



TOWN OF SOUTHAMPTON

Department of Community Preservation
24 W Montauk Hwy, Hampton Bays, NY 11946
Ph: 631-287-5720 Fx: 631-728-1920

www.southamptontownny.gov/WQIPP

2023

COMMUNITY PRESERVATION FUND (CPF) WATER QUALITY IMPROVEMENT PROGRAM CHECKLIST/APPLICATION INSTRUCTIONS

The CPF Water Quality Improvement Project Plan (WQIPP) Fund follows the objectives in the adopted [Water Quality Improvement Project Plan](http://www.southamptontownny.gov/WQIPP) (see <http://www.southamptontownny.gov/WQIPP>)

To apply for funding, an application must be COMPLETED and submitted along with detailed narratives and supporting information as described below. The Water Quality Advisory Committee will rank and score projects based on the [Scoring Criteria contained in the application materials](#). Parcel acquisitions will be considered on an ongoing basis, independent of this application process.

Note: Electronic application submission required and 4 - full printed sets of application, site plan and narrative.

Upload application at www.southamptontownny.gov/WQIPPSUBMISSION

A Public Hearing and Town Board Resolution will be required for individual or multiple projects.

WATER QUALITY IMPROVEMENT PROJECT MEANS:

[1] DEFINITIONS:

1. **Wastewater Treatment Improvement Project** means the planning, design, construction, acquisition, enlargement, extension, or alteration of a wastewater treatment facility, including alternative systems to a sewage treatment plant or traditional septic system, to treat, neutralize, stabilize, eliminate or partially eliminate sewage or reduce pollutants in treatment facility effluent, including permanent or pilot demonstration wastewater treatment projects, or equipment or furnishings thereof. Stormwater collecting systems and vessel pumpout stations shall also be included within the definition of a wastewater improvement project.
2. **Nonpoint Source Abatement and Control Program Projects** developed pursuant to section eleven-b of the soil and water conservation districts law, title 14 of article 17 of the environmental conservation law, section 1455b of the federal coastal zone management act, or article forty-two of the executive law;
3. **Aquatic Habitat Restoration Project** means the planning, design, construction, management, maintenance, reconstruction, revitalization, or rejuvenation activities intended to improve waters of the state of ecological significance or any part thereof, including, but not limited to ponds, bogs, wetlands, bays, sounds, streams, rivers, or lakes and shorelines thereof, to support a spawning, nursery, wintering, migratory, nesting, breeding, feeding, or foraging environment for fish and wildlife and other biota.
4. **Pollution Prevention Project** means the planning, design, construction, improvement, maintenance or acquisition of facilities, production processes, equipment or buildings owned or operated by municipalities for the reduction, avoidance, or elimination of the use of toxic or hazardous substances or the generation of such substances or pollutants so as to reduce risks to public health or the environment, including changes in production processes or raw materials; such projects shall not include incineration, transfer from one medium of release or discharge to another medium, off-site or out-of-production recycling, end-of-pipe treatment or pollution control.
5. **The Operation of the Peconic Bay National Estuary Program**, as designated by the United States Environmental Protection Agency. Such projects shall have as their purpose the improvement of existing water quality to meet existing specific water quality standards. Projects which have as a purpose to permit or accommodate new growth shall not be included within this definition



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**COMMUNITY PRESERVATION FUND (CPF)
 WATER QUALITY IMPROVEMENT PROGRAM
 PROPOSAL SUMMARY**

Project Applicant: _____
 Project Title: _____
 Project Manager Name: _____

Name	
Title	
Organization	
Address	
Phone	
Email	

Property owner (if different from Project manager organization):

Name	
Affiliation	
Organization	
Address	
Phone	
Email	

Project Address: _____ SCTM #(S) _____

Type of Project (Check all that apply):

- Reduction Remediation Restoration

Project Summary: (Provide a brief narrative description of proposed WQIPP project)



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If additional information is needed to describe the project; a project narrative can accompany the application. Please limit the narrative to approximately 3 pages of project description, provide a summary of water quality benefits/objectives of approximately 2 pages and provide a cost estimate of approximately 2 to 4 pages with supporting estimates. Any additional materials should be focused specifically on the proposed project with references to other studies that are pertinent

1. PROJECT TYPE (check all that apply)

Must meet at least one of the definitions of “Water Quality Improvement Project” per State Law Chapter 551 cited above. Check all that apply. **Note: Monitoring costs are only potentially eligible for CPF funding within Aquatic habitat restoration projects.**

- Wastewater Treatment Improvement Project
- Non-point source abatement and control
- Aquatic habitat restoration
- Pollution prevention
- Operation of Peconic Bay National Estuary Program (Grant Match)

2. PRIORITY AREA(S) (check all that apply)

Priority areas are defined in the [Water Quality Improvement Project Plan \(WQIPP\)](#).

- 303(d) Impaired
- Peconic Estuary Program - [PEP map](#)
- High
- Medium
- Outside High and Medium priority areas*

*If Outside High and Medium priority areas, explain how the project is relevant to WQIPP goals.

3. PROJECT DESCRIPTION

3a. Existing conditions of applicable groundwater/sub-watershed/waterbody and most recent and relevant data available (provide sources).

3b. How the proposed solution addresses the issue in the context of Reduction, Remediation and/or Restoration as per the CPF Water Quality Project Plan. Note all remediation and restoration projects must assure that reduction measures are also addressed.



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3c. Describe the proposed technology and its demonstrated efficacy in similar settings. May include published data.

3d. How the project supports Town of Southampton, Suffolk County, NYSDEC, Long Island Nitrogen Action Plan (LINAP) or other adopted goals/policies (provide references with page numbers).

3e. Review the following statements and indicate whether they are applicable to your project. For all “Yes” responses, please indicate how your project addresses the requirements indicated.

YES	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	If stormwater system or drainage is proposed: The project must indicate compliance with the New York State Stormwater Design Manual (2015 and as updated).
<input type="checkbox"/>	<input type="checkbox"/>	If project is related to farmland: Describe any Agricultural Stewardship Plan or other long term strategy for Nitrogen abatement.
<input type="checkbox"/>	<input type="checkbox"/>	If the project is for habitat restoration: The narrative must address how underlying causes are being ameliorated and expected outcomes for local species populations or other ecological considerations are given.
<input type="checkbox"/>	<input type="checkbox"/>	If project is a Sewage Treatment Plant (STP) or cluster treatment system: Fund allocation request is based on cost for reduction of pre-existing conditions and not for purpose of accommodating new density (describe pre-existing density and associated flow (gallons per day) and total projected nitrogen reduction in narrative). Include detailed information on how many homes the system would treat as well as potential for formation of Sewer District, if required by Suffolk County Health Department or Town Law.
<input type="checkbox"/>	<input type="checkbox"/>	If the project is requesting grant match: Include information related to funding program source and purpose of application and any relevant items on this checklist. Note: A Town Board resolution will be required in order to encumber matching funds for grant applications.

4. WATER QUALITY BENEFIT

4a. Identify Nitrogen, Pathogen or Pollutant of Concern (POC) including Existing Condition and Target Reduction.

4b. Describe plans for collecting and reporting on water quality over time.



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4c. Indicate useful life of proposed technology (must meet or exceed five years).

[Redacted area for response to 4c]

5. COST FACTORS

5a. Explain how you have confirmed that the proposed budget is reasonable, appropriate and necessary. If available, provide third party estimates or other documentation of how costs were determined.

[Redacted area for response to 5a]

5b. Describe any matching funds to be provided.

[Redacted area for response to 5b]

5c. Explain: i. Why project cannot proceed and intended benefits cannot be achieved without external funding.
ii. if funds are awarded at a lower level than requested, or if there are cost overruns, explain how the project will proceed.

[Redacted area for response to 5c]

6. MANAGEMENT, EXPERIENCE, ABILITY

6a. Describe applicant's experience in completing similar projects.

[Redacted area for response to 6a]

6b. Describe community support or opposition to project. If there is opposition, explain how this is to be addressed.

[Redacted area for response to 6b]

6c. Describe any permits needed and time frame/status of approvals. If permits are approved, indicate same.

[Redacted area for response to 6c]



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7. MAINTENANCE, MONITORING, EVALUATION

Estimate ongoing maintenance costs and explain how these will be supported. Explain stewardship and monitoring activities planned for ensuring sustainability of the project.

8. DURATION OF PROJECT

8a. Provide a projected project timeline. Note: The Committee will only make recommendations for shovel-ready projects that can commence this fiscal year.

8b. If project is multi-year or phased, provide a breakdown of budget and milestones for each year and phase.

9. ATTESTATION

Allocation of CPF funds will not be for the purpose of accommodating new growth, as this is prohibited by State law.

Check all boxes & sign.

- We certify that funds will not be directed for projects for the purpose of accommodating new growth.
- We understand that progress reports will need to be generated as specified in our Water Quality Improvement Contract AND a final report showing qualitative and/or quantitative data will be generated upon project completion. .

Signature: _____ Date _____

10. REQUIRED ATTACHMENTS Confirm that the following required documents are attached to this application:

- Photos of existing conditions
- Location Map
- State Environmental Quality Review Act (SEQRA) Long or Short Environmental Assessment Form (EAF) <https://www.dec.ny.gov/permits/6191.html>
- Completed EPA Spreadsheet Tool for Evaluating Pollutant Load (STEPL) <https://www.epa.gov/nps/spreadsheet-tool-estimating-pollutant-loads-step1> or similar standardized methodology (describe)
- Project budget (see attached template)
- Ownership commitment is provided via letter of intent (LOI) for non-municipal owners or municipal resolution for municipal owners
- Public agencies must complete SEQRA on the project and submit determination of significance and associated documentation.

11. OTHER ATTACHMENTS

List other attachments provided, including cost estimates, bids, plans, documentation of matching funds, and other as appropriate to demonstrate project readiness, quality, feasibility, and cost effectiveness



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BUDGET PROPOSAL

Is the applicant a municipality? Yes No
 If yes, please enter the request date or anticipated request date of RFP (Request for Proposals) _____.

PLANNING/ENGINEERING/DESIGN	Town CPF Request	Matching Funds Committed	Matching Funds Pending	Estimated Total Project Costs
Task 1-	\$-	\$-	\$-	\$-
Task 2-	\$-	\$-	\$-	\$-
Task 3-	\$-	\$-	\$-	\$-
Task 4-	\$-	\$-	\$-	\$-
Task 5-	\$-	\$-	\$-	\$-
Task 6-	\$-	\$-	\$-	\$-
	\$-	\$-	\$-	\$-
Planning/Engineering/Design Cost Total	\$-	\$-	\$-	\$-

Contractual Services				
	\$-	\$-	\$-	\$-
	\$-	\$-	\$-	\$-
	\$-	\$-	\$-	\$-
	\$-	\$-	\$-	\$-
	\$-	\$-	\$-	\$-
	\$-	\$-	\$-	\$-
	\$-	\$-	\$-	\$-
	\$-	\$-	\$-	\$-
Contractual Services Cost Total	\$-	\$-	\$-	\$-

Construction & Site Improvements				
	\$-	\$-	\$-	\$-
	\$-	\$-	\$-	\$-
	\$-	\$-	\$-	\$-
	\$-	\$-	\$-	\$-
	\$-	\$-	\$-	\$-
	\$-	\$-	\$-	\$-
	\$-	\$-	\$-	\$-
	\$-	\$-	\$-	\$-
Construction & Site Improvements Cost Total	\$-	\$-	\$-	\$-



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COMMUNITY PRESERVATION FUND (CPF)
WATER QUALITY IMPROVEMENT PROGRAM
LETTER OF INTENT

APPLICANT'S INFORMATION

Owner: _____

Contact First and Last Name: _____

Contact Address: _____

Contact Phone: _____

Contact Email: _____

CONTRACT RECIPIANT INFORMATION

Name/Organization: _____

Contact Person/Officer: _____

Contact Address: _____

Contact Phone: _____

Contact Email: _____

PROJECT INFORMATION

Project Title: _____

Project Location: _____

Project Description (1-3 sentences): _____

ANTICIPATED PROJECT TIMELINE

Begin: _____

Complete: _____

Notes: _____

Project Title: Shoreline Softening and Habitat Enhancement in Conjunction with Hampton Bays Bulkhead Permeable Reactive Barrier

Project Summary:

Cornell Cooperative Extension of Suffolk County in collaboration with Coastline Evaluation Inc. propose to soften the shoreline and provide habitat enhancement on the seaward side of the northern wooden section of the Hampton Hills Association bulkhead. The project will include collecting water quality data before and after installation and quantifying the nutrients assimilated into biomass to quantify the water quality benefit. In 2018 the Hampton Hills Association (HHA) was previously awarded a grant to add a permeable reactive barrier (PRB) behind their bulkhead during replacement to support removal of nitrogen in groundwater. The PRB is a form of green infrastructure which continues to provide environmental benefit to Shinnecock Bay. To build on the success of the PRB project and to continue to make the Hampton Hills Association a site where innovative approaches are embraced, CCE proposes introducing sand and gravel substrate and coir logs as well as native plants to support sand and carbon sequestration and create a habitat for ribbed mussels and other marine biota. Permits and approvals will be sought prior to any habitat restoration activities.

2. Priority Area

Shinnecock Bay holds great significance in the Town of Southampton, providing both recreational and commercial opportunities to its residents. It serves as a vital economic engine for the region, offering valuable ecosystem functions including aesthetic and economic benefits to the east-end communities. However, similar to many other bays on Long Island, human activities have exerted increased pressure on Shinnecock Bay, resulting in a decline in water quality, loss of crucial habitats, and reduced ecosystem function.

The excess nitrogen present in coastal waters has emerged as a critical environmental issue on Long Island, leading to coastal water eutrophication, hypoxia, harmful algal blooms, and mass mortalities of marine fauna. Nitrogen has emerged as a significant pollutant that affects water quality in Shinnecock Bay, leading to its classification as a NYS DEC 303d impaired waterbody. The Water Quality Improvement Project Plan (WQIPP) by the Town of Southampton

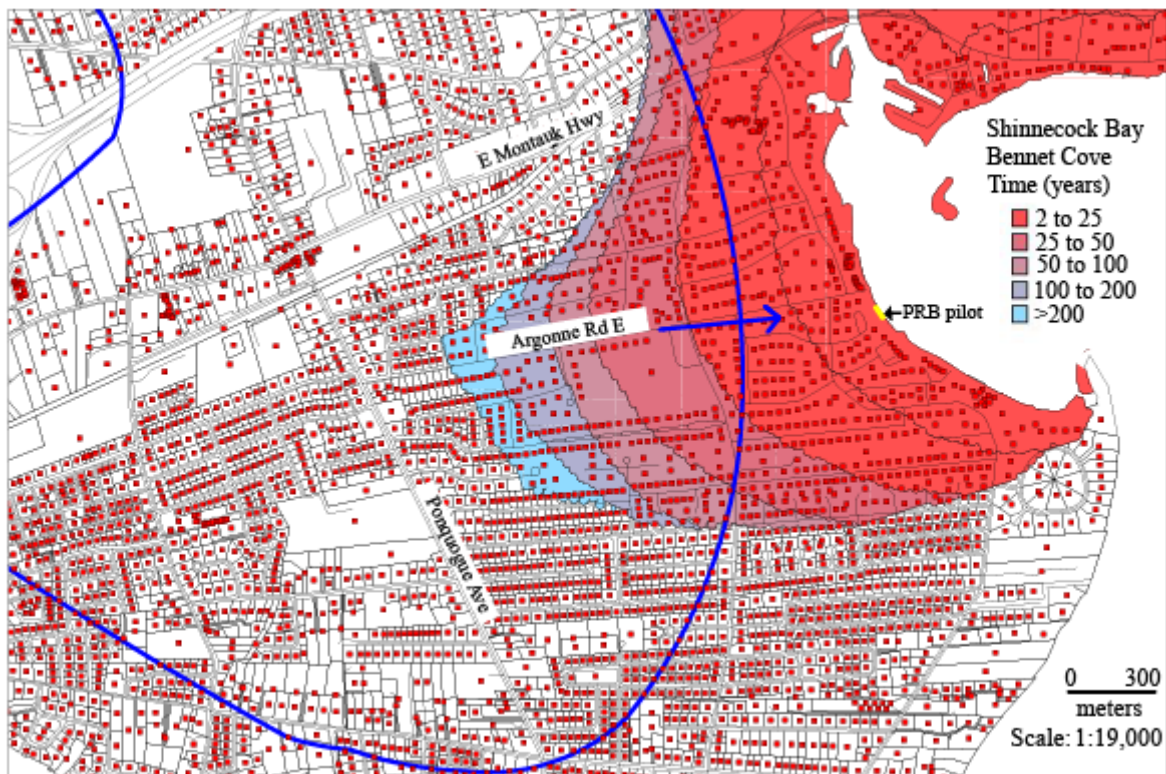


Figure 1. Taken from Graffam et al. 2020. Hampton Hills Association site showing residential area with septic system density of 2 – 4 acre⁻¹ and groundwater travel times to Shinnecock Bay from Task 2a Sub-watershed Model by CDM Smith and Suffolk County Department of Health Services. The blue curved lines indicate USGS water table contours of 5 and 10 ft above mean sea level. Groundwater flow direction is perpendicular to the contour.

has identified the Shinnecock Bay as high priority, especially in areas where groundwater travel time ranges from 0-2 years, such as at the Hampton Hills Association property (Fig. 1).

Various initiatives are currently in place to reduce groundwater nitrogen inputs into the Long Island aquifer at the source, such as improving on-site wastewater treatment systems. Suffolk County has concentrated on reducing nitrogen in wastewater, as detailed in the Suffolk County Subwatershed Wastewater Plan (SCSWP). Although improved treatment of residential wastewater will significantly reduce future nitrogen, it will take a considerable amount of time to implement, and legacy groundwater nitrogen will continue to impact impaired local bays like Shinnecock Bay for decades due to slow groundwater travel time. Reductions in surface waters may take years or decades to manifest, given that legacy nitrogen in the aquifer will continue to seep into coastal waters. Thus, additional approaches to mitigate nitrogen pollution such as those that treat nitrogen directly before it enters coastal water bodies (i.e. shoreline PRBs) or those that directly uptake both groundwater and surface water nitrogen via accumulation in biomass (i.e. living shorelines) are beneficial in the near term.

3a. Existing Conditions

A Town of Southampton Community Preservation Fund project was implemented in 2020 when a full-scale bulkhead PRB was installed at the Hampton Hills Association property their scheduled bulkhead replacement (Fig. 2). The Hampton Hills Association was awarded funding and the site characterization, design, installation, was done in consultation with Cornell Cooperative Extension of Suffolk County (CCE), Stony Brook University, and Tidewater Dockbuilding Company, respectively. A grid of holes was drilled into the below-ground portion of PVC panels to guide water flow through the PRB media, and 12 treatment cells were established with 3 replicate treatment cells for control, 2.5ft thick, 5ft thick, and column PRB (Fig. 3).

Results from the September 2022 sampling event revealed that groundwater entering the barrier had concentrations ranging from 0.6 to 9.8 mg N/L and treated water had < 0.1 mg N/L nitrate in almost all samples. In April 2021 groundwater entering the barrier had nitrate concentrations ranging from <1 to 19 mg N/L and treated water had nitrate ranging from below detection up to 3 mg N/L. The bulkhead PRB system has been monitored periodically over

multiple seasons and it continues to perform extremely well. Furthermore, over multiple seasons the control areas where no woodchips were present had no nitrate removal and the areas where woodchips were present exhibited high percentages of nitrate removal (Fig. 4). These results suggest the barrier is performing as expected and preventing ~171 – 264 lbs of nitrogen per year from entering Shinnecock Bay. Similar nitrogen concentrations in the groundwater and porewater entering the bay are anticipated just north of the PRB where there is currently a section of existing wooden bulkhead. Bulkhead surrounded by native sand without PRB media, are similar conditions to the control sections of the bulkhead where little to no nitrogen removal occurs (Fig. 4).

As part of the bulkhead PRB site characterization process, the hydrogeological conditions of the region were well-studied. During average tidal conditions, a ~5 ft wide intertidal area emerges around low tide on the seaward side of the bulkhead. The site experiences semi-diurnal tides with a typical tidal range of about 3 ft. At high tide, salinity in the bay is ~28 ppt. Downgradient of the bulkhead, the intertidal sediment is poorly sorted sandy gravel, low in fines, with a hydraulic conductivity of ~550 ft day⁻¹ (Graffam, 2020). The natural intertidal sediment is low in fines and has significant fractions of coarse sand and gravel, making it very hydraulically conductive which allows groundwater to flow through it easily. In fact, seepage meter deployments at multiple distances offshore of the bulkhead found highest groundwater flow rate up to 250 cm/day at approximately 10 ft offshore of the bulkhead at low tide (Fig. 5). Data from the landward side of the bulkhead also indicates this region has high groundwater velocity. Using the average hydraulic conductivity of inland soil of 262 ft day⁻¹ and a porosity of 0.35, linear groundwater velocities ranged from 0.66 – 4.1 with an average of 2.6 ft day⁻¹ (Graffam, 2020).

The optimal height for *Spartina alterniflora* is approximately 1.1 ft (35 cm) above mean sea level (Scott, S., 2010). Bay bottom elevation is already elevated along the northern section of wooden bulkhead (Fig. 3A) and an estimated 1 ft. of additional elevation using coir logs as well as certified clean sand and gravel would provide the necessary height for *Spartina alterniflora* to flourish.



Figure 2. Photo during installation of the bulkhead permeable reactive barrier (PRB) that is trenched into the ground to remove nitrogen in groundwater.

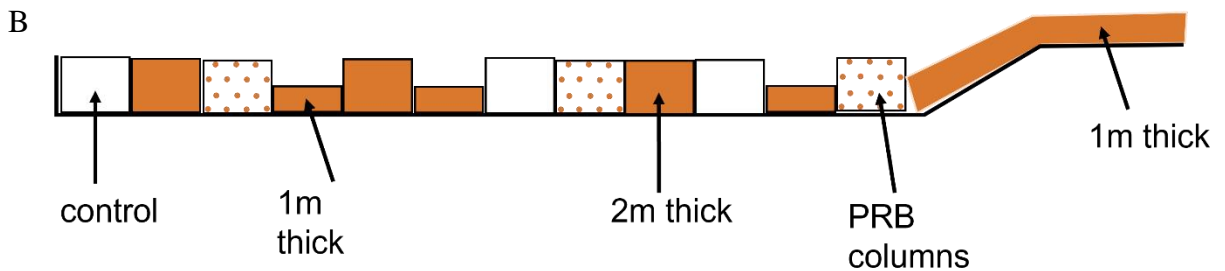


Figure 3: A) Aerial photograph of the Hampton Hills Association bulkhead with yellow line representing the length of the new PVC bulkhead with PRB. The northern section of bulkhead adjacent to the end of the road is wooden bulkhead material B) Schematic of the bulkhead PRB installed in 2020 during bulkhead replacement.

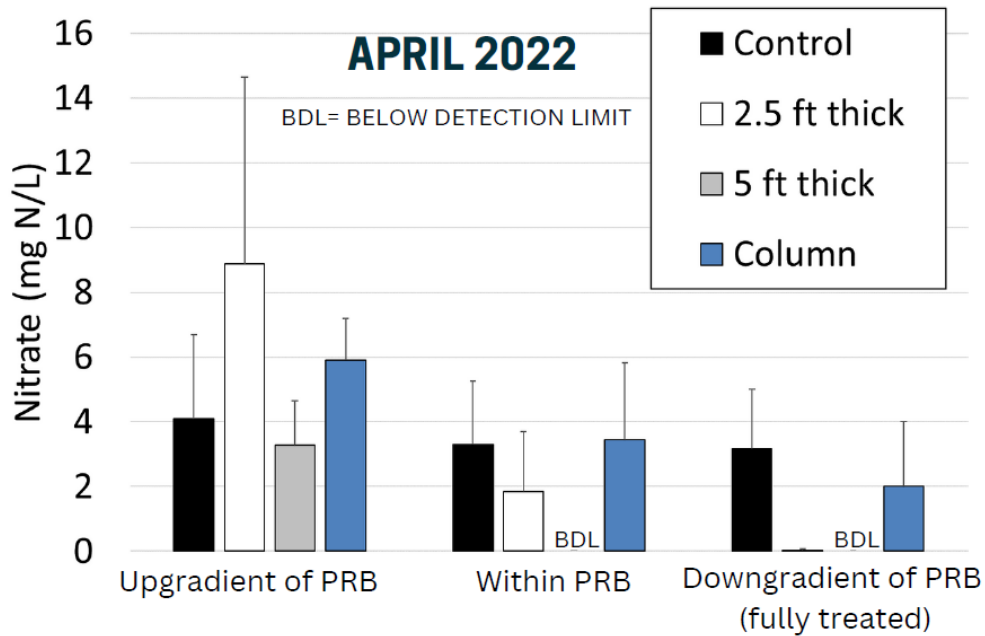


Figure 4: April 2022 performance results from the bulkhead PRB. Stony Brook University Center for Clean Water Technology is currently funding the monitoring. The bar graph represents average \pm standard deviation of 3 replicate PRB treatment cells.

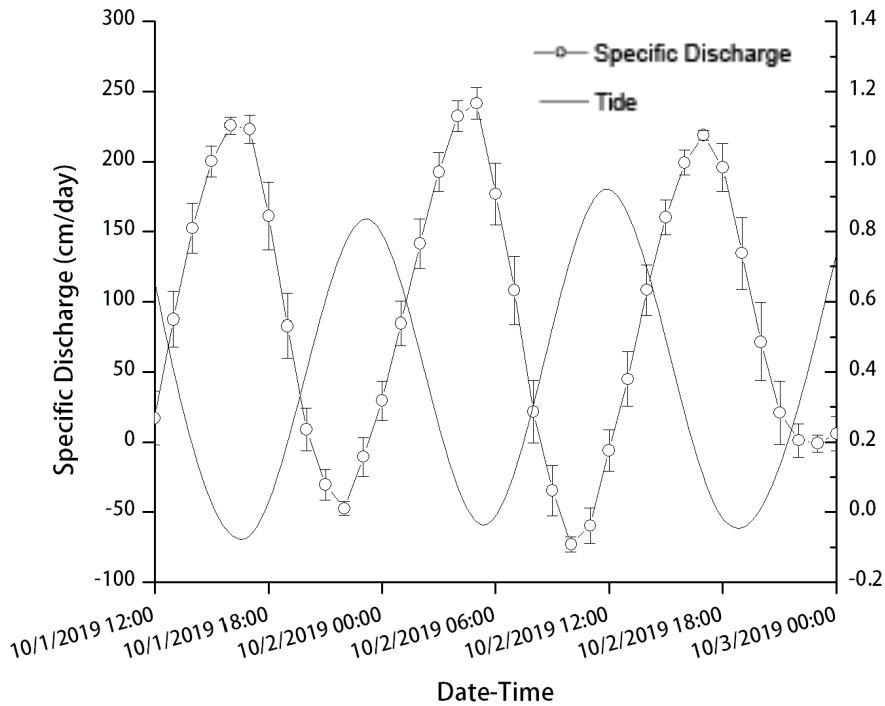


Figure 5: Highest specific discharge rates were measured at low tide with the groundwater seepage meter at 10 ft offshore of the bulkhead.

3b. How the Proposed Solution Addresses Nitrogen Remediation

CURRENT FUNDING REQUEST

Shoreline Softening and Habitat Enhancement Tasks:

1. Design a softened shoreline over approximately ~1600 ft² (150 m²) on the seaward side of the Hampton Hills Association bulkhead using a cost-effective and appropriate design
2. Tidewater Dock Building Company will install coir logs and media (certified clean sand and gravel) as well as *Spartina alterniflora*
3. Monitor establishment of native plants and shellfish, provide maintenance to the shoreline enhancement if necessary and quantify the water quality improvement associated with bioextraction and denitrification in a final report to the Town.
4. Provide educational content related to water quality and living shorelines to stakeholders and the community and communicate project results to the Town.



Figure 6: Aerial schematic of the proposed general location of the softened shoreline and habitat enhancement (red box) north of the existing bulkhead PRB. There is currently wooden bulkhead along the northern part of the shoreline maintained by the Hampton Hills Association. Yellow circle represents an area south of the Hampton Hills Association property where there is currently a thriving living shoreline.

As part of the site characterization work for the bulkhead PRB installed in 2020, the submarine groundwater discharge (SGD) zone in the intertidal region on the seaward side of the Hampton Hills Association bulkhead was mapped. High rates of groundwater seepage and elevated nutrient concentrations introduce nitrogen load to the surface water in this region which made it extremely suitable for a PRB. Although the PRB installed during bulkhead replacement is treating a large portion of the bulkheaded shoreline, the northern section of bulkhead which was not replaced in 2020 is currently providing no environmental benefit.

New bulkheading is strongly discouraged since hardened infrastructure can induce shifts in local ecology, and wave energy reflection can lead to sediment movement (Bozek and Burdick 2005; Davis et al. 2006). Historically there were jetties protruding perpendicular to the bulkhead which have also deteriorated in this area so structures protruding perpendicular to the shoreline are consistent with the historical character of the area. However since bulkheads provide no environmental benefit CCE and Hampton Hills Association seek to improve the environmental conditions surrounding the existing bulkhead. Rather than replace the existing wooden bulkhead with new PVC panels, CCE proposes to soften the shoreline in front of the bulkhead on the seaward side.

Elevated groundwater nitrogen seeping into the surface water through the submarine groundwater discharge zone at the Hampton Hills Association site is likely a combination of residential fertilizer, atmospheric deposition, and wastewater from outdated septic systems. Approaches to mitigate excessive nutrients that remove nitrogen regardless of N source are desirable. Living shorelines are a type of green infrastructure which have been used widely to promote healthy ecosystems. When applied in targeted areas with high nitrogen loads and groundwater conveyances they can provide directly water quality benefits by promoting N removal through multiple mechanisms including nutrient uptake into native plant biomass, and creating sediment conditions which promote denitrification (Hill et al. 2018) and water filtration via shellfish. As sediment accumulates around plant roots and becomes enriched in carbon, the conditions may naturally support nitrogen removal via denitrification. Living shorelines also provide ecosystem services such as providing a nursery habitat for fish and other marine life.

The project will include monitoring the establishment of native plants and shellfish, providing maintenance to the shoreline enhancement if necessary, and quantifying the water

quality improvement (lbs of N removed) associated with nutrient uptake into biomass and removal via denitrification.

A subsampling of the density of plants and shellfish will be quantified at 10% of the total area, i.e. 15 randomly chosen 1 m² locations within the ~150 m² (~1600 ft²) area, and average values will be applied to entire area. Established values from the scientific literature for above ground and belowground plant biomass as well as shellfish tissue and typical denitrification rates will be used to quantify water quality benefits in terms of nitrogen removal. Results will be provided to the Town in a final report. Opportunities for a field trip and involvement in the living shoreline establishment will be made available to local Hampton Bays high school.

The project is proposed downgradient of the Hampton Hills Association property adjacent to the Town-owned property at the end of the road which serves as a boat ramp (Fig. 6) and would not interfere with the boat ramp use or access. The project will involve securing Town Trustee approvals to modify the bay bottom and the Trustees have already provided their preliminary support with a support letter. Additionally, a permit from NYS DEC will likely be required. All permits and approvals will be secured prior to the start of any installation activities. Certified clean sand and gravel with similar properties to the intertidal sediment will be used for this project.

Both elements of the project, including the PRB work and shoreline softening with habitat enhancement will be factored into the outreach and education campaign designed to increase awareness of the multitude of efforts underway to improve water quality conditions in Shinnecock Bay. To further the message and increase community awareness the project will be featured on CCE's communication platforms and showcased in the "On the Water + In the Field" blog and news magazine show. Additionally, CCE will disseminate information through our website.

Under nutrient enriched conditions, such as those at the Hampton Hills Association site nutrient uptake rates in the living shoreline may be enhanced but preliminary nitrogen removal calculations indicate the softened shoreline will remove 10 lb-N in the first growing season with *Spartina alterniflora* alone. The nitrogen removal estimate was calculated according to the following assumptions:

- 150 m² (1600 ft²)
- 1000 *Spartina alterniflora* plants

- 200 day growing season from Spring to Fall in year 1
- 154 mg N/m²/day average removal rate including denitrification and introduction into plant biomass (Hill et al. 2018)

The project meets the objectives for nitrogen reduction in Shinnecock Bay which is a priority waterbody and will have both short and long-term benefits to the bay biota, ecosystem, and residents by promoting and enhancing existing resources in the region. The project will also provide considerable information for future guidance on incorporating forms of green infrastructure in combination with existing bulkhead structures. Our preliminary estimate is that the softened shoreline will remove 10 lb-N in the first growing season and as the shoreline continues to establish, the water quality improvements will be sustained and enhanced with the additional presence of shellfish.

3c. Technology Efficacy in Similar Settings

Approximately 200 ft south of the Hampton Hills Association property there is currently a flourishing living shoreline with native plants and ribbed mussels (Fig. 6). To the best of our knowledge the native plants and ribbed mussels were naturally recruited and established when the elevation and substrate became available. The current project seeks to mimic the existing nearby living shoreline by softening the shoreline and enhancing the habitat including changing the elevation and planting *Spartina alterniflora*. We anticipate shellfish recruitment will happen naturally over time as it did in the nearby living shoreline. In the proposed project area, we will match the elevation of the current living shoreline to ensure successful planting and establishment. The plan includes adding coir logs and stabilizing them with certified clean sand and gravel to increase the elevation by ~1 ft which will support the proper elevation for the native marine plants. CCE's habitat restoration team is knowledgeable on the placement strategy for successful *Spartina alterniflora* plug placement and growth (Fig. 7) and will provide oversight on the installation done by Tidewater Dock Building Company.



Figure 7: *Spartina alterniflora* planting at Pussy's Pond in East Hampton

3d. How the Project Supports Goals/Policies

The project is aligned with regional water quality goals because through bioextraction and natural denitrification, the habitat enhancement would reduce the nutrient load entering Shinnecock Bay and provide relief from elevated surface water nitrogen concentrations, algae growth, and biological oxygen demand. The project seeks to help avoid loss of economic, environmental, and aesthetic value by increasing water clarity and providing a healthier habitat for shellfish and other aquatic life. Specifically, this project is consistent with the following goals and policies important to New York State and the Town of Southampton:

a) [Long Island Nitrogen Action Plan Scope \(ny.gov\)](#)

- Goal #1: Assess nitrogen pollution in Long Island waters (pg. 7)
- Goal #2: Identify sources of nitrogen to impaired and non-impaired water bodies (pg. 7)
- Goal #3: Develop an implementation plan to achieve reductions including action plans which contain near term actions that will reduce nitrogen pollution to groundwater and surface waters (pg. 7)

b) Town of Southampton

- [Vision Goals for Natural Resources](#) Goal #3: Improve the quality of surface and bay waters by reducing nutrient loading, toxins and sedimentation (pg. 5)
- [Southampton 400 + Sustainability Goal](#): Restore and protect the Town's ground and surface waters to ensure their ability to support public health and the maritime, recreational and resort activities that underpin Southampton's way of life and economy (pg. 42)
- [Water Protection Plan](#)
 - Policy 5.1 Reduce nutrients to levels necessary to support a healthy ecosystem; one that allows for harvestable, sustainable fish and shellfish populations, healthy submerged aquatic vegetation, and traditional human uses in the Town's waters.
 - a. Reduce the input of nutrients from all sources including human waste, pet waste, storm water, and fertilizers.
 - b. Employ effective means to reduce nutrients such as permeable reactive barriers etc. (pg. 71)
 - Implementation Thought Projects #2 and #8 (pg. 74)

5. Cost Factors

	Cost
Salary (includes U/I and W/C)	
CCE Principle Investigators	\$10,597
CCE Technicians	\$6,253
Equipment and supplies	
Coir log, certified clean sand and gravel	\$5,500
Equipment rental and supplies	\$6,002
Travel	\$375
Contractor costs	
Coastline Evaluation Inc. (CLEAR)	\$4,963
Tidewater Dock Building Company	\$6,000
Indirect administrative costs	
14.28% Cornell Cooperative Extension	\$5,668
Current CPF Funding Request	\$45,358

The current budget is appropriate and reasonable as it is based on salaries with unemployment and workers compensation benefits, updated quotes for equipment use fees, coir log, sand and gravel media, contractor costs as well as travel reimbursements. CCE and its contractors helped develop the budget for site characterization and installation of the Hampton Bays bulkhead PRB and Pussy's Pond shoreline habitat restoration project and are experienced in properly budgeting for the work.

8. Anticipated Project Timeline

The anticipated timelines are provided to show that CCE and its associated contractors Coastline Evaluation Inc. (CLEAR) and Tidewater Dock Building Company are highly motivated to complete the design and installation of the softened shoreline and habitat enhancements in a timely manner upon securing funds. Timelines are contingent upon contract approvals, fund dispersal, and permit approvals and thus need to be flexible. Town resolutions and contract approvals are assumed to be in the Fall of each year following the March CPF deadline. CCE and CLEAR will be responsible for before and after installation water quality data collection and maintaining/monitoring the function of the softened shoreline during the project duration of ~1 year after Town resolution/funding disbursement. After the project end date, general observations and monitoring will be performed quarterly by volunteer board members of the Hampton Hills Association.

Description	Fall 2023	Winter 2024	Spring 2024	Summer 2024	Fall 2024
Town resolution	X				
Permit approval		X			
Design		X			
Installation			X		
Maintenance				X	
Final Report					X

References:

- Bozek, C. M., and Burdick, D. M. (2005). "Impacts of seawalls on saltmarsh plant communities in the Great Bay Estuary, New Hampshire USA." *Wetlands Ecology and Management*, 13(5), 553-568.
- Hill TD, Sommer NR, Kanaskie CR, Santos EA, Oczkowski AJ. Nitrogen uptake and allocation estimates for *Spartina alterniflora* and *Distichlis spicata*. *J Exp Mar Biol Ecol.* 2018;21:466-472. doi: 10.1016/j.jembe.2018.07.006. PMID: 31296971; PMCID: PMC6621564.
- Graffam, M., Paulsen, R., and Volkenborn, N. (2020). "Hydro-biogeochemical processes and nitrogen removal potential of a tidally influenced permeable reactive barrier behind a perforated marine bulkhead." *Ecol. Eng.*, 155, doi:10.1016/j.ecoleng.2020.105933
- Graffam, M. (2020) Hydro-biogeochemical dynamics in woodchip-based subsurface barriers: Implications for nitrogen removal and pollution swapping (Dissertation thesis)
- Scott, S. M.(2010). *Spartina Alterniflora Productivity and Salt Marsh Stability Relative to Marsh Platform Elevation*. (Master's thesis). Retrieved from <https://scholarcommons.sc.edu/etd/402>

Hampton Hills Association
P.O.Box 1317
Hampton Bays, New York 11946

Town of Southampton
Department of Community Preservation
24 W Montauk Hwy
Hampton Bays, NY 11946

March 12, 2023

To the Department of Community Preservation,

Hampton Hills Association began as Peekskill Hilltop Inc. on January 15, 1941. The name was changed to Hampton Hills Association on December 4, 1945.

Today we consist of 83 residential homes whose families have deeded rights to 650 feet of Waterfront property located on Shinnecock Bay. We have two general meetings a year with our members and Board Of Directors meeting when necessary. Members pay an annual dues of \$300.00 per year.

Prior to the beginning of the Hampton Hills Association meeting on August 2, 2022 there was a presentation from Molly Graffam, PhD Stony Brook University School of Marine and Atmospheric Sciences detailing the positive results obtained by the PRB- Permeable Reactive Barriers. The goal of the PRB is the significant removal of nitrogen which originates from contaminated groundwater before it enters Shinnecok Bay. The PRB project was developed and designed by Ron Paulson, HHA Co-President and Molly Graffam, PhD, in collaboration with Stony Brook University, Cornell University, and awarded grant money from Southampton Town.

The families of Hampton Hills Association are proud to have initiated the PRB project on our Waterfront property. We asked Molly Graffam, PHD and Ron Paulsen what we could do now to complement our PRB project during our last annual association meeting and they suggested adding a Living Shoreline. Our neighboring waterfront property to our south has a successful Living Shoreline with Spartina Grasses and we agreed that the esthetics added a natural environment that we would like to have on our property.

Molly Graffam, PHD and Ron Paulsen also emphasized the the addition of a Living Shoreline will improve the environment by purifying the water, buffering floods, reducing erosion, storing carbon, and attracting wildlife to habitat.

Our new goal for Hampton Hills Association is to create a Living shoreline. This will add to the beauty of our waterfront for our families to enjoy and add many environmental benefits to our Shinnecok Bay.

We look forward to this new collaborative effort and the environmental benefits from this project.

Sincerely,

Richard Iannelli

HHA BOARD			
Richard Iannelli Co-President	Ron Paulsen Co-President	Cathy Seabury Treasurer	Linda Fabiano Secretary

BOARD OF TRUSTEES
OF THE FREEHOLDERS AND COMMONALTY OF THE
TOWN OF SOUTHAMPTON

SCOTT M. HOROWITZ
PRESIDENT

WILLIAM PELL IV
SECRETARY/TREASURER



EDWARD J. WARNER, JR.

ANN WELKER

WILLIAM PARASH

116 HAMPTON ROAD
SOUTHAMPTON, NEW YORK 11968
PHONE: 631 287-5717 FAX: 631 287-5723

March 15th, 2023

Town of Southampton
Water Quality Advisory Committee
Community Preservation Fund Program
24 W. Montauk Highway
Hampton Bays, NY 11946

The Southampton Trustees are writing to express their approval of the project titled "Shoreline Softening and Habitat Enhancement in Conjunction with Hampton Bays Bulkhead PRB" an effort led by Cornell Cooperative Extension of Suffolk County to improve water quality and provide ecosystem benefits in Shinnecock Bay.

The Hampton Hills Association bulkhead currently has an innovative PRB installed on the landward side. CCE and Stony Brook scientists continue to monitor and study the system as it prevents several hundred pounds of nitrogen per year from entering Shinnecock Bay. Rather than replacing additional bulkhead and using the same approach, CCE and the Hampton Hills Association have a new idea which involves shoreline softening and habitat enhancement including native planting to improve water quality and promote green infrastructure along the seaward side of the existing northern section of deteriorating wooden bulkhead.

Historically there were jetties protruding perpendicular to the bulkhead which have also deteriorated in this area. Thus, addition of a softened shoreline with habitat enhancement will provide water quality and environmental benefits to the bay where there is currently none. Although the Trustees are supportive of this work happening on the bay bottom, CCE will need to obtain permits prior to any installation activities.

The Hampton Hills Association has embraced innovative green infrastructure approaches and the Trustees look forward to getting project updates on both the PRB and the softened shoreline.

Sincerely,

Scott M. Horowitz
President

Board of Trustees of the Freeholders and
Commonalty of the Town Southampton

Short Environmental Assessment Form

Part 1 - Project Information

Instructions for Completing

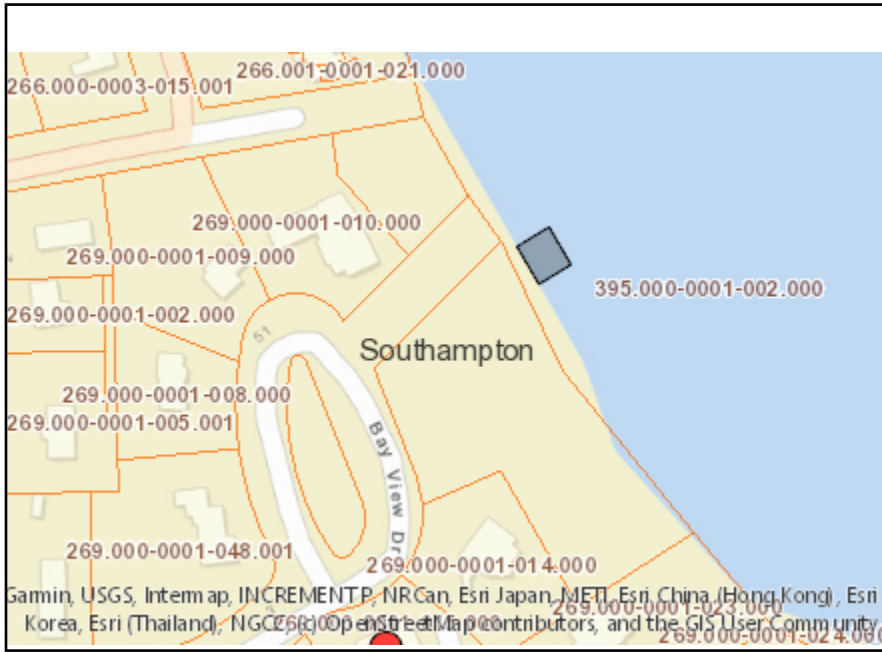
Part 1 – Project Information. The applicant or project sponsor is responsible for the completion of Part 1. Responses become part of the application for approval or funding, are subject to public review, and may be subject to further verification. Complete Part 1 based on information currently available. If additional research or investigation would be needed to fully respond to any item, please answer as thoroughly as possible based on current information.

Complete all items in Part 1. You may also provide any additional information which you believe will be needed by or useful to the lead agency; attach additional pages as necessary to supplement any item.

Part 1 – Project and Sponsor Information				
Name of Action or Project:				
Project Location (describe, and attach a location map):				
Brief Description of Proposed Action:				
Name of Applicant or Sponsor:		Telephone:		
		E-Mail:		
Address:				
City/PO:		State:	Zip Code:	
1. Does the proposed action only involve the legislative adoption of a plan, local law, ordinance, administrative rule, or regulation? If Yes, attach a narrative description of the intent of the proposed action and the environmental resources that may be affected in the municipality and proceed to Part 2. If no, continue to question 2.			NO <input type="checkbox"/>	YES <input type="checkbox"/>
2. Does the proposed action require a permit, approval or funding from any other government Agency? If Yes, list agency(s) name and permit or approval:			NO <input type="checkbox"/>	YES <input type="checkbox"/>
3. a. Total acreage of the site of the proposed action? _____ acres				
b. Total acreage to be physically disturbed? _____ acres				
c. Total acreage (project site and any contiguous properties) owned or controlled by the applicant or project sponsor? _____ acres				
4. Check all land uses that occur on, are adjoining or near the proposed action:				
5. Urban Rural (non-agriculture) Industrial Commercial Residential (suburban)				
<input type="checkbox"/> Forest Agriculture Aquatic Other(Specify):				
<input type="checkbox"/> Parkland				

5. Is the proposed action,	NO	YES	N/A
a. A permitted use under the zoning regulations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Consistent with the adopted comprehensive plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Is the proposed action consistent with the predominant character of the existing built or natural landscape?	NO <input type="checkbox"/>	YES <input type="checkbox"/>	
7. Is the site of the proposed action located in, or does it adjoin, a state listed Critical Environmental Area? If Yes, identify: _____	NO <input type="checkbox"/>	YES <input type="checkbox"/>	
8. a. Will the proposed action result in a substantial increase in traffic above present levels? b. Are public transportation services available at or near the site of the proposed action? c. Are any pedestrian accommodations or bicycle routes available on or near the site of the proposed action?	NO <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	YES <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
9. Does the proposed action meet or exceed the state energy code requirements? If the proposed action will exceed requirements, describe design features and technologies: _____ _____	NO <input type="checkbox"/>	YES <input type="checkbox"/>	
10. Will the proposed action connect to an existing public/private water supply? If No, describe method for providing potable water: _____ _____	NO <input type="checkbox"/>	YES <input type="checkbox"/>	
11. Will the proposed action connect to existing wastewater utilities? If No, describe method for providing wastewater treatment: _____ _____	NO <input type="checkbox"/>	YES <input type="checkbox"/>	
12. a. Does the project site contain, or is it substantially contiguous to, a building, archaeological site, or district which is listed on the National or State Register of Historic Places, or that has been determined by the Commissioner of the NYS Office of Parks, Recreation and Historic Preservation to be eligible for listing on the State Register of Historic Places? b. Is the project site, or any portion of it, located in or adjacent to an area designated as sensitive for archaeological sites on the NY State Historic Preservation Office (SHPO) archaeological site inventory?	NO <input type="checkbox"/> <input type="checkbox"/>	YES <input type="checkbox"/> <input type="checkbox"/>	
13. a. Does any portion of the site of the proposed action, or lands adjoining the proposed action, contain wetlands or other waterbodies regulated by a federal, state or local agency? b. Would the proposed action physically alter, or encroach into, any existing wetland or waterbody? If Yes, identify the wetland or waterbody and extent of alterations in square feet or acres: _____ _____ _____	NO <input type="checkbox"/> <input type="checkbox"/>	YES <input type="checkbox"/> <input type="checkbox"/>	

14. Identify the typical habitat types that occur on, or are likely to be found on the project site. Check all that apply: <input type="checkbox"/> Shoreline <input type="checkbox"/> Forest Agricultural/grasslands Early mid-successional <input type="checkbox"/> Wetland <input type="checkbox"/> Urban Suburban		
15. Does the site of the proposed action contain any species of animal, or associated habitats, listed by the State or Federal government as threatened or endangered?	NO	YES
	<input type="checkbox"/>	<input type="checkbox"/>
16. Is the project site located in the 100-year flood plan?	NO	YES
	<input type="checkbox"/>	<input type="checkbox"/>
17. Will the proposed action create storm water discharge, either from point or non-point sources? If Yes, a. Will storm water discharges flow to adjacent properties? b. Will storm water discharges be directed to established conveyance systems (runoff and storm drains)? If Yes, briefly describe: _____ _____	NO	YES
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
18. Does the proposed action include construction or other activities that would result in the impoundment of water or other liquids (e.g., retention pond, waste lagoon, dam)? If Yes, explain the purpose and size of the impoundment: _____ _____	NO	YES
	<input type="checkbox"/>	<input type="checkbox"/>
19. Has the site of the proposed action or an adjoining property been the location of an active or closed solid waste management facility? If Yes, describe: _____ _____	NO	YES
	<input type="checkbox"/>	<input type="checkbox"/>
20. Has the site of the proposed action or an adjoining property been the subject of remediation (ongoing or completed) for hazardous waste? If Yes, describe: _____ _____	NO	YES
	<input type="checkbox"/>	<input type="checkbox"/>
I CERTIFY THAT THE INFORMATION PROVIDED ABOVE IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE Applicant/sponsor/name: _____ Date: _____ Signature: <u>Molly Laffan</u> Title: _____		



Disclaimer: The EAF Mapper is a screening tool intended to assist project sponsors and reviewing agencies in preparing an environmental assessment form (EAF). Not all questions asked in the EAF are answered by the EAF Mapper. Additional information on any EAF question can be obtained by consulting the EAF Workbooks. Although the EAF Mapper provides the most up-to-date digital data available to DEC, you may also need to contact local or other data sources in order to obtain data not provided by the Mapper. Digital data is not a substitute for agency determinations.



Garmin, USGS, Intermap, INCREMENTP, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, OpenStreetMap contributors, and the GIS User Community

Part 1 / Question 7 [Critical Environmental Area]	No
Part 1 / Question 12a [National or State Register of Historic Places or State Eligible Sites]	No
Part 1 / Question 12b [Archeological Sites]	Yes
Part 1 / Question 13a [Wetlands or Other Regulated Waterbodies]	Yes - Digital mapping information on local and federal wetlands and waterbodies is known to be incomplete. Refer to EAF Workbook.
Part 1 / Question 15 [Threatened or Endangered Animal]	No
Part 1 / Question 16 [100 Year Flood Plain]	Yes
Part 1 / Question 20 [Remediation Site]	No



Tidewater Bulkheading LLC

206 Montauk Hwy
Moriches, NY 11955

631-488-DOCK
twbulkheading@gmail.com

Estimate

Date	Estimate #
3/9/2023	25

Ron Paulson Hampton Hills Association	631 921 0198
	rjp11@cornell.edu

Description	Total
Supply and install (spread) planting; coir logs; and sand Based on roughly 1000 sq ft	
Spartina (roughly 1000 plants, spaced out every 12") \$2,500	
Coir Logs (10) \$3,500	
Sand \$75 per yard	
Total	\$0.00

All material is guaranteed to be as specified. All work is to be completed in a workmanlike manner according to standard practices. Any unforeseen charges will be invoiced at completion of job. All agreements contingent upon strikes, accidents, or delays beyond our control. Any obstructions during installation will be a burden. We reserve the right to install shorter piles or sheeting if any obstructions are encountered during installation.

WE ARE NOT RESPONSIBLE FOR ELECTRICAL, SPRINKLER, OR ANY OTHER BURIED OBJECTS.

acceptance of proposal:	date:
-------------------------	-------

Cat Class: 952-7050

Dump Truck, 5 cubic yds., Single Axle, Gas Powered, Class C



[Sign in](#) to view account pricing and jobsites. *Federal, State or Local government customers must sign in to avoid paying tax and extra fees.*

Start Date

End Date

11/01/2023



11/22/2023



Quantity

-

1

+

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To and From Jobsite



Cost Estimate

Total cost and fees for order determined at checkout. Transit charges may be reduced if multiple items fit on a single truck.

Item Cost	\$3,502.00
Deliver to Jobsite	\$304.20
Retrieval From Jobsite	\$304.20
Environmental Fee ⓘ	\$70.04
Tax	\$360.57
Estimated Cost	\$4,541.01

You are viewing equipment rates for [Riverhead, NY 11901](#)

WEB RATE	Daily	Weekly	Monthly
	\$492	\$1,401	\$3,502

Add to Cart

**Ron Paulsen P.G.- Hydrogeologist
Coastline Evaluation Corp/CLEAR
8 Bay View Drive, Hampton Bays, NY,11946**

EDUCATION:

- 1995 State University of New York at Stony Brook M.S. (Hydrogeology)
- 1979 Adelphi University B.S. (Biology/Chemistry)
- 1976 Suffolk Community College A.S. (Marine Technology)

POSITIONS AND RESPONSIBILITIES

Mr. Paulsen has a Master of Science degree from Stony Brook University in New York and is a New York State licensed professional geologist. He has worked for the last 25 years on numerous groundwater investigations, conducted marine environmental research and developed educational programs at the Cornell Cooperative Extension of Suffolk and the Office of Water Resources in Suffolk County. Currently Mr Paulsen is working with Cornell as an associate under contract with his company CLEAR. He has been the project manager for numerous ground and surface water investigations at numerous state and federal superfund sites. His major responsibilities involve the supervision of groundwater investigative teams comprised of well drilling, percussion drilling, and geophysical units. Mr. Paulsen's primary applied research interest is the study of ground/surface water interactions and the development of equipment and techniques used to locate, define and quantify groundwater-venting areas offshore. He has participated with the US Navy's environmental services program at SPAWAR Systems Center, San Diego SSC SD) in the study of submarine groundwater discharge at Navy harbors throughout the US including San Diego Bay, Pearl Harbor, Puget Sound and the Anacostia River. This cooperative effort included the development of new measurement and sampling techniques and methodologies. As a visiting scientist at Stony Brook University he has published several papers on submarine groundwater discharge and the development and application of ultrasonic groundwater seepage meters. More recent experience has included a 36-month investigation of seepage into the Columbia River at the US Dept. of Energy Hanford, Washington site. Long Island projects include investigation of the hyporheic zone in several embayments in Suffolk County. These projects include groundwater discharge mapping into the Peconic and Great South Bay embayment systems. Most recent work includes a nitrogen fate and transport of groundwater into the Forge River and evaluations of groundwater seepage into Acobonnac Harbor, Sag Pond, Georgica Pond and Pussy Pond on the east end of Long Island. The work also includes pilot testing of near shore permeable reactive barriers to mitigate excessive nitrogen entering these embayments.

MOST RECENT RELATED PROJECTS

Paulsen R.J., M Graffam, P Murray, 2022. Data Report-Locating Groundwater Derived Nitrogen Discharging into Hog Creek, East Hampton, NY

Graffam M.E., R Paulsen, P Murray, 2021. Long Term PRB Monitoring and *Phragmites australis* Salt Treatment in Pussy's Pond - Amendment 6 Final Report

Graffam M.E., R Paulsen, 2021. Identifying and Remediating Groundwater Derived Nitrogen from Accabonac Harbor/Pussy's Pond: Task 1 Report

Paulsen R.J., C.Pickerell, P Murray. 2016. Data Report Locating and Quantifying Groundwater Derived Nitrogen Seeping into Upper Southwest Reach of Accobonac Harbor, Town of East Hampton, NY

Paulsen R.J., C.Pickerell, 2016. Data Report Locating and Quantifying Groundwater Derived Nitrogen Seeping into Pussy Pond, East Hampton, NY

Paulsen R.J., C.Pickerell, 2016. Phase 2 Progress Report on Evaluation of Sediment PRB to Mitigate Nitrogen Seeping into the Surface Waters of Pussys Pond
Town of East Hampton, NY

RELEVANT PUBLICATIONS AND REPORTS:

Chadwick D.B., J.G. Groves, L. He, C.F. Smith, R.J. Paulsen, and B. Harre. 2002a. New Techniques for Evaluating Water and Contaminant Exchange at the Groundwater-Surface Water Interface. Proceedings of Oceans 2002, Biloxi, Mississippi.

Chadwick, D.B., S.E. Apitz, V. Kirtay, J. Germano, J. Maa, C. Smith, R. Paulsen, M. Montgomery, W. Ziebis, and J. Gieskes. 2002b. SERDP CU1209: Pathway Ranking for In-place Sediment Management (PRISM), SERDP Annual Report, December 2002.

Chadwick, D.B., J. Groves, C. Smith, and R. Paulsen. 2003b. Hardware description and sampling protocols for the Trident Probe and UltraSeep system: Technologies to evaluate contaminant transfer between groundwater and surface water. Technical Report #1902, SSC San Diego, United States Navy.

Chadwick, D.B., Groves, J., Smith, C., Paulsen, R., and B Harre. New Tools for Monitoring Coastal Contaminant Migration. Sea Technology 17-22, June 2003.

Paulsen, R.J., C. F. Smith, D. O'Rourke and T. Wong 2001 Development and Evaluation of an Ultrasonic Groundwater Seepage Meter, Ground Water Nov-Dec 2001, 904-911 2001.

Paulsen, R.J., Smith, C.F. and T.F. Wong 1998. Defining freshwater outcrops in West Neck Bay, Shelter Island, New York using direct contact resistivity measurements and transient underflow measurements. Long Island Geology Conference, SUNY-Stony Brook.

Paulsen, R.J., Smith, C.F., and Wong, T-f, 1997, Defining Freshwater Outcrops in West Neck Bay, Shelter Island New York Using Direct Contact Resistivity Measurements and Transient Underflow Measurements, Geology of Long Island and Metropolitan New York Program with Abstracts, April 19,1997, 88-97.

Paulsen, R.J., O'Rourke, D., Smith, C.F. and T-f Wong Tidal Load and Salt Water Influences on Submarine Ground Water Discharge 2004 Vol. 42 No.7.

Paulsen, R.J., Smith, C.F. and T-f Wong. 1997. Development and evaluation of an ultrasonic groundwater seepage meter, in Geology of Long Island and Metropolitan New York, 88-97.

Paulsen, R., C. Smith, and D. O'Rourke (2004b), Peconic Estuary: A preliminary analysis of the relationship between submarine groundwater discharge (DGD) and submerged aquatic vegetation in the Peconic Estuary. U.S. Environmental Protection Agency, Washington, D.C. (http://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryID=85726)

Paulsen, R. J., C.F. Smith, J. Wanlass, and N. H. Stark (2008), *Forge River Groundwater Flow Rate and Nutrient Contaminant Load Site Investigation Draft Report*. 67 pp. Submitted by Suffolk County Department of Health Services, Office of Ecology.

Paulsen, R. J., C.F. Smith, J. Wanlass, and N. H. Stark (2009), *Great Peconic Bay Groundwater Flow Rate and Pesticide Contaminant Load Site Investigation Draft Report*. 74 pp. Submitted by Suffolk County Department of Health Services, Office of Ecology.

Paulsen, R. J., C.F. Smith, J. Wanlass, and N. H. Stark (2009), *Cold Spring Pond Groundwater Flow Rate and Nutrient Contaminant Load Site Investigation Draft Report*. 60 pp. Submitted by Suffolk County Department of Health Services, Office of Ecology.

Paulsen, R. J., C.F. Smith, J. Wanlass, and N. H. Stark (2009), *Jessup Neck Groundwater Flow Rate and Nutrient Contaminant Load Site Investigation Draft Report*. 41 pp. Submitted by Suffolk County Department of Health Services, Office of Ecology.

Paulsen, R.J., J.Duran (2013), *Forge River Nitrogen Evaluation Report*. 78pp. Submitted by Cornell Cooperative Extension of Suffolk County

Smith, C.F., Paulsen, R.J., and D. O'Rourke 2000 Deployment of the Ultrasonic Groundwater Seepage Meter at the Florida State University Marine Laboratory. Report to the International Oceanographic Committee 28pgs.

Smith, C.F., R.J. Paulsen and D. O'Rourke 2001 Demonstration of an Ultrasonic Seepage Meter by Quantifying Specific Discharge Across the Sediment-Water Interface along the Anacostia River, Washington D.C. 2001 Report to the United States Navy and Computer Sciences Defense Group 25pgs.

Molly Graffam, PhD
423 Griffing Ave., Riverhead, NY 11901
meg372@cornell.edu

Education:

Ph.D., Stony Brook University, Marine Science (2014 – 2020)
STRIDE Advanced Graduate Certificate (2019 – 2020)
B.S., Fairfield University, Biochemistry (2009 – 2013)

Employment:

Cornell Cooperative Extension Water Resource Geochemical Specialist (Aug. 2018 – present)

- Conducting applied research on water quality and PRB projects in Suffolk County
- Facilitating outreach/education and information transfer to the local Towns and community members

Professional Experience:

Cornell Cooperative Extension Groundwater Program Assistant (Aug. 2018 – Jan. 2021)

- Helped secure CPF grant for bulkhead PRB integration
- Collected and analyzed site characterization data to inform groundwater velocity and PRB thickness
- Determined bulkhead perforations, i.e. hole size and spatial pattern

New York State Center for Clean Water Technology Research Assistant (Jan. 2016 – Dec. 2020)

- Designed and conducted field and laboratory experiments to address research questions pertaining to groundwater and wastewater nitrogen remediation and pollution swapping potential
- Presented complex research findings to scientists, stakeholders, and the public
- Prepared DEC quarterly reports with insightful data interpretation

Stony Brook University Volkenborn Lab (June 2015 – Jan. 2016)

- Investigated animal-sediment interactions of infaunal intertidal marine organisms
- Used planar optode imaging for spatial/temporal O₂ analysis of marine sediment
- Deployed pressure sensors to monitor pressure dynamics associated with animal burrowing

Fairfield University Harper-Leatherman Lab (Jan. 2011 – May 2013)

- Used analytical techniques and instruments such as Low-Pressure Liquid Chromatography, UV-Vis spectrophotometer, potentiostat & Fourier Transform Infrared Spectrometer to study gold nanoparticle and Cytochrome *c* electrochemical interactions

Publications:

Graffam, M., Polerecky, L., & Volkenborn, N. "Hydro-biogeochemical function of soil based onsite wastewater treatment systems: Insights from high-resolution O₂ imaging." *Journal of Sustainable Water in the Built Environment* 6.2 (2020): 04020005.

Graffam, M., Paulsen, R., & Volkenborn, N. "Hydro-biogeochemical processes and nitrogen removal potential of a tidally influenced permeable reactive barrier behind a perforated marine bulkhead." *Ecological Engineering* 155 (2020): 105933.

Gobler, C. J., Waugh, S., Asato, C., Clyde, P. M., Nyer, S. C., **Graffam, M.**, ... & Walker, H. W. (2021). Removing 80%–90% of nitrogen and organic contaminants with three distinct passive, lignocellulose-based on-site septic systems receiving municipal and residential wastewater. *Ecological Engineering*, 161, 106157.

Harper-Leatherman, A. S., Wallace, J. M., Long, J. W., Rhodes, C. P., **Graffam, M.**, Abunar, B. H., & Rolison, D. R. (2021). Redox Cycling within Nanoparticle-Nucleated Protein Superstructures: Electron Transfer between Nanoparticulate Gold, Molecular Reductant, and Cytochrome c. *The Journal of Physical Chemistry B*.

Presentations:

As presenter

2020. **Graffam, M.** and Volkenborn, N. "Bulkhead permeable reactive barriers for groundwater nitrate remediation." NYS Center for Clean Water Technology Seminar Series

2020. **Graffam, M.** and Volkenborn, N. "High-resolution O₂ imaging as a tool to study hydro-biogeochemical processes in soil-based nitrogen-removing systems." NYWEA Spring Conference

2018. Roberts, S., **Graffam, M.**, "Permeable Reactive Barriers and Constructed Wetlands to Remediate Contaminated Waters". Long Island Clean Water Partnership's "Water We Going To Do?"

2018. **Graffam, M.**, Volkenborn, N., in collaboration with Cornell Cooperative Extension, "Permeable Reactive Barriers" An update on the status of PRB research presented to funders and the public at the annual CCWT Symposium

As co-author

2018. Langlois, K., Collier, J., Volkenborn, N., **Graffam, M.**, Characterization of the microbial community driving on-site wastewater treatment in nitrogen removing biofilters (NRBs). American Chemical Society

Posters:

"CWs and PRBs: Solutions for Removing Nitrogen from Long Island Household Wastewater and Groundwater." presented at State of the Bays seminar, May 2018.

"NRBs and PRBs: Solutions for Removing Nitrogen from Long Island Household Wastewater and Groundwater." presented at Earthstock Environmental Student Research Exhibition, April 2018 and State of the Bays seminar, April 2017.

"Moving Anoxic Porewater: The Dark Side of Bioirrigation." Poster presented at 5th Nereis Park Conference, August 2017, 45th Benthic Ecology Meeting, March 2016, and at the SoMAS