Request for Proposals for Wastewater Planning Study for Fire Island

Coalition for Fire Island Wastewater Solutions

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Citizens Campaign for the Environment
Fire Island Association, Inc.
Fire Island National Seashore
New York State Assembly, Andrew Garbarino, 7th District
New York State, Office of Planning and Development, South Shore Estuary Reserve
New York State Senate, Phil Boyle, 4th Senate District
Seatuck Environmental Association
South Shore Estuary Reserve Council Citizens Advisory Committee
Suffolk County, Peter A. Scully, Deputy County Executive
Suffolk County Legislature, Robert Calarco, 7th District
Suffolk County Legislature, Steven Flotterton, 11th District
Suffolk County Legislature, William J. Lindsay, 8th District
The Nature Conservancy
Town of Islip, Office of the Supervisor
Town of Brookhaven, Office of the Supervisor
United States Geological Survey
Village of Ocean Beach
Village of Saltaire

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I. INTRODUCTION

On June 6, 2018, land managers, including local, state, and federal agencies, nonprofit organizations and Fire Island stakeholders listed above, convened to discuss the current state of wastewater management on Fire Island. This group is now formally recognized as the Coalition for Fire Island Wastewater Solutions (the Coalition).

This effort was prompted by the current upgrades to the Village of Ocean Beach's Sewage Treatment Plant (STP) and collection system that may allow for the expansion of the sewer district beyond the borders of the Village of Ocean Beach. A collective interest exists amongst the Coalition to upgrade and improve wastewater management on Fire Island and identify potential options for technologies that could serve the island's unique geology and human development. There is a recognition that one type of technology may not serve all locations on Fire Island, and an array of options will be necessary to improve wastewater management island-wide.

Given the complex nature of Fire Island's governmental jurisdictions, array of stakeholders, and mosaic of land use and ownership, there was consensus that a cooperative, multi-jurisdictional effort was necessary to develop a Fire Island-wide and comprehensive approach to wastewater management on Fire Island. This document is intended to help inform a Request for Proposals for Wastewater Planning Study for Fire Island (RFP) and act as the first step in the planning process by:

(1) Building consensus around the need to improving the current wastewater management on Fire Island both for the environment and human health;
(2) Describing the existing wastewater infrastructure and geological and hydrological conditions on Fire Island;
(3) Summarizing the current and projected challenges that increase the complexity of this effort;
(4) Developing strategies to engage with Fire Island stakeholders on the issue of wastewater management (including community associations, business owners, the school district, residents, and visitors, etc); and
(5) Locating potential sources of funding that will be required to support this planning effort.

II. CREATING A WASTEWATER PLANNING STUDY FOR FIRE ISLAND

Wastewater treatment and management was a topic of interest for Long Island and Fire Island managers, municipalities, and residents before the Ocean Beach STP expansion project, and other planning initiatives have recommended finding improved wastewater treatment methods for Long Island and Fire Island.

Long Island

In 2001, the South Shore Estuary Reserve (SSER) Council developed the Long Island Comprehensive Management Plan (CMP 2001) which focuses on improvements and maintenance of water quality for human health and the long-term health of the area's bays, tributaries, tidal wetlands, wildlife, tourism, and economy. In 2015, Suffolk County released its Comprehensive Water Resources Management Plan which captures wastewater issues and research Long Island-wide, and includes goals to minimize the impacts of pesticides, pathogens and inorganics to human health and the ecology of Suffolk County's wetlands and aquatic ecosystems (Suffolk County, 2015).

Fire Island

In 2016, Fire Island National Seashore completed its General Management Plan (GMP), which identifies the importance of developing a Wastewater Management Plan for Fire Island in order to transition wastewater and sewage treatment systems to more sustainable systems, both at National Park Service (NPS) sites and within the Fire Island communities.

To advance the goal of optimal wastewater management on Fire Island, Suffolk County will work in partnership with the towns of Brookhaven and Islip, the Fire Island communities, and Fire Island National Seashore, with the help of subject matter experts at the US Geological Survey (USGS) and other agencies and non-profits (the Coalition). The objectives of a Wastewater Planning Study for Fire Island will be to:

1) Evaluate the impacts associated with the current state of wastewater systems on both federal and non-federal lands on Fire Island;
2) Outline a range of possible alternatives for upgrading and replacing current waste water systems with more sustainable and efficient technologies;
3) Develop an implementation strategy to identify and pilot proposed solutions; and
4) Identify funding sources and incentives for municipalities and homeowners to adopt best practices and technologies.

Technology alternatives identified will be feasible, effective and sustainable wastewater treatment options for Fire Island. Through this planning effort, this group will work toward:

- Developing a long term strategy for Fire Island stakeholders to adapt and sustain the cultural significance of Fire Island in light of current conditions and of a changing environment under climate change;
- Striving to reduce Fire Island's loading of nitrogen (and other wastewater-derived pollutants) to the adjacent Great South Bay, thereby decreasing the island's environmental impact;
- Supporting research to identify potential contaminates in surface and groundwater, and respond appropriately with new technologies;
- Developing a better understanding of how to protect the ecological integrity and valuable marine resources within the boundaries of the Fire Island National Seashore and the Great South Bay; and
- Supporting management practices to ensure that water quality, submerged aquatic vegetation (SAV), marsh and shoreline habitats are protected and, where feasible, improved.

III. LOCATION

The Long Island South Shore Estuary Reserve (SSER) extends from the New York City line in Nassau County east for 75 miles to the Village of Southampton in Suffolk County. The Reserve includes one of the state's most distinctive estuaries, the Great South Bay. The Great South Bay is situated between Long Island and Fire Island. It is approximately 25 miles (40 km) long and protected from the Atlantic Ocean by Fire Island, a barrier island. The Great South Bay is part of the SSER and part of the bay is within the boundaries of Fire Island National Seashore.

Fire Island National Seashore (the Seashore), a unit of the National Park System, is located along the southern shore of the Great South Bay in Suffolk County, New York. The Seashore encompasses 19,580 acres of upland, tidal, and submerged lands along a 26-mile stretch of the 32-mile barrier island, part of a much larger system of barrier islands and bluffs stretching from New York City to the eastern end of Long Island at Montauk Point.

Interspersed among the federal lands within the Seashore are residential communities that predate the Seashore's authorization in 1964 (Figure 1). Regulatory oversight for land use and development, water, sanitation, wildlife, coastal zone management, driving, and public health and safety is distributed across multiple jurisdictions within the Seashore boundary, including two incorporated villages

(Saltaire, Ocean Beach), two Long Island-based municipalities (Brookhaven, Islip), Suffolk County, and multiple NY State agencies.

There are over 4,200 homes throughout the residential communities on Fire Island. The permanent resident population is less than 300, but the summer residency climbs to over 30,000. About 2.2 million people are estimated to visit the island each year, with 681,518 people visiting National Park Service sites in 2017 (National Park Service 2016, National Park Service 2018).

IV. EXISTING CONDITIONS

A. ***Geology and Hydrogeology:*** Fire Island is a dynamic barrier island that consists of highly permeable deposits of clay, silt, sand, and gravel that sit atop the sloping bedrock of the continental shelf. The sand and gravel deposits immediately below the surface are collectively known as the upper glacial aquifer. Older, deeper deposits make up the Magothy aquifer which is hydraulically separated from the upper aquifer by lower permeability sediment and saline groundwater. While shallow groundwater from the upper glacial aquifer was historically used as a domestic source of drinking water on Fire Island, this supply has largely been abandoned. Most drinking water on Fire Island is now pumped from the deeper Magothy aquifer.

The groundwater immediately under the surface of Fire Island is a freshwater lens that is surrounded on all sides by saltwater: the Atlantic to the south, Great South Bay, Moriches Bay and other embayments to the north, and saline groundwater underneath. The upper surface of the freshwater lens, also known as the water table, under natural conditions is recharged by precipitation that falls on the island, and is relatively shallow. In addition to natural recharge, the freshwater lens is replenished by the return flow of public-supply water, including drinking and wastewater (Schubert 2010).

The water table height is further influenced by the width of Fire Island at a given location, and its location along the cross section of the island. Near the higher-elevation dunes, the water table is typically deeper from the surface, and in low-lying areas nearer to the bay, the water table can be closer to the surface. Freshwater or brackish ponds and wetlands are formed where land surface dips below the water table. Otherwise, the depth of the water table varies from just under the surface of the ground, to several feet deep. In addition to location, the water table is affected by ocean wave pressure and tidal pumping. This differential pressure results in a groundwater divide that is skewed strongly toward the ocean shore, resulting in about 80% of the island's groundwater discharging to the back-bay estuaries (Schubert 2010).

The overall median travel time of groundwater on Fire Island, from the time of input (as precipitation or wastewater effluent) to discharge in the back-barrier estuaries and the ocean is 3.4 years, with potentially faster discharge occurring at locations closer to the bay (Schubert 2010).

B. Existing Wastewater Infrastructure: Currently, wastewater on Fire Island is managed in several ways:

- The Village of Ocean Beach operates a municipal wastewater treatment plant that was constructed in 1921. The treatment plant collects and treats wastewater from 575 homes and two dozen commercial properties. The facility's treatment technology was upgraded from primary (sedimentation and removal of solid waste from water) to secondary (additional oxidation to further purify wastewater) in the late 1970s. The effluent to the bay is within the criteria for wastewater discharge and monitored by Suffolk County Department of Health and the Department of Environmental Conservation (DEC). The facility is currently undergoing additional upgrades to increase resiliency of the collection and treatment system. (See section VI B)

- Over 3600 homes and businesses in the Fire Island communities are served by onsite wastewater disposal systems (OWDS). The predominant onsite sanitary systems on Fire Island are cesspools- covered underground pits lined with permeable cement blocks or rings without a sealed bottom, as per the Fire Island sanitary design approved by the Suffolk County Department of Health. These systems typically rely on bacteria to breakdown the solid waste, while untreated water percolates into the sandy surficial aquifer (Fisher 2016).

- Some public facilities, like Fire Island National Seashore's visitor facilities, also use leach fields.

V. CHALLENGES

A. Development and Increased Visitation: Fire Island is a densely visited destination with more than 2.2 million people visiting Fire Island annually. A 2017 National Park Service report showed that 431,303 visitors to National Park Service sites on Fire Island in 2016 spent $18.6 million in Long Island gateway communities. The high visitation adds stress to the current wastewater treatment systems. Ongoing new construction and expansion of homes on Fire Island is an additional incentive to improve wastewater treatment options.

B. Ground and Surface Water Pollution: Ground water and surface water pollution is of concern because of its impacts to coastal ecosystems, and the potential human health risks associated with recreational activities. It is important to note that this section does not describe impacts to drink water sources.

Approximately 360,000 residential parcels in Suffolk County, New York, rely on simple OWDS such as cesspools and septic systems, similar to those used on Fire Island. OWDS in coastal settings may contribute a disproportionate amount of nutrients and Contaminants of Emerging Concern (CECs) to adjacent surface-water bodies due to the combination of sandy soils, thin unsaturated zone (high water table), and short distances to groundwater discharge zones, like the Great South Bay (Fisher 2016).

When cesspools and other OWDS systems sit within the water table or become inundated, concerns for human health risks may also arise for the following reasons:

- The EPA recommends that 2-5 feet of aerated soil is needed to complete wastewater treatment from cesspools and septic tanks before reaching the water table. It is not known how many of the older OWDS on Fire Island meet this recommended 2-5 feet of unsaturated soil.
- In addition, sandy and porous soils, especially when those soils are waterlogged, allow fecal bacteria and viruses to travel quickly through groundwater, as fast as 35 meters in 2 days. Ponding of water from rainfall that cannot drain due to a high water table can also interact with inundated OWDS, potentially resulting in storm water runoff that may contain high fecal bacteria concentrations that can pose health hazards to humans and animals (Ahuja 2013).
- This interaction of standing water with inundated OWDS, and the associated pathogen hazards, may also be a concern for groundwater-fed ponds and wetlands in developed areas of Fire Island.

The Coalition agrees that wastewater planning for Fire Island should be informed by an evidence-based understanding of the contributing factors associated with wastewater treatments and subsequent pollution concerns. Several studies have demonstrated that insufficiently-treated wastewater may contain substances that contribute to the degradation of coastal habitats may pose risks to human health. Selected references for further reading include;

Pathogens in ground and surface water:

- Pathogens are of potential concern for wastewater discharges to ground or surface waters, including OWDS. The highest risk is associated with ingestion when pathogens, including bacteria, viruses and protozoans, reach groundwater or surface waters where they can cause human disease through direct consumption, recreational contact, or ingestion of contaminated shellfish (Suffolk County, 2015).

Nitrogen in groundwater discharge:

- Several studies show a direct link between nitrogen loading to coastal waters through groundwater discharge with population density and anthropogenic sources (Fisher 2016, Arnold et al., 2014; Zhao et al., 2011).

Contaminants of emerging concern (CECs) in ground and surface water:

- OWDS in coastal environments can be significant sources of nutrients and organic wastewater-associated compounds, such as pharmaceuticals, personal care and domestic use products, and endocrine active compounds, into surrounding water bodies (Fisher, 2016; Zhao et al., 2011; Howarth, 2008; Arnold, 2014; Schubert, 2010).
- Elevated nutrients and CECs associated with OWDS have been found in shallow groundwater beneath developed areas of Fire Island, including in shoreline zones of groundwater discharge to Great South Bay (Fisher and others, 2016; Schubert, 2010).
- CECs, including personal care products and pharmaceuticals, can impair the ability of native bacteria in groundwater to reduce nitrogen concentrations, further inhibiting the natural filtration of nitrogen (Underwood and others, 2011).
- Exposure of certain CECs, including antidepressants and other endocrine active compounds, to fish and other aquatic organisms has been identified as a cause for declines in fisheries and shellfish, disruption in reproductive development and function and behavioral patterns in fish (Fisher, 2016).
- Skewed fish sex-ratios, and declines in fish and shellfish populations in western Long Island have been attributed to nitrogen and CEC pollution loading from insufficiently treated sewage from OWDS (Duffy et al., 2009; Kraeuter et al., 2005).

C. Health and Safety Related to Bathing Beaches:

Suffolk County regularly tests bathing beaches on Fire Island and around Long Island to protect the health of beach-goers. The majority of Suffolk County beaches are pollution free but some are subject to influences that can adversely affect water quality and potentially expose bathers to contaminants. In certain areas effects from boats, residential septic systems, sewage treatment plants, and limited tidal flushing may be factors to exposure to contaminants. The indicator organisms being monitored at beaches (*Enterococci* and *E.coli*) are common in the environment but are themselves relatively harmless. Because they are associated with fecal contamination however, high numbers of these organisms are an indication of the potential presence of disease-causing pathogens (bacteria, viruses, and parasites). Exposure to pathogen-contaminated water can cause symptoms such as nausea, vomiting, diarrhea, headache,

and fever. Illnesses of the upper respiratory tract, and minor skin, eye, ear, nose and throat infections have also been associated with pathogen exposures. Individuals with compromised immune systems, the elderly, and children, the latter because of their level of activity and opportunities for ingestion of water, are most vulnerable to these illnesses (Suffolk County, 2015). While Fire Island bay and ocean beaches have not had closures related to contaminants, continued testing of swimming beaches is critical, especially with the unknown impacts related to how sea level rise and OSWD will interact on Fire Island.

D. Nitrogen Pollution and the Great South Bay: In 2010 the New York State Department of Environmental Conservation (NYSDEC) declared the majority of Long Island's South Shore Estuary Reserve, including the Great South Bay, as an "impaired water body" under section 303(d) of the Clean Water Act. NYSDEC identifies nitrogen from wastewater as a reason for the designation and states that cesspools, septic systems, and sewage treatment plants cause eutrophication (excess nitrogen), resulting in lower water oxygen levels and persistent algal blooms (Suffolk County, 2015). Suffolk County Office of Water Resources further identifies the impairments of Long Island's south shore waters to include pathogens from urban/stormwater runoff, and nitrogen from on-site wastewater treatment systems (Suffolk County, 2015).

Excess nitrogen introduced into coastal environments degrades the ecological health of estuaries and can produce harmful algal blooms, hypoxia events, and eel grass die off (Howarth, 2008, Heisler et al, 2008, Anderson et al, 2008). The Fire Island contribution of nitrogen is roughly six percent (6%) of the total nitrogen amount entering Great South Bay, Moriches Bay, and Shinnecock Bay from shallow groundwater along the Suffolk County mainland. Fire Island's contribution of nitrogen into the adjacent bay comes from unsewered areas that range from high density development to relatively undeveloped park areas. Although the majority of the total contribution of nitrogen and other pollutants into the Great South Bay comes from Long Island, the flow of nitrogen into the bay from Fire Island is faster than the Long Island nitrogen flow (Schubert 2010). This is because groundwater can flow faster through the porous sand and sediment of Fire Island. In addition, groundwater flow from Fire Island is skewed, where the majority (80%) of groundwater flows into the bay, with only 20% of groundwater flows into the ocean. So, even though Fire Island's total amount of nitrogen and other pollutants are much less than Long Island's contribution of pollutants, Fire Island groundwater carries nitrogen and other pollutants to the bay faster (Schubert 2010).

E. Inundation during Coastal Flood Events: Another concern for Fire Island is inundation of community infrastructure during coastal flood events and damage to OWDS. Periodic or recurring saltwater inundation from storm events may limit the ability of OWDS bacteria to degrade wastewater effluent in groundwater prior to its discharge into the coastal watershed, which may increase potential aquatic and human health impacts in the environment (Fisher 2016). The physical locations of homes and

buildings, and their vulnerability to storm surge and flooding, are variables that should be taken into account when looking at options for wastewater treatment on Fire Island.

F. Impacts of Climate Change, Sea Level Rise and Barrier Island Dynamics:

Accelerated sea level rise, increase in storm frequency, rising temperatures, and changes in patterns of precipitation are all expected to drive significant ecological change and increase vulnerability to coastal areas. Barrier islands by nature are dynamic and are heavily influenced by natural processes, such as erosion, littoral drift, cross-island sediment transport (overwash), and breaching. These natural processes are necessary for maintaining barrier islands, and make them more resilient to future storm events by adding sediment to the interior of the island or to the back bays of the island. Vegetation can then spread to newly added sediment and stabilize the area with roots and biomass. Cross-island sediment transport is particularly important for a saltmarsh's ability to keep pace with sea level rise. Wetlands have been proven to reduce vulnerability from storm surge due to waves losing energy as they travel through vegetation, which can reduce wave height by 80% (Suffolk County, 2015).

Given that the rate of sea level rise is expected to accelerate over the next century, it is important to understand the processes that control saltmarsh growth and its impacts to human development. A long-term study of saltmarsh accretion and sea level rise on Fire Island shows an elevation deficit of saltmarshes compared to sea level rise, indicating that saltmarshes on Fire Island are becoming submerged (National Park Service, 2007). Although the majority of Fire Island saltmarshes are located in the eastern portion of Fire Island where little human development exists, consideration for how saltmarshes can protect infrastructure and buffer interactions with ground water should be captured in a wastewater planning study.

Among the most vulnerable natural resources on Fire Island is the freshwater lens. NOAA estimates that intermediate-high sea level rise projections for the New York area are 0.7 meters by 2050 (NOAA 2017). Increases in sea level directly affect groundwater levels on Fire Island by pushing the water table up, further saturating the substrate, and creating new or enlarged inland waterbodies. Today, Fire Island is already experiencing this water table rise with increased groundwater flooding, particularly on the bayside of the communities, and extended periods of water ponding after rain events or storm tides. When evaluating OWDS systems on Fire Island, increasing water temperatures and their interactions with rising water tables should be investigated as they are known to significantly affect the overall functioning of OWDS These conditions may also impact the effectiveness of older OWDS systems, resulting in negative environmental impacts and potential human health risks (Cooper et al. 2016). Understanding projected sea level rise scenarios for Fire Island will be necessary to

evaluate the island's vulnerable resources and locations, and how those stressors may impact potential wastewater treatment options.

G. The Need for Multiple Solutions: As described in the Introduction, the goal of this effort is to ultimately produce a Comprehensive Wastewater Management Plan for Fire Island that identifies various effective and sustainable wastewater treatment alternatives for Fire Island. One of the main challenges of this effort is finding multiple alternatives for the unique mosaic of jurisdictions, land uses and development that exist in different geographical areas on Fire Island. Factors that may influence the efficacy of treatment technologies include development density and composition, existing infrastructure, depth to groundwater, vicinity to the ocean or bay, elevation, seasonality of use, as well as other unique characteristics of each community or location. In addition, sea-level rise projections must be considered when analyzing the long-term sustainability and functionality of potential systems. All of these factors will influence the research and identification of wastewater treatment options for Fire Island. A commitment to collaborative stewardship and partnerships between the local municipalities, homeowners, land managers, and various stakeholders will be necessary for success.

VI. OPPORTUNITIES

A. Wastewater Management is a Suffolk County Environmental Priority: Suffolk County (the County) government has identified the lack of active wastewater treatment infrastructure in most of the County as a significant problem, and is implementing a multi-pronged strategy to address the issue. The *Reclaim Our Water* initiative includes connection of parcels to sewers where feasible, and to move away from reliance on cesspools and septic systems to the use of Innovative/Alternative Onsite Wastewater Treatment Systems (IAOWTS) where sewering is not a practical or economic alternative. The County is in the process of finalizing its Subwatersheds Wastewater Plan, which will establish nitrogen reduction targets for all water bodies in the County, and was recently awarded a grant through the Long Island Nitrogen Action Plan to study the creation of a county-wide wastewater management or water quality improvement district. Suffolk County's mission and the goals identified by the Fire Island Wastewater Solutions Coalition align and provide an opportunity to meet both the interests of Fire Island stakeholders and Suffolk County.

B. *Upgrades to Ocean Beach Sewage Treatment Plant and Collection System*: This wastewater planning effort was in part prompted by the current upgrades to the Village of Ocean Beach's Sewage Treatment Plant (STP) and collection system, and the subsequent opportunity to expand the sewer district. The Village's STP was built in

1921, and is being redesigned and upgraded to current technology and efficiency standards. The upgrades to the system will significantly reduce the infiltration of ground water that is currently being treated, and as a result, the STP will gain capacity. The current system supports 575 homes and two dozen businesses in Ocean Beach. If properly configured, the new system may allow for an additional 700 homes to be connected. Connecting homes from nearby communities to the STP has the potential to reduce the levels of effluent that may be leaching directly into the bay.

Ocean Beach's upgrade to its STP will occur regardless of other wastewater management planning efforts. Although nearby communities may have the potential to connect to Ocean Beach's upgraded STP, it is not be feasible to sewer Fire Island in its entirety. Other options must be explored as part of a comprehensive plan for wastewater management on Fire Island.

C. *Aligning with the Fire Island National Seashore General Management Plan*: Fire Island National Seashore's 2016 General Management Plan (GMP) is a comprehensive document that defines the park's purpose and management direction, and provides the overarching guidance necessary to coordinate all subsequent planning and management for Fire Island for the next 15 to 20 years. At the heart of this planning effort has been the recognition that Fire Island is a special place and an important asset to the people of Fire Island, Long Island, New York State, and the nation as a whole. It acknowledges that the long-term management and stewardship of Fire Island's varied resources and communities will require a collaborative and cooperative approach in order to protect the environment and distinctive community character. The GMP identifies the need for a Wastewater Management Plan for all of Fire Island on both federal and non-federal lands in collaboration with Suffolk County, the towns of Brookhaven and Islip, Fire Island communities and villages, and subject matter experts, like the US Geological Survey. The plan would include the evaluation of the issues and impacts associated with the present state of wastewater management on Fire Island, outline a range of possible alternatives, and develop a cooperative implementation strategy to address the issues identified.

D. Existing Collaborative Relationships:

The success of a Wastewater Planning Study for Fire Island will be driven by the strong collaborative relationships that currently exist between the various stakeholders and stewards of Fire Island that make up the Coalition. Management of Fire Island inherently depends on collaboration given its complex jurisdictions of federal, state, county, towns, villages and other various layers of government and stakeholders, including the Fire Island communities. Collaboration with all Fire Island stakeholders has been identified and committed to by the National Park Service in its General

Management Plan (2016), by New York State through the Long Island South Shore Estuary Reserve Act (1993), and Long Island Comprehensive Management Plan (2001).

Other examples that demonstrate the need for collaboration related to managing wastewater and Fire Island development include the Suffolk County Subwatershed Wastewater Plan, Long Island Nitrogen Action Plan, the Fire Island Inlet to Moriches Inlet Project, the Fire Island Inlet to Montauk Point Reformulation Plan, and New York Rising projects that have occurred on Fire Island. The partnerships created by these larger initiatives and projects have strengthened the management capabilities and capacity for success for Fire Island.

In addition to the various governmental agencies managing Fire Island, one of the largest groups of stakeholders and stewards of Fire Island are the residents and businesses in the private communities represented by the Fire Island Association. These communities have long family histories that connect them to the natural resources of the island, and to the establishment of the national seashore. This stakeholder group understands the need for living sustainably on a barrier island and co-existing with the natural environment. A realistic and effective wastewater planning study that includes the Fire Island communities is imperative to decreasing their environmental impact, and ensuring the sustainability of the Fire Island communities, now and into the future.

The various agencies and organizations engaged in this Coalition have committed to working collaboratively to improve wastewater management on Fire Island through communication, cooperation, and creative problem-solving. The Coalition recognizes the importance for a wastewater planning study to be conducted in a timely manner in order to be successful. Collaborative stewardship is necessary to improve land use planning and regulations, and to protect the environmental quality and distinctive character of Fire Island.

E. Additional Research:

Through the work of this group and planning process, data gaps and research needs will be identified.

A current gap in data is the status of bacterial and viral pathogens in low lying areas with standing water on Fire Island. USGS, FIA, and NPS are already working on a research program to quickly and economically fill in this data gap.

VII. COMMUNICATION, EDUCATION, AND ENGAGEMENT

The Coalition will be proactive in communicating the goals and initiatives for improving wastewater management on Fire Island with local elected officials, Fire Island residents, and other stakeholders. The Wastewater Planning Study for Fire Island will include synthesized scientific information, briefs, and presentations for the Coalition to share with stakeholders.

In particular, the Seashore has an interest in providing more climate change and wastewater management education and outreach in the Fire Island communities. The Seashore aims to share the outcomes of scientific studies conducted on Fire Island and encourage sustainable practices on both federal and non-federal lands. There are internship programs accessible to the Seashore that can be expanded with additional funding and could be used for focused communications identified in the Wastewater Planning Study. Sourcing interns and volunteers from the Fire Island communities would be of interest to make the education programming more successful.

VIII. FUNDING NEEDS AND POTENTIAL SOURCES

NYS DEC/EFC Wastewater Infrastructure Engineering Planning Grant
NYS Clean Water State Revolving Fund
NYSDEC Water Quality Improvement Project Program
NYS Water Infrastructure Improvement Act
NYS Inter-municipal Water Infrastructure Grants Program

NYS Environmental Protection Fund
Suffolk County 477 Funds
Source Water Protection Fund
Regional Economic Development Council

IX. REQUEST FOR PROPOSALS, WASTEWATER PLANNING STUDY FOR FIRE ISLAND

It is envisioned that a Wastewater Planning Study for Fire Island will be advertised through a Request for Proposals (RFP). First, the Fire Island Wastewater Solutions Coalition will seek funding through grant opportunities, and once these funds are acquired, Suffolk County will accept and manage the funding on behalf of the Coalition. Suffolk County will then solicit an RFP for the Wastewater Planning Study to be completed by a consulting firm with the Coalition's involvement. Elements of the plan will include much of the information captured in this document, but will also delve deeper into and better synthesize many of these issues. Elements and topics of the study the Coalition would like included:

Introduction and Location – Major players and stakeholders
Purpose and Need for a Study
Existing Conditions
- Geology and Hydrogeology
- Existing Wastewater Infrastructure
- Development and Increased Visitation
- Groundwater and Surface Water Pollution
- Nitrogen Pollution and the Great South Bay- Harmful Algal Blooms, Submerged Vegetation, Hard Clams/Oysters
- Inundation during Coastal Flooding Events
- Alternatives of wastewater treatment
- Sewer- expansion options for the Ocean Beach STP for the surrounding communities- what would work and what won't.
- Cesspools/Septics/Leach Fields- are there any locations that current technologies work?
- I/A systems- Suffolk County approved and other
- Cluster systems
- Urine separation systems
- Compost toilets
- Emerging technologies
- Others

Analysis of Feasible Options
- Potentially analyze technologies by "reach" or sections of Fire Island
- Potentially analyze technologies by density/development
- Potentially analyze technologies by cross section of island- Ocean to Bay variations in elevation and depth to ground water.

Options analyzed under Climate Change, Sea Level Rise projections, storm events, and flood inundation.
Identify best options for the various Fire Island reaches/density/location
With consideration into the future with lifespan estimates/ adaptions/ cost estimates
Suggested town and code regulation changes
Background Information for Appendices
Current/Existing town and county regulations associated with wastewater management and development.

Other Deliverables:

1. Create a tool box of media and educational materials to help disseminate info to all stakeholders—community education and engagement
2. Community engagement, public workshops/presentations, public forums, and site visits.
3. Identify Funding Sources for Implementation and Recommended Implementation Priorities/Plan

Sources for more information for consultant:

- Suffolk County Comprehensive Water Resources Plan
- Ocean Beach Sewerage Treatment Plant Plans
- USGS and NPS research (wells, Breach Management Plan, Vulnerability Study, General Management Plan)
- LWRP current/future funding for Ocean Beach STP
- Suffolk County's Subwatershed Wastewater Plan
- Harmful Algal Bloom research by Dr. Christopher Gobler

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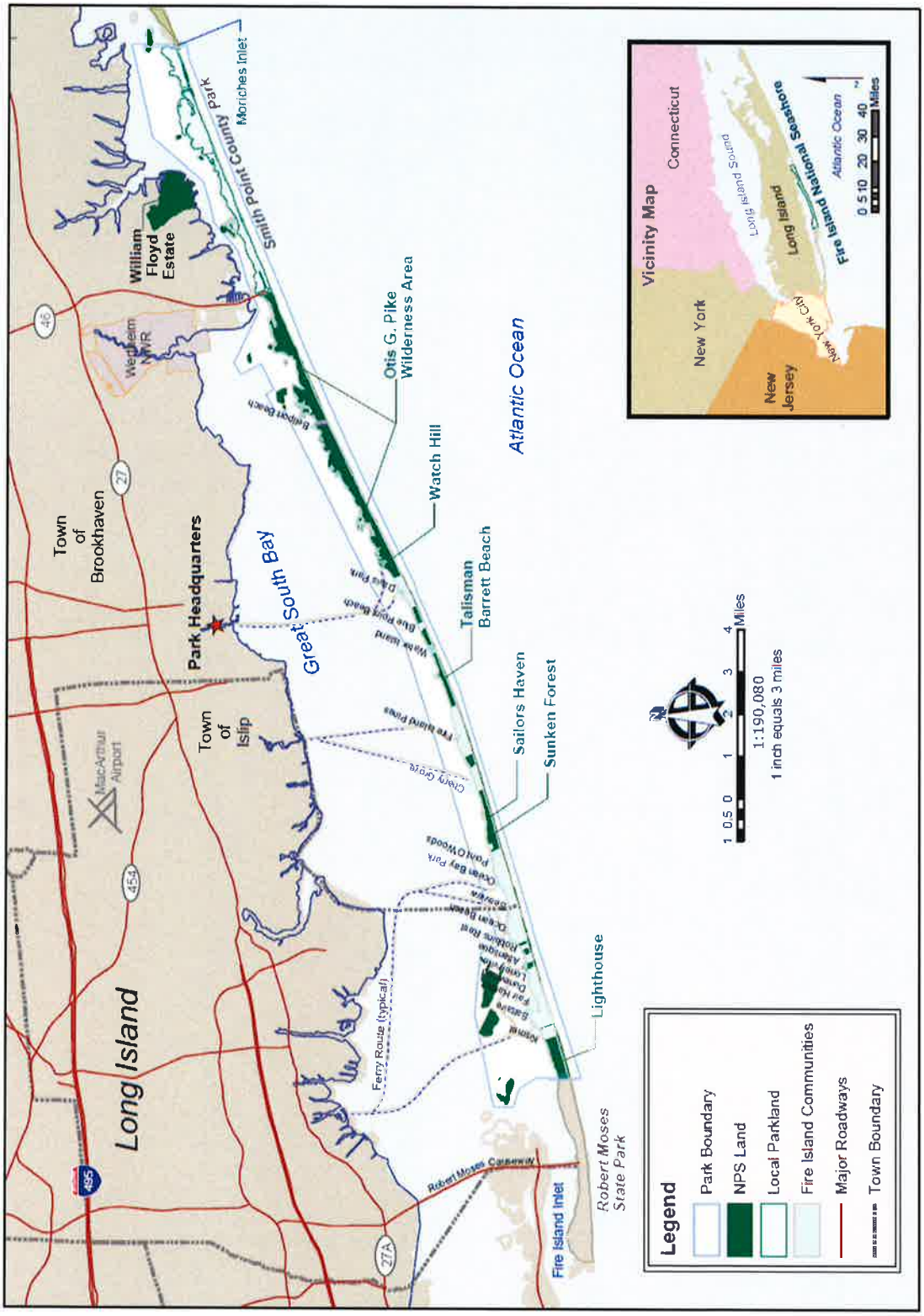
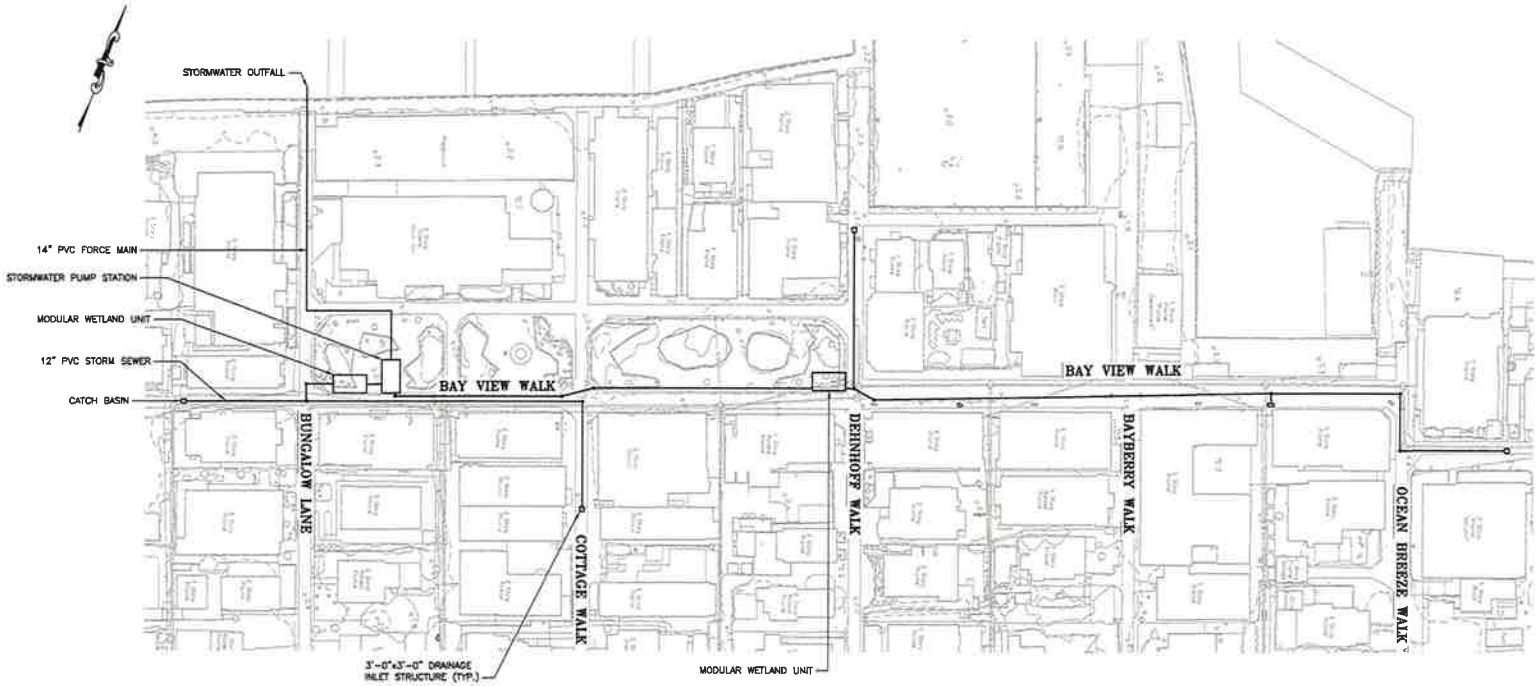
Figure 1. Fire Island federal and non-federal lands.





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OCEAN BEACH

SUFFOLK COUNTY — NEW YORK

STORMWATER DESIGN

BAY VIEW WALK
PLAN AND PROFILE - STA. XX

PROJECT NO.	DRAWING NO.
3583	X
DATE: -	
SCALE: HORIZ.: 1"=40' VERT.: 1"=4'	