Charlestown Coastal Watershed Protection and Restoration Program

Town of Charlestown, Rhode Island
Office of Environmental Scientist and On-Site Wastewater Management
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Project Total $878,857.25 Fiscal Match $20,515.28 In-Kind Match Total $184,140.97
Grant Request Total $674,201.00

The Town of Charlestown, Rhode Island submits this proposal for the US Environmental Protection Agency (EPA) Region 1 Southeast New England Program for Coastal Watershed Restoration Grant. **Funding will be used for watershed restoration by implementing practices to quantifiably reduce and mitigate nutrient impacts to groundwater and surface water bodies located within Charlestown's South Shore Salt Ponds Watershed (the "Watershed") of Green Hill, Ninigret and Quonochontaug Salt Ponds**.

The Town has partnered with the University of Rhode Island (URI), Save the Bay (STB), and the Salt Ponds Coalition (SPC) to implement this project. We will also develop a framework for continued implementation and additional policies within the Watershed. The Town will produce plans and programs that can be used as models by other local or regional entities to implement similar remedial goals. Project tasks include:

1.) Quarterly sampling and analysis of final effluent from up to 50 existing nitrogen (N) reducing onsite wastewater treatment systems (OWTS) for three years in the most critically nutrient impacted Zones within the Watershed (URI). Results will be utilized to optimize N-reducing OWTS functionality to meet the ≤19 milligrams per liter N regulatory effluent threshold,

2) Establish a program to manage and implement the upgrade of 15 substandard/unpermitted older conventional OWTS to N-reducing technology in the critically impacted Zones, which will result in the reduction of up to 150 pounds (lb) N/year to the Watershed (Town), and

3) Develop and implement a Town-Recommended Landscaper Process (Town), install six demonstration rain gardens on town properties within the impacted Zones to promote storm-water infiltration (STB), and establish and sample two surface water sampling stations in Green Hill Pond to analyze and track nutrient impacts to the most impacted salt pond in town (SPC).

I Background

The Town of Charlestown, situated on the South Shore of Rhode Island (RI), contains three coastal lagoons ("Salt Ponds") that connect to Block Island Sound by engineered breachways. A large portion of Charlestown (12.5 mi^2) falls within the Salt Ponds Watershed (the "Watershed"), which includes portions of four RI South Shore municipalities. The boundary of the Watershed has been used for policy development by RI Coastal Resources Management Council (CRMC) as the Salt Ponds Region Special Area Management Plan (SAMP) and by the RI Department of Environmental Management (DEM) as the South Shore Salt Ponds Critical Resource Area (CRA). The Town of Charlestown utilizes the Watershed boundary within its jurisdictional area as its Coastal Groundwater Protection Overlay District.

Though the Watershed makes up 33% of the Town, it contains over 63% of all dwellings, and is the Town's most densely developed area. There are 3.7 mi^2 of very dense development classified by the CRMC as "Developed Beyond Carrying Capacity" which typically contain 2-8 dwellings per acre (CRMC, 1999). The Town has prioritized these areas into 7 Critical Nutrient Reduction Zones (the "Zones") in order to maximize the cumulative impact of N reduction proposed here and for programmatic and planning purposes. These Zones will form the geographic basis for the work we propose.

The Town and others have documented significantly elevated groundwater nitrate-N (NO_3) concentrations in its most densely developed coastal areas. Recent shallow potable well water sampling of small community water systems and shallow private wells in these areas indicates that groundwater NO_3-N concentrations approach or exceed the EPA established maximum contaminant level (MCL) of 10 mg NO_3-N/L. This N-enriched groundwater also eventually discharges to all three of Charlestown's Salt Ponds (USGS, 2006), where it causes eutrophication and increases the risk of hypoxia. Green Hill and eastern Ninigret Pond have been closed to shellfishing since 1994 by DEM based on significantly deteriorated water quality. DEM has established a total maximum daily load (TMDL) discharge regulation for bacteria to these ponds.

Reducing N loading is a major priority for Charlestown to protect the Watershed for public health, safety and welfare, and the environment. The Town relies exclusively on local groundwater for drinking water through small public and individual private wells. In addition, all households and businesses rely solely on local soils for dispersal and treatment of wastewater through the use of OWTS. Nutrient inputs from these systems run counter to the Town's public health objectives and for water quality of the Salt Ponds, the health of which is directly related to Charlestown's tourism industry. Charlestown is the only coastal municipality in RI facing this combination of water quality and utility issues.

II Sources of Nitrogen

Lee (1980) examined the causes and impacts of land use development and relationships to the Salt Pond water quality. Septic systems were identified as the major source of N entering most of the Salt Ponds as early as 1982 (Nixon et al. 1982, Lee & Olsen 1984). N loading to groundwater has long been known to be the main conduit for nutrients entering the Salt Ponds, since groundwater is the predominant source of input of fresh water to the ponds (Olsen & Lee, 1984). OWTS remain the largest contributor of N to groundwater. Recent models developed by the URI Cooperative Extension (URI CE), Nonpoint Education for Municipal Officials (NEMO) indicate that approximately 80% of groundwater N is attributable to OWTS discharge (URI, 2014). URICE models indicate that the balance of N loading to the Watershed originates mainly from fertilizer use. The average annual N influx to the ponds is approximately 46,903 lb/yr for Green Hill, 44,794 lb/yr for Ninigret and 24,579 lb/yr for Quonochontaug Ponds (Ernst, 1996; Ernst et al., 1999; URI CE, 2001; DEM, 2006; Donohue, 2013).

N sources and impacts to the Green Hill and Eastern Ninigret Pond subwatershed have been extensively studied. In 2006, DEM calculated that an 80% reduction in N loading to the Green Hill Pond watershed was required in order for the pond to meet its established eutrophication index (DEM, 2006). The N-loading percent reduction was subsequently modified to a goal of 61% as part of the 2011 S. Kingstown Wastewater Facilities Plan (Woodard & Curran, 2011).

Since January 2008, DEM has required the upgrade of all substandard and conventional OWTS to N-reducing technology for any new construction, altered building construction, or failing OWTS in the Watershed. In the last eight years, the Town's OWTS data indicate that approximately 35 OWTS per year have been upgraded to N-reducing technology in the Watershed for a net N reduction of approximately 350 lb/year. Given the existing concentration of groundwater N and annual loading, the current replacement rate is insufficient to address the problem. We believe a mechanism is warranted to expedite upgrades of older conventional OWTS to N-reducing OWTS in the Critical Nutrient Reduction Zones.

Conventional OWTS typically have final effluent N concentrations of 44 mg/L (Valiela et al., 1997). For a three-bedroom dwelling, this amounts to a discharge of approximately 21 lb/yr of N (Morton et al., 1988; Gold et al., 1990). N-reducing OWTS are designed to lower the Total N (TN) concentration of N in wastewater by 50%, meet final effluent TN concentrations of ≤19 mg TN/L and meet the NSF/ANSI Standard 245 N reduction.

Donohue (2013) showed that cumulative impacts of N loading are greatest in densely developed areas. Models of shallow groundwater samples from critical Zones predict to show N concentrations from 6.8 mg/L to >10 mg/L (Donohue, 2013). The Town has recently modified these density relationships to more accurately reflect hydrogeologic/geologic setting, glacial till versus glacial-fluvial stratified deposits.

Final effluent sampling from N-reducing OWTS in the Greater Narragansett Bay Watershed (including Charlestown) indicates that these systems are not always optimized to achieve maximum N removal. In such cases, final effluent N concentrations exceed the 19 mg TN/L threshold (Lancellotti et al., 2015). Non-monitored N-reducing OWTS are operating less effectively than the same technologies in Barnstable County, MA, where monitoring occurs and effluent samples are routinely analyzed. Lancellotti et al. (2015) suggest that not incorporating sampling into the policy for N-reducing OWTS omits a critical link to enhancing system performance. We believe effluent from N-reducing OWTS must therefore be collected and analyzed to optimize system functionality and consistently achieve the ≤19 mg/L threshold. These data will be utilized to promote the novel use of individual OWTS Operating Permits on a Town level that establishes specific O&M and monitoring needs for all N-reducing OWTS.

III History of Mitigation Efforts

Since 2004, the Town has required removal of all cesspools and the upgrade of failing or malfunctioning OWTS. Of the original >1,000 cesspools, all but eight have been upgraded to modern OWTS. In the Zones, most have been upgraded to N-reducing systems. The Town maintains an active database of the design, usage, solids accumulation rate, and inspection and pumping history of every OWTS.

In Charlestown, there are 3,008 OWTS located within the Watershed, 2,509 (84%) of which are located within the CRMC Lands Developed Beyond Carrying Capacity area. Of those systems, 1,907 (75.2%) are conventional OWTS, 464 (15%) use N-reducing technology, and 138 (5.4%) are classified as unpermitted and/or substandard, and installed before 1968.

IV Project Description

We propose three concurrent tasks to address the main sources of N to ground and surface water: Tasks 1 and 2 mitigate inputs from OWTS and Task 3 manages fertilizer application and stormwater runoff. Specifically, Task 1 involves sampling and optimizing existing N-reducing OWTS to facilitate compliance with DEM regulations and reduce N input into the Watershed. Task 2 will upgrade the oldest and/or least-effective substandard OWTS in the most critical Zones to N-reducing technologies. Task 3 develops a program to encourage best management practices (BMPs) among landscapers, as well as the installation of demonstration rain gardens, and the engagement of citizen scientists, volunteers, and residents to improve water quality and implement BMPs in the Watershed.

The proposed approaches will be transferrable to other coastal watersheds and communities across the EPA SNEP region. By implementing these measures and creating a blueprint for a more sustainable watershed, we will also develop resiliency of our wastewater treatment infrastructure, better preparing the Town for the impacts of sea level rise and climate change.

Task 1 –OWTS Final Effluent Monitoring and Optimization (SNEP Priority 1, 2, 3 & 4)

The Town has partnered with URI Laboratory of Soil Ecology and Microbiology (LSEM) to conduct field evaluations of N-reducing OWTS focused on final effluent N concentrations within the Watershed. Analytical results will be made available to state, regional and national audiences to assist operation and maintenance (O&M) service providers, regulators and inspectors in order to optimize system performance and lower N inputs to the Watershed. To achieve this, the following objectives will be implemented:

1. Collect and statistically analyze data of effluent N levels and relevant operational variables from up to 50 N-reducing OWTS four times a year over the course of three years.
2. Develop outreach education materials and transfer project findings to regulators and industry practitioners through a training class and seminar that will be delivered at state, regional and national workshops and webinars.
3. Use project findings to help effect changes in local and state regulatory policy, transforming optimized management practices identified by our project into standard operating practices.

By observing data trends over time coupled with system optimization, decreases in N load will be calculated within the Watershed. We anticipate that this program will form the basis of a wider local or regional N-reducing OWTS sampling and system optimization strategy.

Sub-Task A: Effluent Sampling and Analyses (Years 1 – 3)

Up to 50 N-reducing OWTS will be sampled within the Watershed. Sampling and analyses will take place quarterly, in February, May, August and November for three years, starting in February of 2017. The data will be used to identify which OWTS meet the 19 mg N/L standard and quantify variation as a function of time and treatment technology. For those systems that do not meet the standard, the data will be used to guide system operation and maintenance service providers to perform appropriate adjustments to operational parameters to get systems into compliance, and to evaluate the effectiveness of adjustments. At every system sampling event, field measurements of pH, temperature and concentration of dissolved oxygen (DO) will be collected using an electronic probe, and alkalinity, NH_4^+ and NO_3^- in final effluent using rapid

tests that have been evaluated for accuracy (Lancellotti et al., 2015). Information on specific OWTS recirculation ratio and hydraulic flow will also be recorded. Samples will be collected for laboratory analysis of pH, alkalinity, NH_4^+, NO_3^-, TN and BOD-5 using USEPA-approved laboratory methods. These data will allow for comparison of efficacy of field measurements in predicting actual constituent levels determined from laboratory analyses. O&M providers will be able to utilize these field-tested, laboratory-verified methods to evaluate performance on-site.

Sub-Task B: Modeling and Statistical Analysis (Years 2 – 4)

Multiple linear regression/optimization analysis (Frost, 2014) will be used to identify the set of parameters that best predicts effluent N concentration. This information will be used to adjust operational parameters for underperforming systems, with continued monitoring of effluent N and operational parameters to determine to which extent the adjustments lowered effluent N.

A best subsets multiple linear regression model will be used to identify the set of parameters that best predicts effluent N concentration with a minimum data set, in order to reduce the time and cost of acquiring data, thus increasing the likelihood of regulatory and practitioner adoption of project-developed system monitoring protocol. The regression model will compare models with similar levels of fit and accuracy, but different number of variables. This will minimize the number of variables needed to be measured to predict N levels with a range of models including different variables, addressing concerns of cost and time. Regressions on data will be separated by season (February, May, August, and November) and type of system for those systems with effluent N concentration of 19 mg/L or lower. Analyses will be based on data generated using both laboratory and field methods. Untransformed as well as transformed variables (e.g. ratios, $[NO_3^-\text{-N}]/[BOD_5]$ and sums, $[NO_3^-\text{-N}] + [NH_4^+\text{-N}]$) will be included in model evaluation.

Once optimal models are developed, we will identify the range of predictive variables that produce values of effluent N concentration that meet the regulatory threshold of 19 mg N/L. This information will be used to adjust system variables as necessary in February 2018 (and subsequently, as needed) for those systems not performing to standard in the first year of the study. We will continue to collect the same field and laboratory data for all monitored systems over Years 2, 3 and 4 of the study. This will allow us to determine the extent to which variable adjustments resulted in lower effluent N levels in previously underperforming systems, and help us develop more robust models. A series of practitioner-friendly monographs (based on modeling results) will be produced to provide quantitative, easily understood information about the range and optimum values of operational variables in the field. Because the results of our modeling efforts are likely to be applicable in other areas of the region and country, and for similar technologies, we will make these available as part of our outreach education efforts.

Sub-Task C: Outreach Education and Policy (Years 3 and 4)

Study methods and results will be summarized and communicated to OWTS service providers, inspectors, designers, installers, regulators, and watershed managers through the multiple outreach classes offered by the New England Onsite Wastewater Training Center at URI (NEOWTC), and to the DEM Technical Review Committee (TRC), charged with setting advanced technology OWTS policy recommendations for DEM. We will synthesize project findings and develop a 4- to 6-hour long class that will be offered through the auspices of the NEOWTC, which for the past 20 years has offered continuing education credit-ready classes for

wastewater practitioners that are approved in RI, MA, VT, and NH. We will submit this class to DEM, MADEP, NHDES and VTDEC for continuing education credit approval required for wastewater practitioner license renewals. We will also request that the TRC recommend policy changes to DEM for this training class to be mandatory for all O&M service providers in RI, and make similar requests of other above-mentioned state regulatory programs. A long-term goal to be pursued beyond the project time period, is to request the TRC and DEM develop a policy change requiring all O&M service providers to perform field BMPs developed by our research at every system O&M visit and record and retain this information for annual reporting to DEM and/or established town wastewater management programs. In addition, we will request the USEPA feature the findings of this project in a decentralized system webinar, and we will deliver the project findings to practitioners at various regional and national professional conferences.

Task 2 – OWTS Upgrades to Reduce N inputs by 150 lb/yr (SNEP Priority 1, 2, 3 & 4)
The Town will establish and manage a program to upgrade 15 substandard or unpermitted existing OWTS to N-reducing systems, reducing N inputs to the Watershed by at least 150 lb/year (Years 2 - 4). The upgrades will be implemented within one geographic location to maximize the cumulative benefit of N-reduction, specifically within Zones 5 and 6.

In Zones 5 and 6, located in the Eastern Ninigret and Green Hill Ponds subwatershed, there are a total of 474 OWTS (56 substandard, 244 conventional and 130 N-reducing). The total groundwater N input of these OWTS combined is 7,665 lb/yr based on 3 bedroom full time occupancy (6,300 lb/yr from conventional and substandard OWTS and 1,364 lb/yr from N-reducing OWTS). Upgrading 15 of the oldest OWTS in Zone 5 and 6 will result in a net N reduction of 150 lb/yr or 2% to the Watershed. Modeling indicates that upgrading every OWTS in the Green Hill Eastern Ninigret Pond subwatershed in Charlestown and in South Kingstown would achieve a 27% reduction of N loading to the ponds (Woodard & Curran, 2011). We believe fostering these upgrades is a critical step in the right direction.

The program will compensate homeowners 75% (up to $18,000 per system) of the cost of the engineering design, permitting, components and installation of 15 N-reducing OWTS to replace substandard and unpermitted OWTS Zones 5 and 6. The Town will establish an application process based on specific property criteria such as ownership, drinking water source, and OWTS information. Preference will be given to properties which are owner occupied, full time primary residences and whose owners meet the HUD Low Income Guidelines. The selected property owners will be required to enter into a contract with the Town that includes but is not limited to: a date specified for the upgrade, maintaining property ownership during the project period, maintaining a contract with an approved service provider, and allowing access for sampling and release of performance data to the project partners and contracted O&M service provider.

Task 3 – Storm-water and Fertilizer Management (SNEP Priorities 1, 2, 3 and 4)
Sub-Task A: Fertilizer Management (Years 1 – 4): The Charlestown Town Council has taken steps to support a voluntary program to mitigate the next largest contributor of N to the aquifer: fertilizer use. Modeling has demonstrated (URI NEMO, 2016) that fertilizer use represents as much as 20% of the groundwater N in densely developed areas where high-maintenance lawns are clustered together and from 9-14% (URI NEMO, 2014) in low to moderately densely developed areas. Therefore, the Town will complete and implement a voluntary Charlestown

Recommended Landscaper Process. The process will incorporate peer-reviewed academic research, collaboration with turf grass and lawn care professionals and academics, other municipalities and the URI CE. The concept of a Charlestown Recommended Landscaper Process has already been endorsed by DEM.

Landscapers who sign onto the program will be Town of Charlestown registered businesses that conduct work in southern RI and will agree to the Town's designed landscaping process. The process will promote BMPs in lawn care and landscaping. A major requirement of the process will be to utilize less than 2 pounds of insoluble fertilizer per 1,000 ft^2 of lawn/yr, established by DEM as the recommended threshold usage in environmentally sensitive areas (DEM 2015). The process will also apply to local retailers and sod companies that have agreed to the practices. We will develop technical training programs for management approaches and create a resident-accessible online list of recommended landscapers. We will partner with URI CE NEMO, turfgrass managers and landscapers to develop and implement the process. This program is scalable and transferrable and can serve as the blueprint for a statewide or regional lawn care/fertilizer management program to other SNEP communities.

Sub-Task B: Stormwater Nutrient Reduction and Public Engagement (Years 1 – 4): The Town will partner with Save the Bay (STB) to foster citizen scientists and encourage the adoption of voluntary nutrient reduction efforts. Trained staff at STB will lead the installation of six demonstration rain gardens within the Zones to promote stormwater management, infiltration of runoff, and dilution of nutrient loaded groundwater. These projects will engage local elementary students as a community-teaching tool. At least half of the gardens will be installed on Town-owned properties along with informational kiosks. Rain gardens will be installed in accordance with guidelines in Dietz and Filchak (2004) by staff trained by the RI Residential Rain Garden Training Program and volunteers. Public outreach related to best practices at home for Sustainable Watersheds will be disseminated by direct mailing to residents of the Watershed and an online resource for the Watershed will be developed. STB will share this project with a presentation at the annual RI Land and Water Summit.

Sub-Task C: Surface Water Sampling and Citizen Scientists for Nutrient Reduction (Years 2 – 4)
The Town will partner with the SPC, the Watershed Council for the Watershed and URI CE Watershed Watch to establish two surface water sampling stations in Green Hill Pond. The stations will be established in the western reaches of the pond in an effort to monitor surface water quality that is affected by groundwater outwelling from Nutrient Reduction Zones 5 and 6.

SPC will sample surface water from the stations for laboratory analysis of NO_3-N, TN, NH_4^+-N, and phosphate monthly and field analyze for observations of DO, pH, and temperature from May through October for a period of three years (2017 through 2019). Samples will be collected by trained volunteer citizen scientists and analyzed by the USEPA certified URI CE Watershed Watch laboratories. Laboratory and field analytical results will be tabulated, summarized and posted on the SPC website. The SPC will publish a "Trends Analysis" for the sampling stations and will be available both on-line and in hard copy. The datasets will also be compared to preexisting baseline pond Aquatic Health Indices.

SPC produces quarterly newsletters, conducts educational events, videos and seminars for citizens interested in the salt pond environment. For this project, the SPC will produce an on-line video resource website pertaining to the Watershed and the Project to disseminate project information and results. A similar video was prepared for Green Hill Pond in 2015: https://greenhillrocks.com/below-the-surface/

V. Programmatic Capability and Past Performance:

The Town is uniquely positioned through its institutional organization and staffing to successfully manage not only complex day to day municipal functions but additional highly technical professional tasks. Municipal staff includes highly skilled professionals who also have project management experience. Technical staffing and Partner expertise consists of:

Matthew J. Dowling, Town of Charlestown OWTS Manager/Environmental Scientist: Lead technical expert and project manager, has over 16 years of project coordination experience in groundwater hydrogeology, groundwater remediation and watershed management. Under Municipal Code, he currently oversees the individual management of over 5,000 OWTS (and >600 N-Reducing OWTS) in town for protection of public health and the environment. The program has also recently removed 99% of cesspools from Charlestown. He developed policies, meta-analyses, datasets, publications and maps that quantify nutrient impacts to the Watershed.
Stephen J. McCandless, Town of Charlestown Coastal Geologist/GIS Specialist: Principal technical expert for the project is a leading expert specializing in the geologic processes of the coastal barrier lagoon complexes of Southern Rhode Island. He directs the Town's GIS Dept.
Patricia M. Anderson, Town Finance Director: Has over 34 years of experience and will provide fiscal management and financial grant reporting. She manages accounting of the General Fund and 45 additional grants and funds. Town annual audits are consistently "clean" with no findings.
Jose A. Amador, PhD Soil Science, URI LSEM: Research project and data analysis leader. Dr. Amador will supervise a PhD student to conduct field sampling, laboratory and data analysis. Specializes in applied soil ecology and microbiology; biogeochemistry; biodegradation and bioremediation; onsite wastewater treatment systems; source tracking of fecal contamination.
George Loomis, Director URI New England On-Site Wastewater Training Center (NEOWTC): Project field sampling and outreach education leader who will oversee a research assistant/field sampling coordinator. He is a research soil scientist and the director of the NEOWTC with over 31 years of experience in siting, design, O&M, and research in OWTS. He directed state and federally-funded OWTS projects installing nearly 60 N-removal technologies in RI. He is a member of the DEM TRC and OWTS Task Force and co-developed the RI sand filter guide and bottomless sand filter guide for DEM.

Charlestown has obtained over **$1.25 million** in funding and has implemented over 25 Federal and State assistance awards over the past 3 years for a total award expenditure of **$1.13 million**. Projects are diverse and have been managed by Town of Charlestown staff. A summary of the largest and most applicable awards are:

The United States Department of Housing and Urban Development (HUD): FY 2013 through 2015 **$564,416.24** to implement the CDBG program for housing development, rehab, support for shelters and public service organizations.

The United States Department of Housing and Urban Development (HUD): FY 2013 through 2014, **$414,567** - Disaster Relief assistance for Winter Storm NEMO and Super Storm Sandy. Reports submitted to HUD and FEMA. Combined HUD CDBG funding was utilized from 2013 through 2015 for the following additional projects:
1. Church Woods Community Housing - **$375,000**: Church Woods senior housing project ($251,040 currently 67% expended), a 24 unit housing development for low/moderate income seniors An additional $4.1 million has been approved. To date, the Town has provided copies of the invoices and has been reimbursed for $248,132.

2. Charlestown Municipal Community Center - **$119,300** for improvements including emergency generator, parking lot lighting and a software system.

United States Transportation Equity Act for the 21st Century and DEM – FY 2013, **$60,000** (20% municipal fiscal match) for recreational facilities at Mud Cove/Powaget Park.

All the above-mentioned grants have been audited on an annual basis by Town auditors. There have been no irregularities or findings. All filing reports have been consistently filed on time and the Town has received reimbursements in a timely manner. The Town documents in-kind services, manages budgetary and technical aspects of each project and copies of all submittals are retained by the Town.

VI. Budget Narrative: Refer to Budget Detail Attached

Task 1: Request $315,403, In-Kind/Fiscal Match $93,874.88, Total $409,277.88

Personnel: Funds are requested for stipend, tuition and fees, and benefits for a PhD student for the first 3.5 years of the task. The student's dissertation will be supervised by Dr. Amador and will be based on the work carried out in this project. Our request covers the academic year stipend and benefits for semesters Fall 2016 through Fall 2019; summer stipend and benefits for 2017 through 2019; and in-state tuition for semesters Fall 2016 through Fall 2019. A teaching assistantship will cover the student's stipend and tuition for Spring 2020. Funds are also requested for stipend and benefits for an undergraduate or graduate student intern from URI for the first three years (Fall 2016 through Fall 2019). The Town will provide a fiscal match of $20,515.28 for costs associated with personnel, supplies and travel and in-kind cost services will be provided through town staff salary and benefits including: Environmental Scientist at 5% of time, GIS at 7.5% of time and Assistant at 7.5% of time all for a period of three years (Fall 2016 through Fall 2019) for a total of $56,360.88. Also, $35,226 is provided as non-federal match, from Dr. Amador's academic year salary, benefits and associated overhead.
Research Supplies: Funds are requested to purchase equipment for field sampling, consumables, plasticware, replacement probes and reagents used in measuring effluent parameters in the field; and for reagents, glassware, standards and other consumables used in lab analyses of effluent.
Travel: Funds are requested to cover the cost of traveling between Kingston, RI and research sites in Charlestown, RI and to meet with project partners.
Indirect Costs: Overhead is charged at a rate of 53.5% of URI personnel, supplies and travel.

Task 2: Request $282,900, In-Kind $77,940.64, Total $360,840.64

Personnel: Funds are requested to cover stipend and benefits for a URI environmental science student intern in years 2 through 4 (Fall 2017 through Fall 2020). The student's work will be will

be supervised by M. Dowling and a URI professor. In-kind cost services will be provided by the Town through staff salary and benefits including: Environmental Scientist at 10% of time, GIS at 7.5% of time and Assistant at 7.5% of time. Additional Administrative staff time at 10% of time for a period of one year will be provided for a total of $77,940.64 non-federal match.
Equipment and Services: Funds are requested to upgrade 15 substandard / unpermitted (pre1968) OWTS to N-reducing technology. Up to $18,000 per upgrade ($270,000 total) will cover costs for N-reducing OWTS equipment, engineering design (DEM licensed designer), and installation (DEM licensed installer). Property owners will contract with the Town. Funds are requested for mailings to reach out to potential sites for upgrades ($420).

Task 3: Request $75,898, In-Kind $32,840.73, Total $108,738.73
Subtask A Fertilizer Management: Funds are requested for materials to create and publish information relating to the Charlestown Recommended Landscaper Process ($1,700). In-kind cost services provided by the Town including USPS postage and staff including: Environmental Scientist salary and benefits at 1% of time, Assistant at 2% of time all for a period of three years and a URI environmental science intern for 30-hours, Fall 2016 through Fall 2019 ($8,264.73).

Subtask B Stormwater Nutrient Reduction: Personnel: Funds are requested for the STB Director of Habitat Restoration, Director of Advocacy, and Coastkeeper to manage volunteer coordination and installation of six rain gardens and for the Coastkeeper to conduct community outreach relating to the subtask ($6,500). In-kind personnel match will be provided by 12 volunteers to install three rain gardens ($3,322) and 32 local elementary school children and teacher volunteers to install three rain gardens ($6,644).
Supplies: Funds for supplies for six rain gardens, to print and mail outreach materials ($14,498).
Travel: Funds are requested for the cost of traveling between STB's Providence campus and sites in Charlestown and to provide three school buses for three classes of elementary school children and teachers for transportation to the rain garden sites ($1,200).

Subtask C Surface Water Sampling and Citizen Scientists for Nutrient Reduction:
Personnel: Funds are requested for the salary and benefits for the Salt Ponds Coalition Executive Director at 10% of time for three years and stipend for two graduate student interns for a period of 3 years during the project ($39,300). In-kind cost services will be provided by three trained citizen scientist volunteer surface water samplers for three years for a total of 200 hours ($14,070).
Contractual: Funds are requested for laboratory analysis of surface water NO_3-N, TN, NH_4^+-N, and phosphate for the URI Watershed Watch Laboratory for two sites, six samples each every year for three years ($3,600).
Other Costs: Funds are requested to utilize the services of a local video production professional to develop an on-line video production relating to the Salt Ponds Watershed protection. Additional funds will be utilized to bolster the SPCs watershed website, conduct search engine optimization and apply marketing principals to foster page views ($8,500).

VII. Timely Expenditure of Grant Funds:

Each task and subtask has been given a priority, project outlook and expected completion date. All tasks will be entered into a matrix for internal tracking purposes and to ensure schedules are met. The existing infrastructure and organizational structure of the OWTS Management Office and Finance Department will easily allow for seamless transition into each task.

VIII. References

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Charlestown Coastal Watershed Protection and Restoration Program

Budget Detail

	Grant Request Total	**$674,201.00**
	Fiscal Match Total	**$20,515.28**
+	**In-kind Match Total**	**$184,140.97**
Breakdown by Task		**$878,857.25**

Task 1 - OWTS Effluent Sampling and Optimization

Coordinate sampling, sample and optimize 50 N-reducing OWTS for 3 years and Synthesize Data

University of Rhode Island Laboratory of Soil Ecology and Microbiology	**Request**	**In-kind**	**Total**
PERSONNEL			
Jose Amador	$0.00	$14,545.00	$14,545.00
Research Assistant	$25,101.00	$4,360.00	$29,461.00
GRA - Academic Year	$65,761.00	$5,425.00	$71,186.00
GRA - Summer	$29,538.00	$0.00	$29,538.00
Undergraduate Students	$12,740.00	$1,292.00	$14,032.00
TOTAL PERSONNEL COSTS	**$133,140.00**	$14,545.00	$147,685.00
FRINGE			
Jose Amador (Fringe - 36%)	$0.00	$5,236.00	$5,236.00
Research Assistant (Fringe - 7.65%)	$1,921.00	$0.00	$1,921.00
GRA - AY - Fringe Benefits	$9,436.00	$0.00	$9,436.00
GRA - Summer FICA	$2,260.00	$0.00	$2,260.00
TOTAL FRINGE BENEFITS	**$13,617.00**	$5,236.00	$18,853.00
TRAVEL			
Domestic	$3,700.00	$288.00	$3,988.00
TOTAL TRAVEL	**$3,700.00**	**$288.00**	**$3,988.00**
SUPPLIES			
Lab Supplies	$10,000.00	$2,000.00	$10,000.00
TOTAL SUPPLIES	**$10,000.00**	**$2,000.00**	**$10,000.00**
OTHER COSTS			
In-State Tuition	$56,622.00	$0.00	$56,622.00
TOTAL OTHER COSTS	**$56,622.00**	$0.00	$56,622.00
TOTAL DIRECT COSTS	$217,079.00	$19,781.00	$236,860.00
TOTAL MODIFIED DIRECT COSTS	$160,457.00	$19,781.00	$180,238.00
FACILITIES AND ADMINISTRATIVE COSTS 53.5% MTDC	$85,844.00	$17,733.00	$103,577.00
Town of Charlestown Fiscal Match Personnel, Supplies, Travel	$0.00	$20,515.28	$20,515.28
TOTAL REQUESTED FROM AGENCY	**$302,923.00**	$37,514.00	$340,437.00

Town of Charlestown	Request	In-kind	Total
PERSONNEL			
Environmental Scientist, 5% time over 3 years	$0.00	$10,685.42	$10,685.42
GIS Specialist/Coastal Geologist, 7.5% time over 3 years	$0.00	$16,105.17	$16,105.17
Administrative Assistant, 7.5% time over 3 years	$0.00	$8,256.22	$8,256.22
Environmental Science Intern, $15/Hour 832 hours over 3 yea	$12,480.00	$0.00	$12,480.00
TOTAL PERSONNEL COSTS	**$12,480.00**	$35,046.80	$47,526.80
FRINGE			
Environmental Scientist	$0.00	$6,274.21	$6,274.21
GIS Specialist/Coastal Geologist	$0.00	$9,435.69	$9,435.69
Administrative Assistant	$0.00	$5,604.18	$5,604.18
TOTAL FRINGE BENEFITS		$21,314.08	$21,314.08
TOTAL DIRECT COSTS	$12,480.00	$56,360.88	$68,840.88
TOTAL REQUESTED FROM AGENCY	**$12,480.00**	$56,360.88	$68,840.88

TASK TOTAL **$315,403.00** **$93,874.88** **$409,277.88**

Task 2 –OWTS Upgrades

Establish and administer OWTS Upgrade Fund

Town of Charlestown	Request	In-kind	Total
PERSONNEL			
Environmental Scientist, 10% time over 3 years	$0.00	$21,370.83	$21,370.83
GIS Specialist/Coastal Geologist, 7.5% time over 3 years	$0.00	$16,105.17	$16,105.17
Administrative Assistant, 10% time over 3 years	$0.00	$11,008.30	$11,008.30
Environmental Science Intern, $15/Hour 832 hours over 3 yea	$12,480.00	$0.00	$12,480.00
TOTAL PERSONNEL COSTS	**$12,480.00**	$48,484.29	$60,964.29
FRINGE			
Environmental Scientist	$0.00	$12,548.42	$12,548.42
GIS Specialist/Coastal Geologist	$0.00	$9,435.69	$9,435.69
Administrative Assistant	$0.00	$7,472.24	$7,472.24
TOTAL FRINGE BENEFITS	$0.00	$29,456.35	$29,456.35
OPERATING COSTS			
Funds for design, permitting, installation, and supplies 15 systems @ $18,000 per system	$270,000.00	$0.00	$270,000.00
Letterhead, envelopes, ink, etc	$420.00	$0.00	$420.00
TOTAL OPERATING COSTS	**$270,420.00**	$0.00	**$270,420.00**
TOTAL DIRECT COSTS	$282,900.00	$77,940.64	$360,840.64
TOTAL REQUESTED FROM AGENCY	**$282,900.00**	$77,940.64	$360,840.64

TASK TOTAL **$282,900.00** **$77,940.64** **$360,840.64**

Task 3 - Stormwater and Fertilizer Management

Install 6 demonstration rain gardens in the Zones to promote storm-water infiltration
Engage local elementary and middle school students as a community-teaching tool

Save the Bay	Request	In-kind	Total
PERSONNEL			
Director of Advocacy	$1,375.00	$0.00	$1,375.00
Director of Education	$1,650.00	$0.00	$1,650.00
Director of Habitat Restoration	$1,375.00	$0.00	$1,375.00
South County Coastkeeper	$2,100.00	$0.00	$2,100.00
Volunteer	$0.00	$3,322.00	$3,322.00
Student volunteer	$0.00	$6,644.00	$6,644.00
TOTAL PERSONNEL COSTS	**$6,500.00**	$9,966.00	$16,466.00
OPERATING COSTS			
Rain garden supplies	$12,348.00	$0.00	$12,348.00
Printing and Outreach materials	$2,150.00	$0.00	$2,150.00
TOTAL OPERATING COSTS	**$14,498.00**	$0.00	$14,498.00
TRAVEL			
Mileage, 300 miles of driving @$0.50/mile	$150.00	$0.00	$150.00
Student bus transportation	$1,050.00	$0.00	$1,050.00
TOTAL TRAVEL	**$1,200.00**	$0.00	$1,200.00
TOTAL DIRECT COSTS	$22,198.00	$9,966.00	$32,164.00
TOTAL REQUESTED FROM AGENCY	**$22,198.00**	$9,966.00	$32,164.00

Establish 2 surface-water sampling stations in Green Hill Pond
Produce on-line video resource, website on the Watershed

Salt Ponds Coalition	Request	In-kind	Total
PERSONNEL			
SPC Executive Director, 10% time over 3 years	$15,900.00	$0.00	$15,900.00
Graduate Assistants / Interns, 2 per year over 3 years	$24,000.00	$0.00	$24,000.00
Volunteer	$0.00	$14,070.00	$14,070.00
TOTAL PERSONNEL COSTS	**$39,900.00**	$14,070.00	$53,970.00
OPERATING COSTS			
Laboratory analysis	$3,600.00	$0.00	$3,600.00
Video Production	$5,000.00	$0.00	$5,000.00
Website Development, Search Engine Optimization, Marketing	$3,500.00	$0.00	$3,500.00
TOTAL OPERATING COSTS	**$12,100.00**	$0.00	$12,100.00
TOTAL DIRECT COSTS	**$52,000.00**	$14,070.00	$66,070.00
TOTAL REQUESTED FROM AGENCY	**$52,000.00**	$14,070.00	$66,070.00

Sample water in field to observe DO, pH and temperature monthly

Town of Charlestown	Request	In-kind	Total
PERSONNEL			
Environmental Science Intern, 36 hours over 3 years	$0.00	$540.00	$540.00
TOTAL PERSONNEL COSTS	**$0.00**	$540.00	$540.00
TOTAL DIRECT COSTS	$0.00	$540.00	$540.00
TOTAL REQUESTED FROM AGENCY	**$0.00**	$540.00	$540.00

Develop and implement a Town-Recommended Landscaper Process

Town of Charlestown	Request	In-kind	Total
PERSONNEL			
Environmental Scientist, 1% time over 3 years	$0.00	$2,137.08	$2,137.08
Administrative Assistant, 2% time over 3 years	$0.00	$2,201.66	$2,201.66
Environmental Science Intern, $15/Hour 30 hours	$0.00	$450.00	$450.00
TOTAL PERSONNEL COSTS	**$0.00**	$4,788.74	$4,788.74
FRINGE			
Environmental Scientist	$0.00	$1,254.84	$1,254.84
Administrative Assistant	$0.00	$747.22	$747.22
TOTAL FRINGE BENEFITS	$0.00	$2,002.07	$2,002.07
OPERATING COSTS			
Brochures, envelopes, ink, etc	$1,700.00	$0.00	$1,700.00
Mailings and postage, 3,008 stamps @ $0.49/each	$0.00	$1,473.92	$1,473.92
TOTAL OPERATING COSTS	**$1,700.00**	$1,473.92	**$3,173.92**
TOTAL DIRECT COSTS	$1,700.00	$8,264.73	$9,964.73
TOTAL REQUESTED FROM AGENCY	**$1,700.00**	$8,264.73	$9,964.73

TASK TOTAL	**$75,898.00**	**$32,840.73**	**$108,738.73**

Charlestown Coastal Watershed Protection and Restoration Program

Letters of Commitment from Partners

THE
UNIVERSITY
OF RHODE ISLAND
COLLEGE OF
THE ENVIRONMENT
AND LIFE SCIENCES

Department of Natural Resources Science
Laboratory of Soil Ecology and Microbiology
1 Greenhouse Way
Kingston, RI 02881
T 401.874.2902
jamador@uri.edu
https://sites.google.com/site/soilecologyandmicrobiology/

January 19, 2016

United States Environmental Protection Agency Region 1
Southeast New England Program for Coastal Watershed Restoration
Coastal Watershed Grant Review Committee

Dear Review Committee:

This letter is to indicate our commitment to participate in the project entitled "Charlestown Coastal Watershed Protection and Restoration Program." As a land-grant institution, the University of Rhode Island has maintained an active program of research, extension and outreach to municipalities throughout the state. The University has operated the New England Onsite Wastewater Training Center since 1993, and one of us (G. Loomis) has been involved with the Town of Charlestown since 2002, when alternative onsite wastewater demonstration systems were installed in southern Rhode Island.

For decades water quality in the coastal zones of Green Hill, Ninigret and Quonochontaug Ponds has suffered the impact of rapid development, aging and failing septic systems, stormwater runoff, fertilizer inputs, and a host of other issues that increase nutrient loads and negatively impact groundwater and surface water throughout the Salt Ponds Watershed. Despite efforts within the Town and region - including the implementation of onsite wastewater treatment system (OWTS) upgrades and stormwater management plans - densely developed areas in these coastal zones continue to exhibit significant impacts from nutrient-laden ground and surface water. These residential areas rely exclusively on groundwater for drinking and OWTS for wastewater dispersal, and lie within a critically sensitive coastal habitat; thus, more must be done to ameliorate nutrient inputs. Our past work within this watershed and with local residents makes us uniquely qualified to help garner support from residents for the proposed project.

We will partner with the Town of Charlestown, and are committed to carry out sampling, field and laboratory analyses, and data analysis of effluent from N-reducing OWTS within the watershed. The data collected from these OWTS will provide information required to help understand the reasons for nutrient discharge exceedances, optimize OWTS N-removal efficiency, decrease overall nutrient levels to their lowest designed limits, and help make decentralized wastewater management more resilient to climate change. We will also provide technical support for OWTS upgrades in the most critical, impacted areas to replace aging or substandard conventional septic systems with N-reducing OWTS technology.

We look forward to continuing to work with the Town in support of this project by providing technical and analytical support crucial to its success. Please contact me at (401) 874-2902 or jamador@uri.edu should you have any further questions about our support of this project.

Sincerely,

Jose Amador and George Loomis

SAVE THE BAY®
NARRAGANSETT BAY

Save The Bay Center
100 Save The Bay Drive
Providence, RI 02905

P: 401-272-3540
F: 401-273-7153
SAVEBAY.ORG

January 19, 2016

Mark Stankiewicz, Town Manager
Charlestown Town Hall
4540 South County Trail
Charlestown, RI 02813

RE: Charlestown Coastal Watershed Protection and Restoration Program

Dear Mr. Stankiewicz,

Save The Bay strongly supports the town of Charlestown's funding request to the Environmental Protection Agency Region 1 Southeast New England Program for Coastal Watershed Restoration grant program to mitigate nutrient inputs into the South Shore Ponds Watershed.

For decades, the coastal zones of Green Hill, Ninigret and Quonochontaug Ponds have suffered from rapid development, aging and failing septic systems, stormwater runoff, fertilizer inputs, and a host of other issues that increase nutrient loads that negatively impact the health of the pond and the quality of local groundwater. In spite of efforts within the Town and local watersheds including implementing required septic system upgrades and stormwater management plans, densely developed areas in the coastal zone continue to exhibit the impacts of nutrient-1aden groundwater and surface water.

Analytical data collected from onsite wastewater treatment systems (OWTS) will help homeowners optimize the efficiency of their systems, which will decrease the nutrient input from already-installed denitrification systems. New systems will be installed in the most critical and most impactful areas to replace aging or otherwise failing septic systems. Reducing fertilizer use, providing residents with outreach, mitigating impervious area through the installation of rain gardens and disseminating the tools to property owners will assist in reducing runoff, promoting groundwater recharge and reducing nutrient concentrations entering the watershed.

Save the Bay supports the Town of Charlestown's efforts to reduce nutrient inputs to the coastal ponds and is committed to partner with the Town to design, develop and install six (6) rain gardens as demonstration projects within the watershed under this grant. The rain gardens will provide homeowners with a model of what could be installed on private property to reduce runoff to the coastal ponds.

Save The Bay will also commit to providing outreach to the community through educational programming at local schools, involvement of volunteers in the plantings of the rain gardens and highlighting the project through mailings, social media and holding meetings with the public. Save The Bay will disseminate information to residents about how to install a rain garden through its printed material and on-line publication Bay Friendly Backyards. Educating residents about simple steps they can take to reduce runoff from landscaped areas will help mitigate nutrient inputs to improve groundwater and surface water quality of the coastal ponds.

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SAVEBAY.ORG

Please let me know if you have any further questions. You can reach me at 401-272-3540 ext. 104 or at jstone@savebay.org.

Sincerely,

Jonathan Stone
Executive Director

Topher Hamblett
Director of Policy & Advocacy

Stewards
For the
Coastal Environment

Salt Ponds Coalition

P.O. Box 875, Charlestown, RI 02813
Phone: (401) 322-3068 E-Mail: info@saltpondscoalition.org Website: www.saltpondscoalition.org
Preserving our coastal ponds: Point Judith, Potter, Card, Trustom, Green Hill, Ninigret, Quonochontaug, Winnapaug, Maschaug, Little Maschaug

January 17, 2016

United States Environmental Protection Agency Region 1
Southeast New England Program for Coastal Watershed Restoration Coastal Watershed Grant Review Committee

RE: Charlestown Coastal Watershed Protection and Restoration Program

Grant Program Review Committee,

Since 1985, the Salt Ponds Coalition has acted as a liaison between residents of coastal communities and state and local governments and has worked to implement programs that protect and preserve the ecological and economic integrity of the salt ponds of Southern Rhode Island. The Salt Ponds Coalition has been monitoring water quality on the ponds for 30 years, and we have the longest running volunteer marine water testing program in the country. Since 2003, we have represented the salt pond region on the Rhode Island Watershed Council. On behalf of our membership, we strongly support the Town of Charlestown's project and commit support for and the benefits of the Town's projects.

For decades, the salt ponds watershed has suffered from rapid development, aging and failing septic systems, stormwater runoff, fertilizer inputs, and a host of other issues that increase nutrient loads that negatively impact the health of the pond. In spite of recent efforts within the Town and the local watershed including septic system upgrades and stormwater management plans, densely developed areas in the coastal zone show little improvement in water quality. Given our past work in the salt ponds and with residents of the salt ponds area, we are uniquely positioned to garner support and educate residents for this project.

The Salt Ponds Coalition has committed to provide the Town of Charlestown with staffing and resources to create, submit, present, post and disseminate materials related to the three proposed coastal watershed restoration projects conducted as part of the grant. This will include the production of an online video resource and search engine optimized website for maximized distribution. The website will provide distribution of program materials, details and data across the larger Salt Ponds Watershed, statewide and regionally. The Salt Ponds Coalition also has an extensive reach throughout the Watershed and regionally with its quarterly publication "Tidal Page". In addition to outreach, the Salt

Stewards
For the
Coastal Environment

Salt Ponds Coalition

P.O. Box 875, Charlestown, RI 02813
Phone: (401) 322-3068 E-Mail: info@saltpondscoalition.org Website: www.saltpondscoalition.org
Preserving our coastal ponds: Point Judith, Potter, Card, Trustom, Green Hill, Ninigret, Quonochontaug, Winnapaug, Maschaug, Little Maschaug

Ponds Coalition has continually conducted water quality testing by volunteer citizen scientists in the six major salt ponds of south western Rhode Island in cooperation with University of Rhode Island Watershed Watch. We will test at two new test sites to foster the goal of this project.

The Salt Ponds Coalition looks forward to continuing to work with the Town in support of this project by facilitating these resources to our members, local, statewide and regional residents. Please contact Alicia Eichinger (SPC Executive Director) at saltpondscoalition@gmail.com or (401)322-3068 should you have any further questions about our support of this project.

Sincerely,

Art Ganz, President
Salt Ponds Coalition

State of Rhode Island and Providence Plantations
Department of Administration
Division of Planning
One Capitol Hill
Providence, RI 02908-5870

INTERGOVERNMENTAL REVIEW PROCESS:
NOTICE OF DETERMINATION

21 January 2016

Matthew J. Dowling
Onsite Wastewater Manager/
Environmental Scientist
4540 South County Trail
Charlestown, RI 02813-3454

Subject: Charlestown Coastal Watershed Protection and Restoration Program

State Application Identifier: CHA-16-01

Dear: Mr. Dowling,

We are pleased to notify you that the review of your above identified application has been completed. It is in conformance with applicable State Guide Plan elements and does not conflict with other plans of which we are aware. Therefore, we have no objection to this project receiving Federal financial assistance.

In an effort to promote interagency coordination and avoid duplication, we recommend that you contact Mr. Jeffrey Willis, of the Coastal Resources Management Council (CRMC), at 783-3370, and/or Mr. Joe Antonio, of the Department of Environmental Management, at 222-4700, extension 4410, regarding the permitting processes of each respective agency.

This action has been taken in accordance with the rules and regulations governing the Intergovernmental Review Process adopted by the State Planning Council pursuant to Presidential Executive Order 12372.

If you have any questions, please refer to our Intergovernmental Review Process webpage at www.planning.ri.gov/misc/intergovt.htm. You can also contact me directly at 222-1755, or benny.bergantino@doa.ri.gov.

Best Regards,

Benny L. Bergantino
Review Coordinator

Cc: Jared L. Rhodes II