater infrastructure best management practices (BMPs) at public boat ramps in order to reduce untreated stormwater runoff from entering already impaired waterbodies. The short-term objectives of this project were to 1) complete a regional assessment and prioritization of public boat ramps on Cape Cod based on stormwater improvement needs, 2) develop conceptual designs for twenty high priority boat ramps, and 3) advance designs to permit-ready level at up to five priority boat ramp sites. The long-term

objectives involve permitting, final design, and implementation of the stormwater retrofits which reached permit-ready designs as well as securing funds to finish design, permitting, and construction for the other boat ramp sites.

Project Accomplishments

Task 1 – Planning and Prioritization

Following the award announcement, APCC notified potential state, regional, and town project partners of the grant award and requested their participation in the collaborative meetings and boat ramp site data sourcing in September 2021. APCC received interest from the several towns, state agencies and regional entities (see Section 2.D below for a list of Project Partners).

In October and November 2021, APCC reviewed ranking criteria from previous stormwater and salt marsh site assessments for the proposed desktop assessment component of the project scope. The site assessment metrics, which were evaluated for use in the boat ramp project, were based on the SNEP-funded Three Bays Stormwater Management Project, the Cape Cod Water Resources Restoration Program, and the APCC Restoration Coordination Center’s salt marsh inventory. The relevant criteria were combined into a draft list of site ranking/prioritization measures and GIS-based data were obtained through various sources (including download from MassGIS and the Cape Cod Commissions GIS Data Portal).

These compiled criteria and draft ranking system were shared with the state and town partners at an initial meeting and presentation provided on November 16, 2021. The meeting agenda included an introduction to the SNEP21 Boat Ramp project’s scope and timeline, overview of expected partner involvement and match tracking requirements, and a review and discussion of the draft criteria proposed for the boat ramp site prioritization. However, during the meeting the attendees voted to provide town and state priorities in order to highlight sites which already have known issues related to stormwater management and impaired water quality.

APCC compiled a draft list of the top twenty priority public boat ramps for stormwater improvements from the individual lists provided by the project team. APCC also coordinated with Donald Liptack of the Cape Cod Conservation District on selecting public boat ramp sites in order to avoid confusion and duplication of efforts between the NRCS Cape Cod Water Resources Restoration Project funded sites and the SNEP21 project. The draft list was shared with the project team for review. The twenty public boat ramp sites were selected as follows:

- The top two sites from each participating town’s priority list were included in the draft list of boat ramp sites.

- Where towns did not supply priority lists or only had one eligible site, the remaining slots were filled with state-owned public ramps. Bob Duncanson with the Town of Chatham reflected on the boat ramp design opportunity but ultimately found that there were no suitable sites in Chatham for the project.

After receiving comments on the draft list of priority boat ramps, in February 2022 APCC finalized the list of twenty public boat ramps to receive 10% concept designs (Table 1). APCC also confirmed the eligibility of all of the sites with Restore America’s Estuaries and EPA as four of the sites are located outside of the SNEP boundary (but within SNEP town limits).

Table 1: Summary table of twenty priority public boat ramps on Cape Cod.

#	ID#	Boat Ramp Name	Ownership	Town	Associated Waterbody	Impaired/ Pollutant (2018/2020 Integrated List)	Water Quality Status (SOTW)*	Freshwater / Estuarine	Existing Site Condition	Anadromous Fish Run?	Shellfishing Area?	Public beach?	Env Justice Pop (1-mile buffer)
1	BA-BR1	Willimantic Dr Landing	State	Barnstable	Shubael Pond	No Uses Assessed	Unacceptable	F	Fair	N	N	Y	No
2	BA-BR2	Hathaways Pond	Town	Barnstable	Hathaway Pond North	NA	Acceptable	F	Poor	N	N	Y	Minority
3	BO-BR1	Barlow's Landing Boat Ramp	Town	Bourne	Pocasset/Red Brook Harbor	Estuarine Bioassessments, Fecal Coliform	Unacceptable	E	Good	N	Y	Y	Income
4	BO-BR2	Electric Avenue Boat Ramp	Town	Bourne	Buttermilk Bay	Estuarine Bioassessments, Fecal Coliform, Nutrient/ Eutrophication Biological Indicators	Acceptable	E	Fair	N	Y	Y	Income
5	BR-BR1	Upper Mill Pond Boat Ramp	Town	Brewster	Upper Mill Pond	Meets some uses, other uses not assessed.	Acceptable	F	Fair	Y	N	N	No
6	DE-BR1	Scargo Lake Landing Ramp	Town	Dennis	Scargo Lake	No Uses Assessed	Unacceptable	F	Fair	Y	N	N	No
7	DE-BR2	Dr Lords Common Landing	Town	Dennis	Scargo Lake	No Uses Assessed	Unacceptable	F	Poor	Y	N	Y	No
8	DE-BR3	Horsefoot Cove Landing	Town/State	Dennis	Bass River	Estuarine Bioassessments, Fecal Coliform, Total Nitrogen	Unacceptable	E	Fair	N	Y	N	Income
9	FA-BR1	Seapit River Landing (Waquoit Bay Landing)	State	Falmouth	Seapit River/ Waquoit Bay	DO, Estuarine Bioassessments, Total Nitrogen, Nutrient/ Eutrophication Biological	Unacceptable	E	Poor	N	Y	N	Minority and Income
10	FA-BR2	Ashumet Pond	State	Falmouth	Ashumet Pond	DELTS, DO, Mercury in Fish Tissue, TP	Unacceptable	F	Fair	N	N	N	Minority and income
11	HA-BR1	Herring River Boat Ramp	Town	Harwich	Herring River	Coliform, Total Nitrogen, Nutrient/ Eutrophication Biological Indicators	Unacceptable	E	Poor	N	Y	N	Minority and Income
12	MA-BR1	Ockway Boat Ramp	Town	Mashpee	Ockway Bay	Estuarine Bioassessments (3)	Unacceptable	E	Good	N	Y	N	No
13	MA-BR2	Mashpee Wakeby Boat Ramp	State	Mashpee	Mashpee Pond	DO, Mercury in Fish Tissue	Unacceptable	F	Poor	Y	N	Y	Minority
14	MA-BR3	John's Pond Boat Ramp	State	Mashpee	John's Pond	(Fish Passage Barrier), Mercury in Fish Tissue	Acceptable	F	Fair	Y	N	N	Income
15	OR-BR1	Route 28	Town	Orleans	Pleasant Bay	Estuarine Bioassessments, Total Nitrogen	Acceptable	E	Fair	N	Y	Y	No
16	OR-BR2	Lonnie's Pond (Kescayogansett Pond)	Town	Orleans	The River	Fecal Coliform, Total Nitrogen (4)	Unacceptable	E	Fair	N	Y	N	Minority and income
17	SA-BR1	Peters Pond (Oak Crest Cove)	Town	Sandwich	Peters Pond	Mercury in Fish Tissue	NA	F	Fair	N	N	Y	Income
18	SA-BR2	Peters Pond	State	Sandwich	Peters Pond	Mercury in Fish Tissue	NA	F	Poor	N	N	Y	No
19	YA-BR1	Follins Pond Road	Town	Yarmouth	Follins Pond/Bass River	Eutrophication Biological Indicators	Unacceptable	E	Good	N	Y	N	No
20	YA-BR2	Davis Road/Long Pond Boat Ramp	State	Yarmouth	Long Pond	No Uses Assessed	Acceptable	F	Fair	Y	N	N	Income

Task 2 – 10% Concept Design Development

Stormwater engineering contract: APCC developed a request for proposal (RFP) to procure an engineering firm through subcontract. The RFP listed the tasks that the engineering firm would be responsible for completing as well as the not-to-exceed budget limit. Tasks included: 1) developing an EPA-approved Quality Assurance Project Plan detailing site survey methods and site assessment criteria, 2) 10% concept designs of stormwater retrofits at twenty pre-selected public boat ramps, 3) 25% retrofit design development for up to five of the original twenty sites, and 4) 75%, or permit-ready, designs for the subset of sites.

Following an online search utilizing the SDO directory for WBE/MBE certified engineering firms, APCC distributed the RFP in on January 4, 2022, to nine different engineering firms including three certified WBE/MBE firms. APCC held an information session on January 20, 2022, for the engineering firms to ask questions regarding the RFP. Representatives from four of the firms attended. The questions and responses were compiled and shared with all prospective engineering firms.

Three APCC staff separately reviewed and evaluated three proposals received on February 4, 2022, for the engineering contract. The evaluation consisted of scores from rubric criteria and reference interviews. APCC awarded the contract to the proposal with the highest combined score, Horsley Witten Group. APCC and Horsley Witten Group met to review project scope before the final development and execution of the engineering contract was completed. The contract was fully executed on March 7, 2022.

Group meetings: In early March, APCC and Horsley Witten met to discuss the criteria for evaluating the twenty boat ramp sites which would be used to select the top five sites moving to 25% designs. Additionally, the group discussed next steps regarding town data requests. APCC then organized a meeting with the entire project team (including state and town partners) on March 24, 2022, in order to: 1) introduce Michelle West as the Project Manager from the Horsley Witten Group for the project, 2) update the team on project scope and timeline, and 3) obtain feedback regarding criteria to be used in determining which five sites progress to the 25% designs this fall.

QAPP development: APCC and Horsley Witten met with Chelsea Glinka from VHB to discuss QAPP requirements in March of 2022. At the March 24th meeting, APCC requested all available data and other materials pertaining to the twenty boat ramp sites from the state and town partners in order for Horsley Witten to compile a list of secondary data sources and files. In April 2022, Horsley Witten developed and submitted a first draft of the QAPP to APCC for general review and to add specific sections related to the early stages of project development and site prioritization. Following APCC's review and section additions, Horsley

Witten submitted the revised QAPP draft to Chelsea Glinka at VHB for review on April 22, 2022. After addressing comments raised by VHB, Horsley Witten submitted the revised QAPP draft to EPA for review on May 11th, 2022. EPA approved the QAPP contingent upon a few minor adjustments related to distribution list and contact information. The QAPP was distributed for signatures and EPA signed off on May 31, 2022. APCC sent the final QAPP (with all signatures) to the distribution list including all project team members.

Stakeholder engagement: APCC developed a stakeholder contact list (including but not limited to pond associations, yacht clubs, Cape Cod Fisherman’s Alliance, and Mashpee Wampanoag Tribe) and sent electronic invites via email for an initial stakeholder engagement meeting, or “public meeting”, held on June 9, 2022. See Outreach and Communications section for more information.

Field site assessments: In June, Horsley Witten Group (HWG) compiled information for each boat ramp site, printed GIS-based maps, and coordinated field site scheduling with the towns and the Office of Fishing and Boating Access. Horsley Witten Group (contracted engineer for project; HW) completed site assessment visits to all twenty public boat ramps. Town and state project team members attended the site visits to provide background information and answer questions about the site specifics. Main objectives of these site visits included: 1) speaking to town and/or state



Figure 3: Horsley Witten meets project team members at Oak Crest Cove Boat Ramp for initial site investigation. Photo credit: APCC.

staff regarding stormwater, access, or other concerns related to the boat ramp, 2) confirming drainage area, and 3) taking photos. APCC was present for all site visits. APCC’s main objective during the site visits was to ask town and/or state staff about local stakeholders who would be interested in the site for public outreach. Secondly, APCC became more familiarized with the sites and the challenges associated with each in order to make informed decisions regarding the five sites that would move forward to 75% designs.

Concept (10%) Green Stormwater Infrastructure Engineering Designs: Horsley Witten developed draft concept designs and compiled a criterion ranking spreadsheet for all twenty sites (Table 2). The concept designs were included in site-specific summary field forms which listed existing conditions in addition to potential benefits from the proposed design. APCC shared the draft concept designs and site ranking with the project team for discussion at the project team meeting held on October 4, 2022. Following feedback on the designs from

Table 2: Results from ranking criteria of conceptual retrofit designs for twenty priority public boat ramp sites. Initial results provided by Horsley Witten Group and reviewed by Association to Preserve Cape Cod.

Site #	Boat Ramp Name	Total WQv treated (20)	Pollutant Reduction (10)	Water Quality Impairment (10)	#1 Score	#2 Score*	Wetlands/Permitting (5)	Construction Access Issues (5)	Potential Abutter Property Impacts (5)	Maintenance Burden (5)	#3 Score	Environmental Justice Populations (5)	High Priority Resource Areas and/or Public Beach Benefits (5)	Habitat Improvements (5)	Addresses Existing Conditions (5)	Builds Resiliency (5)	Public Education/Demonstration (5)	#4 Score	SCORE
MA-BR2	Mashpee Wakeby Boat Ramp	15.92	10.0	5.0	30.9	6	0	5	5	2.5	12.5	2.5	5	2.5	5	2.5	2.5	20	69.4
BO-BR2	Electric Avenue Boat Ramp	10.65	10.0	10.0	30.6	6	2.5	5	5	2.5	15	2.5	5	2.5	2.5	2.5	2.5	17.5	69.1
YA-BR1	Follins Pond Road	20.00	10.0	5.0	35.0	8	5	2.5	5	5	17.5	0	2.5	0	2.5	0	0	5	65.5
HA-BR1	Herring River Boat Ramp	7.65	8.2	10.0	25.8	4	0	2.5	5	2.5	10	5	2.5	5	5	2.5	5	25	64.8
BA-BR2	Hathaways Pond	13.54	10.0	0.0	23.5	6	5	5	5	2.5	17.5	2.5	2.5	0	5	0	5	15	62.0
FA-BR2	Ashumet Pond	12.68	10.0	5.0	27.7	4	5	5	5	2.5	17.5	5	0	2.5	0	2.5	2.5	12.5	61.7
DE-BR2	Dr Lords Common Landing	9.17	10.0	5.0	24.2	2	0	2.5	2.5	5	10	0	5	5	5	5	5	25	61.2
FA-BR1	Seapit River Landing (Waquoit Bay Landing)	11.17	9.9	10.0	31.1	6	2.5	2.5	0	2.5	7.5	5	2.5	0	5	2.5	0	15	59.6
SA-BR1	Peters Pond (Oak Crest Cove)	15.50	10.0	0.0	25.5	4	5	0	5	2.5	12.5	2.5	2.5	2.5	5	0	5	17.5	59.5
BA-BR1	Willimantic Dr Landing	6.33	7.9	5.0	19.2	10	5	2.5	5	5	17.5	0	2.5	2.5	0	2.5	2.5	10	56.7
BO-BR1B	Barlow's Landing Boat Ramp North	8.43	5.0	10.0	23.4	10	2.5	5	0	2.5	10	2.5	5	0	0	0	5	12.5	55.9
DE-BR3	Horsefoot Cove Landing	7.87	10.0	10.0	27.9	4	0	2.5	5	0	7.5	2.5	2.5	0	5	0	5	15	54.4
OR-BR2	Lonnie's Pond (Kescayogansett Pond)	5.26	10.0	10.0	25.3	10	2.5	0	2.5	5	10	5	2.5	0	0	0	0	7.5	52.8
BO-BR1A	Barlow's Landing Boat Ramp South	7.53	4.6	10.0	22.1	10	0	5	0	0	5	2.5	5	0	2.5	0	5	15	52.1
DE-BR1	Scargo Lake Landing Ramp	6.13	7.2	5.0	18.3	8	2.5	5	5	5	17.5	0	2.5	0	2.5	0	2.5	7.5	51.3
SA-BR2	Peters Pond	16.24	10.0	0.0	26.2	2	2.5	2.5	2.5	0	7.5	0	2.5	2.5	2.5	2.5	2.5	12.5	48.2
BR-BR1A	Upper Mill Pond Boat Ramp	5.35	10.0	0.0	15.4	10	2.5	5	5	2.5	15	0	2.5	0	0	0	5	7.5	47.9
BR-BR1B	Upper Mill Pond Boat Ramp	5.29	6.8	0.0	12.0	10	2.5	5	5	2.5	15	0	2.5	0	2.5	0	5	10	47.0
MA-BR1	Ockway Boat Ramp	5.89	10.0	5.0	20.9	10	2.5	2.5	2.5	2.5	10	0	2.5	0	2.5	0	0	5	45.9
YA-BR2	Davis Road/Long Pond Boat Ramp	6.09	7.2	0.0	13.2	10	2.5	5	5	5	17.5	2.5	2.5	0	0	0	0	5	45.7
OR-BR1	Route 28	5.00	10.0	5.0	20.0	10	2.5	0	0	2.5	5	0	5	0	0	0	0	5	40.0
MA-BR3	John's Pond Boat Ramp	10.02	10.0	0.0	20.0	4	2.5	0	0	0	2.5	2.5	2.5	0	2.5	0	0	7.5	34.0

the project team and APCC, Horsley Witten developed final concept designs for all twenty sites and updated criteria ranking spreadsheet. See Supporting Materials for additional information.

Public Outreach & Engagement: Two regional public meetings were held virtually via Zoom on November 1, 2022 and November 3, 2022 at 2-4pm. APCC provided the public meetings to receive feedback from stakeholders on 10% concept designs. The western sites (Bourne, Falmouth, Mashpee, and Sandwich) were discussed on November 1 and the eastern sites (Barnstable, Brewster, Dennis, Harwich, Yarmouth, and Orleans) were discussed on November 3. Following the public meetings, APCC continued to receive feedback from stakeholders on concept designs until November 14th. See Sections 2.E. and 2.F. for more information regarding community involvement and communications.

Final Site Selection: Following the public meetings in November 2022, APCC coordinated with Horsley Witten and individual project team members regarding priority and capacity to determine the final sites moving forward to 25% and 75% design. A description of this process is available in the Final Memorandum available under Supporting Materials.

The final site selection was shared with the full project team on November 29, 2022, and included the following sites (partners confirmed continued participation and are listed in parentheses):

- Mashpee-Wakeby Boat Ramp in Mashpee (Town of Mashpee and Office of Fishing and Boating Access)
- Electric Avenue Boat Ramp in Bourne (Town of Bourne and Cape Cod Conservation District)
- Ashumet Pond Boat Ramp in Falmouth (Town of Falmouth and Office of Fishing and Boating Access)
- Dr Lords Common Landing in Dennis (Town of Dennis)
- Herring River Boat Ramp in Harwich (Town of Harwich)
- Oak Crest Cove Boat Ramp in Sandwich (Town of Sandwich)
- Follins Pond Road Boat Ramp in Yarmouth (Town of Yarmouth)

Of the sites selected, the retrofit designs for the following sites were covered with the SNEP21 grant: Oak Crest Cove, Electric Ave, Ashumet Pond, and Herring River. These sites combined require at least five retrofits as Oak Crest Cove will entail two different retrofits (permeable pavement under the current parking lot and a swale behind the basketball courts). Additional retrofit designs were funded for Dr Lords Common Landing in Dennis, Mashpee-Wakeby Boat Ramp in Mashpee, and Follins Pond Road Boat Ramp in Yarmouth

through a FY23 Coastal Habitat and Water Quality Grant administered by the Office of Coastal Zone Management.

In December 2022, APCC sent an update via email to stakeholders who registered for the public meetings or sent written comments regarding the concept designs and future site selection. APCC also sent all comments received from stakeholders to respective project team members, so they have a record of all correspondence and feedback for future work.

Lastly, APCC and Horsley Witten drafted and finalized Boat Ramp Site Prioritization Memorandum, which includes all field assessment information, concept designs, and site ranking for all twenty boat ramps as well as a list of the sites selected to advance to 75% designs and a description for how those final sites were determined. See Supporting Materials (Section 4) to obtain a copy of the Memorandum.

Task 3 – 25% Design Development

APCC met regularly with Horsley Witten (HW) to discuss project progress and next steps for partner input and coordination. In December 2022 and January 2023, APCC and Horsley Witten met with respective project teams (i.e., town and state staff relevant to each particular boat ramp site) for an initial 25% design kickoff meeting. During these initial meetings, we reviewed the 10% concept designs again and discussed scheduling and coordination of test pits for soil evaluations, wetland delineations, and site survey. The table below (Table 3) shows the progression of soil tests, wetland delineation memos, existing condition plans, and 25% designs for each public boat ramp, including those funded solely with FY23 Coastal Habitat and Water Quality funds.

Table 3: Major milestones for completion of Task 3 (25% design development). This list includes three additional sites funded by the CZ Coastal Habitat and Water Quality Grant.

HW Site ID#	Boat Ramp Name	Town	Funding	Ownership	Soil Test Complete	Wetland Memo	Existing Conditions		25% Designs
							Draft	Final	
FA-BR2	Ashumet Pond Boat Ramp	Falmouth	SNEP21	State	Jan-23	Dec-22	Feb-23	Mar-23	Jun-23
DE-BR2	Dr Lords Common Landing	Dennis	FY23 CZM	Town	Jan-23	Jan-23	Jan-23	Mar-23	Jun-23
BO-BR2	Electric Avenue Boat Ramp	Bourne	SNEP21	Town	Dec-22	Jan-23	Jan-23	Feb-23	Jun-23
YA-BR1	Follins Pond Road	Yarmouth	FY23 CZM	Town	Feb-23	Jan-23	Apr-23	Apr-23	Jun-23
HA-BR1	Herring River Boat Ramp	Harwich	SNEP21	Town	Jan-23	Mar-23	Mar-23	Apr-23	Jun-23
MA-BR2	Mashpee Wakeby Boat Ramp	Mashpee	FY23 CZM	State	Dec-23	Jan-23	Feb-23	Mar-23	Jun-23
SA-BR1	Oak Crest Cove (Peters Pond)	Sandwich	SNEP21	Town	Jan-23	Dec-23	Jan-23	Feb-23	May-23

In April 2023, APCC and Horsley Witten attended an onsite meeting at the Herring River Boat Ramp in Harwich and the Electric Avenue Boat Ramp in Bourne to discuss potential construction funding opportunities through the Cape Cod Water Resources Restoration Project (CCWRRP), a Natural Resources Conservation Service program. In attendance were members of Restore America's Estuaries (Herring River only), town staff, Cape Cod Conservation District (CCCD), and NRCS. During the meeting we discussed the site's eligibility for the CCWRRP and Horsley Witten explained the proposed 10% design with CCCD and NRCS to learn if there were any components that would not qualify for NRCS funding.

APCC coordinated 25% design review meetings for each boat ramp site with Horsley Witten as well as town and state staff. Additionally, APCC invited associated stakeholders (e.g., pond association members, Mashpee Wampanoag Tribe, and other interested community members) to the remote Zoom meetings. The Oak Crest Cove and Ashumet Pond 25% design review meetings were held in June 2023, and the review meetings for Electric Ave and Herring River were held via Zoom in July 2023 (see meeting notes under Supporting Materials).

Task 4 – 75% Design Development

APCC scheduled the 75% draft design review meetings with respective teams and stakeholders. The Ashumet Pond, Herring River (Harwich), Electric Ave, and Oak Crest Cove meetings were held on September 18th, September 26th, October 10th, and October 14th, respectively. Prior to the meetings, Horsley Witten developed and shared draft materials including the project cost estimate, 75% site plans, and stormwater report. Project teams were given at least two weeks to review and provide comments on the draft material.

Horsley Witten finalized all materials by the end of November 2023. The final cost estimates, site plans, and stormwater report (including the Operations and Maintenance Plan) are provided in the Supporting Materials. APCC helped to distribute final products to project teams and relevant stakeholders. The 75% site plans and stormwater reports are also available on the project website: <https://apcc.org/stormwater-management-at-public-boat-ramps/>.

Project Impacts

The table below (Table 4) provides conservative estimates of improvement to stormwater management at the four SNEP-funded sites, Ashumet Pond, Electric Avenue, Herring River, and Oak Crest Cove boat ramps, based on Horsley Witten's design modeling. At all of the sites, the green stormwater infrastructure retrofits will remove some percentage of Total

Suspended Solids (TSS), Total Phosphorus (TP), Total Nitrogen (TN), and Bacteria. Horsley Witten proposed some kind of bioretention area at all of the high priority sites. A bioretention area is a shallow depression used to treat stormwater runoff using a specific planting soil and plants to filter runoff. The method combines physical filtering and adsorption with biogeochemical processes to remove pollutants. The system consists of an inflow component, a pretreatment element, a shallow ponding area planted with appropriate native plant species (tolerant to both wet and dry periods as well as other site conditions such as wind, salt, shade, etc.), an overflow structure, and an emergency overflow weir.

Table 4: Conservative estimates of improvement to stormwater management at subset of priority public boat ramps on Cape Cod. Results are based on green stormwater infrastructure design and modeling by the Horsley Witten Group.

Boat Ramp Site	Town	Existing Drainage Area (ac)	Existing Impervious Area (ac)	Proposed Impervious Area (ac)	WQv Provided (cf)	Runoff Depth Treated (in)	TSS Removal (%)	TP Removal (%)	TN Removal (%)	Bacteria Removal (%)
Ashumet Pond	Falmouth	1.53	0.77	0.59	2,003.76	1.0	89%	98%	100%	100%
Electric Avenue	Bourne	2.00	1.00	0.85	2,874.96	0.9	82%	90%	92%	91%
Herring River	Harwich	0.38	0.24	0.23	348.48	0.5	44%	37%	23%	41%
Oak Crest Cove	Sandwich	9.42	1.45	0.94	3,876.83	0.7	63%	73%	73%	73%

The greatest reductions will likely be at Ashumet Pond in Falmouth where the full one inch of stormwater runoff will be treated to nearly 100% pollutant removal. The proposed retrofits for Ashumet Pond included the following: resurfaced parking lot and boat ramp access road to better direct runoff while maintaining current parking spaces and required drive aisle and parking space dimensions; GSI including two bioretention areas and porous asphalt; reduction in overall impervious cover; buffer restoration; and protection of as many existing mature trees as possible. Pretreatment will be provided with sediment forebays, and overflows from large storm events will flow out of the stormwater control measure inlets and/or an overflow structure.

Conversely, Herring River in Harwich shows the lowest percent removal of pollutants due to the limitations in space for treatment practices and the close proximity to the groundwater table.



Figure 4: Photo from Ashumet Pond Boat Ramp parking lot looking east. Photo credit: APCC.



Figure 5: Herring River Boat Ramp in Harwich from the parking lot facing west. Photo credit: APCC.

However, this site floods during most spring high tides, so there are additional benefits to the proposed practices in stabilizing sediment and providing salt marsh habitat that are not reflected in the stormwater modeling results. In total, the Herring River proposed retrofits consist of resurfaced entrance/exit driveways and parking lot to better direct runoff while maintaining current parking spaces, adequate drive aisle and required parking space dimensions, traffic flow, and stabilization of the parking lot surface; GSI including two wet bioretention areas; reduction in overall impervious cover through permeable paver system; and revegetation and protection of salt marsh areas to promote regrowth.

At most of the boat ramp sites, the volume of stormwater runoff is reduced in the proposed retrofit designs by removing some area of impervious surface. The greatest reduction in impervious surface will be at Oak Crest Cove where roughly 0.37 acres and 0.17 acres are proposed as porous pavement in the upper parking lot and the basketball court, respectively. Reducing the volume of stormwater discharge by removing impervious surface area improves the water quality in the adjacent waterbody by increasing the proportion of precipitation that percolates into the soil, a process that helps remove nutrients and bacteria before the water reaches the groundwater table.



Additional stormwater improvements in the retrofit proposal include a bioretention area, a surface infiltration basin, and underground infiltration. Pretreatment will be provided with sediment forebays, and overflows from extreme events will flow through structures and spillways. These practices, if implemented, will improve slope stabilization on the existing eroded steep slope and reduce pollutants from entering Peters Pond by treating roughly 3,900 cubic feet of stormwater.

Figure 6: Oak Crest Cove basketball court and upper part of boat ramp (top) and lower boat ramp and dock (bottom). Photo credit: APCC.

Lastly, the retrofits proposed at Electric Avenue Boat Ramp will treat roughly 2,800 cubic feet of stormwater through a large bioretention area and underground infiltration trench. Pretreatment will be provided with proprietary water quality units, and overflows from extreme events are designed to bypass catch basin

grates and flow down the boat ramp. Additional benefits of this design include resurfaced boat ramp access road to better direct runoff, formal sidewalk to improve pedestrian access to boat ramp dock; coastal bank planting for stabilization and resiliency; and reduction in overall impervious cover.



Figure 8: Electric Avenue Boat Ramp and Buttermilk Bay. Note failed stormwater drain in foreground. Photo credit: APCC.

In addition to the site designs, other significant project impacts included: 1) network building through meetings with the town staff, the Office of Fishing and Boating Access, the Natural Resources Conservation Service (NRCS), and the Cape Cod Conservation District; 2) transferring knowledge regarding the benefits of green stormwater infrastructure to the project team, general public, pond associations, and other partners; and 3) leveraging this initial SNEP award to obtain \$143,552.25 in additional funds from the Massachusetts Office of Coastal Zone Management (CZM). The CZM funds were applied towards supplementing funding gaps in outreach, assessment, and design and towards completing permit-ready (75%) designs for three additional high priority boat ramps (Dr Lords Common Landing in Dennis, Mashpee-Wakeby Boat Ramp in Mashpee, and Follins Pond Boat Ramp in Yarmouth).

Challenges: APCC and Horsley Witten encountered a few minor challenges as part of the prioritization process. First, the group had to discuss how to apply valuation of the estimated construction costs for a site as part of the ranking criteria. It was unclear whether the towns and state would benefit more from placing higher value on smaller projects which would be easier to implement (“low hanging fruit”) or larger, more expensive projects that would remove a greater percentage of the pollutants entering the waterbody (“best bang for your buck”). In the end, the team chose to place lower value on higher costs but gave more weight to the potential pollutant removal category.



Figure 8: Follins Pond Road Boat Ramp in Yarmouth. Arrow indicates existing catch basin. Photo credit: APCC.

Second, the team had to grapple with how to rank existing stormwater infrastructure that was functioning poorly. For example, at the Follins Pond Boat Ramp in Yarmouth, the existing infrastructure was theoretically reducing the

drainage area of runoff to the ramp. However, in actuality, the catch basins were not effectively intercepting the runoff due to the steep slope of the roadway. The team discussed and agreed that it was important to address the failing infrastructure. In the Follins Pond case, changing the drainage area to address these poorly functioning catch basins pushed the site from near the bottom of the list into the one of the highest ranked spots.

Lastly, APCC and Horsley Witten agreed that after the prioritization of the concept designs had been completed, it was critical to receive feedback from the public and the partners regarding general acceptance of the project as well as capacity of staff to be involved in the later stages of design review. These aspects were considered when drafting the proposal but due to the number and variety of the projects, the final coordination and decision-making was more involved than expected.

Site-specific challenges:

Peters Pond Boat Ramp (state-owned) - The Peters Pond Boat Ramp, located on the southeastern shoreline of Peters Pond in Sandwich, receives stormwater runoff from two privately owned roads (Pierre Vernier Dr and John Ewer Rd, Figure 9). This runoff should be maintained by several leaching catch basins but due to lack of maintenance, the stormwater bypasses these structures and drains into the boat ramp area. This scenario complicated the stormwater management plans at this site. However, APCC met with Friends of Peters Pond to discuss the Peters Pond Boat Ramp and possible next steps. The Friends of Peters Pond are invested in finding a solution to the problem with the ineffective catch basins so that work at the Peters Pond Boat Ramp can proceed and water quality can be improved in the freshwater pond.

Herring River Boat Ramp in Harwich (town-owned) - During the 25% design phase, the project team learned that the Town of Harwich was simultaneously pursuing another project in this area. GHD had been hired by the town to design and construct a secondary water main under Route 28, and their plans require the parking lot at the Herring River Boat Ramp for staging for the directional drilling. As a result, APCC, Horsley Witten, GHD, and Harwich town staff worked



Figure 9: Aerial view of the Peters Pond Boat Ramp showing the two private roads that are currently contributing to the drainage area due to malfunctioning catch basins. (Image from Google Earth)



Figure 10: Photo taken from Herring River Boat Ramp showing the Route 28 bridge under which the secondary water main pipe will be drilled. Photo credit: APCC.

closely to make sure that plans for both projects were completed in tandem with joint meetings with town staff and GHD. The most critical element will be the timing as the stormwater retrofits will have to be installed after the water main work is completed so the control measures are not damaged or undermined.

Lessons Learned: APCC realized early on that the proposed budget would not adequately meet the needs of the project. Although APCC had experience managing grants for greens stormwater infrastructure projects through the EPA SNEP Barnstable Three Bays Stormwater Project, the added logistics and coordination required for a regional project across ten towns (versus one) added more time and expense to the project than anticipated. To accommodate these higher costs, APCC pursued supplemental funding through the Office of Coastal Zone Management (CZM) Coastal Habitat and Water Quality Grant. This additional funding was awarded in September of 2022 and provided the funding to complete the conceptual designs and public outreach components of Task 2.

Budget constraints arose again for Task 3 (Existing Conditions & 25% Designs) because the sites with the largest drainage area ranked highest on the pollutant removal criterion and were selected to advance to 75% designs. The original budget for Task 3 was based on several assumptions: 1) multiple site assessment activities could be scheduled for one or more sites in a day, 2) smaller drainage areas with fewer utilities and other infrastructure to survey, and 3) fewer meetings for coordination of town and state partners. However, due to the complexity of the project and working with multiple partners, site assessments had to be scheduled site by site. Additionally, the survey and assessment efforts were more extensive due to the large area of each site, and more meetings were required to coordinate with the team and partners. As a result, the budget needs exceeded the budget allocated for Task 3 and additional funds were pursued to meet the project goals.

APCC requested a budget amendment through CZM to cover the higher costs associated with the 25% and 75% designs. This request included costs not only for the advanced design of the CZM-funded sites but also the SNEP-funded sites. To complete the 25% and 75% design for the SNEP-funded sites (Ashumet Pond, Electric Ave, Herring River, and Oak Crest Cove) required an additional \$20,976. The 25% and 75% designs for the CZM sites (Dr Lords Common Landing, Follins Pond Road, and Mashpee-Wakeby Pond) required another \$27,651.25. The full request of \$48,537.25 was granted by CZM in April 2023.

Thus, through careful planning and coordination, APCC was able to overcome the budget shortages by seeking additional funds. The process provided a valuable lesson that project management logistics do become more time consuming the larger the extent and scale of the project. Also, design budgets do not extend as far across stormwater improvement sites with very large drainage areas because of the additional onsite survey work required. In the

future, APCC will take these factors into consideration when planning and prioritizing a regional-scale project with finite resources for design.

2.B. Next Steps & Recommendations

The long-term goals of the project are to implement the proposed stormwater retrofits by developing final designs, acquiring permits, and completing construction. For a few high-ranking sites that were not selected in November 2022 for 75% designs, APCC secured \$73,800 in private foundation funds to move the Waquoit Bay Landing (or Seapit Landing) in Falmouth, Willimantic Drive on Shubael Pond in Barnstable, and Scargo Landing on Route 6A in Dennis from concept designs to 25% designs by spring 2024. APCC contracted Horsley Witten to continue these designs and tasks include site surveys, existing condition plans, and 25% design.

For the sites with 75% (permit-ready) designs, the next step is to secure funding to finalize designs, apply for permits, and subcontract a construction company to make the plans a reality. APCC applied to funding opportunities through Southeast New England Program (SNEP) Watershed Implementation Grant administered by Restore America's Estuaries and the SNEP Stormwater Infrastructure Grant administered U.S. Environmental Protection Agency during the summer of 2023 in order to complete permitting and construction for a subset of the priority sites, but neither application was accepted. However, APCC secured \$36,936 in private foundations to meet the permitting objective for all four SNEP-funded sites (Electric Ave in Bourne, Ashumet Pond in Falmouth, Herring River in Harwich, and Oak Crest Cove in Sandwich) by May 2024 and will continue to pursue funding opportunities to meet the long-term construction objective.

For the three CZM-funded sites (Follins Pond Road in Yarmouth, Dr Lords Common Landing in Dennis, and Mashpee-Wakeby Pond in Mashpee), an FY24 CZM Coastal Habitat and Water Quality grant of \$761,137 was awarded to APCC in October 2023 to complete permitting, final design, and construction for Dr Lords Common Landing and the Scargo Landing on Route 6A as well as to complete permitting for Follins Pond and Mashpee-Wakeby. The CZM sites also required an additional \$15,000 to finish out 75% designs for Dr Lords and Follins Pond, and this supplemental funding was also provided through a private foundation.

One significant challenge to future progress for the Ashumet Pond and Oak Crest Cove sites is the limited number of funding opportunities for



Figure 9: Ashumet Pond Boat Ramp in Falmouth.
Photo credit: APCC.

isolated freshwater ponds in this area. While the CZM grants are available for systems with coastal connections, like Herring River and Electric Avenue, SNEP funding is one of the few options to acquire construction funding for the other two locations.

2.C. Compliance

The Quality Assurance Project Plan (QAPP) was developed by Horsley Witten with support from APCC. Horsley Witten submitted the QAPP in May 2022 for review and it was approved by EPA in June 2022.

Horsley Witten coordinated with respective town Conservation Commissions regarding permitting requirements for soil test pits. The soil test pits (up to 10ft deep) were necessary for the soil evaluation which will inform the existing conditions documentation and 25% designs. In all cases, the town staff agreed to assist with filing any approval requests.

For the Ashumet Pond boat ramp in Falmouth, Doug Cameron, Director and Chief Engineer for the Office of Fishing and Boating Access, submitted a letter to the Massachusetts Historical Commission (MHC) inquiring as to potential historical or archeological assets within the project area. MHC responded on December 16, 2022, stating that the project was “unlikely to affect significant historic or archeological resources.”

2.D. Project Partners

Below is a list of the participants or partners that APCC regarded as the original “project team.”

- Amanda Lima (Yarmouth, Town Engineer)
- Amber Unruh (Barnstable, Senior Project Manager – Special Projects)
- Ashley Fisher (Mashpee, DNR Director)
- Chris Miller (Brewster, DNR Director)
- David Deconto, DNR Director, and Paul Tilton, Town Engineer (Sandwich)
- Doug Cameron (MA DFG Office of Fishing and Boating Access Doug Cameron, Director)
- Gregg Fraser (Falmouth, Director of the Marine and Environmental Services Department)
- Heinz Proft (Harwich, DNR Director)
- Tim Lydon (Bourne, Engineering Department)
- Tom Andrade (Dennis, Town Engineer)
- Tom Daley (Orleans, DPW Director)
- and
- Michelle West (Project Manager, Horsley Witten Group)

- Gemma Kite (Horsley Witten Group)

The partners who were involved in coordination meetings and design review for the 25% and 75% design phases included the following:

- Bourne: Tim Lydon (Engineering Department) and Chris Southwood (DNR Director)
- Dennis: Tom Andrade (Town Engineer), Chris Wickson (Civil Engineer), and Dustin Pineau (Beach and Recreation Director)
- Department of Fish and Game Office of Fishing and Boating Access: Doug Cameron (Chief Engineer and Director)
- Falmouth: Mark Kasprzyk (Conservation Land Manager and MES Technician) and Gregg Fraser (Director of Marine and Environmental Services)
- Harwich: Heinz Proft (DNR Director), John Rendon (Harbormaster), and Amy Usowski (Conservation Agent)
- Mashpee: Ashley Fisher (DNR Director) and Catherine Laurent (DPW Director)
- Sandwich: David Deconto (DNR Director), Paul Tilton (Town Engineer), and Sam Jensen (Assistant Town Engineer)
- Yarmouth: Amanda Lima (Town Engineer), Nathan Whetten (Civil Engineer), Bill Bonnetti (DNR Director)
- Michelle West (Project Manager, Horsley Witten Group)
- Gemma Kite (Horsley Witten Group)

Additionally, the relevant stakeholders contributed to meetings related to the development of the 25% and 75% stormwater designs. These stakeholders included:

- Donald Liptack, Stormwater Specialist, Cape Cod Conservation District
- Martha Craig, Program Director, Cape Cod Conservation District
- Lisa Petruski, NRCS
- Steve Spear, NRCS
- Debra and Paul Hennessey, Friends of Ashumet Pond
- Susan Dangel, President of Save Mashpee Wakeby Pond Alliance
- Christine Dennis, Friends of Peters Pond
- Linda Smith, Save Mashpee-Wakeby Pond Alliance
- Dale Oakley, Assistant Director of Natural Resources, Mashpee Wampanoag Tribe

2.E. Volunteer and Community Involvement

APCC hosted a public meeting to introduce the project to the community and potential stakeholders on June 9th, 2022, via Zoom; 23 people participated. A list of the registered attendees and each affiliation is provided below:

- Nancy Horn (Friends of Peters Pond) – interested in Peters Pond in Sandwich

- Judith McDowell (Falmouth Water Stewards) – interested in Falmouth Sites
- Susan Dangel (Save Mashpee Wakeby Pond Alliance) – interested in Mashpee Wakeby Pond Site
- Michaela Colombo (Save Mashpee Wakeby Pond Alliance)
- John and Linda Bowers – interested in Ashumet Pond, Falmouth side
- John Carroll – interested in Bourne sites
- Chris Southwood (Bourne DNR)
- Scott Flood (Orleans Pond Coalition) – interest in Orleans sites
- Mark Bracco (Friends of Ashumet Pond) – Ashumet Pond boat ramp
- Chris Wickson (Dennis Engineering)
- Eric Thomas (Connecticut DEEP watersheds program)
- Donald Liptack (Cape Cod Conservation District)
- Kathleen Mason (Cape Cod Commission, Water Resources)
- Tom Andrade (Town of Dennis, Town Engineer)
- Erinn McCarty (Friends of Bass River) – interested in Horsefoot Cove and Follins Pond Road
- Candy Thomson (Sandwich, MA)
- Present from APCC: Jordan Mora, April Wobst, and Kristin Andres

There was also strong community involvement and support during the concept design review phase. Two regional public meetings were held virtually via Zoom on November 1, 2022 and November 3, 2022 at 2-4pm. APCC provided these public meetings to receive feedback from stakeholders on 10% concept designs. The western sites (Bourne, Falmouth, Mashpee, and Sandwich) were discussed on November 1 and the eastern sites (Barnstable, Brewster, Dennis, Harwich, Yarmouth, and Orleans) were discussed on November 3.

The public meetings held in November 2022 were well attended and APCC received numerous emails and phone calls about the project. The feedback for the project was overwhelmingly supportive. The total number of attendees at the public meetings was roughly 82 (42 participants on Nov. 1 and ~40-45 on Nov. 3). Additionally, we received written comments from another ten stakeholders, including members from respective pond associations, abutting homeowners, and owners of local businesses). See Supporting Materials for a link to participant list and notes from November 1 and November 3 public meetings.

Lastly, there was community involvement and support by pond associations and the Mashpee Wampanoag Tribe during the 25% and 75% design review project meetings. Members of the Friends of Peters Pond, Save Mashpee-Wakeby Alliance, and Friends of Ashumet Pond attended the Oak Crest Cove, Mashpee-Wakeby, and Ashumet Pond Boat Ramp meetings, respectively. Dale Oakley, Assistant Director of Natural Resources for the Mashpee Wampanoag Tribe, also attended the Mashpee-Wakeby and Ashumet Pond

meetings. See Supporting Materials for a link to notes from each 25% and 75% design review meeting.

2.F. Outreach & Communications

Educational materials: APCC developed a factsheet regarding stormwater management at boat ramps and distributed it with the announcements for the public meeting held on June 9, 2022. APCC also developed outreach materials (meeting registration webpage, announcement flyer and letter to abutters) for the public meetings held on November 1 and November 3, 2022. At least two weeks before each of the aforementioned meetings, the meeting announcements and other associated materials were shared with the project team partners (state and town staff), posted on the APCC e-newsletter for two weeks preceding the meeting, and posted on the APCC social media pages (Facebook and Instagram). Municipal and state staff were encouraged to share the announcement with other departments and post it as desired in town halls and/or social media outlets. Direct invites were also sent electronically via email to key stakeholders including regional entities, such as the Cape Cod Commission, the Cape Cod Conservation District, and the Waquoit Bay National Estuarine Research Reserve, as well as local pond associations and coalitions, tribal communities, and other affiliated groups. Lastly, the announcement materials were shared with Restore America's Estuaries and EPA SNEP communications staff.

Press Releases: Following the public meeting, APCC was interviewed by Jamie Costa of the Sandwich Enterprise and a short article about the project ran in the Sandwich, Mashpee, Bourne, and Falmouth news outlets on June 17, 2022. See Supporting Materials for copy of news article. APCC was also interviewed by Sam Houghton of WCAI regarding the boat ramp project and a short summary of the project aired on the radio in mid-to-late June 2022.

APCC provided a press release to local and regional news organizations regarding the November public meetings on October 14, 2022. See Supporting Materials for a copy of the press release. In addition to the press release that APCC submitted, there was coverage of the public meetings in Cape News (see Supporting Materials for a copy).

Presentations: (pdf of presentation slides are available in Supporting Materials)

APCC provided presentations to the Mashpee Environmental Coalition and the Falmouth Water Quality Management Committee in October 2022 to update members on the public boat ramp project and encourage attendance at the November public meetings. APCC also attended the Cotuit Library Harvest Festival on October 8th to educate the public on green infrastructure stormwater best management practices as well as spread the word about the public boat ramp project and upcoming public meetings.

In collaboration with Horsley Witten Group, APCC developed and recorded RAE Summit presentation entitled “How to choose: criteria for selecting stormwater remediation sites when there is overwhelming need and finite resources.” Ms. Mora provided the in-person presentation at the RAE Summit in New Orleans on 12/6/2022.

Lastly, APCC provided a presentation as part of the Land to Sea Series organized by Clean Ocean Access in Rhode Island on February 21, 2023. The presentation covered the ecological benefits of green system infrastructure stormwater design, methods for building a stormwater master plan, as well as a brief overview of the Public Boat Ramps and Three Bays projects and lessons learned.

Website Development: In summer of 2022, APCC developed a website for the project. It included a registration portal for stakeholders and members of the public to sign up for notifications regarding public meetings and other project updates. Prior to the public meetings held in November, the website also provided a means to register and gain access to the Zoom meeting links. In December, APCC updated the website with the final sites selected to advance to 75% (permit-ready) stormwater designs.

<https://apcc.org/stormwater-management-at-public-boat-ramps/>

3. Project Budget Report

3.A. Summary Budget Tables

Summary Budget Table 1: Expenditures by Federal Cost Category as of Dec 31, 2023. “This Period” refers July 1, 2023 to Dec 31, 2023.

Budget Category	Total Budgeted Funds	Total Budgeted Match	Grant Funds this Period	Grant Funds Cumulative	Match Funds this Period	Match Funds Cumulative	Match Source
Personnel	\$21,766.00	\$3,480.00	\$2,972.82	\$25,188.26	\$8,020.30	\$24,870.40	APCC - CZM grant
Fringe	\$5,441.00	\$870.00	\$1,040.49	\$6,801.41	\$0.00	\$250.65	APCC
Travel	\$2,903.00	\$0.00	\$0.00	\$2,272.25	\$0.00	\$71.20	CZM grant
Equipment	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	n/a
Supplies	\$500.00	\$1,500.00	\$0.00	\$279.96	\$0.00	\$0.00	n/a
Contractual	\$112,700.00	\$0.00	\$27,302.31	\$108,306.50	\$52,685.00	\$118,407.75	HW – CZM grant
Other	\$0.00	\$40,250.00	\$0.00	\$0	\$0.00	\$17,697.05	State & Town Partners
Total Direct	\$143,310.00	\$46,100	\$31,465.62	\$142,848.38	\$60,705.30	\$161,297.05	Partners & CZM grant
Indirect	\$5,561.00	\$3,085.00	\$416.33	\$6,015.45	\$0.00	\$1,895.03	APCC
Total	\$148,871.00	\$49,185.00	\$31,881.95	\$148,863.83	\$60,705.30	\$163,192.08	APCC/Partners/CZM

Summary Budget Table 2: Expenditures by Project Task (Grant Funds Only)

Budget Category	Budgeted Grant Funds	Expended; Progress Period 1	Expended; Progress Period 2	Expended; Progress Period 3	Expended; Progress Period 4	Expended; Progress Period 5	Actual Expended to Date
Task 1 - Planning and Prioritization	\$12,375.00	\$8,083.44	\$4,291.56	NA	NA	NA	\$12,375.00
Task 2 - 10% Concept Designs (20 sites)	\$35,020.00	\$398.66	\$25,409.54	\$ 29,769.72	NA	NA	\$55,577.92
Task 3 - 25% Concept Designs (4 sites)	\$45,180.00	\$0.00	NA	\$ 15,944.06	\$28,194.90	\$1,041.04	\$45,180.00
Task 4 - 75% Concept Designs (4 sites)	\$56,296.00	\$0.00	NA	NA	\$4,890.00	\$30,840.91	\$35,730.91
Total	\$148,871.00	\$8,482.10	\$29,701.10	\$45,713.78	\$33,084.90	\$31,881.95	\$148,863.83

3.B. Budget Narrative

In total, the SNEP21 and the CZM grants along with in-kind match, provided by APCC and partners, contributed \$312,055.91 to the project, “Stormwater Management at Cape Cod Public Boat Ramps,” between November 2021 to December 2023. Of that combined total, \$148,863.83 was provided through the SNEP21 grant (note that \$7.17 of the grant award went unspent under the APCC personnel costs). The combined match exceeded the original SNEP21 budgeted amount of \$49,185 by roughly \$114,000.

Personnel & Fringe: The personnel (total = \$25,188.26) and fringe (\$6,801.41) expenses included time and benefits associated with APCC staff time. Jordan Mora, Restoration Ecologist, led project management, which entailed arranging project team and internal APCC meetings, preparing public meeting presentations, handling grant administration, and corresponding with stakeholders and project team members. Additional support for the project was provided by April Wobst (Restoration Ecologist), Kristin Andres (Associate Director of Education and Informational Services), and Eliza Fitzgerald (Restoration Technician) who assisted with project outreach, website development, and planning.

Travel: The APCC travel expenses (total = \$2,272.25) included mileage reimbursement for site visits during field assessments in July 2022 and partners meetings in April 2023, as well as transportation to New Orleans for the Restore America’s Estuaries Summit in December 2022.

Supplies: The APCC supplies costs (total = \$279.96) consisted of expenses associated with ArcGIS software as well as ink for printing maps needed for site visits.

Contractual: The bulk of the SNEP21 contractual expenses included Horsley Witten Group’s labor and other incurred costs related to attending projects meetings; site assessments and conceptual designs for twenty public boat ramps; wetland delineations, soil test evaluations, and other site surveys; developing existing conditions, 25% designs, drainage area maps, 75% designs, stormwater reports, and cost estimates (total = \$107,694). Contractual expenses also included payment to COLEwebdev for website development and updates (total = \$612.50)

Other Match: “Other” match was provided in-kind by state and municipal staff who submitted priority boat ramp site lists, attended meetings, and reviewed project materials. In total, the state and staff members tracked \$17,697.05 of in-kind match for the project. Because APCC was awarded a Coastal Habitat and Water Quality Grant from the MA Office of Coastal Zone Management which fulfilled the remaining match requirements for the SNEP grant, staff and state team members were not requested to supply in-kind match, by tracking their time on the project, after July 2022.

Personnel and Contractual Match: APCC provided \$3,176.28 in match related to staff, GIS consultant time, and indirect costs from the start of the project until August 2022. The CZM Coastal Habitat and Water Quality grant covered at least a portion of APCC's monthly personnel expenses and/or monthly payments for Horsley Witten from August 2022 through December 2023. CZM funds were used to support APCC time and expense related to outreach, communications, and overall project management (total = \$23,911 expended as of December 2023). Additionally, the CZM grant provided additional contractual funds to support Horsley Witten Group's time and expense to advance seven boat ramp sites to permit-ready (75%) designs (total = \$118,407.75). Because the CZM grant budget includes fully loaded salaries, fringe and indirect costs are not listed separately for this funding source. In total, the CZM grant provided approximately \$142,318.75 in match as of December 2023.

Supplemental & Leveraged Funds:

The actual expended costs were much higher for Task 2 than budgeted in the SNEP21 proposal as this task required more APCC personnel time than expected to coordinate team meetings, communicate with stakeholders, and plan next steps for all the boat ramp sites. Fortunately, APCC was awarded \$95,015 through a Coastal Habitat and Water Quality Grant from the MA Office of Coastal Zone Management to support and expand the stormwater management project at public boat ramps on Cape Cod. The additional funds did not change the scope or timeline of the SNEP project. The award period originally extended from August 2022 to November 2023, but was extended to January 31, 2024. In addition to supplementing the budget for project management and outreach, the CZM funding also supported permit ready designs for three more of the top priority sites (Mashpee – Wakeby Boat Ramp, Dr Lords Common Landing, and Follins Pond Road-Yarmouth).

When the costs for the site survey component of developing the 25% designs (Task 3) were also much higher than expected due to the large size and drainage area of the selected sites, APCC requested and was granted an amendment to the award from the MA Office of Coastal Zone Management. The budget was amended to \$143,552.25 (amended as of 4/28/2023) to support 25% and 75% design of seven priority sites (Mashpee – Wakeby Boat Ramp in Mashpee, Dr Lords Common Landing in Dennis, Electric Ave in Bourne, Ashumet Pond in Falmouth, Oak Crest Cove in Sandwich, Herring River in Harwich, and Follins Pond Road-Yarmouth).

For the next phase of the project, \$125,736 was secured through APCC private foundation funds to complete 25% designs for three sites (Waquoit Bay Landing in Falmouth, Willimantic Drive on Shubael Pond in Barnstable, and Scargo Landing on Route 6A in Dennis); final 75% designs for two sites (Follins Pond Road and Dr Lords Common Landing); and permitting for four sites (Electric Avenue, Ashumet Pond, Herring River, and Oak Crest Cove). Also, \$761,137 was awarded to APCC by CZM through the FY24 Coastal Habitat and Water Quality grant to complete permitting, final design, and construction for two sites (Dr

Lords and Scargo Landing) as well as permitting for Mashpee-Wakeby Pond and Follins Pond. All combined, \$1,198,929 has been allocated through this project towards improving stormwater management at Cape Cod's public boat ramps since November 2021.

4. Supporting Materials

Supporting materials related to this report:

- 1) Introductory presentation slides from November 16, 2021 meeting ([pdf](#))
- 2) RFP released in January for engineering firm subcontract ([pdf](#))
- 3) Fact sheet regarding stormwater management at public boat ramps ([pdf](#))
- 4) Presentation slides, notes, and recording from public meeting held on June 9, 2022 ([presentation](#), [notes](#), [recording](#))
- 5) Sandwich Enterprise Public Boat Ramp article ([pdf](#))
- 6) Criteria for ranking concept designs, developed by Horsley Witten with input from APCC ([pdf](#))
- 7) EPA approved Quality Assurance Project Plan ([pdf](#))
- 8) Fully executed contract between APCC and Horsley Witten Group ([pdf](#))
- 9) Completed Field Forms - *Includes concept designs and photos of sites* ([pdf](#))
- 10) Final boat ramp ranking information ([pdf](#))
- 11) Mashpee Environmental Coalition presentation slides ([pdf](#))
- 12) Falmouth Water Quality Management Committee presentation slides ([pdf](#))
- 13) November public meeting flyer sent to project team and other stakeholders ([pdf](#))
- 14) Letter to boat ramp site abutters, mailed two weeks prior to November 2022 meetings ([pdf](#))
- 15) APCC press release for November 2022 public meetings ([pdf](#))
- 16) Presentation slides, notes, and recording from public meetings reviewing concept designs:
 - a. November 1, 2022: [PowerPoint](#), [Word](#), [Recording](#)
 - b. November 3, 2022: [PowerPoint](#), [Word](#), [Recording](#)
- 17) News coverage of project meetings in Cape News, capenews.net ([pdf](#))
- 18) Final Memorandum: Site Concept Designs, Ranking, and Selection ([pdf](#))
- 19) Link to APCC Stormwater Management at Public Boat Ramps website:
<https://apcc.org/stormwater-management-at-public-boat-ramps/>
- 20) Restore America's Estuaries Summit presentation slides ([pdf](#))
- 21) Land to Sea Series presentation slides ([pdf](#))
- 22) Combined wetland delineation memorandum ([pdf](#))
- 23) Combined soil test pit logs ([pdf](#))
- 24) Final/stamped Existing Conditions
 - a. Ashumet Pond ([pdf](#))
 - b. Electric Avenue, Bourne ([pdf](#))
 - c. Herring River, Harwich (

- d. Oak Crest Cove, Sandwich ([pdf](#))
- 25) 25% stormwater designs
 - e. Ashumet Pond ([pdf](#))
 - f. Electric Avenue, Bourne ([pdf](#))
 - g. Herring River, Harwich ([pdf](#))
 - h. Oak Crest Cove, Sandwich ([pdf](#))
- 26) Design drainage area maps
 - i. Ashumet Pond ([pdf](#))
 - j. Electric Avenue, Bourne ([pdf](#))
 - k. Herring River, Harwich ([pdf](#))
 - l. Oak Crest Cove, Sandwich ([pdf](#))
- 27) 75% stormwater design site plans
 - a. Ashumet Pond ([pdf](#))
 - b. Electric Avenue, Bourne ([pdf](#))
 - c. Herring River, Harwich ([pdf](#))
 - d. Oak Crest Cove, Sandwich ([pdf](#))
- 28) Stormwater Reports (including Operation & Maintenance Plan)
 - a. Ashumet Pond ([pdf](#))
 - b. Electric Avenue, Bourne ([pdf](#))
 - c. Herring River, Harwich ([pdf](#))
 - d. Oak Crest Cove, Sandwich ([pdf](#))
- 29) Cost estimates
 - a. Ashumet Pond ([pdf](#))
 - b. Electric Avenue, Bourne ([pdf](#))
 - c. Herring River, Harwich ([pdf](#))
 - d. Oak Crest Cove, Sandwich ([pdf](#))

5. Certification

The undersigned verifies that the descriptions of activities and expenditures in this progress report are accurate to the best of my knowledge; and that the activities were conducted in agreement with the grant contract. I also understand that matching fund levels established in the grant contract must be met.

Grantee Signature:



Name: Andrew Gottlieb

Organization/Job Title: Association to Preserve Cape Cod, Executive Director

Date: January 17, 2024