Long Island Water Reuse Road Map & Action Plan

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Seatuck & Greentree Foundation

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About Seatuck & Greentree Foundation

Seatuck

Seatuck Environmental Association is dedicated to conserving Long Island wildlife and the environment. The organization pursues its mission by advocating for wildlife and advancing conservation projects, engaging community scientists in wildlife research, and offering high-quality environmental education opportunities for Long Islanders of all ages. Seatuck, a 501(c)(3) nonprofit organization, is based at the Suffolk County Environmental Center at the Scully Estate in Islip, which it manages through a partnership with the Suffolk County Department of Parks. The organization also manages the South Shore Nature Center in East Islip through a partnership with the Town of Islip.

Greentree Foundation

Greentree Foundation is a private non-profit operating foundation established by Betsey Cushing Whitney in 1982. The Foundation organizes programs and hosts meetings at Greentree for the advancement of peace, human rights, and cooperation among nations; practices sustainable land and wildlife management; and makes grants to support Long Island philanthropies.

Acknowledgments

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The Water Reuse Technical Working Group was established to provide technical expertise and guidance on the development of the Long Island Water Reuse Action Plan & Roadmap.

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Introduction

Over the past half century, water quality in Long Island's groundwater aquifers (the sole source of drinking water for more than 2.5 million Nassau and Suffolk County residents), as well as both freshwater and coastal surface waters, has steadily declined. Notable among this water quality problem is the detrimental impacts to human and ecosystem health associated with excess nitrogen. In drinking water aquifers, excess nitrogen can pose a public health risk to infants and small children; in surface waters it can trigger deleterious algae blooms and degrade salt marsh health.

During this same time period, Long Island's water quantity problem has also come into focus. High rates of pumping have impacted Long Island's vast aquifer resources, with water table levels significantly decreased in many places. While these reductions may not impact the overall availability of drinking water, they do result in lost streams and other wetlands, which serve as vital wildlife habitat. High rates of groundwater withdrawal can also alter salinity regimes in coastal embayments and result in saltwater intrusion into aquifers used for drinking water.

An array of laws, policies, and strategies have been adopted over the years to address Long Island's dual water problems. These include the federal Clean Water Act and the New York State Pollution Discharge Elimination System, as well as local efforts to reduce the use of lawn fertilizers, encourage water conservation, require the enclosure of road salt piles, and a mandate that below grade gasoline storage tanks be double walled.

More recently, Nassau and Suffolk Counties have meaningfully responded to the threat from excess

Figure 1a - Dry Streambed, Nassau County

nitrogen by advancing ambitious programs to replace the nearly 400,000 existing private cesspools/septic tanks with Innovative/Alternative systems ("I/A systems"). These new systems significantly reduce the amount of nitrogen discharged into the groundwater and surrounding environment. While these efforts are having a positive impact, it is clear that more must be done to ensure that both the quality and quantity of Long Island's water resources remain high for generations to come.

Water reuse (or water recycling, as it is also known) is a complementary strategy that can meaningfully help Long Island address its water issues. It involves "reusing" highly treated wastewater generated from sewage treatment plants for water-dependent purposes instead of discharging it into the ocean or local coastal waters.

Water reuse provides dual benefits related to both water quality and quantity. First, it impacts surface water quality by avoiding the discharge of nitrogen-laden water into coastal waters by putting it to use in other applications. In many reuse applications (e.g., golf courses, sod farms, nurseries), the nitrogen in the reclaimed wastewater is used by plants, which can reduce the need to apply synthetic fertilizers. Second, water reuse addresses water quantity problems by eliminating the need to pump "new water" from the aquifer and, in some applications, allowing reclaimed water to infiltrate back into the ground.

The dual benefits of water reuse have long been recognized and embraced in other parts of the world, such as the Middle East, and across the country, especially in places, such as California, Arizona and Florida, where supplies of freshwater are limited.

Figure 1b - Dry Streambed, Nassau County

These states have incorporated extensive strategies to recapture and reuse valuable water resources. Some are even moving aggressively towards the direct use of highly treated wastewater for potable purposes. According to the Environmental Protection Agency approximately 2.6 billion gallons of water are reused daily in the United States. New York and other states in the Northeast have been slower to adopt these strategies, largely because they have more abundant supplies of freshwater. But water reuse is getting more attention as a tool for addressing both water quality and quantity problems in areas facing water management challenges.

On Long Island, the Riverhead Sewage Treatment Plant (STP) Water Reuse Project, in operation since 2016, illustrates how water reuse addresses both sides of the "water management coin." During the growing season the project redirects highly-treated wastewater from discharge into the Peconic River to the irrigation system of the adjacent Suffolk County owned Indian Island Golf Course. As a result, each year the project prevents more than one ton of nitrogen from entering the river and keeps approximately 63 million gallons of water in the aquifer.

Figure 2 - Purple pipes carrying reclaimed water in Florida

Roadmap & Action Plan

The Riverhead STP Water Reuse Project got Long Island off to a great start. In nearly five years of operation, it has demonstrated problem-free operations, engendered no public opposition and achieved significant water quality and quantity benefits. However, despite this important success, it still remains the only large-scale external reuse project on Long Island. It is clear that there are additional opportunities for water reuse and more must be done.

The Greentree Foundation and Seatuck Environmental Association, convinced of the untapped potential of water reuse strategies, initiated the *Long Island Water Reuse Roadmap and Action Plan* ("Roadmap") with the goal of fanning the flames that the Riverhead project sparked. It seeks to catalyze the implementation of water reuse on Long Island and ensure that the strategy plays a larger and more meaningful role in safeguarding the region's drinking water and surface water resources.

The timing of this report is intended to coincide with both the growing recognition of Long Island's dual water problems, as well as the increase in potential funding for large infrastructure projects. The passage of the federal *Infrastructure Investment and Jobs Act* and New York voters' recent approval of the $4.2 billion *Clean Water, Clean Air, Green Jobs Bond Act* can provide meaningful funding to advance water reuse projects in the coming years.

As described below, with potential funding coming, the Roadmap provides the background, vision and technical details to help water reuse proponents connect the dots and take advantage of this unique opportunity to advance projects across Long Island.

A. Opportunity Screening & Summary Cards

There are a total of 48 public wastewater treatment plants (WWTPs) on Long Island (in addition to more than 130 small, privately owned treatment plants not included in this analysis). Nine of the public WWTPs are in Nassau County and thirty-nine are in Suffolk County.

The area within a two-mile radius of each of these facilities was carefully screened for water reuse application opportunities (golf courses, nurseries, industrial facilities, etc.). The results fell into four major categories:

- *Irrigation* - Reclaimed water is ideal for non-potable watering at locations such as golf courses, sod farms and greenhouses, as well as for lawns and fields at educational and commercial campuses. Ninety-two potential irrigation projects were identified as possible end-users for reclaimed water from the forty-eight Long Island WWTPs. With more than 140 water-reliant golf courses on Long Island, golf course irrigation, not surprisingly, represents a majority of these reuse opportunities.

- *Commercial/Industrial* - Commercial centers, industrial parks and job sites have considerable potential to utilize reclaimed water for a range of purposes, from cooling to cleaning to mixing non-consumptive products (e.g., concrete).
- *Internal* - Wastewater treatment plants have tremendous potential to reclaim treated water and use it on site for various internal processes, including cleaning, make-up water, spray water systems and fire protection. These internal applications at WWTPs are considered the "low hanging fruit" for water reuse and should be a high priority.
- *Environmental* - Reclaimed water can be used to address hydrological or ecological needs, especially those associated with over-pumping, such as augmenting streamflow or restoring aquatic habitat.

A "Summary Card" profile was created for each of the forty-eight WWTPs that identifies all potential projects within the two-mile radius and provides detailed information about the facility's size, treatment volume, existing technology, etc.

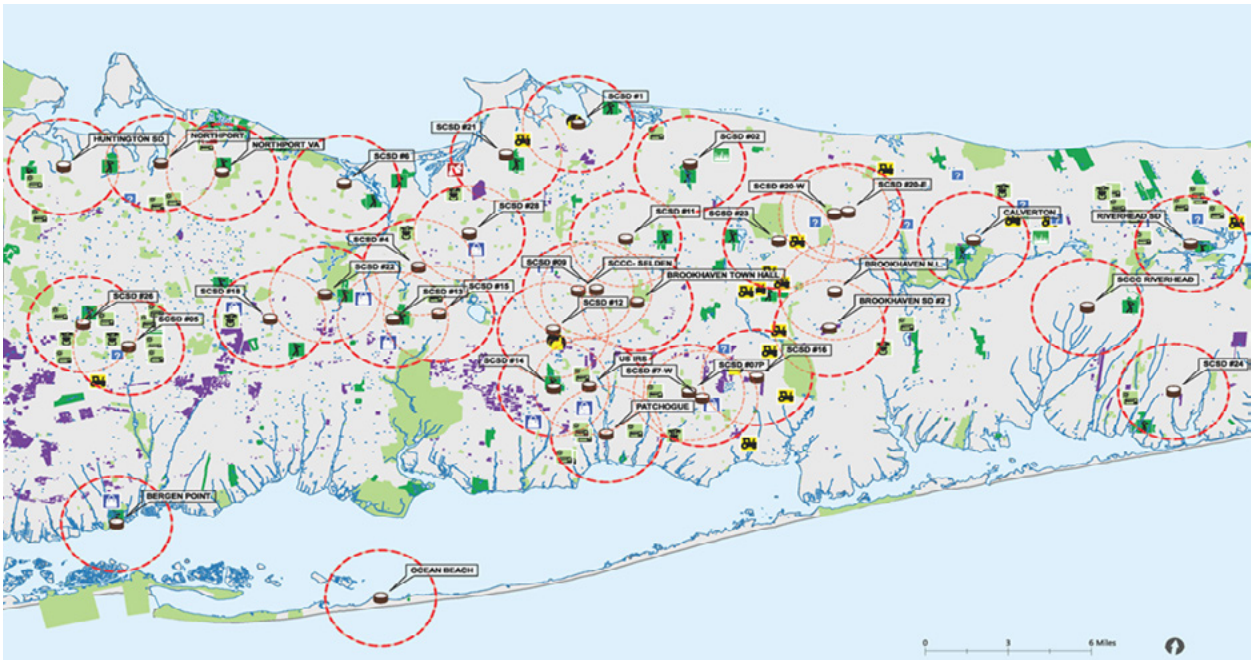

Figure 3 - Wastewater Treatment Plants & Reuse Opportunities - Western Suffolk County

B. Irrigation Prioritization Ranking

The primary analytical component of the Roadmap is a detailed review and ranking of each of the ninety-two potential irrigation projects identified in the screening process. This was done through an analytical framework (Reuse Matrix) that scored each potential project pursuant to a range of factors. While there is considerable potential on Long Island for the commercial/industrial, internal and environmental reuse projects identified through the screening process, these projects were not specifically analyzed in the Reuse Matrix or included in the prioritization ranking in this report.

To score and rank the potential irrigation reuse projects, the following criteria were considered as part of the Reuse Matrix:

- *Normalized Capital Cost* - The cost to install the tertiary microfiber filtration and UV treatment system and to install the distribution line for the length of the transmission distance. To normalize the comparison of projects of varying size, the capital cost was divided by the gallons of reclaimed water the project would consume annually.
- *Nitrogen Reduction* - The reduction of nitrogen loading from the WWTP discharge to marine and estuarine waterways.
- *Annual Quantity of Potable Water Savings* - The amount of new fresh water pumping that is eliminated by the use of reclaimed water.
- *Water Supply Pumping Concerns* - This factor considers whether the project is in an area of Long Island where there are existing or imminent concerns about drawdowns of the aquifer.
- *Effect on Water Management at the Project Location* - This factor considers whether the addition of extra water infiltration will have a positive or negative impact on local water management at the project location. In other words, will increased filtration at the project site help counter saltwater intrusion or, on the other hand, potentially increase local flooding.
- *Transmission Distance* - The impact of the distance between the WWTP and the project site on annual operational costs.
- *Potential for Associated Projects to Share Infrastructure* - This final factor considers the potential to execute one project in coordination with another, which may reduce overall capital costs and facilitate implementation.

All irrigation projects received a score (from 1 to 4) in each of the seven categories outlined above and were then ranked, based on their overall score, into three tiers, with Tier 1 projects having the highest feasibility and Tier 3 the lowest. The projects have also been organized into five "Top Ten" lists, based on the following criteria:

- Most water reused
- Most nitrogen removed
- Lowest normalized project cost
- Priority projects for Nassau County and Suffolk County

C. Reuse Matrix Highlights

Highlights of the Reuse Matrix include the following:

- Of the seventeen projects that scored high enough to rank in Tier 1, sixteen involve golf course irrigation. Turf irrigation at Stony Brook University was the other Tier 1 project.
- Estimated capital costs for Tier 1 projects range from $4.4 to $28 million.
- Of the twenty-one Tier 2 projects, nine are golf courses. Other projects in this tier include farms, greenhouses, municipal parks and educational campuses.
- Estimated capital costs for Tier 2 projects range from $4.2 to $51 million.

D. Major Action Plan Recommendations

Based on the results of this study, including the outcomes of the Reuse Matrix, an Action Plan has been developed that provides recommendations for advancing water reuse projects on Long Island. The following list encapsulate the major recommendations from the Action Plan:

- *Develop Water Reuse Regulations/Guidelines* - New York State must develop and implement water reuse guidelines and standards to provide regulatory clarity for project proponents, as required in Article 15, Title 6 of the NYS Environmental Conservation Law. Many other states have developed and adopted regulations.
- *Promote Water Reuse* -
  - Convene a *Long Island Water Reuse Workgroup* to develop and implement strategies for advancing water reuse on Long Island, including meeting with elected and other public officials
  - Develop a communication and outreach plan to engage the public and build acceptance of water reuse projects
  - Explore inter-utility partnerships with water suppliers and other stakeholders
  - Research grant funding opportunities
- *Implement Irrigation Projects* - Promote and advance irrigation projects, especially the seventeen projects that ranked in Tier 1, by:
  - Obtaining letters of commitment from stakeholders (WWTP owners and end users)
  - Conducting engineering studies on the most feasible projects
  - Engaging Long Island Golf Course Association in plan development and advocacy
  - Initiating meetings with regulatory agencies to initiate the permitting process
  - Conducting small-scale testing of technology to evaluate efficiency and mitigate risks, as well as ensuring reliable achievement of California Title 22 water quality criteria.

- *Internal Reuse* - On-site reuse of treated water at wastewater treatment plants represents the most achievable and affordable opportunities to rapidly advance water reuse rates on Long Island. All WWTPs should be encouraged to explore opportunities for reusing wastewater at their facilities.
- *Environmental Reuse* - As detailed above, there are numerous opportunities on Long Island to use reclaimed water to address ecological problems, such as insufficient stream flow and salt water intrusion. These opportunities were not analyzed in detail as part of this Roadmap, but they should be explored in the coming years, especially where they fall within the 2-mile radius of a WWTP and/or are in proximity to other proposed reuse projects.
- *Commercial/Industrial Reuse* - Similarly, there are numerous opportunities across the island to use reclaimed water in commercial and industrial settings. These opportunities were not analyzed in detail as part of this Roadmap, but they should be explored in the coming years, especially where they fall within the 2-mile radius of a WWTP and/or are in proximity to other proposed reuse projects.
- *Private WWTPs* - The more than 130 private treatment plants in Suffolk County have considerable potential to develop water reuse projects, including through internal reuse projects and site irrigation. Further study of these sites and advancement of potential projects is recommended.

Water Reuse Background

Introduction & Background

General

In 2016, after years of planning, the Riverhead Water Resource Recovery Plant, in conjunction with the Suffolk County Department of Parks and the staff at Indian Island County Golf Course, commenced operation of Long Island's first major water reuse project. During the growing season (April to October), the project redirects highly treated wastewater (that was formerly discharged into the Peconic River) to irrigate the nearby Indian Island County Golf Course owned and operated by Suffolk County. The project generates significant water quality and water quantity benefits: according to the Engineering Report, each year it prevents approximately 1.4 tons of nitrogen from being discharged into Peconic River and keeps 63 million gallons of freshwater from being pumped out of local aquifer.

In more than five years of operation, the Riverhead reuse project has demonstrated problem-free operations, generated no public opposition and achieved significant water quality and quantity benefits. However, despite this important success, it still remains the only large-scale external reuse project on Long Island. It is clear that much more must be done to advance water reuse as a commonly used strategy to protect Long Island's groundwater supply and coastal waters.

The Greentree Foundation and Seatuck Environmental Association, convinced of the untapped potential of water reuse strategies, initiated the Long Island Water Reuse Roadmap and Action Plan ("Roadmap") with the goal of adding momentum to the movement the Riverhead project started. It seeks to catalyze the implementation of water reuse on Long Island and ensure that the strategy plays a larger and more meaningful role in safeguarding the region's drinking water and surface water resources.

The timing of this report is intended to coincide with both the growing recognition of Long Island's dual water problems, as well as the increase in potential funding for large infrastructure projects. The passage of the federal Infrastructure Investment and Jobs Act, New York voters' recent approval of the $4.2 billion Clean Water, Clean Air, Green Jobs Bond Act, and a fully funded NYS Environmental Protection Fund ($400 million) can provide meaningful funding to advance water reuse projects in the coming years.

As detailed below, the Roadmap provides the background, vision and technical details to help water reuse proponents connect the dots and take advantage of this unique and important opportunity to advance important projects across Long Island.

Long Island Water Quality

Over the past half century, water quality in Long Island's freshwater and marine waterways and groundwater aquifers (the sole source of drinking water for 2.6 million Nassau and Suffolk County residents) has steadily declined. Notable among this water quality problem is the detrimental impacts to human and ecosystem health associated with excess nitrogen. In drinking water aquifers, excess nitrogen can pose a public health risk, especially to infants and small children. In surface waters it can trigger deleterious algae blooms, weaken tidal marshes, and generally degrade estuarine health. Given this, it is no surprise that the Suffolk County Executive has declared nitrogen Long Island's environmental "public enemy #1."

During this same time period, Long Island's water quantity problem has also come into focus. High rates of pumping have impacted Long Island's vast aquifer resources, with water table levels significantly decreased in many places. While these reductions may not impact the overall availability of drinking water, they do result in lost streams and wetlands, which serve as vital wildlife habitat, as well as altered salinity regimes in coastal embayments and saltwater intrusion into coastal areas with drinking water wells.

A large array of laws, policies, and strategies have been adopted over the past five decades that address Long Island's dual water problems. These include, but are not limited to, the federal Clean Water Act and the New York State Pollution Discharge Elimination System, as well as an array of local efforts to reduce the use of lawn fertilizers, limit residential development density, encourage water conservation, require the enclosure of road salt piles, and mandate that gasoline station storage tanks be double walled.

More recently, Nassau and Suffolk Counties have meaningfully responded to the threat from excess nitrogen by advancing ambitious programs to replace the nearly 400,000 existing private cesspools/septic tanks with Innovative/Alternative systems ("I/A systems"). These new systems, essentially miniature sewage treatment plants, significantly reduce the amount of nitrogen discharged into the groundwater and surrounding environment. While these efforts are having a positive impact, it is clear that much more must be done to ensure that both the quality and quantity of Long Island's water resources remain high for generations to come, especially given the fact the population of the two counties will continue to grow with a commensurate increase in water use.

Water reuse (or water recycling, as it is also known) is a complementary strategy that can meaningfully help Long Island address its water issues. It involves "reusing" highly treated wastewater generated from sewage treatment plants for water-dependent purposes instead of discharging it into the ocean, local coastal waters, or into groundwater.

It is important to emphasize that water reuse provides dual benefits relating to both water quality and quantity. First, it impacts surface water quality by avoiding the discharge of nitrogen-laden water into coastal waters by putting it to use in other applications. In many reuse applications (e.g., golf courses, sod farms, nurseries), the nitrogen in the reclaimed wastewater is used by plants, which limits the amount of nitrogen that permeates into the groundwater, and can also reduce the need to apply synthetic fertilizers. Second, water reuse addresses water quantity problems by 1) eliminating the need to withdraw "new water" from the aquifer and 2) in some applications, allowing reclaimed water to infiltrate through the soil and recharge groundwater resources.

History & Status of Water Reuse

The history of using previously used water for secondary purposes dates back thousands of years. In the modern era, reclaimed water is used around the world for a wide variety of purposes, including agricultural irrigation, groundwater recharge, industrial recycling and – increasingly – potable uses.

Water reuse has been increasingly recognized as an essential component in effective water resource management plans; the United Nations formally acknowledged the importance of water reuse in 2017.

The benefits of water reuse have long been recognized and embraced in other parts of the world, especially in the Middle East and Northern Africa, where access to freshwater is limited. Today, counties in these regions have some of the highest wastewater reuse rates in the world. Israel, for example, reuses more than 80% of the wastewater it generates, almost exclusively for irrigating agricultural crops.

Water reuse projects have been implemented in the United States since at least the early 20th Century. California, Florida and other states with limited supplies of freshwater were the first to adopt water reuse strategies. Several dozen states have developed strategies, plans or laws over the past two decades to advance reuse. New York and other states in the Northeast have been slower to adopt these strategies, largely because they have more abundant supplies of freshwater. But water reuse is getting more attention as a tool for addressing both water quality and quantity problems in areas facing water management challenges, such as Long Island. Today, according to the U.S. Environmental Protection Agency, approximately 2.6 billion gallons of water is reused daily. Most reclaimed water in the United States is still used for agricultural irrigation, with 95% of irrigation occurring in four states: California, Arizona, Texas and Florida. Golf course irrigation is the second most frequent target.

Direct potable reuse - using highly treated wastewater as a potable water supply source or used in food products requiring water (such as beer!) - is gaining momentum and is highly likely to play a larger role in the future, especially in the arid areas of the western United States.

The first effort to govern water reuse – to ensure food eaten raw was safe for consumers – was implemented in California in 1918. More comprehensive regulation of water reuse first arrived in the 1970s and 1980s to reduce uncertainty among stakeholders (e.g., farmers, consumers, and policy-makers), and facilitate the broader adoption of water reuse strategies. State-wide guidelines were first implemented in California, Florida and several Southwestern states where water reuse strategies were being widely adopted.

As of 2022, some form of water reuse regulations or guidelines were in place in 33 states. Some have adopted comprehensive regulatory frameworks for water reuse, while others simply offer guidelines to support the permitting of water reuse projects. Some states, such as New York, have yet to implement state-wide standards or guidance; projects in these states are regulated on a case-by-case basis. It has become clear that water recycling has, as noted by one author on the topic, “a place in all climates”.

While there are no federal water reuse standards or guidance, the National Water Reuse Action Plan was adopted by the U.S. Environmental Protection Agency and other federal, state and local water leaders in 2020 to encourage “collaborative and coordinated engagement around water reuse to help ensure safe and reliable water supplies critical to our nation’s communities and economy.”

In New York, large-scale water reuse projects have been limited. There are a few projects in upstate New York and one on Long Island involving the Riverhead Water Resource Recovery Plant, which commenced operation in 2016. The Riverhead reuse project was implemented to redirect highly treated wastewater (as much as 450,000 gallons per day during the growing season) to irrigate the nearby Indian Island County Golf Course instead of discharging it into the Peconic River.

There have also been several smaller, internal reuse efforts that have been implemented involving sewage treatment plants on Long Island. These projects, at the Great Neck STP and Cedar Creek STP, among others, involve the internal use of treated wastewater within the treatment plant itself (for washdown, cleaning, pump seal water, etc.). These projects have collectively saved several million gallons of water to date. It is important to note that these washdown applications have limited water quality benefits.

Reusing water, for some other valuable purpose, provides numerous benefits. These include: protecting public wells and water supplies from salt water intrusion, protection and maintenance of freshwater wetlands from the lowering of water table elevations, enhancement of coastal water quality by reducing nitrogen inputs, and providing less expensive cost water to golf courses, agricultural operations, and businesses.

Water Conservation & Protection

Water reuse is a tool that can and should supplement other policies, practices and technologies to safeguard water quality and quantity on Long Island; it is not a panacea to solve the water-related issues facing the region. The wide range of important existing strategies must be continued and, in many cases, expanded if Long Island is to fully solve its dual water quality and quantity challenges.

It is critical that work to improve water quality and protect public and ecosystem health continues. This includes efforts to reduce nitrogen pollution (through I/A systems, fertilizer reductions, etc.) and to address contaminants of emerging concern (CECs). These are the chemicals, including pharmaceuticals and personal care products (PPCPs), endocrine disrupting compounds (EDCs), perfluorooctanoic acid (PFOA) and 1, 4 dioxane, that are being increasingly detected in ground and surface waters and pose potential impacts to human health and aquatic life.

Similarly, water reuse can only be part of the solution to address water quantity problems on Long Island. Broader measures to advance water efficiency must also be implemented, and expanded. Examples of these varied strategies include tiered-rate structures for water supply, requirements for rain sensors on inground home irrigation systems, and leak detection and repair programs offered by water companies.

Overview – Roadmap & Action Plan

The Riverhead water reuse project got Long Island off to a great start. In nearly five years of operation, it has demonstrated problem-free operations, engendered no public opposition and achieved significant water quality and quantity benefits. However, despite this important success, it still remains the only large-scale external reuse project on Long Island. Given the mounting quality and quantity problems confronting Long Island, it is clear that more must be done. There are many potential reuse projects that need to be evaluated for implementation.

The Greentree Foundation and Seatuck Environmental Association, convinced of the untapped potential of water reuse strategies, initiated the Long Island Water Reuse Roadmap and Action Plan ("Roadmap") with the goal of adding momentum to the movement the Riverhead reuse project started. It seeks to catalyze the implementation of water reuse on Long Island and ensure that the strategy plays a larger and more meaningful role in safeguarding the region's drinking water and surface water resources.

The timing of this report is intended to coincide with both the growing recognition of Long Island's dual water problems, as well as the increase in potential funding for large infrastructure projects. The passage of the federal Infrastructure Investment and Jobs Act and New York voters' recent approval of the $4.2 billion Clean Water, Clean Air, Green Jobs Bond Act can provide meaningful funding to advance water reuse projects in the coming years.

As described below, with potential funding coming, the Roadmap provides the background, vision and technical details to help water reuse proponents connect the dots and take advantage of this unique opportunity to advance projects across Long Island. Like with any roadmap it is important to note that this Water Reuse Roadmap marks only the beginning of the effort to guide and advance water reuse projects and we recognize that a detailed engineering study will be required to identify costs and operational and logistical issues associated with the project.

A. Opportunity Screening & Summary Cards

There is a total of 48 publicly owned wastewater treatment plants (WWTPs) on Long Island (in addition to more than 130 small, privately owned treatment plants not included in this analysis). Nine of the WWTPs are in Nassau County and thirty-nine are in Suffolk County.

The areas within a two-mile radius of each of these facilities have been carefully screened for water reuse application opportunities (irrigation, industrial/commercial facilities, etc.). The results fall into four major categories:

- Irrigation - Reclaimed water is ideal for non-potable watering at locations such as golf courses, sod farms and greenhouses, as well as for lawns and fields at educational and commercial campuses. Ninety-two potential irrigation projects were identified as possible end-users for reclaimed water from the forty-eight Long Island WWTPs. With more than 140 water-reliant golf courses on Long Island, golf course irrigation, not surprisingly, represents the majority of these opportunities.
- Commercial/Industrial - Commercial centers, industrial parks and job sites have considerable potential to utilize reclaimed water for a range of purposes, from cooling to cleaning to mixing non-consumptive products (e.g., concrete). Wastewater treatment plants have tremendous potential to use reclaimed treated water and use it on-site for various internal processes, including cleaning, make-up water, spray water systems, seal water systems and fire protection. These internal application applications at WWTPs are considered the "low hanging fruit" for water reuse and should be a high priority for implementation.
- Municipal Water Supply – Reclaimed water can also be used to supplement municipal water supplies. Most commonly, it is used for secondary indoor uses such as toilet flushing, laundry, etc., generally

in larger facilities, such as government complexes, schools, sports arenas, community centers and commercial centers. This requires separate potable and reclaimed water distribution lines in the facility and is often accomplished with an on-site treatment system that recycles potable water used in the facility.

- Environmental - Reclaimed water can be used to address hydrological or ecological needs, especially those associated with over-pumping, such as augmenting streamflow or restoring aquatic habitat. There is potential for environmental reuse but determining where environmental reuse would be most effective is beyond the scope of this project, therefore environmental reuse projects were not considered in the project analysis.

A "Summary Card" profile was created for each of the forty-eight WWTPs that identifies all potential projects within a two-mile radius and provides detailed information about the facility's size, treatment volume, existing technology, etc.

B. Irrigation Prioritization Ranking

Each of the ninety-three (93) potential irrigation projects were reviewed through an analytical framework (Water Reuse Matrix) that considered a range of factors, including:

- Normalized capital cost
- Nitrogen reduction
- Annual quantity of potable water savings
- Water supply pumping
- Effect on water management at the project location
- Transmission distance
- Potential for associated projects to share infrastructure

All projects received a score (from 1 to 4) in each of the seven categories and were then ranked, based on their overall score, into three tiers, with Tier 1 projects having the highest feasibility and Tier 3 the lowest. The projects are organized below into five "Top Ten" lists, based on the following criteria:

- Most water reused
- Most nitrogen removed
- Lowest normalized project cost
- Priority projects for Nassau County and Suffolk County

Based on the results of this study, including the outcomes of the Water Reuse Matrix, an Action Plan has been developed that provides recommendations for advancing water reuse projects on Long Island.

Water Reuse Regulations & Guidelines

Federal

The Safe Drinking Water Act and Clean Water Act are the primary federal laws that serve to protect surface waters and community drinking water. Beyond the regulations promulgated under these broad water-related laws, there are no federal laws that specifically govern water reuse. This is largely because primary regulatory authority over allocation and development of water resources generally rests with the state. However, the U.S. Environmental Protection Agency (USEPA) has released two sets of guidelines regarding water reuse: 2012 Guidelines for Water Reuse (GWR) and 2017 Potable Reuse Compendium (PRC).

- The GWR is an extensive water reuse guideline that includes:
- Framework for planning and management of reuse programs
- Overview of reuse applications and treatment technologies
- Suggested guidelines for water reuse quality by application type
- Summary of various state regulatory programs and regional variations in reuse potential
- List of potential funding sources for reuse programs
- Tools to manage public outreach and acceptance
- Examples of water reuse across the globe

While the PRC has a narrower scope encompassing only potable water reuse, it includes research on potable reuse regulations, sources, risks, treatments, training and monitoring, public acceptance, and examples of existing potable reuse applications.

The GWR provides suggested water quality guidelines for water reuse. For uses with the potential for human contact (publicly accessible landscaping, food crops, and indirect potable reuse), it recommends that wastewater have a neutral pH (6.0-9.0), ≤10 mg/l BOD, ≤2 NTU), no detectable fecal coliform/100 ml, and residual disinfection. The recommended water quality requirements for restricted uses (landscaped areas with restricted/no public access, non-food crops, industrial cooling towers, and environmental reuse) are less strict at ≤30 mg/l BOD, ≤30 mg/l TSS, ≤200 fecal coliform/100 ml, and residual disinfection.

New York

Title 6 of Article 15 of the New York Environmental Conservation Law, under "Water Efficiency and Reuse" (see Table 1 below), provides requirements for water reuse in New York State. The law, passed in 2005, required NYSDEC to:

1. Conduct a statewide water reuse feasibility study,
2. Establish and maintain a water reuse registry; and
3. Develop standards governing, among other items, levels of treatment needed for each proposed use.

While the Department has fulfilled the first two legislative mandates, the third mandate has not been fulfilled, it has not yet developed the required standards; to this end NYSDEC and NYSDOH commenced discussions in 2021 to develop treatment and use standards for reclaimed water.

Table 1 – NYS Laws of Environmental Conservation, Title 6 Water Efficiency and Reuse

Section 15-0601 - Definitions as used in this title
• "Water reclamation project" means a project designed to utilize reclaimed wastewater or greywater for beneficial non-potable uses including, but not limited to, agricultural and landscape irrigation, commercial and industrial uses, and wetland maintenance purposes. • "Greywater" means untreated wastewater from bathtubs, showers, washing machines, dishwashers, and sinks, but shall not include discharges from toilets or urinals or industrial discharges. • "Reclaimed wastewater" means water discharged from a treatment works utilizing at least effective secondary treatment as defined in section 17-0509 of this chapter.
Section 15-0603 - Reclaimed wastewater feasibility study
• The Department, in consultation with the Department of Health, shall conduct a study of potential uses of greywater and reclaimed wastewater in New York state, and develop a strategy for promoting water reclamation projects. • Such study shall be completed within eighteen months of the effective date of this section and a report of the findings from the study shall be presented to the Governor, the Speaker of the Assembly, and the temporary President of the Senate within ninety days of the completion of the study.

Section 15-0605 - Standards for reuse and disposal of reclaimed wastewater

The Commissioner, in consultation with the Department of Health, shall establish rules, regulations and standards for the reuse and disposal of reclaimed wastewater and/or greywater. The Department of Health shall advise the Department on water quality and pathogens monitoring requirements.

- Such rules, regulations and standards shall specify:
    a. The permitted uses of reclaimed wastewater and greywater with required levels of water quality and treatment for each permitted use; permitted uses shall include, but not be limited to industrial cooling; commercial and industrial landscaping; park and golf course irrigation; groundwater recharge; surface water supply augmentation; wetland creation and augmentation, and non-food agricultural crop and lawn irrigation.
    b. Operational requirements including, but not limited to, treatment facility reliability; storage requirements, if necessary; system labeling and color-coding requirements; and pipe location and placement.
- Such rules, regulations and standards shall be promulgated within thirty months of the effective date of this section

Section 15-0607 - Utilization of reclaimed wastewater registry

All persons utilizing reclaimed wastewater or greywater shall register such project with the Department. The Department shall maintain such registry.

Currently, standards for reuse are applied programmatically through the existing NYSDEC's State Pollutant Discharge Elimination System (SPDES) permit process. One such permit (the first of its kind on Long Island) was issued in 2016 to the Town of Riverhead Water Resource Recovery Plant to provide up to 450,000 gallons per day of reused water for landscape irrigation at the adjacent Indian Island Golf Course. The permit requires that the wastewater be treated to the following levels: <5 mg/l TSS, <2 NTU, and non-detectable fecal coliform in 4 of 7 days with a 23 fecal coliform/100ml max.

Nearby, the New York City Department of Environmental Protection (NYCDEP) has developed water reuse programs, including grants and sewer fee reductions for on-site treatment and reuse systems, to encourage water efficiency, promote resilience to drought and minimize infrastructure impairment. The NYC water reuse, water quality standards and monitoring requirements are outlined in the 2014 NYC Construction Code, Plumbing Code Sections, which regulate both wastewater reuse and rainwater reuse systems. The Department of Buildings permit process ensures the reuse system is installed in compliance with the code. DEP's water quality standards for reused water are similar to the EPA guidelines.

Other States

As mentioned earlier, several dozen other states have developed and implemented water reuse programs and regulations. This section outlines the regulations in effect in the states of California, Florida and New Jersey.

California

California's water reuse program, which is the oldest in the country (the first measures date back to 1918), is managed by the State Water Resources Control Board (SWRCB) through regulations found in Title 17 and 22 of the California Code of Regulations. Water reuse is an extensive and vital part of managing California's growing water scarcity problems. The state's program has grown considerably over the years and now covers a scope that is matched in breadth only by the State of Florida. California is currently in the process of developing regulations to facilitate the direct potable use of treated wastewater.

California's 2019 plan for advancing water reuse, the "Water Reuse Action Plan," was a collaboration between the state's major water districts and private consulting firms. It was intended to help the state reach its maximum reuse potential, with a goal of increasing from 750,000 acre-feet per year in 2015 to an expected growth potential of 1,500,000 acre-feet per year. To accomplish this, California hopes to advance potable water reuse research and development, streamline permitting procedures, increase local collaboration, incentivize reuse infrastructure, and expand grant and loan opportunities.

California regulations have the following categories:

- Disinfected Secondary – Recycled Water
- Disinfected Tertiary – Recycled Water

The disinfected tertiary category allows unrestricted access to golf courses and is the most stringent and is the current standard guideline considered for application on Long Island.

Table 2 – California Title 22 Disinfected Tertiary Criteria

Parameter	Criteria
Total Coliform	• Median concentration does not exceed an MPN of 2.2 / 100 ML in a 7-day period • Does not exceed MPN of 23 / 100 ML more than once in a 30-day period • Never exceed MPN of 240 / 100 ML
Turbidity	• Cannot exceed an average of 2 NTU within a 24-hour period • Cannot exceed 5 NTU more than 5% of the time within a 24-hour period • Cannot exceed 10 NTU at any time
Virus Inactivation	• >5-log removal of MS2 Phage or Polio virus

Table 3 – Reuse of Recycled Water Under California's Title 22

Use Type	Allowable Uses
Irrigation	• Food crops where recycled water comes into contact with edible portion of crop • Parks, playgrounds • Landscaping • *Unrestricted access golf courses*
Cooling	• Industrial or commercial cooling of air condition cooling tower, evaporative condensers
Other Purposes	• Flushing of toilets and urinals • Industrial process water that may come into contact with workers • Structural fire fighting • Commercial car washes

Florida

Florida's reuse program is overseen and permitted by the state's Department of Environmental Protection (FDEP) pursuant to the Florida Administrative Code, Chapter 62-610, titled "Reuse of Reclaimed Water and Land Application." The regulations, which were first created in 1989, have been revised through the years as more has been learned about using reclaimed water for edible crops, public access areas and industrial and urban uses.

The code regulates treatment and disinfection, operations & maintenance, monitoring, setback distances, control systems and surface runoff. It also governs the permitting of a range of reuse systems, including edible crops, toilet flushing, fire protection, groundwater recharge and industrial cooling. Like California, Florida currently has an effort is underway to add potable reuse regulations to the state's code.

A key component to Florida's long-standing success with water reuse is a commitment to collaboration through a broad coalition that includes EPA Region 4, various Florida state agencies (FDEP, Department of Health, Public Service Commission, Department of Agriculture & Consumer Services, and Department of Economic Opportunity), and the numerous water management districts throughout the state.

New Jersey

New Jersey Department of Environmental Protection (NJDEP) has made a similar investment in water reuse. In 2005, the Bureau of Surface Water and Pretreatment Permitting released the "Technical Manual for Reclaimed Water for Beneficial Reuse" that reviews planning and implementation tools, tips and requirements. The manual governs all reuse projects pursuant to the New Jersey Administrative Code. In addition, the manual provides information on potential funding opportunities and tax benefits for water reuse projects.

These efforts have resulted in over 125 permits through the New Jersey Pollutant Discharge Elimination System for reuse projects across the state. The regulations contain the effluent reuse treatment guidelines for New Jersey, with water quality and monitoring requirements for public access landscaping, edible and non-edible crop irrigation, industrial systems, and construction and operational reuse systems.

Water Reuse Applications

The potential applications of water reuse are limitless: reclaimed water can be used for essentially any water application where freshwater is needed. The only requirement is that the water be treated to an appropriate standard to ensure the health and safety of the end users. For this reason, regulation of water reuse is typically broken down by use category and expected human contact into three major types, with different treatment requirements for each. The three water reuse categories are environmental, non-potable and potable.

Table 4 – Water Reuse Applications

Use Type	End Use of Reclaimed Water
Environmental	• Streamflow Augmentation • Wetlands Restoration • Seawater Intrusion Barrier
Non-potable	• Agricultural Irrigation • Municipal or Residential Irrigation • Building or Industrial Cooling Towers • Boiler Makeup • Process Water • Industrial Wash Water • Industrial Fire Protection • Municipal Water Supply
Potable	• Indirect Potable Reuse • Direct Potable Reuse

Source: WEF: Water Reuse Road Map Publication

Water reclaimed for potable uses requires the highest level of treatment, water used for environmental purposes requires the least. Non-potable uses fall on a spectrum in between, depending on the potential for direct human contact.

On Long Island, water reuse is expected to initially fall into the following categories: irrigation, industrial/commercial, municipal water supply and environmental, as detailed below.

Irrigation

Irrigation is the most common use of reclaimed wastewater around the world, especially in regions with low annual precipitation. This practice is often referred to as "fertilized irrigation" or "fertigation" due to the fact that the low levels of nitrogen (and other nutrients) commonly present in the treated wastewater generally enhances the growth of the irrigated plants. This fact is often a benefit to the end-user as it reduces reliance on synthetic fertilizers and generates cost savings. Importantly, in the process of using these nutrients, the irrigated plants "polish" the recycled reclaimed water, improving the water quality before it recharges into aquifers or flows to surface waters.

Reclaimed water can be used for landscape irrigation, including golf courses, public parks, corporate and educational campuses and municipal rights-of-way. Treatment requirements for such projects vary based on the extent of human contact and public access to the areas being irrigated. In some cases, the availability of reclaimed water can allow for greater irrigation rates, such as golf courses with private wells that are capped by withdrawal limits.

In addition, reclaimed water can also be used in agriculture for both food and non-food crops, with the water quality standards being, not surprisingly, more stringent for food crops. Non-food crop applications include horticulture facilities, such as flower and ornamental plant nurseries, as well as turf or sod farms. As some nutrient constituents of wastewater can be harmful to various crops, it is important that irrigation projects include a detailed understanding of both the reclaimed water's chemistry and the needs of the target plants before implementation.

Industrial/Commercial

Reclaimed water is also common in industrial applications, where it is used in a range of facilities and job sites that require water as part of their operational process. For example, reclaimed water is often used internally at sewage treatment plants for wash-down and other purposes (this "low-hanging fruit" strategy is currently being utilized to clean equipment at the Great Neck Water Pollution Control District and Nassau County's Cedar Creek WWTP). It is also common in the construction industry to control dust, mix concrete and a host of other purposes.

Another common application for reclaimed water is for cooling in a variety of industries. It's used in cooling towers in power plants, generators in factories and cooked liquids in the beverage industry. In these applications the water is often recirculated and typically kept isolated in non-contact conditions, which requires a low level of treatment. In the contexts of power plants, using reclaimed water for cooling can also achieve important ecological benefits by reducing typical reliance on surface waters, which results in high mortality to larval and planktonic marine life that is drawn directly into the power plant from adjacent waters.

A benefit of industrial applications is that they typically engender little opposition since there is little to no public exposure to the reclaimed water. Support for industrial uses is also increased when they generate reduced utility costs for businesses using the reclaimed water. Finally, since most industrial applications do not involve public contact, the quality standard is limited by the industry's own water quality requirements.

It is important to note that with some industrial reuse applications, while there is always a water quantity benefit, there is little overall water quality benefit. This is because the nitrogen or other contaminants are not reduced through the reuse application.

Municipal Water Supply

Reclaimed water can also be used to supplement municipal water supplies. Most commonly, it is used for secondary indoor uses such as toilet flushing, laundry, etc., generally in larger facilities, such as government complexes, schools, sports arenas, community centers and commercial centers. This requires separate potable and reclaimed water distribution lines in the facility and is often accomplished with an on-site treatment system that recycles potable water used in the facility. The large on-site reclamation project that was installed in Battery Park City buildings is one high-profile example.

This use is most feasible in new construction where separate lines and recycling equipment can be more easily installed. Reclaimed water can also be treated to drinking water standards and be used as a potable water supply. Potable reuse has been implemented in water-scarce areas in the US and globally but requires a very high level of water treatment and considerable effort to achieve public acceptance. Direct potable water reuse is in the process of being implemented in California, Colorado and Florida.

Environmental Reuse

A fourth major category of water reuse with high potential application on Long Island is "environmental" reuse or reuse to advance ecosystem health. This application is similar in nature to standard wastewater disposal, where treated wastewater is discharged into ground or surface waters. However, in an environmental reuse application, the goal is to not just to dispose of the wastewater (generally as easily or affordably as possible), but rather use it to address a hydrological or ecological need.

For example, reclaimed water can be used to augment streamflow or restore aquatic habitat. In such surface water applications, water quality benefits can be achieved through additional polishing, where aquatic plants and microbes uptake nitrogen and other components in the reclaimed water. Environmental reuse can also involve injecting reclaimed water into the ground to replenish depleted water tables and combat saltwater intrusion. Unless the water is being used for potable groundwater recharge, recommended water quality standards are typically within the limits of existing wastewater treatment.

Water Reuse Treatment Technology

Existing Treatment Technology

In New York, wastewater treatment plants (WWTPs) are permitted and regulated through New York's State Pollutant Discharge Elimination System (SPDES), which is managed by NYSDEC pursuant to authority delegated by the U.S. Environmental Protection Agency (EPA). There are generally two levels of treatment authorized under the SPDES program on Long Island: "secondary" and "tertiary" treatment. Secondary treatment reduces biochemical oxygen demand (BOD5), suspended solids (SS) and ammonia (NH3-N), while tertiary treatment also reduces total nitrogen in addition to BOD5, SS and NH3-N.

SPDES permit limits are generally based on the land use of the community served and the WWTP's effluent discharge location. The potential impact of the discharge on local receiving waters (marine discharge) is also considered.

Surrounding land use plays a role as the permit limits are tailored to capture the influent characteristics of the wastewater being generated. This report focuses on WWTPs in residential and commercial communities. On Long Island, specifically, the existence of large industrial WWTPs is few due to the land use of the Island. Industrial WWTPs may have targeted permit limits based on the influent characteristics, such as a particular chemical, pharmaceutical or metal that is manufactured or processed in the WWTP's service area. However, there are some metal concentration limits in residential and commercial communities as well. For example, permits typically reference an acceptable concentration of lead in the WWTPs effluent, as lead was the traditional piping material of water distribution systems. It has been known to be found in excess at WWTPs in more established communities having older water distribution systems.

On Long Island, WWTPs discharge to either groundwater (through the use of leaching pools or recharge basins) or marine surface waters. WWTPs discharging to groundwater typically have permit limits that include BOD5, TSS and total nitrogen (TN) of 10 mg/l. Surface water discharge permits require a minimum of secondary treatment limits with added requirements of coliform limits (disinfection), E. coli limits and nitrogen reduction. Depending on the surface water's characteristics and the exact discharge location (ex. tidal flushing, water's health, water use – beach access, fishing, water quality issues, etc.), the TN limit may be required and is typically lower than that of a groundwater discharge permit and a very low level of coliform bacteria.

Due to the timing of EPA regulations, federal funding opportunities and Nassau County's year-round population, 85-90% of Nassau County's population is serviced by sewer systems with WWTPs located on the north and south shores, all coastally located treatment facilities discharge to marine surface waters.

In contrast, in Suffolk County WWTPs only serve approximately 26% of the county's population. As compared with other highly populated counties of downstate New York, Suffolk County's land area is one of the largest. The population boom (about a 300% growth) from 1950 to 1970 occurred just before the Clean Water Act was reorganized and expanded. Suffolk County's 1972 report known as the 208

Study, laid the foundation of the County's zoning regulations and guidelines still referenced today.

While there are approximately 200 WWTPs located in Suffolk County, most of the large treatment facilities are located on the shorelines with marine surface water discharges. This is primarily because high property values makes groundwater discharge cost prohibitive because of the large amount of land required. In some cases, the WWTP may not be directly located on waterfront, and has an effluent pump station to transfer the treated effluent to a surface water to be able to obtain a surface water permit

Advanced Treatment Technology: Selections & Assumptions

As stated above, the level of treatment that reclaimed wastewater must undergo before being applied in a reuse project depends on the application. Simply put, the more potential for human contact with reclaimed water, the more treatment is required. There's a considerable difference in wastewater treatment between environmental uses on one end of the spectrum and potable uses on the other.

While there are not yet New York State standards to guide reuse projects on Long Island, it is assumed that a majority of applications will require additional treatment to meet standards that conform with the California Title 22 tertiary disinfection criteria. Satisfying this standard will require treating the wastewater with both a tertiary microfiber filtration system and UV disinfection.

For the purpose of the "Roadmap Prioritization Matrix" below, where the costs of potential reuse projects on Long Island are analyzed and used in ranking priority projects, a selection of treatment technologies was established. The equipment selected is detailed below.

The design and construction costs for the decision-making exercise included three conceptual flow ranges: 100, 200 and 300 gallons per minute (gpm). These flows represent design points for typical reuse projects due to size and scope. For example, reuse for golf course irrigation will use a 300-gpm flow rate, while a general landscaping application is assigned a rate of 100-gpm. A summary of the project assessment and costs is provided in Appendix B.

Filtration Systems

Compliance with criteria of California Title 22 (the long-time national benchmark for water reuse standards) requires a polishing filtration system for turbidity and solids removal. Here, the Amiad AMF Filter, a self-cleaning microfiber water filter produced by an approved Title 22 manufacturer, was selected for treatment schemes. The Amiad filter has a record of exceptional performance and the ability to treat down to at least 20 microns. The filter is also effective in removing Cryptosporidium and Giardia Cysts. This level of filtration will enhance the transmissivity and therefore increase the performance of the UV disinfection.

UV Disinfection

In addition to a water polishing system, compliance with California Title 22 water reuse standards also requires an in-line UV disinfection unit to further protect end users from contact with microorganisms. Here, a Trojan UVFit 72AL75 is recommended for overall performance and design capabilities. The Trojan UVFit 72AL75 unit disinfects flows up to 300 gpm. The unit's upstream filtering requirement of 50 micron would be satisfied by the Amiad AMF Filter.

Miscellaneous Equipment & Costs

Additional items and assumptions for water reuse treatment costs include the following:

- Pre-engineered building to house the treatment system.
- Pump station and force main to transfer the water to the end user.
- Up to 50,000 gallons of storage at the point of use
- Distance between the end user and the WWTP (determined using Google Maps with the assumption that the piping is placed within roadway right-of-ways)
- Contingency of 50%, based on a planning level study estimate.
- 25% added for soft costs (i.e., engineering and construction management)
- Complex cost factor (from 5 to 20%) added to account for constructability issues, such as complexity (highway/railroad/high traffic roads) and grade differentials that impact pumping costs and operations.
- Costs are based on 2023 dollars.
- Costs do not reflect a present worth analysis, which is beyond the study scope and are for comparative purposes only. Present worth is based on all future costs (operation and maintenance) and transformed to equivalent present day costs.

Screening, Prioritization & Action Plan

Screening of Water Reuse Opportunities

The effort at the heart of this project – to identify and prioritize water reuse opportunities on Long Island – began with compiling a list of all publicly owned wastewater treatment plants (WWTP) in Nassau and Suffolk counties (see locations in Figures 4 - 6 below).

Table 5 – Long Island Publicly Owned WWTP

Long Island Publicly Owned WWTP	
Nassau County	9
Suffolk County – SCDPW	24
Suffolk County – Non-SCDPW	15
TOTAL	**48**

Nassau County has nine public WWTP, all of which are all located on the north and south shores. The two largest, the South Shore Water Reclamation Facility (previously known as the Bay Park Sewage Treatment Plant) and the Cedar Creek WWTP, are owned by Nassau County.

Suffolk County has thirty-nine public WWTP, the majority of which (24) are managed by the Suffolk County Department of Public Works. The other fifteen plants are managed by various towns and villages. In addition, there are over 130 small, privately owned treatment plants in Suffolk County. While these private WWTP fell outside the scope of this review, a detailed analysis of these facilities is warranted as they would likely provide additional water reuse opportunities.

With the 48 public WWTP identified, the area within a two-mile radius of each of these facilities was carefully screened for water reuse application opportunities (golf courses, nurseries, industrial facilities, etc.). The study focused on the following categories: irrigation, commercial/industrial, and environmental, which are discussed in detail below. Reclaimed water potential end users as a supplement to municipal water supply were identified, however a detailed study was outside the scope of this study.

Appendix A contains "Summary Cards" for each of the forty-eight WWTPs, identify all potential reuse projects within the two-mile radius and providing detailed information about the facility's size, treatment volume, existing technology, etc.

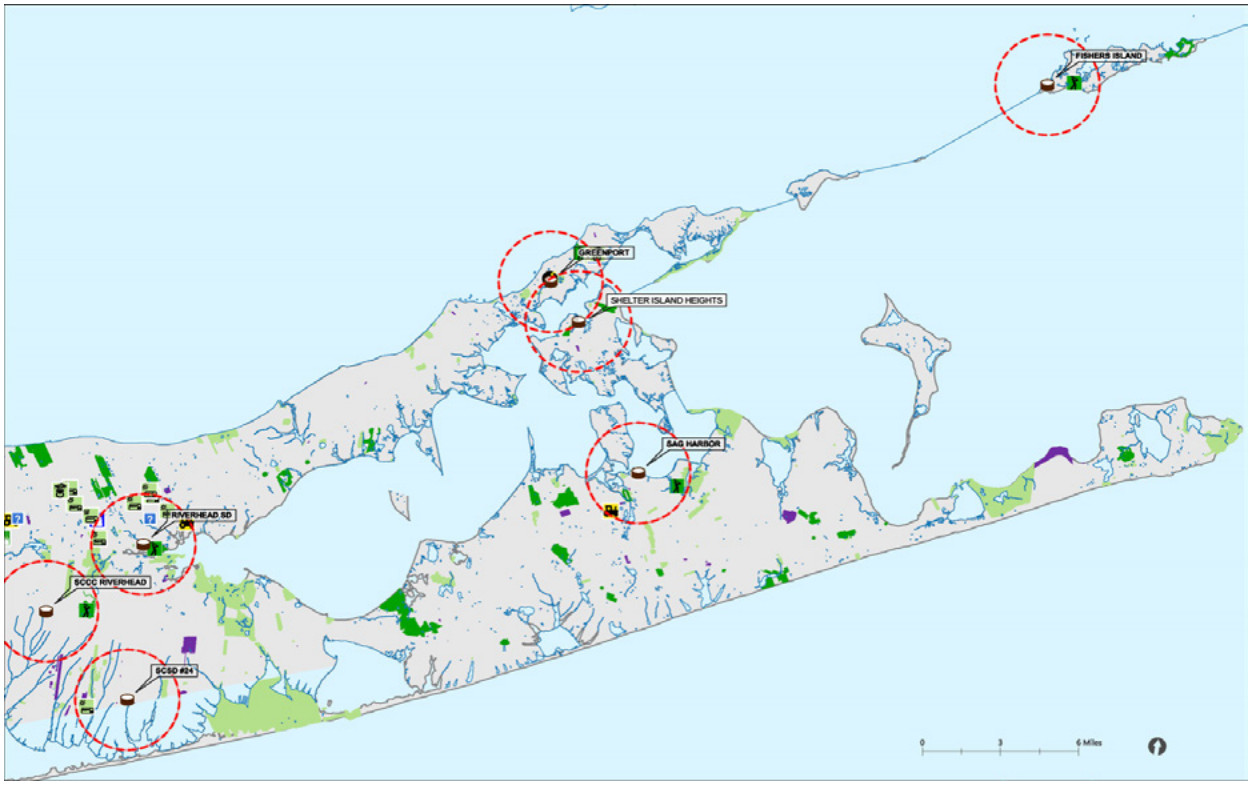

Figure 4 – Nassau County WWTP

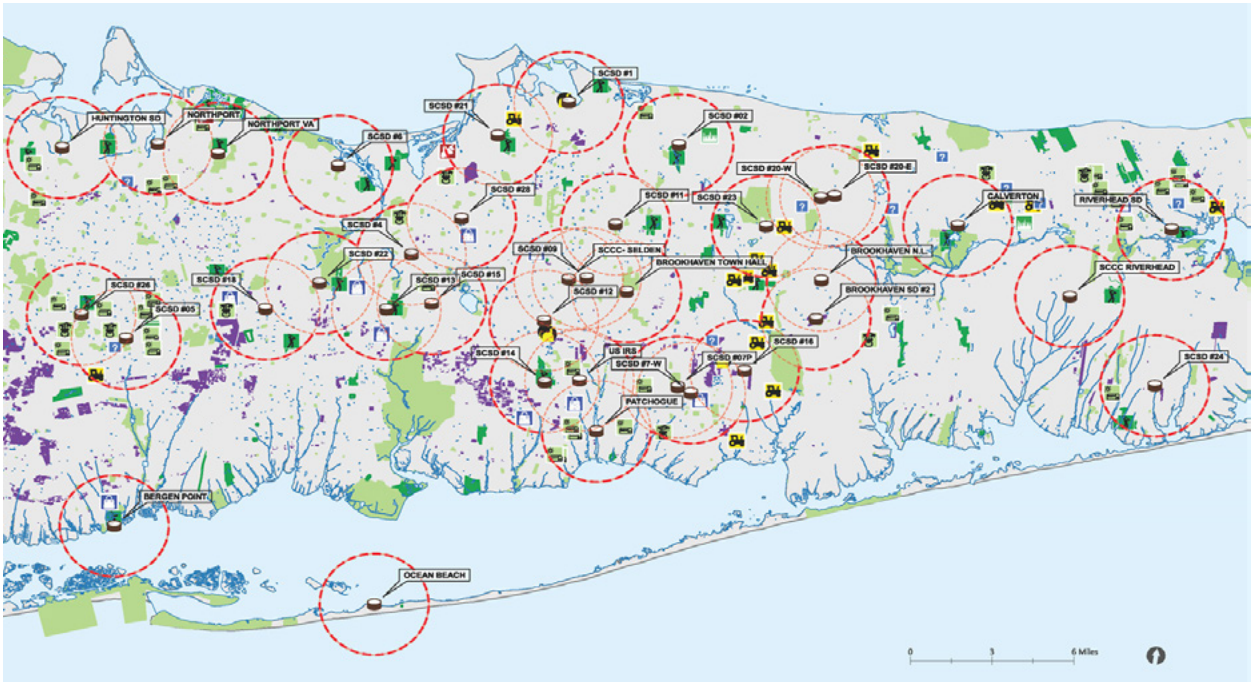

Figure 5 – Nassau County WWTP

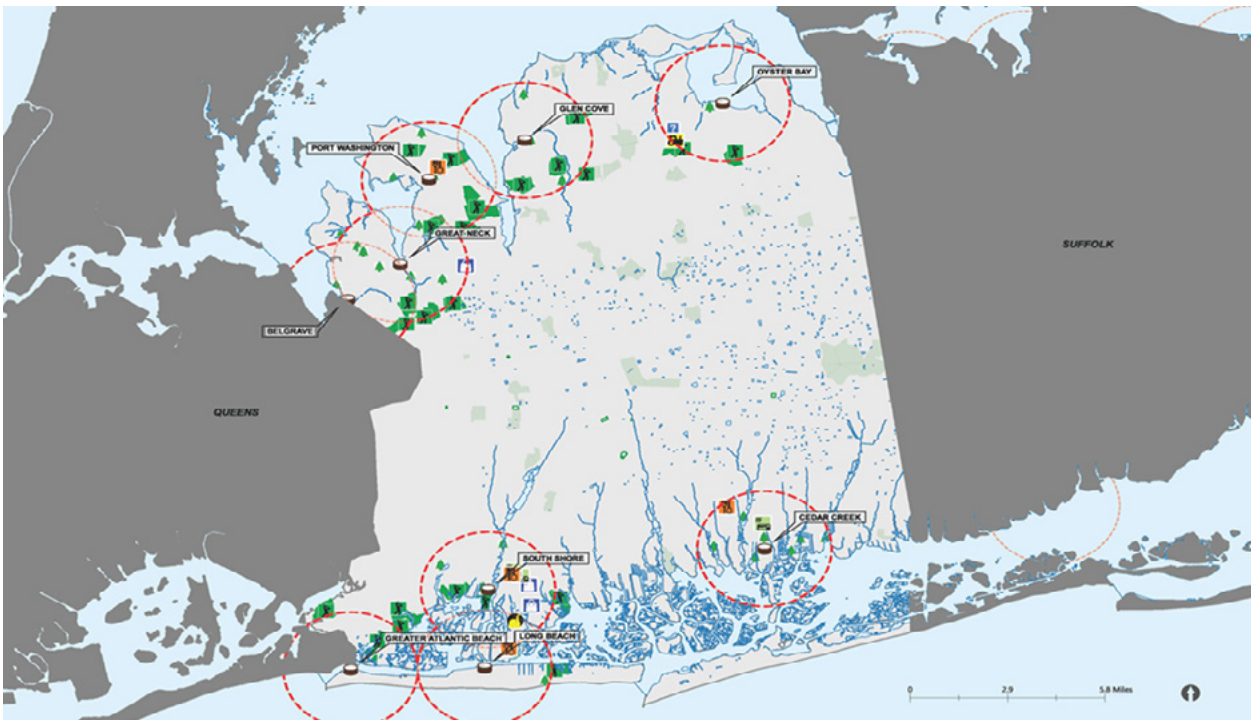

Figure 6 – Nassau County WWTP

Irrigation

Reclaimed water is ideal for non-potable watering at locations such as golf courses, sod farms and greenhouses, as well as for lawns, fields and landscaping on commercial and educational campuses. Ninety-one potential irrigation projects were identified as possible end-users for reclaimed water from the forty-eight Long Island WWTPs.

With more than 140 water-reliant golf courses on Long Island, golf course irrigation, not surprisingly, represents one of the region's best opportunities for using reclaimed water. More than a third of the region's golf courses (49/140) are within two miles of a public WWTPs. In fact, the Long Island Nitrogen Action Plan (LINAP) – a collaboration between NYSDEC, Nassau & Suffolk counties, and the Long Island Regional Planning Council – has recognized the potential for water reuse on golf courses as an important opportunity to reduce nitrogen loading on Long Island. Given this, it is no surprise, as detailed in section xxx above, that Long Island's first water reuse project, at the Riverhead WWTP project, involved using reclaimed water for irrigation at a golf course.

In addition to golf course irrigation, there are also many public parks and preserves, agricultural facilities and commercial/educational campuses throughout the region that could potentially use reclaimed water for irrigation. While much of the agriculture on Long Island is in rural areas that are less likely to be near treatment plants, there is still considerable potential for reclaimed water to be used at sod farms, greenhouses, and nurseries, which are more widely distributed across the island.

Commercial/Industrial Reuse

Commercial centers, industrial parks and job sites have considerable potential to utilize reclaimed water for a range of purposes, from cooling to cleaning to mixing non-consumptive products (e.g., concrete). While assessing the scope of costs and requirements for such commercial/industrial water reuse (which often requires retrofitting existing facilities) is beyond the scope of this plan, the individual "summary cards" for each public WWTP identify nearby commercial centers, industrial parks, and energy plants for potential future projects.

Energy plants are a major water consumer on Long Island, mainly for use in cooling towers. However, the technical challenges with process use and associated biofouling, scaling and corrosion made it difficult to determine the viability of water reuse projects at these facilities and, therefore, was not considered in the Reuse Matrix analysis.

New York City has found success encouraging on-site water reuse systems at industrial and commercial facilities – in fact the city won a 2022 Transformational Award from the Water Reuse Association. The City's Department of Environmental Protection encourages reuse by offering a "Water Conservation and Reuse Grant Pilot Program" that provides funding for design and installation of on-site water reuse systems. In addition, DEP's Comprehensive Water Reuse Program offers a water and wastewater fee discount for customers who reduce their building's water consumption by at least 25% through a water reuse system.

Development of such a program is beyond the scope of this report, but it would be a helpful tool for Nassau and Suffolk counties; it is recommended that this strategy be investigated by state and county policy and decision makers to determine its viability on Long Island. Is this in the action plan?

Wastewater treatment plants have tremendous potential to reclaim treated water and use it on site within their own facilities. These internal applications at WWTPs are considered the "low hanging fruit" for water reuse and should be a high priority. They are simple, relatively low-cost ways to begin to implement water reuse throughout Long Island.

Typical water reuse opportunities at a WWTP include:

- Wash down/cleaning water
- Seal water systems
- Spray water (foam control) systems
- Process chemical make-up water (i.e., polymer)
- Fire Protection

Several WWTPs on Long Island have already implemented and reported success in implementing internal water reuse projects. The Nassau County Cedar Creek facility utilizes treated effluent for various plant operations and process cooling water, saving nearly one million gallons of water on a daily basis. Similarly, the Great Neck Water Pollution Control District reutilizes treated effluent for pump seal water, belt press, washdown and cleaning systems, and reported average savings of 27 million gallons of potable water per year. The Nassau County South Shore Water Reclamation Facility is also considering water reuse projects for service water, seal water and fire protection. Irrigation at the adjacent golf course is also under consideration.

Using reclaimed water within WWTPs is a highly cost-effective method to initiate water reuse programs. There are minimal transport costs and the complexity of retrofitting pipes and installing hose spigots at the outflow of the plant's treatment process is limited. While these projects have not been specifically analyzed or included in the prioritization ranking in this report, internal reuse is applicable at all WWTPs. It is strongly recommended that internal water reuse be implemented by all facility operators on Long Island.

Environmental Reuse

Reclaimed water can also be used to address hydrological or ecological needs, such as augmenting streamflow, restoring aquatic habitat, supplement aquifer recharge or irrigating native flora. These application use can be especially valuable on Long Island to address problems related to the historic high rates of groundwater pumping, which has reduced freshwater wetland habitat and resulted in increased saltwater intrusion into the region's aquifers.

In places where salt water intrusion is increasing, reclaimed water can be used to increase groundwater infiltration and help augment freshwater aquifers. In places where streams are running below historic levels (which includes most streams in south Nassau), reclaimed water can be used to supplement flows and restore wildlife habitat.

In fact, there have already been several efforts to augment stream flow (using ground water, not reclaimed water) on Long Island. These include the Nassau County Flow Augmentation Needs Study (FANS) in the early 1980s and the Stream and Wetland Area Management Program of the early 2000s. Three flow augmentation projects were implemented as part of the FANS study: Meadowbrook Creek, Seaford Creek and Massapequa Creek.

Various groundwater and streamflow studies by the USGS can also be used to help direct efforts to establish groundwater recharge, stream augmentation, and irrigation of State and County parks through water reclamation on the Island.

Appendix C summarizes the nature preserves within a 2-mile radius of the WWTP. Long Island has many parks, nature and wildlife areas that offer large areas for potential irrigation.

Shallow pressurized drainage systems can be considered (Fertigation) and could be a potential benefit and a viable water reuse alternative.

The evaluation of the feasibility and impacts to the environment are outside the scope of this study.

Irrigation Prioritization Matrix

The primary analytical component of the Roadmap is a detailed review and ranking of each of the ninety-three potential irrigation projects identified in the screening process. This was done through an analytical framework (Reuse Matrix) that scored each potential project pursuant to a range of factors. While there is considerable potential on Long Island for the commercial/industrial, municipal water supply and environmental reuse projects identified through the screening process, these projects were not specifically analyzed in the Reuse Matrix or included in the prioritization ranking in this report.

Matrix Criteria & Methodology

To score and rank the potential irrigation reuse projects, the following factors were considered:

- Normalized capital cost
- Nitrogen reduction
- Annual quantity of potable water savings
- Water supply pumping concerns
- Effect on water management at the project location
- Transmission distance
- Potential for associated projects to share infrastructure

To convert the project factors into a decision matrix each factor was assigned a weighted value (multiplier) and a score. Multipliers are adjustable depending on the level of importance of the specific item and sum to a total of 100%. The score for each factor and ultimately each project has a point range of 1-4, with a lower score being less desirable and higher score being more desirable.

Normalized Capital Cost

Capital cost is always a major consideration when ranking project feasibility and worthiness and as such was given the largest multiplier of thirty percent (30%).

To normalize the comparison of projects of varying size, the capital cost was divided by the gallons of reuse water the project would consume annually. The capital construction cost was determined using the price points to install the tertiary microfiber filtration and UV treatment system shown in Section 5.3 based on the project flow rate and the cost to install the distribution line for the length of the transmission distance.

The capital cost per gallon of water reused annually had a wide range for projects assessed. The lowest cost was just above $0.09, and the highest cost was just above $60. Projects with a large volume potential user in close proximity to the WWTP were able to have a lower cost per gallon reused, while smaller volume projects that are farther from the WWTP had a higher cost per gallon reused. Ranges for the top scores were based on desired cost for projects while the ranges for the lower scores were made to accommodate the breadth of project costs.

Score	Range
4	$0.01 - $0.30
3	$0.31 - $1.00
2	$1.01 - $5.00
1	$5.01 - $60.00

Nitrogen Reduction of WWTP Discharge

Protection of Long Island's marine and estuarine waterways from the environmental impacts of excess nitrogen loading is a major impetus for the Roadmap. For this reason, nitrogen reduction was given high priority in the ranking matrix; it was assigned the second highest multiplier of twenty percent (20%).

Nitrogen reduction was compared using the capital cost per pound of nitrogen removed over an expected lifetime of 20 years. The nitrogen removed by the project was estimated using nitrogen limits for the WWTP source of either 10 mg/l for groundwater discharge or 5 mg/l for surface water discharge. Typically, nitrogen reduction projects are for untreated water which would have a much higher concentration than treated wastewater. As such the cost per pound of nitrogen removed was generally higher than typically seen in nitrogen reduction projects, ranging from $60 to $64,000. Similar to capital cost larger projects tended to score much higher in this category. These ranges seem skewed to the low end.

Score	Range
4	$58 - $500
3	$501 - $1,000
2	$1,001 - $5,000
1	$5,001 - $65,000

Annual Quantity of Potable Water Savings

Reducing over-reliance on Long Island's aquifers was the other major impetus for the water reuse roadmap. This factor, which considers the quantity of potable water saved annually, was given a multiplier of fifteen percent (15%).

Most projects assessed are irrigation projects where annual usage was estimated by project acreage and the typical irrigation rate for the project use type. Irrigation rates are based on a Natural Resources Conservation Service, New Jersey Irrigation Guide. The values used can be found in the project assessment assumptions in Appendix C. The remaining projects were energy plants whose annual water usage was pulled from a 2015 Harrington News article on Long Island power plants' freshwater usage.

The projects had a very wide range of expected annual usage from 350,000 gallons to almost 150 million gallons per year. The ranges were chosen to try and evenly disperse projects to the 4 scores.

Score	Range
4	30 - 150 million gallons
3	10 - 30 million gallons
2	3 - 10 million gallons
1	0.35 - 3 million gallons

Water Supply Pumping Concerns

This factor considers whether the project is in an area of Long Island where there are existing or imminent concerns about drawdowns of the aquifer. This relates closely to reducing over-reliance on Long Island's aquifers and was given a multiplier of ten percent (10%).

The scores, which are ranked from very high to negligible, were based on whether the location had current or imminent issues related to water quantity, specifically, the need for well water caps or existence of salt water incursion. USGS data was used to determine if there are existing or anticipated water table concerns in the project area.

Score	Range
4	Very high – area has current issues with both well water caps and saltwater intrusion
3	High – area has concerns about both well water caps and saltwater intrusion in the near future
2	Limited – area does not have well water caps but does have saltwater intrusion concerns
1	Negligible – area does not have well water caps or saltwater intrusion concerns

Effect on Water Management at Project Location

This factor considers whether the addition of extra water infiltration will have a positive or negative impact on local water management at the project location; it is multiplied by ten percent (10%).

The main project attributes considered are the elevations in the local water table and risk of saltwater intrusion in the area. Saltwater intrusion concerns are the same used in the previous factor. Adding infiltration to an area with saltwater intrusion concerns will generally have a positive impact to counteract the effects of the intrusion interface by enlarging the barrier against seawater. However, if the area has a high-groundwater table the added infiltration could potentially increase local basement and street flooding during storm events.

Score	Range
4	Positive impact through addition of water infiltration to an area at risk of saltwater intrusion
3	Potential for positive impact through addition of water infiltration to an area that will likely be at risk of saltwater intrusion in the near future.
2	Neutral impact with addition of water infiltration to an area not at risk of saltwater intrusion OR no impact due to no addition of water infiltration for a non-land applied project.
1	Negative impact due to increased flooding risk from addition of water infiltration to an area with a high-water table.

Transmission Distance

Transmission distance between the WWTP and the end-use site represents the largest potential capital cost for reuse projects and is the most significant component of the project's operational cost. These are important factors when considering a project; however, it should be noted that construction difficulties can be overcome with proper and detailed planning. Further, pumping costs associated with a water reuse project will be comparable to or less than purchasing fresh water from a water purveyor. As such, transmission distance was given a multiplier of ten percent (10%).

The transmission distance for the assessed projects was estimated by using Google Maps to measure the driving route from the WWTP to the end-use project. End users ranged from being adjacent to the WWTP to as far as 4.5 miles away. As seen below, the highest score was assigned for projects within a half mile of the WWTP, with each range increasing by a mile up to the max distance, except for the last range which covers two miles.

Score	Range
4	0.0 - 0.5 miles
3	0.51 - 1.5 miles
2	1.51 - 2.5 miles
1	2.51 - 4.5 miles

Potential for Associated Projects to Share Infrastructure

This final factor assumes that the potential to execute one project in coordination with another increases the overall ease and cost of implementation. This was given the lowest multiplier of five percent (5%) since the ability to coordinate multiple projects will be inherently challenging, and, further, because the lack of coordination should not be a major factor that inhibits project implementation.

The best potential project overlap will likely occur when a WWTP is renewing its SPDES permit (typically a lengthy process) and desires to add water reclamation treatment and effluent approval at the same time. Next, when projects were mapped for transmission distance, it was also checked if a single force main could potentially share treated effluent with multiple end users. Lastly, projects that were located far from others but still had other potential end users from the same WWTP were considered and are scored.

Score	Range
4	WWTP has an upcoming SPDES permit renewal
3	There are multiple potential end users along a single force main
2	There are multiple potential end users for the same WWTP
1	No potential projects

Matrix Results

A prioritization matrix was used to assess, score and rank each of 91 identified potential water reuse irrigation projects. All projects received a score (from 1 to 4) in each of the seven categories outlined above (Section 6.1) and were then ranked by descending total score ("overall matrix score"), with each project assigned an ID based on that order (See, Appendix B). The score scale for each category can be found at the bottom of each page. The information collected and used to determine each categorical score for a project is included in the project assessment documents included below; the project ID can be used to quickly find the information for a specific project.

In addition to the overall project list, the potential irrigation projects have been organized into three tiers based on their overall matrix score, with Tier 1 projects having the highest feasibility and Tier 3 the lowest.

Finally, the projects have also been organized into five "Top Ten" lists, based on the following criteria:

- Most water reused
- Most nitrogen removed
- Lowest normalized project cost
- By County: Nassau County and Suffolk County

Projects by Tier

Table 6 presents the 17 Tier-1 projects that scored 3.0 and above on the prioritization matrix. The projects, which are presented in alphabetical order, range in cost from $4.3 to $28 million. Not surprisingly, projects with lower capital costs tend to be closer to the WWTP with costs that ranged from $4.3 to 5.3M. Most of the projects involve golf course end uses, with one educational institution also included (SUNY Stony Brook).

Table 7 presents the 21 Tier-2 projects that scored 2.5 to 2.9 on the prioritization matrix. Nine of the projects are golf courses; others that scored high enough to make the Tier 2 list include the following:

- Sod Farms: L. Delea and Sons Sod Farms (Miller Place)
- Greenhouses: Kurt Weiss Greenhouses (Melville)
- Town Parks: City Stadium (Glen Cove), Sipps Ave Complex (Patchogue), Half Hollow Park (Melville)
- Educational Institutions: Manhasset Secondary School (Manhasset), Miller Place High School (Miller Place) and Kings Park High Schools (Kings Park) [Note: the Forge River Schools near the future Forge River Sewer District also scored on the Tier 2 list]
- Farms: Pantaleons Farms (Stony Brook), M&F Farms and White Post Farms (Melville)

Table 8 and 9 (should this be one table?) presents the Tier-3 projects that scored under 2.5, including the following:

- Sod Farms: DeLalio, Delea and Satur Farms (Calverton)
- Nurseries; Deckers (Greenlawn), Van Cott (Greenlawn) and Bloomin Haus (Holtsville)
- School Landscaping; Great Neck Public Schools (North Hempstead), Northport High School (Northport), Harborfields High School (Greenlawn) and Suffolk County Community College (Selden)
- Farms; Holmes Farm (Huntington), Longwood Farms (Middle Island)
- Vineyards: Del Vino (Northport) and Whisper Vineyard (Nesconset)
- Groundwater Recharge/Injection; Shelter Island and Greenport

Table 6 – Tier 1 Projects (17)

WWTP	User	ID	Score	Annual Usage (gal)	Capital Cost ($)	Normalized Cost ($/annual usage)	lb N removed annually	$/lb N removed Lifetime	End Users that Could Share Capital Costs
Belgrave WPCP	Lake Success Golf Club	17	3.00	29,230,000	$22,250,000	$0.76	1217	$914	None
Glen Cove WWTF	Glen Head Country Club	10	3.20	45,410,000	$18,220,000	$0.40	1891	$482	None
	Nassau Country Club	14	3.00	38,890,000	$16,870,000	$0.43	1619	$521	None
	North Shore Country Club	15	3.00	40,720,000	$18,890,000	$0.46	1695	$557	None
Great Neck WPCD	Fresh Meadows Country Club	3	3.45	41,760,000	$14,850,000	$0.36	1739	$427	Fresh Meadows Country Club, Deepdale Golf Club, North Hills Country Club, Manhasset Secondary School and Greentree Campus.
	Deepdale Golf Club	7	3.25	45,150,000	$20,240,000	$0.45	1880	$538	
	North Hills Country Club	11	3.15	38,370,000	$28,310,000	$0.74	1598	$886	
Oyster Bay STP	Mill River Club	13	3.05	31,840,000	$20,910,000	$0.66	1326	$789	Memorial Stadium
Port Washington WPCP	Village Club of Sands Point	1	3.65	53,770,000	$5,310,000	$0.10	2239	$119	Sands Point Golf Club
South Shore WRF	Bay Park Golf Course	16	3.00	11,220,000	$5,360,000	$0.48	467	$573	None
Suffolk County SD No. 2	Willow Creek Country Club	5	3.40	35,040,000	$5,110,000	$0.15	2918	$88	None
Suffolk County SD No. 3	Bergen Point Golf Course	4	3.40	37,060,000	$5,360,000	$0.14	1543	$174	None
Suffolk County SD No. 6	Smithtown Landing Golf Course	12	3.10	41,760,000	$14,150,000	$0.34	3478	$203	None
Suffolk County SD No. 13	Wind Watch Golf Course	6	3.35	32,850,000	$4,950,000	$0.15	2736	$90	None
Suffolk County SD No. 21	St. Georges Country Club	2	3.60	34,450,000	$8,630,000	$0.25	1435	$301	None
	SUNY Stony Brook Campus	9	3.25	13,020,000	$4,370,000	$0.34	542	$403	None
Suffolk County SD No. 26	Greens Golf Course	8	3.25	22,450,000	$4,950,000	$0.22	1869	$132	None

Table 7 – Tier 2 Projects (21)

WWTP	User	ID	Score	Annual Usage (gal)	Capital Cost ($)	Normalized Cost ($/annual usage)	lb N removed annually	$/lb N removed Lifetime	End Users that Could Share Capital Costs
Forge River Sewer District *	Group of Schools Next to Eachother	35	2.70	30,810,000	$27,180,000	$0.88	2566	$530	Schools in area - William Floyd Elementary, John S Hobart Elementary, Nathaniel Elementary, William Floyd High School, William Paca Middle School, Lincoln Ave Sports Complex.
Glen Cove WWTF	City Stadium Park	28	2.90	5,210,000	$4,230,000	$0.81	217	$975	None
Great Neck WPCD	Manhasset Secondary School	38	2.55	4,560,000	$8,680,000	$1.90	190	$2,287	Force main would come off the main leading to the golf courses.
Northport VA Medical Center	Indian Hills Country Club	18	2.95	32,850,000	$20,310,000	$0.62	1368	$742	Northport Golf Course, Crab Meadow Golf Course, Indian Hills Country Club, Northport Middle School, Del Vino Vineyards, and S Scherer and Sons.
	Northport Golf Course	25	2.90	12,530,000	$8,120,000	$0.65	522	$778	
	Crab Meadow Golf Course	32	2.85	32,630,000	$23,600,000	$0.72	1358	$869	
Oyster Bay STP	Pine Hollow Country Club	30	2.90	33,410,000	$23,600,000	$0.71	1391	$848	None
Port Washington WPCP	Sands Point Golf Club	26	2.90	29,230,000	$14,850,000	$0.51	1217	$610	Village Club of Sands Point
	Plandome Country Club	31	2.85	27,140,000	$20,310,000	$0.75	1130	$898	None
Suffolk County SD No. 1	Port Jefferson Country Club	36	2.65	27,670,000	$22,930,000	$0.83	1152	$995	None
Suffolk County SD No. 2	L. Delea & Sons Sod Farm	29	2.90	35,040,000	$15,640,000	$0.45	2918	$268	None
	Miller Place High School	34	2.80	8,250,000	$5,000,000	$0.61	687	$364	None
Suffolk County SD No. 6	Kings Park High School	23	2.90	14,320,000	$12,720,000	$0.89	1193	$533	New Beginning of Kings Park
Suffolk County SD No. 7P	Sipp Ave Complex	27	2.90	10,420,000	$4,230,000	$0.41	867	$244	None
Suffolk County SD No. 11	Pine Ridge Golf Course	20	2.95	39,670,000	$17,140,000	$0.43	3304	$259	Diamond in the Pines
Suffolk County SD No. 21	Pantaleons Farms	22	2.95	12,490,000	$10,270,000	$0.82	520	$987	None
Suffolk County SD No. 22	Stonebridge Country Club	33	2.85	21,900,000	$13,340,000	$0.61	1824	$366	None
Suffolk County SD No. 26	Half Hollow Park	21	2.95	13,020,000	$4,230,000	$0.32	1084	$195	None
	Kurt Weiss Greenhouses	19	2.95	30,660,000	$17,120,000	$0.56	2553	$335	M&F Farms, North Service Nursery, West Hollow Middle School, Kurt Weiss Greenhouses, & Woodbourne Cultural Nurseries.
	M&F Farms	24	2.90	12,140,000	$9,750,000	$0.80	1011	$482	
	White Post Farms of Melville	37	2.65	11,130,000	$9,750,000	$0.88	927	$526	None

Table 8 – Tier 3 Projects (29)

WWTP	User	ID	Score	Annual Usage (gal)	Capital Cost ($)	Normalized Cost ($/annual usage)	lb N removed annually	$/lb N removed Lifetime	End Users that Could Share Capital Costs
Bellgrave WPCP	Great Neck Public Schools	42	2.35	6,510,000	$22,140,000	$3.40	271	$4,084	Lake Success Golf Club
	Great Neck Estates Park	85	1.45	2,170,000	$29,080,000	$13.40	90	$16,092	None
Calverton	Swan Lake Golf Course	67	1.90	7,670,000	$9,750,000	$1.27	319	$1,527	None
Calverton	De Lalio Farms	69	1.85	7,670,000	$25,770,000	$3.36	319	$4,037	De Lalio Farms, Delea Sod Farms and Sartur Farms.
	Delea Sod Farms	71	1.85	7,670,000	$25,770,000	$3.36	319	$4,037	
	Satur Farms	72	1.85	7,670,000	$22,740,000	$2.96	319	$3,562	
Forge River Sewer District *	Calabro Ballfields	40	2.40	5,210,000	$5,460,000	$1.05	434	$629	None
	Brookhaven Calabro Airport	89	1.35	870,000	$18,960,000	$21.79	72	$13,115	None
Greenport WWTP	Village Polo Groundwater Recharge	75	1.70	340,000	$4,230,000	$12.44	14	$15,162	None
Northport VA Medical Center	Northport Middle School	52	2.15	3,910,000	$12,820,000	$3.28	163	$3,941	Northport Golf Course, Crab Meadow Golf Course, Indian Hills Country Club, Northport Middle School, Del Vino Vineyards, and S Scherer and Sons
	Del Vino Vineyards	82	1.50	2,580,000	$15,280,000	$5.92	107	$7,114	
	S. Scherer and Sons	83	1.50	350,000	$18,780,000	$53.66	15	$63,667	
Northport Village	Harborfields High School	44	2.20	10,850,000	$24,160,000	$2.23	452	$2,674	Deckers Nursery, Harborfield High, Northport High School, Thomas Lahen Elementary, and Van Cott Nursery.
	Northport High School	76	1.65	3,470,000	$17,430,000	$5.02	145	$6,028	
	Thomas Lahey Elementary School	78	1.55	3,470,000	$24,160,000	$6.96	145	$8,356	
	Deckers Nursery	81	1.50	610,000	$20,800,000	$34.10	25	$41,134	
	Van Cott Nursery	87	1.40	510,000	$24,160,000	$47.37	21	$57,334	
Oyster Bay STP	Oyster Bay Memorial Stadium	58	2.00	2,600,000	$10,070,000	$3.87	108	$4,644	Mill River Club
Port Washington WPCP	Lions Field	41	2.40	3,910,000	$4,230,000	$1.08	163	$1,300	None
SCCC (Riverhead)	SCCC Riverhead	77	1.60	550,000	$4,230,000	$7.69	46	$4,639	None
Sag Harbor	Sag Harbor Golf Course	49	2.20	11,220,000	$15,380,000	$1.37	467	$1,646	None
Shelter Island STP	SI Country Club and GW Injection	54	2.15	4,600,000	$11,350,000	$2.47	192	$2,963	None
South Shore WRF	Rockville Links Club	39	2.45	27,670,000	$51,990,000	$1.88	1152	$2,257	None
South Shore WRF	Seawane Club	51	2.15	23,230,000	$34,040,000	$1.47	967	$1,760	None
Suffolk County SD No. 1	Port Jefferson High School	56	2.05	2,600,000	$10,700,000	$4.12	108	$4,934	None
Suffolk County SD No. 3	Venetian Shores Park/ Harding Elem	68	1.90	7,810,000	$28,170,000	$3.61	325	$4,330	None
Suffolk County SD No. 4	Smithtown East High School	63	1.95	8,250,000	$20,120,000	$2.44	687	$1,465	Smithtown East High School, Nesaquake Middle School and Whisper Vineyards.
	Whisper Vineyards	79	1.55	4,160,000	$26,180,000	$6.29	346	$3,778	
	Nesaquake Middle School	90	1.20	2,600,000	$26,180,000	$10.07	217	$6,036	

Table 8 – Tier 3 Projects (29)

WWTP	User	ID	Score	Annual Usage (gal)	Capital Cost ($)	Normalized Cost ($/annual usage)	lb N removed annually	$/lb N removed Lifetime	End Users that Could Share Capital Costs
Suffolk County SD No. 4	Great Hollows Middle School	60	2.00	4,770,000	$11,340,000	$2.38	398	$1,426	None
Suffolk County SD No. 5	Half Hollow Hills High School East	64	1.95	13,020,000	$23,490,000	$1.80	1084	$1,083	None
	Deer Park Ave Nurseries	70	1.85	9,110,000	$30,890,000	$3.39	759	$2,036	None
	Holmes Farms	73	1.85	2,720,000	$9,560,000	$3.51	226	$2,114	Angel Plants Inc, Half Hollow Nursery Inc, The Garden Depot, Delalio Sod Farms, Delea Sod Farms, Atlantic Nurseries, Van Bourgondien Nursery, American Wholesale Nurseries, Bissett Nursery Corporation.
Suffolk County SD No. 6	New Beginnings of Kings Park	74	1.80	1,740,000	$9,350,000	$5.37	145	$3,234	None
Suffolk County SD No. 7W	Martha Ave Recreation Park	43	2.25	10,850,000	$17,120,000	$1.58	904	$947	Kings Park High School
Suffolk County SD No. 11	Stagecoach Elementary School	59	2.00	2,820,000	$6,070,000	$2.15	235	$1,292	None
	Diamond in the Pines	61	1.95	3,040,000	$13,870,000	$4.56	253	$2,741	Selden Middle School and Newfield High School
	Selden Middle/ Newfield High	62	1.95	7,380,000	$16,510,000	$2.24	614	$1,344	Pine Ridge Golf Course
	Brookhaven Highway Dept	88	1.35	430,000	$12,210,000	$28.40	36	$16,891	Stagecoach Elementary
Suffolk County SD No. 12	Chippewa Elem/Sagamore Middle	46	2.20	7,810,000	$11,370,000	$1.46	651	$874	None
	Holbrook Country Club	50	2.15	26,280,000	$29,820,000	$1.13	2189	$681	None
	Bloomin Haus Nursery	91	1.15	1,010,000	$22,740,000	$22.51	84	$13,491	None
	MacArthur Airport	92	1.15	430,000	$29,080,000	$67.63	36	$40,229	None
Suffolk County SD No. 21	Paul J Gelinas Jr High School	47	2.20	4,340,000	$13,240,000	$3.05	181	$3,663	None
Suffolk County SD No. 22	Hauppauge Youth Org Baseball Fields	86	1.45	2,600,000	$13,240,000	$5.09	217	$3,053	None
Suffolk County SD No. 23	Longwood Middle School	57	2.00	4,340,000	$17,040,000	$3.93	361	$2,357	None
	Longwood Farms	65	1.90	8,760,000	$24,640,000	$2.81	730	$1,689	Line passes Longwood High School
	Longwood High School	66	1.90	8,760,000	$22,740,000	$2.60	730	$1,559	None
Suffolk County SD No. 24	Gabreski Airport	84	1.45	430,000	$4,230,000	$9.84	36	$5,852	Longwood Farms
	Westhampton Country Club	93	1.15	1,310,000	$17,140,000	$13.08	109	$7,832	None
Suffolk County SD No. 26	Woodbourne Cultural Nurseries	45	2.20	20,240,000	$28,400,000	$1.40	1686	$842	None
	West Hollow Middle School	53	2.15	9,110,000	$14,050,000	$1.54	759	$926	M&F Farms, North Service Nursery, and Kurt Weiss Greenhouses.
	North Service Nursery	55	2.05	3,540,000	$8,530,000	$2.41	295	$1,446	
	Albert Schmidt Farm	80	1.55	2,280,000	$11,970,000	$5.25	190	$3,156	
Suffolk County SD No. 28	BB & GG Farms & Nursery	48	2.20	10,120,000	$15,410,000	$1.52	843	$914	None

Most Water Reused

Table 10 lists the ten projects with the potential to use the most reclaimed water, all of which are golf courses. Other end users, such as sod farms, could have scored higher but were limited by the capacity of the WWTP providing the water.

Table 10 – Most Water Reused

Long Island - Most Water Reused					
Rank	User	WWTP	Annual Usage (gal)	Score	ID
1	Village Club of Sands Point	Port Washington WPCP	53,770,000	3.65	1
2	Glen Head Country Club	Glen Cove WWTF	45,410,000	3.20	10
3	Deepdale Golf Club	Great Neck WPCD	45,150,000	3.25	7
4	Fresh Meadows Country Club	Great Neck WPCD	41,760,000	3.45	3
5	Smithtown Landing Golf Course	Suffolk County SD No. 6	41,760,000	3.10	12
6	North Shore Country Club	Glen Cove WWTF	40,720,000	3.00	15
7	Pine Ridge Golf Course	Suffolk County SD No. 11	39,670,000	2.95	20
8	Nassau Country Club	Glen Cove WWTF	38,890,000	3.00	14
9	North Hills Country Club	Great Neck WPCD	38,370,000	3.15	11
10	Bergen Point Golf Course	Suffolk County SD No. 3	37,060,000	3.40	4

Most Nitrogen Removed

Table 11 summarizes the ten projects with the potential to remove the most nitrogen. The top 3 are golf courses. L. Delea & Sons Sod Farm ranked number 4. The Forge River Schools and Kurt Weiss Greenhouses ranked Nos. 6 and 7, respectively.

Table 11 – Most Nitrogen Removed

Long Island - Most Nitrogen Removed					
Rank	User	WWTP	lb N Removed Annually	Score	ID
1	Smithtown Landing Golf Course	Suffolk County SD No. 6	3,478	3.10	12
2	Pine Ridge Golf Course	Suffolk County SD No. 11	3,304	2.95	20
3	Willow Creek Country Club	Suffolk County SD No. 2	2,918	3.40	5
4	L. Delea & Sons Sod Farm	Suffolk County SD No. 2	2,918	2.90	29
5	Wind Watch Golf Course	Suffolk County SD No. 13	2,736	3.35	6
6	Group of Schools Next to Eachother	Forge River Sewer District *	2,566	2.70	35
7	Kurt Weiss Greenhouses	Suffolk County SD No. 26	2,553	2.95	19
8	Village Club of Sands Point	Port Washington WPCP	2,239	3.65	1
9	Holbrook Country Club	Suffolk County SD No. 12	2,189	2.15	50
10	Glen Head Country Club	Glen Cove WWTF	1,891	3.20	10

Lowest Normalized Cost

Table 12 lists the ten projects with the lowest normalized cost. The top 6 are golf courses. The Half Hollow Park and SUNY Stony Brook Campus ranked Nos. 7 and 8, respectively. The capital costs, which ranged from $5.31 to $14.85 million dollars, do not reflect a present worth analysis which is beyond the study scope and is for comparative purposes only.

Table 12 – Lowest Normalized Cost

Long Island - Lowest Normalized Cost						
Rank	User	WWTP	Capital Cost ($)	Normalized Cost ($/annual usage)	Score	ID
1	Village Club of Sands Point	Port Washington WPCP	$5,310,000	$0.10	3.65	1
2	Bergen Point Golf Course	Suffolk County SD No. 3	$5,360,000	$0.14	3.40	4
3	Willow Creek Country Club	Suffolk County SD No. 2	$5,110,000	$0.15	3.40	5
4	Wind Watch Golf Course	Suffolk County SD No. 13	$4,950,000	$0.15	3.35	6
5	Greens Golf Course	Suffolk County SD No. 26	$4,950,000	$0.22	3.25	8
6	St. Georges Country Club	Suffolk County SD No. 21	$8,630,000	$0.25	3.60	2
7	Half Hollow Park	Suffolk County SD No. 26	$4,230,000	$0.32	2.95	21
8	SUNY Stony Brook Campus	Suffolk County SD No. 21	$4,370,000	$0.34	3.25	9
9	Smithtown Landing Golf Course	Suffolk County SD No. 6	$14,150,000	$0.34	3.10	12
10	Fresh Meadows Country Club	Great Neck WPCD	$14,850,000	$0.36	3.45	3

Top Nassau County Projects

Tables 13, 14 and 15 list the top Nassau County projects by Most Water Reused, Most Nitrogen removed and the lowest normalized cost.

Table 13 – Nassau County – Most Water Reused

Nassau County - Most Water Reused					
Rank	User	WWTP	Annual Usage (gal)	Score	ID
1	Village Club of Sands Point	Port Washington WPCP	53,770,000	3.65	1
2	Glen Head Country Club	Glen Cove WWTF	45,410,000	3.20	10
3	Deepdale Golf Club	Great Neck WPCD	45,150,000	3.25	7
4	Fresh Meadows Country Club	Great Neck WPCD	41,760,000	3.45	3
5	North Shore Country Club	Glen Cove WWTF	40,720,000	3.00	15
6	Nassau Country Club	Glen Cove WWTF	38,890,000	3.00	14
7	North Hills Country Club	Great Neck WPCD	38,370,000	3.15	11
8	Pine Hollow Country Club	Oyster Bay STP	33,410,000	2.90	30
9	Mill River Club	Oyster Bay STP	31,840,000	3.05	13
10 (tie)	Sands Point Golf Club	Port Washington WPCP	29,230,000	2.90	26
	Lake Success Golf Club	Belgrave WPCP	29,230,000	3.00	17

Table 14 - Nassau County – Most Nitrogen Removed

Nassau County - Most Nitrogen Removed					
Rank	User	WWTP	lb N Removed Annually	Score	ID
1	Village Club of Sands Point	Port Washington WPCP	2,239	3.65	1
2	Glen Head Country Club	Glen Cove WWTF	1,891	3.20	10
3	Deepdale Golf Club	Great Neck WPCD	1,880	3.25	7
4	Fresh Meadows Country Club	Great Neck WPCD	1,739	3.45	3
5	North Shore Country Club	Glen Cove WWTF	1,695	3.00	15
6	Nassau Country Club	Glen Cove WWTF	1,619	3.00	14
7	North Hills Country Club	Great Neck WPCD	1,598	3.15	11
8	Pine Hollow Country Club	Oyster Bay STP	1,391	2.90	30
9	Mill River Club	Oyster Bay STP	1,326	3.05	13
10 (tie)	Lake Success Golf Club	Belgrave WPCP	1,217	3.00	17
	Sands Point Golf Club	Port Washington WPCP	1,217	2.90	26

Table 15 – Nassau County – Lowest Normalized Cost

Nassau County - Lowest Normalized Cost						
Rank	User	WWTP	Capital Cost ($)	Normalized Cost ($/annual usage)	Score	ID
1	Village Club of Sands Point	Port Washington WPCP	$5,310,000	$0.10	3.65	1
2	Fresh Meadows Country Club	Great Neck WPCD	$14,850,000	$0.36	3.45	3
3	Glen Head Country Club	Glen Cove WWTF	$18,220,000	$0.40	3.20	10
4	Nassau Country Club	Glen Cove WWTF	$16,870,000	$0.43	3.00	14
5	Deepdale Golf Club	Great Neck WPCD	$20,240,000	$0.45	3.25	7
6	North Shore Country Club	Glen Cove WWTF	$18,890,000	$0.46	3.00	15
7	Bay Park Golf Course	South Shore WRF	$5,360,000	$0.48	3.00	16
8	Sands Point Golf Club	Port Washington WPCP	$14,850,000	$0.51	2.90	26
9	Mill River Club	Oyster Bay STP	$20,910,000	$0.66	3.05	13
10	Pine Hollow Country Club	Oyster Bay STP	$23,600,000	$0.71	2.90	30

Top Suffolk County Projects

Tables 16, 17 and 18 list the top Suffolk County projects by Most Water Reused, Most Nitrogen removed and the lowest normalized cost.

Table 16 – Suffolk County – Most Water Reused

Suffolk County - Most Water Reused					
Rank	User	WWTP	Annual Usage (gal)	Score	ID
1	Smithtown Landing Golf Course	Suffolk County SD No. 6	41,760,000	3.10	12
2	Pine Ridge Golf Course	Suffolk County SD No. 11	39,670,000	2.95	20
3	Bergen Point Golf Course	Suffolk County SD No. 3	37,060,000	3.40	4
4	L. Delea & Sons Sod Farm	Suffolk County SD No. 2	35,040,000	2.90	29
5	Willow Creek Country Club	Suffolk County SD No. 2	35,040,000	3.40	5
6	St. Georges Country Club	Suffolk County SD No. 21	34,450,000	3.60	2
7	Indian Hills Country Club	Northport VA Medical Center	32,850,000	2.95	18
8	Wind Watch Golf Course	Suffolk County SD No. 13	32,850,000	3.35	6
9	Crab Meadow Golf Course	Northport VA Medical Center	32,630,000	2.85	32
10	Group of Schools Next to Eachother	Forge River Sewer District *	30,810,000	2.70	35

Table 14 - Nassau County – Most Nitrogen Removed

Suffolk County - Most Nitrogen Removed					
Rank	User	WWTP	lb N Removed Annually	Score	ID
1	Smithtown Landing Golf Course	Suffolk County SD No. 6	3,478	3.10	12
2	Pine Ridge Golf Course	Suffolk County SD No. 11	3,304	2.95	20
3	Willow Creek Country Club	Suffolk County SD No. 2	2,918	3.40	5
4	L. Delea & Sons Sod Farm	Suffolk County SD No. 2	2,918	2.90	29
5	Wind Watch Golf Course	Suffolk County SD No. 13	2,736	3.35	6
6	Group of Schools Next to Eachother	Forge River Sewer District *	2,566	2.70	35
7	Kurt Weiss Greenhouses	Suffolk County SD No. 26	2,553	2.95	19
8	Holbrook Country Club	Suffolk County SD No. 12	2,189	2.15	50
9	Greens Golf Course	Suffolk County SD No. 26	1,869	3.25	8
10	Stonebridge Country Club	Suffolk County SD No. 22	1,824	2.85	33

Table 18 – Suffolk County – Lowest Normalized Cost

Suffolk County - Lowest Normalized Cost						
Rank	User	WWTP	Capital Cost ($)	Normalized Cost ($/annual usage)	Score	ID
1	Bergen Point Golf Course	Suffolk County SD No. 3	$5,360,000	$0.14	3.40	4
2	Willow Creek Country Club	Suffolk County SD No. 2	$5,110,000	$0.15	3.40	5
3	Wind Watch Golf Course	Suffolk County SD No. 13	$4,950,000	$0.15	3.35	6
4	Greens Golf Course	Suffolk County SD No. 26	$4,950,000	$0.22	3.25	8
5	St. Georges Country Club	Suffolk County SD No. 21	$8,630,000	$0.25	3.60	2
6	Half Hollow Park	Suffolk County SD No. 26	$4,230,000	$0.32	2.95	21
7	SUNY Stony Brook Campus	Suffolk County SD No. 21	$4,370,000	$0.34	3.25	9
8	Smithtown Landing Golf Course	Suffolk County SD No. 6	$14,150,000	$0.34	3.10	12
9	Sipp Ave Complex	Suffolk County SD No. 7P	$4,230,000	$0.41	2.90	27
10	Pine Ridge Golf Course	Suffolk County SD No. 11	$17,140,000	$0.43	2.95	20

Regulatory Approval & Permitting

Regulatory approval of the reuse systems selected will begin with Nassau County Department of Health Services (NCDHS), Suffolk County Department of Health Services (SCDHS), New York State Department of Health (NYSDOH) and New York State Department of Environmental Conservation (NYSDEC). Figure 4 presents the NYSDEC Treated Wastewater Reuse Roadmap. NYSDEC regulates all discharges from Wastewater Treatment Plants through the State Pollution Discharge Elimination System. The SPDES permit will need to be modified to include an additional outfall for the potential end user. (golf course irrigation, etc.) through the NYSDEC reuse approval process. An Environmental Assessment Form (EAF) for the State Environmental Quality Review (SEQR) process will also be required.

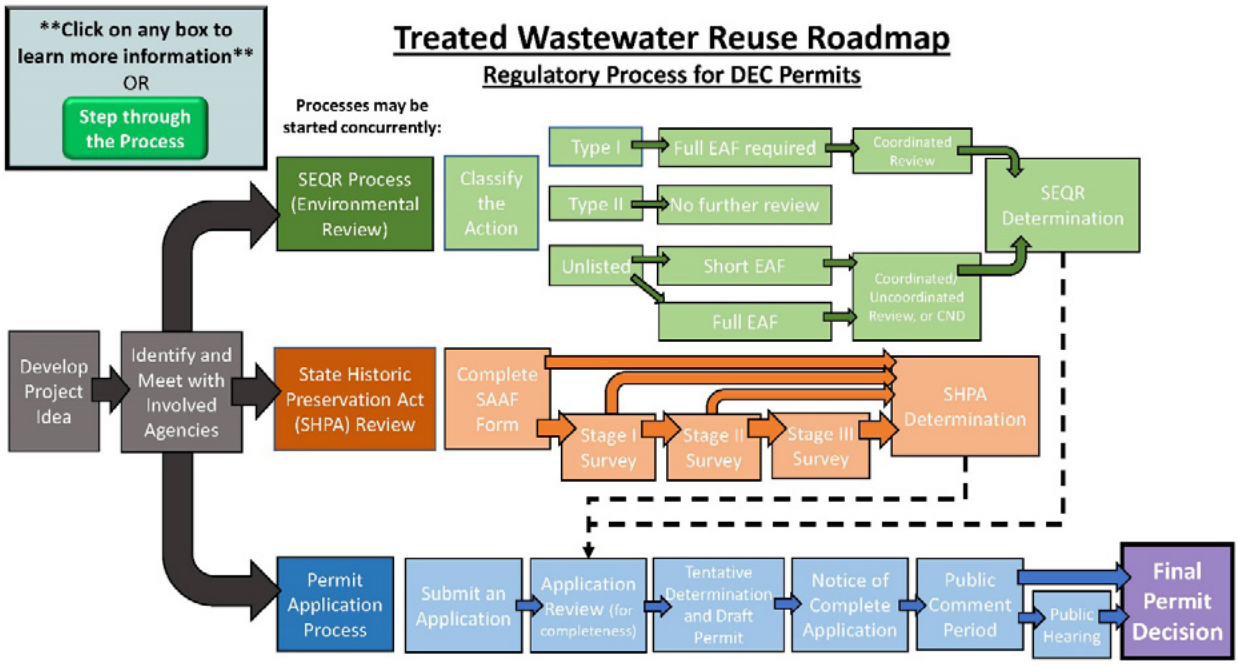

Figure 7 – Treated Wastewater Reuse Roadmap

A summary of the permitting steps are as follows:

- Determine which regulatory agencies and permitting process may be involved. An engineering firm should develop a conceptual plan and determine the scope and location of the project.
- An initial meeting with state/local regulatory agencies that will have jurisdiction over project. A conceptual plan should be prepared prior to this meeting to aid the discussion. Because DEC regulates discharges from Wastewater Treatment Plants through the SPDES program, they should be included in the process at this point, and the Health Department should be contacted to ensure that public health issues related to reusing treated effluent are addressed.
- An engineering report and full environmental review will be necessary. Applications for DEC permits will not be considered complete without favorable SEQR determinations being made first.
- New York's Sate Environmental Quality Review Act (SEQRA) requires state and local government agencies to consider environmental impacts (along with social and economic factors) during discretionary decision-making. The SEQR Cookbook is a good reference and is DEC's guide to the environmental review process.

Road Map Action Plan

This section provides a description of the Top Tier 1 projects identified in the priority matrix and the framework for planning and implementation. Many of the Tier 2 and 3 projects have potential opportunities and some scored high in specific categories (Most Water Reuse, Most Nitrogen Removed, Lowest Normalized Costs). These projects have multiple tiers of opportunity. A more detailed engineering analysis may demonstrate that further consideration and study is warranted.

An engineering planning phase is the first step towards implementation. A more detailed analysis of the water reuse projects would include developing sufficient detail to prepare cost estimates to seek approvals from regulatory agencies and funding sources. Cost estimates should include benefit cost and present worth analysis. Key to a water reuse project is commitment of the WWTP and potential end user.

The Long Island Superintendent's Golf Course Association (LISGCA) has expressed general support for the utilization of water reuse projects involving several golf courses. Sands Point, Deepdale, and Rockville Links have specifically expressed a willingness to use reclaimed water.

All the Nassau County WWTPs except one responded to the survey and expressed interest in water reuse. The Suffolk County Department of Public Works also expressed a commitment to the water reuse plan. Nassau County Department of Public Works and its private operator have studied the feasibility of water reuse at the Bay Park Golf Course (ID 17).

The Great Neck Water Pollution Control District (GNWPCD) has also expressed interest in potentially supplying water to several of the golf courses (e.g., Deepdale Country Club), as well as North Shore University Hospital and the Greentree Foundation.

Letters of interest or a memorandum of understanding (MOU) should be obtained from the potential end user and WWTP owner.

Tier 1 Project Description

The following provides a summary of the Top Tier 1 project:

WWTP:	Great Neck WPCD
Potential End User:	Fresh Meadow Country Club Deepdale Golf Club North Hills Country Club
Capital Costs:	$14.8 - 28.3M
Other Potential End Users:	North Shore Hospital Manhasset Secondary School Greentree Campus

Description: The GNWPCD has an average flow of 2.5 MGD that can supply all the potential end users. The golf courses, North Shore Hospital and Greentree campus could all share the infrastructure (treatment/distribution piping) reducing project costs, thereby increasing the potential of benefits and feasibility.

WWTP:	Belgrave
Potential End User:	Lake Success Golf Course
Capital Costs:	$22.5M
Other Potential End Users:	None

Description: The Village of Belgrave has a 1.3 MGD average flow that can supply all the flow to the Lake Success golf club.

WWTP:	Glen Cove
Potential End User:	Glen Head Country Club Nassau County Club North Shore Country Club
Capital Costs:	$38.9 – 45.4M
Other Potential End Users:	None

Description: The Nassau County Glen Cove WWTP has a 2.7 MGD average flow that can supply all the flow to the potential end users. The golf courses can share treatment system capital costs reducing project cost, increasing the potential benefits and feasibility.

WWTP:	Oyster Bay
Potential End User:	Mill River Club
Capital Costs:	$20.9M
Other Potential End Users:	Town of Oyster Bay Memorial Stadium Park

Description: The Town of Oyster Bay WWTP plant has a 1.0 MGD average flow that can supply all the water to the golf courses. The Town's Memorial Park Stadium is also a potential end user to share treatment system capital cost reducing overall project cost increasing the benefits and feasibility.

WWTP:	Port Washington
Potential End User:	Village Club of Sands Point
Capital Costs:	$5.3M
Other Potential End Users:	Sands Point Golf Club

Description: The Town of Port Washington WWTP has a 2.8 MGD average flow that can supply all the water to the two golf courses. The golf courses can share infrastructure (treatment system and distribution piping) reducing project cost, increasing the benefits and feasibility.

WWTP:	Nassau County South Shore WRP
Potential End User:	Bay Park Golf Course
Capital Costs:	$5.36M
Other Potential End Users:	None

Description: The Nassau County WWTP has a 50 MGD average flow and can supply all the water to the golf courses. Nassau County has conducted a preliminary study on the feasibility costs for reuse at the County golf course. The nearby location of the golf course lowers the project capital cost.

WWTP:	Suffolk County SD No. 2 (Tallmadge Woods)
Potential End User:	Willow Creek Country Club
Capital Costs:	$5.1
Other Potential End Users:	L. Delea & Sons Sod Farms Daisy White Nursery

Description: The Suffolk County SD No. 2 WWTP has a 0.16 MGD average flow that can supply all the water to the golf courses but will have limited capacity to serve the L. Delea Sod Farm and Daisy White Nursery. Further study is required on the WWTP operation and capacity to supply water to the other potential end users.

WWTP:	Suffolk County SD No. 3 (Bergen Point)
Potential End User:	Suffolk County Bergen Point Golf Club
Capital Costs:	$5.36M
Other Potential End Users:	None

Description: The Suffolk County SD No. 3 WWTP has a 27 MGD average flow that can supply all the water to the Suffolk County golf course. The nearby location of the golf course lowers the capital cost. Potential facilities are owned by Suffolk County and have expressed support of the water reuse plan.

WWTP:	Suffolk County SD No. 6 (Kings Park)
Potential End User:	Smithtown Landing Golf Course
Capital Costs:	$14.15M
Other Potential End Users:	Educational Institutions Nature Preserves (Nissequogue River) State Park, King Bluff, Arthur H. Kunz County Park

Description: The Suffolk County SD No. 6 WWTP has a 0.3 MGD average flow that can supply all the water to the golf course. Further study is required om the feasibility of fertigation at the nearby nature preserves and landscape irrigation at the educational institutions.

WWTP:	Suffolk County SD No. 13 (Wind Watch)
Potential End User:	Wind Watch Golf Course
Capital Costs:	$4.95M
Other Potential End Users:	None

Description: The Suffolk County SD No. 13 WWTP has a 0.15 MGD average flow that can supply all the water for the golf course. Other potential end users include nature preserves that are greater than 2 miles. The plant capacity is limited, and further study is required on the feasibility of expanding water reuse at the plant.

WWTP:	Suffolk County SD No. 26 (Greens at Half Hollow)
Potential End User:	Greens Golf Course
Capital Costs:	$4.95M
Other Potential End Users:	Agricultural (Albert Schmitt Farms, North Service Nursery, M&F Farms)

Description: The Suffolk County SD No. 26 WWTP has a 0.16 MGD average flow and can supply all the water to the golf course. Several agricultural applications are nearby as potential end users. Further study is required on feasibility of reuse for the agricultural applications.

WWTP Internal Plant Water Reuse

All WWTP on Long Island have the potential to implement internal reuse projects onsite using their treated water to wash down facility equipment. This is a simple way to begin to implement water reuse throughout the island.

Typical water reuse opportunities include:

- Wash down/cleaning water
- Seal water systems
- Process chemical make-up water
- Spray water systems
- Fire Protection

As mentioned previously in Section 4.3, several plants on Long Island have reported success in implementing water reuse. The Nassau County Cedar Creek facility utilizes treated effluent for various plant operations and process cooling water. The Great Neck Water Pollution Control District water reuse for pump seal water, washdown and cleaning systems. The Nassau County South Shore Water Reclamation Facility (a.k.a. Bay Park) is considering water reuse projects for service water, seal water and fire protection. Irrigation at the adjacent golf course is also under consideration.

There is minimal cost to transport the water and retrofit the pipes at the end of the existing treatment plan to have a secondary spigot and hose to use the treated water on-site. Internal reuse projects should be considered by all WWTPs on Long Island.

Implementation can be encouraged by introducing a requirement for WWTP to investigate and prepare a water reuse plan as part of SPDES Permit renewals. A minimum water reuse goal can be established, and grants funding made available for WWTPs that can implement these measures.

Privately Owned WWTP (Suffolk County)

As discussed in Section 4.0, Suffolk County has over 130 privately owned WWTPs not evaluated for potential reuse opportunities because these facilities fell outside the scope of this study. The private plants tend to be smaller and their operations less reliable and warrant further study concerning the feasibility of water reuse opportunities.

One notable possibility is the private plant that services the residents of the Meadowbrook Pointe Links and Spa development situated on Mill Road in Medford. This project is adjacent to the existing 18-hole golf course owned and operated by the Town of Brookhaven.

Recommendation would be to review records of these facilities for compliance with permit conditions, then if appropriate visit the plant to check conditions and meet with the operator to determine if the facility is suitable to be considered for participation in a reuse project.

Water Reuse Road Map & Action Plan Summary

Table 19 presents a summary of the Action Plan elements that are recommended for planning and implementing water reuse projects on Long Island. This provides direction and guidance on the next steps for successful reuse programs on Long Island.

Table 19 – Long Island Water Reuse Road Map and Action Plan Summary

Item Description	Action Plan
Water Reuse Regulations/ Guidelines	• NYS Laws of Conservation Title 6 Water Efficiency/Reuse provide guidelines for developing standards • NYSDEC/NYSDOH to develop standards • Establish standards thru NYSDEC SPDES permit process • California Title 22 Tertiary Disinfection Criteria to be used as guideline.
Water Reuse Applications	• Golf Course irrigation highest potential acceptance with New York case studies (River Head Indian Island Golf Course, Lake Placid and Turning Stone Casino). • Develop plan with LISGCA • Sod Farms, Greenhouses and Nurseries have potential applications. Further study is recommended/collaboration with the LI Farm Bureau. • Educational Institutions landscape irrigation is less likely to obtain regulatory approvals. Further study and developing pilot cases should be considered.
Water Reuse Treatment Technology	• Golf Course irrigation highest potential acceptance with New York case studies (Riverhead Indian Island Golf Course, Lake Placid and Turning Stone Casino) • Focus on technologies that can reliably achieve water quality criteria. • California Title 22 approved treatment processes (Tertiary filtration/ Disinfection) • Small scale testing is recommended to confirm performance.
Potential Water Reuse Project Implementation	• Research grant funding opportunities • Develop a communication and outreach plan to engage public interest and acceptance. • Explore inter-utility partnerships with water suppliers and other stakeholders.
Miscellaneous • **WWTP Internal Plan Water Reuse** • **Suffolk County Privately Owned WWTP**	• All WWTP have potential for water reuse. Encourage implementation during SPDES Permit renewal process. • Suffolk County has over 130 private plants. Further study is recommended on feasibility of water reuse applications.

APPENDIX A

Nassau County Municipal WWTP Summary Cards

Owner	Name	Card	Comments
Belgrave Water Pollution Control District	Belgrave WPCP	X	
Nassau County	Cedar Creek WPCP	X	No end users in matrix
Nassau County	Glen Cove WWTF	X	
Great Neck Water Pollution Control District	Great Neck WPCD STP	X	
Greater Atlantic Beach Water Reclamation District	Greater Atlantic Beach WWTP	X	No end users in matrix
City of Long Beach	Long Beach WPCP	X	To be Decommissioned
Oyster Bay Sewer District	Oyster Bay STP	X	
Port Washington Water Pollution Control District	Port Washington WPCP	X	
Nassau County	South Shore WRF (Bay Park)	X	

Nassau County Municipal WWTP Summary Cards

WWTP: Belgrave WPCP
Address: 34-01 255th St
Flushing, NY 11363

Capacity: 2.0 MGD
Avg Flow: 1.3 MGD

Receiving Water: Little Neck Bay
USGS Saltwater
Intrusion Area: Critical Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- n/a

Commercial Centers
- n/a

Educational Insitutions
- Great Neck South Middle School (2.7)
- Great Neck South High School (2.7)

Golf Courses
- Lake Success Golf Course (2.6 mi)
- Fresh Meadow Country Club (2.6 mi)

Industrial Facilities
- n/a

Nature Preserves
- Pond Park (1.9 mi)

Parks
- Great Neck Estates Park (2.4 mi)
- Allenwood Park (3.3 mi)
- Village Green Park (3.4 mi)
- Memorial Park (3.5 mi)

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Lake Success (2.6 mi)
- Udalls Millpond (4.0 mi)

Nassau County Municipal WWTP Summary Cards

WWTP: Cedar Creek WPCP
Address: 3340 Merrick Rd
Wantagh, NY 11793

Capacity: 72 MGD
Avg Flow: 65 MGD

Receiving Water: Atlantic Ocean
USGS Saltwater Intrusion Area: Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- Abby's Parkside Nursery & Florist (0.9 mi)
- Islands Greenery (1.9 mi)

Commercial Centers
- n/a

Educational Insitutions
- Seaford Harbor School (2.0 mi)
- Mandalay School (2.3 mi)
- John F Kennedy High School (2.9 mi)

Golf Courses
- n/a

Industrial Facilities
- n/a

Nature Preserves
- Mill Pond Preserve Wantagh (1.9 mi)
- Twin Lakes Preserve (2.3 mi)
- Tackapausha Nature Preserve (3.3 mi)

Parks
- Cedar Creek Park (1.2 mi)
- Wantagh Park (2.1 mi)
- Seamans Neck Park (3.0 mi)
- Newbridge Road Park (3.1 mi)
- Anchor Park (3.7 mi)
- Alhambra Park (3.9 mi)

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Cedar Creek (0.3 mi)
- Seamans Creek (2.2 mi)
- Bellmore Creek (3.0 mi)
- Newbridge Creek (2.9 mi)
- Seaford Creek (3.3 mi)
- Wantagh Pond (2.6 mi)
- Seaman Pond (2.7 mi)
- Cedar Swamp Creek (3.3 mi)

WATER REUSE PROJECTS IMPLEMENTED BY OWNER/OPERATOR

- Tertiary UV and chlorine disinfection system for various plant operations and process cooling water.

Nassau County Municipal WWTP Summary Cards

WWTP: Glen Cove WWTF
Address: 100 Morris Ave
Glen Cove, NY 11542

Capacity: 5.5 MGD
Avg Flow: 2.7 MGD

Receiving Water: Glen Cove Creek
USGS Saltwater Intrusion Area: Future Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- n/a

Commercial Centers
- n/a

Educational Insitutions
- North Shore High and Middle School (1.8 mi)

Golf Courses
- Nassau Country Club (1.8 mi)
- Glen Head Country Club (2.0 mi)
- North Shore Country Club (2.1 mi)

Industrial Facilities
- Large cluster (1.4 mi)

Nature Preserves
- Welwyn Preserve (2.2 mi)

Parks
- City Stadium Park (0.1 mi)
- Glen Head Community Center (2.7 mi)

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Lower Glen Lake (0.5 mi)
- Swan Lake (1.6 mi)
- Scudders Pond (1.8 mi)
- Glen Head Pond (2.7 mi)

Nassau County Municipal WWTP Summary Cards

WWTP: Great Neck WPCD STP
Address: 236 E Shore Rd
Great Neck, NY 11023

Capacity: 5.3 MGD
Avg Flow: 2.8 MGD

Receiving Water: Manhasset Bay
USGS Saltwater Intrusion Area: Critical Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- n/a

Commercial Centers
- American Manhasset (2.5 mi)

Educational Insitutions
- Manhasset Secondary School (0.7 mi)

Golf Courses
- Fresh Meadow Country Club (1.5 mi)
- Deepdale Golf Club (2.3 mi)
- Plandome Country Club (2.7 mi)
- North Hills Country Club (3.5 mi)

Industrial Facilities
- North Shore Hospital (1.5 mi)

Nature Preserves
- Leeds Pond Preserve (2.6 mi)
- Kings Point Park (2.9 mi)
- Greentree Campus (1.0 mi)

Parks
- Manhasset Valley Park (0.6 mi)
- Allenwood Park (0.8 mi)
- Memorial Park (1.6 mi)
- Selter Rock Verdant (1.9 mi)
- Village Green Park (2.0 mi)

Plant Water Reuse
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Whiteney Lake/Pond (0.7 mi)
- Leeds Pond (2.6 mi)
- Mitchells Creek (2.7 mi)
- Multiple unnamed creeks going into Whitney Lake and Leeds Pond

WATER REUSE PROJECTS IMPLEMENTED BY OWNER/OPERATOR

- In-plant Reuse - Washdown and Cleaning Water

Nassau County Municipal WWTP Summary Cards

WWTP: Greater Atlantic Beach WWTP
Address: 2150 Bay Blvd
Atlantic Beach, NY 11509

Capacity: 1.5 MGD
Avg Flow: 0.5 MGD

Receiving Water: Reynold's Channel
USGS Saltwater Intrusion Area: Critical Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- n/a

Commercial Centers
- n/a

Educational Insitutions
- n/a

Golf Courses
- Lawrence Yacht and Country Club (2.1 mi)
- Rockaway Hunting Club (3.1 mi)
- Inwood Country Club (3.1 mi)

Industrial Facilities
- 2 small pockets of buildings (1.5 mi)

Nature Preserves
- n/a

Parks
- n/a

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Sage Pond (2.9 mi)

Nassau County Municipal WWTP Summary Cards

WWTP: Oyster Bay STP
Address: 15 Bay Ave
Oyster Bay, NY 11771

Capacity: 1.8 MGD
Avg Flow: 1.0 MGD

Receiving Water: Oyster Bay
USGS Saltwater
Intrusion Area: Future Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- Orkestai Farm (2.4 mi)

Commercial Centers
- n/a

Educational Insitutions
- Oyster Bay High School (.6 mi)

Golf Courses
- Mill River Club (2.4 mi)
- Pine Hollow Country Club (2.8 mi)

Industrial Facilities
- n/a

Nature Preserves
- Planting Fields Arboretum (1.8 mi)
- Tiffany Creek Preserve (2.0 mi)

Parks
- Oyster Bay Memorial Stadium (0.6 mi)

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Mill River/Mill Pond (0.8 mi)
- Tiffany Creek (2.0 mi)
- Beaver Brook/Francis Pond (2.3 mi)

Nassau County Municipal WWTP Summary Cards

WWTP: Port Washington WPCP
Address: 70 Harbor Rd
Port Washington, NY 11050

Capacity: 4.0 MGD
Avg Flow: 2.8 MGD

Receiving Water: Manhasset Bay
USGS Saltwater Intrusion Area: Future Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- North Shore Garden Center (0.6 mi)

Commercial Centers
- n/a

Educational Insitutions
- Carrie Palmer Middle School (1.5 mi)
- Paul D Schreiber Sr. High School (1.6 mi)

Golf Courses
- Village Club of Sands Point (1.0 mi)
- Sands Point Golf Club (1.5 mi)
- Harbor Links Golf Course (1.8 mi)
- Plandome Country Club (2.5 mi)
- North Hempstead Country Club (2.7 mi)

Industrial Facilities
- Small dispersed buildings (0.8 mi)

Nature Preserves
- Sands Point Preserve (2.1 mi)
- Hempstead Harbor Woods (2.4 mi)

Parks
- Lion's Field (0.1 mi)
- Manorhaven Town Park (1.4 mi)

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Mill Pond (0.2 mi)
- Leeds Pond (2.2 mi)

Nassau County Municipal WWTP Summary Cards

WWTP: South Shore WRF (Bay Park)
Address: 2 Marjorie Ln
East Rockaway, NY 11518

Capacity: 70 MGD
Avg Flow: 50 MGD

Receiving Water: Reynold's Channel
USGS Saltwater Intrusion Area: Critical Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- Rainbow Nursery & Landscaping (0.9 mi)
- Melrosa Inc (1.0 mi)
- Dee's Nursery and Florist (1.2 mi)

Commercial Centers
- Oceanside Plaza (2.3 mi)
- Sands Shopping Center (3.2 mi)

Educational Insitutions
- n/a

Golf Courses
- Bay Park Golf Course (0.1 mi)
- Seawane Club (2.8 mi)
- Middle Bay Country Club (3.2 mi)
- Rockville Links Club (4.5 mi)

Industrial Facilities
- Small dispersed buildings (1.2 mi)
- EF Barrett Generation Station (3.6 mi)

Nature Preserves
- n/a

Parks
- Grant Park (2.8 mi)

Plant Water Reuse
- Washdown/Cleaning Water
- Spray Water Systems

Waterbodies
- Mill River
- Thixton Creek
- Powell Creek
- Bedell Creek
- Willow Pond (2.6 mi)
- Grant Pond (2.8 mi)
- Smith Pond (2.8 mi)

WATER REUSE PROJECTS UNDER CONSIDERATION BY OWNER/OPERATOR

- Bay Park Golf Course Irrigation
- In-plant Reuse - Service and Seal Water

Suffolk County Municipal WWTP Summary Cards

SCSD #	Name	Baseball Card	Comments
1	Port Jefferson	X	
2	Tallmadge Woods	X	
3	Bergen Point WWTP	X	
4	Smithtown Galleria	X	See note 1 (Combined with STP 13 & 15)
5	Huntington	X	See note 1 (Combined with STP 26)
6	King's Park	X	
7P	Twelve Pines	X	See note 1 (Combined with STP 7W)
7W	Woodside	X	See note 1 (Combined with STP 7P)
9	College Park	-	Not included (One potential user)
11	Selden	X	
12	Birchwood	X	See note 1 (Combined with STP 14)
13	Wind Watch	X	See note 1 (Combined with STP 4 & 15)
14	Parkland	X	See note 1 (Combined with STP 12) No end users in matrix
15	Nob Hill	X	See note 1 (Combined with STP 4 & 13) No end users in matrix
16	Yaphank County Center	X	
18S	Hauppauge Industrial Park	X	See note 1 (Combined with STP 22)
20E	Ridgehaven	-	Not included (No potential users)
20W	Leisure Village	-	Not included (No potential users)
21	SUNY Stony Brook	X	
22	Hauppauge County Center	X	See note 1 (Combined with STP 18S)
23	Coventry Manor	X	
24	Gabreski Airport	X	
26	Greens at Half Hallow	X	See note 1 (Combined with STP 5)
28	Fairfield	X	

[1] Some cards have multiple STPs due to overlapping proximity to potential end users

Suffolk County Municipal WWTP Summary Cards

WWTP: SCSD #1 - Port Jefferson
Address: 500 Beach St
Port Jefferson, NY 11777

Capacity: 1.15 MGD
Avg Flow: 0.65 MGD

Receiving Water: Port Jefferson Harbor
USGS Saltwater
Intrusion Area: Future Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- Spring Farm (1.8 mi)

Commercial Centers
- n/a

Educational Insitutions
- Port Jefferson High School (1.1 mi)

Golf Courses
- Port Jefferson Country Club (2.7 mi)

Industrial Facilities
- Port Jefferson Generating Station (0.1 mi)
- Fox Linen Services (1.8 mi)
- Empire Asphalt (2.0 mi)
- 3 Industrial Zoning Clusters (2.2 mi)

Nature Preserves
- n/a

Parks
- Washington Avenue Park (3.1 mi)

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- n/a

Suffolk County Municipal WWTP Summary Cards

WWTP: SCSD #2 - Tallmadge Woods
Address: 3 Pipe Stave Hollow Rd
Miller Place, NY 11764

Capacity: 0.40 MGD
Avg Flow: 0.16 MGD

Receiving Water: Groundwater
USGS Saltwater
Intrusion Area: Not an Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- L Delea & Sons Sod Farms (1.8 mi)
- Daisy White Nursery (2.1 mi)

Commercial Centers
- n/a

Educational Insitutions
- Miller Place High School (0.2 mi)

Golf Courses
- Willow Creek Golf & Country Club (0.1 mi)

Industrial Facilities
- n/a

Nature Preserves
- n/a

Parks
- n/a

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- n/a

Suffolk County Municipal WWTP Summary Cards

WWTP: SCSD #3 - Bergen Point WWTP
Address: 600 Bergen Ave
West Babylon, NY 11704

Capacity: 40.5 MGD
Avg Flow: 27.0 MGD

Receiving Water: Atlantic Ocean
USGS Saltwater Intrusion Area: Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- n/a

Commercial Centers
- Great South Bay Shopping Center (1.0 mi)

Educational Insitutions
- Harding Elementary (2.4 mi)

Golf Courses
- Bergen Point Golf Course (0.1 mi)

Industrial Facilities
- Babylon Ind. Park (2.0 mi)

Nature Preserves
- n/a

Parks
- Bergen Point County Park (0.8 mi)
- Venetian Shores Park (2.4 mi)
- Shore Road Park (3.0 mi)

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Neguntatogue Creek (2.2 mi)
- Carlls River (2.8 mi)
- Strongs Creek (3.0 mi)
- Santapogue Creek (3.0 mi)

Suffolk County Municipal WWTP Summary Cards

WWTP: SCSD #4 - Smithtown Galleria
Address: Town Commons Dr
Nesconset, NY 11767

Capacity: 0.17 MGD
Avg Flow: 0.08 MGD

Receiving Water: Groundwater
USGS Saltwater
Intrusion Area: Not an Issue

WWTP: SCSD #13 - Wind Watch
Address: 500 Blydenburgh Rd
Hauppauge, NY 11788

Capacity: 0.40 MGD
Avg Flow: 0.15 MGD

Receiving Water: Groundwater
USGS Saltwater
Intrusion Area: Not an Issue

WWTP: SCSD #15 - Nob Hill
Address: 519 Nichols Rd
Ronkonkoma, NY 11779

Capacity: 0.09 MGD
Avg Flow: 0.04 MGD

WWTP: SCSD #15 - Nob Hill

Receiving Water: Groundwater
USGS Saltwater
Intrusion Area: Not an Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural	#4	#13	#15
● Borella Nursery	2.1 mi	2.8 mi	1.0 mi
● Olsens' Nursery	2.4 mi	2.9 mi	1.0 mi
● D'aiello Vermont	3.0 mi	-	-
● Whisper Vineyards	2.6 mi	-	-
Commercial Centers			
● Islandia Shopping Ctr		1.6 mi	-
Educational Insitutions			
● Great Hollow Middle School	1.2 mi	3.4 mi	1.9 mi
● Smithtown East High School	1.9 mi	-	-
● Nesaquaake Middle School	2.8 mi	-	-
Golf Courses			
● Wind Watch Golf & Country Club	4.1 mi	0.1 mi	1.8 mi
Industrial Facilities			
● Small Industrial Clusters			

Nature Preserves	#4	#13	#15
● Lakeland County Park	-	2.8 mi	2.3 mi
● Lake Ronkonkoma County Park	-	4.3 mi	1.6 mi
Parks			
● Nesconset Athletic Fields	1.9 mi	2.7 mi	1.4 mi
● Sprofera Park	2.2 mi	-	-
● Andreoli Park	2.6 mi	-	1.5 mi
● Gaynor Park	2.7 mi	-	-
Plant Water Reuse			
● Washdown/Cleaning Water			
● Seal Water			
● Spray Water Systems			
● Fire Protection			
Waterbodies			
● Northeast Branch	0.9 mi	1.2 mi	1.9 mi
● Hunts Pond	2.5 mi	1.7 mi	3.1 mi
● Lake Ronkonkoma and Ponds	-	-	1.8 mi
● Connetquot Brook	-	3.2 mi	3.6 mi
● Nissequogue River	2.6 mi	-	-

Suffolk County Municipal WWTP Summary Cards

WWTP: SCSD #5 - Huntington
Address: 28 Ebbtide Ln
Dix Hills, NY 11746

Capacity: 0.24 MGD
Avg Flow: 0.18 MGD

Receiving Water: Groundwater
USGS Saltwater Intrusion Area: Not an Issue

WWTP: SCSD #26 - Greens at Half Hollow
Address: 701 Old South Path
Melville, NY 11747

Capacity: 0.33 MGD
Avg Flow: 0.16 MGD

Receiving Water: Groundwater
USGS Saltwater Intrusion Area: Not an Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

	#5	#26
Agricultural		
• Holmes Farm LLC	0.8 mi	2.5 mi
• Suburban Water Garden	1.0 mi	3.1 mi
• Cluster of 9 Nursery/ Greenhouses on Deer Park	1-4 mi	-
• Albert H Schmitt Family Farm	2.9 mi	1.3 mi
• North Service Nursery	-	0.8 mi
• M&F Farms	-	1.0 mi
• White Post Farms of Melville	-	1.0 mi
• Kurt Weiss Greenhouses	-	2.2 mi
• Woodbourne Cultural Nursery	-	4.0 mi
Commercial Centers		
• n/a		
Educational Insitutions		
• James Allen Elementary School	2.0 mi	-
• Robert Frost Middle School	2.3 mi	-
• Half Hollows Hills High East	2.9 mi	2.5 mi
• West Hollow Middle School	-	2.2 mi
Golf Courses		
• The Greens at Half Hollow	4.8 mi	0.1 mi
Industrial Facilities		
• Small Industrial Zones	1.2-1.7 mi	1.6 mi

	#5	#26
Nature Preserves		
• Strathmore Park	0.5 mi	3.1 mi
• Dr. Jeffrey Wenig Memorial Park	3.3 mi	1.8 mi
• Butterfly Park	3.6 mi	2.9 mi
• West Hills Nature Preserve/ County Park	-	2.0 mi
Parks		
• Pine Acres Park	3.1 mi	-
• Half Hollow Park	-	0.1 mi
Plant Water Reuse		
• Washdown/Cleaning Water		
• Seal Water		
• Spray Water Systems		
• Fire Protection		
Waterbodies		
• Carlls River	2.3 mi	

Suffolk County Municipal WWTP Summary Cards

WWTP: SCSD #6 - Kings Park
Address: 87 Mariner Dr
Kings Park, NY 11754

Capacity: 0.6 MGD
Avg Flow: 0.3 MGD

Receiving Water: Long Island Sound
USGS Saltwater Intrusion Area: Future Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- n/a

Commercial Centers
- n/a

Educational Insitutions
- New Beginnings School (0.6 mi)
- Kings Park High School (1.3 mi)
- William T. Rogers Middle School (1.3 mi)

Golf Courses
- Smithtown Landing Golf Course (1.6 mi)
- Nissequogue Golf Club (8.1 mi)

Industrial Facilities
- n/a

Nature Preserves
- Nissequogue River State Park (0.1 mi)
- Kings Park Bluff (1.1 mi)
- Arthur H Kunz County Park (1.3 mi)
- Sunken Meadow State Park (4.1 mi)

Parks
- Cy Donnelly Park (2.2 mi)

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Unnamed Creek by Sunken Meadow State Park

Suffolk County Municipal WWTP Summary Cards

WWTP: SCSD #7P - Twelve Pines
Address: 260 E Woodside Ave
East Patchogue, NY 11772

Capacity: 0.83 MGD
Avg Flow: 0.50 MGD

Receiving Water: Groundwater
USGS Saltwater Intrusion Area: Not an Issue

WWTP: SCSD #7W - Woodside
Address: 47 Harrison Ave
Bellport, NY 11713

Capacity: 0.40 MGD
Avg Flow: 0.20 MGD

Receiving Water: Groundwater
USGS Saltwater Intrusion Area: Not an Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

	#7P	#7W
Agricultural		
● Woodside Nursery	1.2 mi	2.1mi
● Bonsai Boy	2.9 mi	2.4 mi
Commercial Centers		
● Bellport Outlets	1.8 mi	1.1 mi
● Spring Hill Suites	2.1 mi	1.9 mi
● Insurance Auto Auction	3.0 mi	3.4 mi
Educational Insitutions		
● Frank P LongSchool	2.7 mi	1.9 mi
Golf Courses		
● n/a		
Industrial Facilities		
● Caithness LI Energy	3.3 mi	1.7 mi
● LI Precast Inc	-	2.7 mi
● Many Industrial Zones	1-2 mi	0.7-2 mi
● Adesa	2.2 mi	2.0 mi
● Star Ready Mix	2.9 mi	3.5 mi

	#7P	#7W
Nature Preserves		
● n/a		
Parks		
● Martha Ave Rec	3.3 mi	2.2 mi
● Sipp Ave Complex	0.1 mi	1.4 mi
Plant Water Reuse		
● Washdown/Cleaning Water		
● Seal Water		
● Spray Water Systems		
● Fire Protection		
Waterbodies		
● Swan River	1.3 mi	2.3 mi
● Mud Creek	2.2 mi	1.8 mi
● Beaverdam Creek	-	2.4 mi

Suffolk County Municipal WWTP Summary Cards

WWTP: SCSD #11 Selden
Address: 969 Old Town Rd
Coram, NY 11727

Capacity: 2.25 MGD
Avg Flow: 1.35 MGD

Receiving Water: Groundwater
USGS Saltwater
Intrusion Area: Not an Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- n/a

Commercial Centers
- Brookhaven Highway Dept (1.4 mi)
- Movieland Cinema (1.5 mi)

Educational Insitutions
- Stagecoach Elementary School (0.4 mi)
- Selden Middle/Newfield High (2.1 mi)

Golf Courses
- Pine Ridge Golf Club (2.0 mi)

Industrial Facilities
- n/a

Nature Preserves
- n/a

Parks
- Diamond in the Pines (1.6 mi)

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- n/a

Suffolk County Municipal WWTP Summary Cards

WWTP: SCSD #12 Birchwood
Address: 1 Essex Dr
Ronkonkoma, NY 11779

Capacity: 0.18 MGD
Avg Flow: 0.12 MGD

Receiving Water: Groundwater
USGS Saltwater Intrusion Area: Not an Issue

WWTP: SCSD #14 - Parkland
Address: 117 Joanne Dr
Holbrook, NY 11741

Capacity: 1.25 MGD
Avg Flow: 0.50 MGD

Receiving Water: Groundwater
USGS Saltwater Intrusion Area: Not an Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

	#14	#12
Agricultural		
• Bloomin Haus	3.4 mi	3.0 mi
Commercial Centers		
• Gateway Plaza	3.2 mi	-
• Sayville Plaza	3.4 mi	-
Educational Insitutions		
• Chippewa Elem/ Segamore Middle	-	1.1 mi
Golf Courses		
• Holbrook Country Club	0.1 mi	4.0 mi
Industrial Facilities		
• MacArthur Airport	3.4 mi	4.0 mi
• Many Industrial Zones	1-2 mi	0.5-2 mi
• Holtsville - Natl Grid	-	1.0 mi
• Richard M Flynn - Natural Gas	-	1.3 mi

	#14	#12
Nature Preserves		
• n/a		
Parks		
• n/a		
Plant Water Reuse		
• Washdown/Cleaning Water		
• Seal Water		
• Spray Water Systems		
• Fire Protection		
Waterbodies		
• Unnamed Creek at 445 Broadway Ave, Sayville	1.9 mi	-
• Tuthills Creek	3.0 mi	-
• Unnamed Creek at 249 Holtsville	4.0 mi	-

Suffolk County Municipal WWTP Summary Cards

WWTP: SCSD #16 - Yaphank County Center
Address: 490 Oak St
Yaphank, NY 11980

Capacity: 0.25 MGD
Avg Flow: 0.08 MGD

Receiving Water: Groundwater
USGS Saltwater Intrusion Area: Not an Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- SC Farm & Education Center (1.8 mi)
- Glover Farms (2.3 mi)

Commercial Centers
- n/a

Educational Insitutions
- n/a

Golf Courses
- n/a

Industrial Facilities
- Caithness LI Energy (3.0 mi)
- Many Industrial Zones (0.3-2.0 mi)

Nature Preserves
- Southhaven County Park (2.8 mi)
- Wertheim National Wildlife Refuge (3.5 mi)

Parks
- n/a

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Yaphank Creek (2.1 mi)
- Little Neck Run (2.5 mi)
- Camans River (3.0 mi)

Suffolk County Municipal WWTP Summary Cards

WWTP: SCSD #18 - Hauppauge Industrial Park
Address: 116 Motor Pkwy
Hauppauge, NY 11788

Capacity: 1.65 MGD
Avg Flow: 0.25 MGD

Receiving Water: Groundwater
USGS Saltwater
Intrusion Area: Not an Issue

WWTP: SCSD #22 - Hauppauge County Ctr
Address: 725 Veterans Memorial Hwy
Hauppauge, NY 11788

Capacity: 0.20 MGD
Avg Flow: 0.10 MGD

Receiving Water: Groundwater
USGS Saltwater
Intrusion Area: Not an Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

	#18	#22
Agricultural		
● Sams B C Nurseries	1.4 mi	-
Commercial Centers		
● Commack S Shopping Ctr	1.8 mi	-
● Hauppague Shopping Ctr	-	1.9 mi
Educational Insitutions		
● n/a		
Golf Courses		
● Brentwood Country Club	3.1 mi	-
● Stonebridge Country Club	-	1.4 mi
● The Hamlet Country Club	3.5 mi	-
Industrial Facilities		
● Hauppague Industrial Park	0.1 mi	2.9 mi
Nature Preserves		
● Brentwood State Park	1.1 mi	-
● Hoyt Farm Nature Reserve	2.3 mi	2.4 mi
● Blydenburgh County Park	3.7 mi	0.5 mi
● Caleb Smith State Park	-	2.2 mi
Parks		
● Hauppague Baseball Fields	-	1.3 mi
● Valmont Village Park	2.3 mi	-
Plant Water Reuse		
● Washdown/Cleaning Water		
● Seal Water		
● Spray Water Systems		
● Fire Protection		
Waterbodies		
● New Millpond @ Nessequogue River	-	0.2-2 mi
● Webster, Willow, and Vail Ponds	-	2.5 mi

Suffolk County Municipal WWTP Summary Cards

WWTP: SCSD #21 - SUNY Stony Brook
Address: 25 Circle Road
Stony Brook, NY 11794

Capacity: 2.5 MGD
Avg Flow: 2.0 MGD

Receiving Water: Port Jefferson Harbor
USGS Saltwater Intrusion Area: Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- Pantaleons Farm (1.0 mi)
- Harmony Vineyards (2.7 mi)

Commercial Centers
- n/a

Educational Insitutions
- SUNY Stony Brook (0.1 mi)
- Paul J. Gelinas Jr High School (1.5 mi)

Golf Courses
- St Georges Country Club (0.7 mi)

Industrial Facilities
- 1 Industrial Cluster (1.0 mi)

Nature Preserves
- n/a

Parks
- Washington Avenue Park (3.7 mi)

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Setauket Millpond (1.8 mi)
- Stony Brook (1.8 mi)
- West Meadow Creek (2.5 mi)

Suffolk County Municipal WWTP Summary Cards

WWTP: SCSD #23 - Coventry Manor
Address: 2 Short St
Middle Island, NY 11953

Capacity: 0.07 MGD
Avg Flow: 0.04 MGD

Receiving Water: Groundwater
USGS Saltwater Intrusion Area: Not an Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- Longwood Farms (3.3 mi)
- Tree Farm (3.5 mi)

Commercial Centers
- n/a

Educational Insitutions
- Longwood Middle School (2.1 mi)
- Longwood High School (3.0 mi)

Golf Courses
- Birchwood at Spring Lake (2.9 mi)

Industrial Facilities
- n/a

Nature Preserves
- Cathedral Pines County Park (2.5 mi)
- Longwood Pine Barrens State Forest (3.0 mi)
- Rocky Point Pine Barrens State Forest (3.0 mi)

Parks
- n/a

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Artist Lake (1.4 mi)
- Carmens River (3.1 mi)

Suffolk County Municipal WWTP Summary Cards

WWTP: SCSD #24 - Gabreski Airport
Address: S Perimeter Rd, West of Moen St
Westhampton Beach, NY 11978

Capacity: 1.15 MGD
Avg Flow: 0.65 MGD

Receiving Water: Groundwater
USGS Saltwater Intrusion Area: Not an Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- Peat & Son Nursery (2.2 mi)

Commercial Centers
- n/a

Educational Insitutions
- n/a

Golf Courses
- Westhampton Country Club (2.0 mi)

Industrial Facilities
- Gabreski Airport (0.1 mi)

Nature Preserves
- Quogue Wildlife Refuge (1.0 mi)
- Hampton West Park (2.2 mi)
- Westhampton Dwarf Pine Plains (2.4 mi)

Parks
- n/a

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Aspatuck River (0.2 mi)
- Beaverdam Creek (0.9 mi)
- Quantuck Creek (1.1 mi)

Suffolk County Municipal WWTP Summary Cards

WWTP: SCSD #28 - Fairfield STP
Address: 221 Moriches Rd
Saint James, NY 11784

Capacity: 0.140 MGD
Avg Flow: 0.055 MGD

Receiving Water: Groundwater
USGS Saltwater Intrusion Area: Not an Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- BB & GG Farms & Nursery (1.7 mi)

Commercial Centers
- Smith Haven Mall (0.7 mi)

Educational Insitutions
- n/a

Golf Courses
- n/a

Industrial Facilities
- n/a

Nature Preserves
- n/a

Parks
- Veterans Memorial Park (0.7 mi)
- Stony Brook Soccer Club (3.4 mi)
- Oxhead Road Park (3.5 mi)

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Mills Pond (1.8 mi)

Name	Potential End User
Brookhaven Town Hall	None
Ocean Beach	One baseball field 0.5 miles away
SCCC Selden	None
SCSD #9 - College Park	Centereach Square Commercial center 2.0 miles away
SCSD #20E - Riverhaven	Undeveloped agriculture parcels 1.5-2 miles away
SCSD #20W - Leisure Village	Undeveloped agriculture parcels 1.5-2 miles away

Suffolk County Municipal WWTP's (not owned by SCDPW)

Owner	Name	Card	Notes
US Dept of Energy	Brookhaven Ntnl Laboratory	-	Not included (Industrial Process Water)
Town of Brookhaven	Brookhaven SD2	-	Not included (Industrial Process Water)
Town of Brookhaven	Brookhaven Town Hall	-	Not included (No potential users)
Town of Riverhead	Calverton WWTF	X	
Village of Greenport	Greenport WWTP	X	
Town of Huntington	Huntington SD STP	X	No end users in matrix
US Dept of Treasury	IRS Service Center	X	No end users in matrix
Village of Northport	Northport Village	X	
Village of Northport	Northport Veterans Hospital	X	
Village of Ocean Beach	Ocean Beach STP	-	Not included (No potential users)
Town of Patchogue	Patchogue Village	X	No end users in matrix
Town of Riverhead	Riverhead Town WWTF	X	No end users in matrix
Village of Sag Harbor	Sag Harbor WWTP	X	
Suffolk Community College	SCCC Riverhead WWTP	X	
Suffolk Community College	SCCC Selden WWTP	-	Not included (No potential users)

Suffolk County Municipal WWTP's (not owned by SCDPW)

WWTP: Calverton WWTF
Address: 4062 Grumman Blvd
Calverton, NY 11933

Capacity: 0.078 MGD
Avg Flow: 0.030 MGD

Receiving Water: Peconic River
USGS Saltwater
Intrusion Area: Not an Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- Satur Farms (3.0 mi)
- DeLalio Sod Farms Inc (3.0 mi)
- Delea Sod (3.4 mi)
- Calverton Tree Farm (3.5 mi)

Commercial Centers
- n/a

Educational Insitutions
- n/a

Golf Courses
- Swan Lake Golf Club (0.5 mi)

Industrial Facilities
- n/a

Nature Preserves
- Calverton Nature Preserve (2.5 mi)
- Robert Cushman Murphy Cty Park (2.8 mi)

Parks
- Veteran's Memorial Park (1.6 mi)

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- McKay Lake
- Swan Pond
- Pond Series - North Pond, Forest Pond, Linus Pond, etc (1.5 mi)

Suffolk County Municipal WWTP's (not owned by SCDPW)

WWTP: Greenport WWTP
Address: 1885 Moores Lane
Greenport, NY 11944

Capacity: 0.66 MGD
Avg Flow: 0.30 MGD

Receiving Water: Long Island Sound
USGS Saltwater Intrusion Area: Critical Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- Sep's Farms (2.5 mi)
- Lavender By the Bay (2.6 mi)
- Pebble Beach Farms (3.1 mi)

Commercial Centers
- n/a

Educational Insitutions
- n/a

Golf Courses
- Island's End Golf & Country Club (2.0 mi)

Industrial Facilities
- Hawkeye Energy Greenport LLC (0.0 mi)

Nature Preserves
- Paul Stoutenburgh Preserve (1.2 mi)

Parks
- n/a

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- n/a

WATER REUSE PROJECTS UNDER CONSIDERATION BY OWNER/OPERATOR

- Aquifer recharge with the installation of injection wells

Suffolk County Municipal WWTP's (not owned by SCDPW)

WWTP: Huntington SD STP
Address: 65 Creek Road
Huntington, NY 11743

Capacity: 2.6 MGD
Avg Flow: 2.0 MGD

Receiving Water: Huntington Harbor
USGS Saltwater Intrusion Area: Future Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- Main Street Nursery (1.2 mi)

Commercial Centers
- n/a

Educational Insitutions
- n/a

Golf Courses
- Huntington Country Club (2.0 mi)
- Huntington Crescent Club (2.1 mi)

Industrial Facilities
- n/a

Nature Preserves
- n/a

Parks
- Mill Damn Park (0.1 mi)
- Heckscher Park (0.6 mi)

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Unnamed Creek by Mill Ln and New York Ave (0.4 mi)
- Unnamed Creek by Vineyard Rd and Mulberry Drive (1.3 mi)

Suffolk County Municipal WWTP's (not owned by SCDPW)

WWTP: IRS Service Center
Address: 1040 Waverly Ave
Holtsville, NY 11742

Capacity: 0.09 MGD
Avg Flow: 0.02 MGD

Receiving Water: Groundwater
USGS Saltwater Intrusion Area: Not an Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- Bloomin Haus (1.1 mi)

Commercial Centers
- Gateway Plaza (1.1 mi)

Educational Insitutions
- Sequoya High School (0.8 mi)
- St Joseph's University (1.6 mi)

Golf Courses
- Holbrook Country Club (2.0 mi)

Industrial Facilities
- Many Industrial Zones (0.5-2 mi)
- Richard M Flynn - Natural Gas (2.6 mi)

Nature Preserves
- n/a

Parks
- n/a

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Unnamed Creek at 249 Holtsville (2.2 mi)
- Tuthills Creek (2.8 mi)
- Unnamed Creek at 445 Broadway Ave, Sayville (3.0 mi)

Suffolk County Municipal WWTP's (not owned by SCDPW)

WWTP: Northport STP
Address: 1 Ketchum Pl
Northport, NY 11768

Capacity: 0.45 MGD
Avg Flow: 0.26 MGD

Receiving Water: Northport Bay
USGS Saltwater Intrusion Area: Future Issue

WWTP: Northport VA Medical Center
Address: 79 Middleville Rd
Northport, NY 11768

Capacity: 0.35 MGD
Avg Flow: 0.20 MGD

Receiving Water: Northport Harbor
USGS Saltwater Intrusion Area: Future Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

	STP	VA
Agricultural		
● Van Cott Nurseries	3.0 mi	-
● Decker's Nursery	2.5 mi	4.2 mi
● S. Scherer and Sons, Inc	2.4 mi	2.6 mi
● Del Vino Vineyards	3.1 mi	1.9 mi
Commercial Centers		
● n/a		
Educational Insitutions		
● Northport Middle School	-	1.5 mi
● Northport High School	2.0 mi	3.8 mi
● Harborfields High School	3.0 mi	5.1 mi
● Thomas Lahey Elementary	3.0 mi	5.1 mi
Golf Courses		
● Huntington Crescent Club	1.6 mi	-
● Northport Golf Course	2.0 mi	0.5 mi
● Crab Meadow Golf Course	2.1 mi	2.8 mi
● Indian Hill Country Club	-	2.5 mi
Industrial Facilities		
● Northport Power Station	2.3 mi	3.2 mi
● Small Industrial Zones	2.5 mi	2.0 mi

	STP	VA
Nature Preserves		
● Betty Allen Twin Ponds Park	1.1 mi	-
● Edwin and Gertrude Grace Nature Preserve	2.2 mi	-
● Makmah Nature Preserve	2.9 mi	1.5 mi
● Meadowlark Park/ Veteran's Nature / Knolls Park	-	0.5 mi
Parks		
● Steer's Park	2.0 mi	-
● Veteran's Park	-	2.5 mi
Plant Water Reuse		
● Washdown/Cleaning Water		
● Seal Water		
● Spray Water Systems		
● Fire Protection		
Waterbodies		
● Ponds in Betty Allen Nature Park	1.2 mi	-
● Mill Pond	1.8 mi	-
● Streams in Makamah Nature Preserve	2.9 mi	1.5 mi
● Stream to Fresh Pond	-	2.5 mi

Suffolk County Municipal WWTP's (not owned by SCDPW)

WWTP: Patchogue STP
Address: 1 Hammond St
Patchogue, NY 11772

Capacity: 0.8 MGD
Avg Flow: 0.4 MGD

Receiving Water: Patchogue River
USGS Saltwater Intrusion Area: Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- Division Ave Greenhouses (0.8 mi)
- Foliage Garden (2.4 mi)
- Daisy Garden Corporation (2.5 mi)
- Bayport Flower Houses (2.6 mi)

Commercial Centers
- Gateway Plaza (2.6 mi)

Educational Insitutions
- St Joseph's University (2.2 mi)

Golf Courses
- n/a

Industrial Facilities
- 1 Industrial Cluster (1.0 mi)

Nature Preserves
- Swan River Preserve (1.8 mi)
- Blue Point Nature Preserve (2.2 mi)

Parks
- Rider Avenue Park (1.7 mi)
- SJC's Outdoor Field Complex (2.2 mi)

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Patchogue River (0.0 mi)
- Great Patchogue Lake (0.2 mi)
- West Lake (1.1 mi)
- Little Creek (1.7 mi)
- Purgatory Creek (1.9 mi)
- Swan River (1.8 mi)
- Swan Lake (2.0 mi)
- Stillman Creek (2.6 mi)

Suffolk County Municipal WWTP's (not owned by SCDPW)

WWTP: Riverhead WWTF
Address: 2 River Ave
Riverhead, NY 11901

Capacity: 1.5 MGD
Avg Flow: 1.0 MGD

Receiving Water: Peconic River
USGS Saltwater
Intrusion Area: Future Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- Verderber's Nursery (2.6 mi)
- Bianchi Davis Green House (2.9 mi)
- Helens Greenhouses & Flower Farm (3.2 mi)

Commercial Centers
- n/a

Educational Insitutions
- n/a

Golf Courses
- Cherry Creek Golf Links (5.0 mi)

Industrial Facilities
- 2 small pockets of buildings (1.9 mi)

Nature Preserves
- Peconic Estuary (0.4 mi)
- Indian Island County Park (1.3 mi)
- David A Sarnoff Preserve (2.6 mi)
- Maple Swamp/ Birch Creek Owl/ Hubbard County Parks (3.9 mi)
- Peconic Bog County Park (5.0 mi)

Parks
- n/a

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Peconic River (0.3 mi)
- Sawmill Creek
- Terrys Creek

WATER REUSE PROJECTS IMPLEMENTED BY OWNER/OPERATOR

- Indian Island Golf Course Irrigation

Suffolk County Municipal WWTP's (not owned by SCDPW)

WWTP: Sag Harbor STP
Address: 33 Bay St
Sag Harbor, NY 11963

Capacity: 0.25 MGD
Avg Flow: 0.075 MGD

Receiving Water: Sag Harbor Bay
USGS Saltwater Intrusion Area: Future Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- Spring Farm (2.2 mi)

Commercial Centers
- n/a

Educational Insitutions
- n/a

Golf Courses
- Sag Harbor Golf Course (1.8 mi)

Industrial Facilities
- n/a

Nature Preserves
- Linda Gronlund Memorial Nature Preserve (2.7 mi)

Parks
- Mashashimuet Park (1.5 mi)

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Rattlesnake Creek (1.6 mi)
- Ligonee Brook (1.6 mi)

WATER REUSE PROJECTS IMPLEMENTED BY OWNER/OPERATOR

- In-plant Reuse - Washdown and Cleaning Water

Suffolk County Municipal WWTP's (not owned by SCDPW)

WWTP: SCCC - Riverhead STP
Address: 121 Speonk-Riverhead Rd
Riverhead, NY 11901

Capacity: 0.01 MGD
Avg Flow: 0.003 MGD

Receiving Water: Groundwater
USGS Saltwater Intrusion Area: Not an Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- n/a

Commercial Centers
- n/a

Educational Insitutions
- SCCC Riverhead (0.1 mi)

Golf Courses
- Hampton Hills Golf & Country Club (3.0 mi)

Industrial Facilities
- n/a

Nature Preserves
- Long Island State Pine Barrens Preserve (0.3 mi)
- David A Sarnoff Preserve (1.7 mi)
- Manorville Hills County Park (6.0 mi)

Parks
- n/a

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Seatuck Creek and Tributaries (0.5 mi)
- East River (1.8 mi)

Suffolk County Municipal WWTP's (not owned by SCDPW)

WWTP: Shelter Island Heights
Address: Summerfield Pl & Clinton Ave
Shelter Island Heights, NY 11965

Capacity: 0.05 MGD
Avg Flow: 0.02 MGD

Receiving Water: Shelter Island Sound
USGS Saltwater Intrusion Area: Future Issue

POTENTIAL END USERS NEAR WWTPS (2 Mile Radius)

Agricultural
- n/a

Commercial Centers
- n/a

Educational Insitutions
- n/a

Golf Courses
- Shelter Island Country Club (0.7 mi)
- Gardiner's Bay Country Club (2.6 mi)

Industrial Facilities
- Greenport Energy Station (2.3 mi)
  note: across Peconic River

Nature Preserves
- Mashomack Nature Preserve (3.0 mi)

Parks
- n/a

Plant Water Reuse
- Washdown/Cleaning Water
- Seal Water
- Spray Water Systems
- Fire Protection

Waterbodies
- Gardiners Creek (1.3 mi)

WATER REUSE PROJECTS UNDER CONSIDERATION BY OWNER/OPERATOR

- Shelter Island Country Club Irrigation and Sub-Surface Infiltration

APPENDIX B

Project Assessments

CAMERON ENGINEERING & ASSOCIATES, LLP

LI Water Reuse Road Map Action Plan Table
1. Prioritization Matrix

SEATUCK

		Weighting	30%		20%		15%		10%		10%		10%		5%		100%
ID	Project User	WWTP	Normalized Capital Cost		Cost of Nitrogen Reduction of WWTP Discharge		Annual Quantity of Potable Water Savings		Water Supply Pumping Concerns		Effect on Water Management at Project Location		Transmission Distance		Associated Projects		Total Score
1	Village Club of Sands Point	Port Washington WPCP	4	1.2	4	0.8	4	0.6	3	0.3	3	0.3	3	0.3	3	0.15	3.65
2	St. Georges Country Club	Suffolk County SD No. 21	4	1.2	4	0.8	4	0.6	2	0.2	4	0.4	3	0.3	2	0.1	3.60
3	Fresh Meadows Country Club	Great Neck WPCD	3	0.9	4	0.8	4	0.6	4	0.4	4	0.4	2	0.2	3	0.15	3.45
4	Bergen Point Golf Course	Suffolk County SD No. 3	4	1.2	4	0.8	4	0.6	2	0.2	1	0.1	4	0.4	2	0.1	3.40
5	Willow Creek Country Club	Suffolk County SD No. 2	4	1.2	4	0.8	4	0.6	1	0.1	2	0.2	4	0.4	2	0.1	3.40
6	Wind Watch Golf Course	Suffolk County SD No. 13	4	1.2	4	0.8	4	0.6	1	0.1	2	0.2	4	0.4	1	0.05	3.35
7	Deepdale Golf Club	Great Neck WPCD	3	0.9	3	0.6	4	0.6	4	0.4	4	0.4	2	0.2	3	0.15	3.25
8	Greens Golf Course	Suffolk County SD No. 26	4	1.2	4	0.8	3	0.45	1	0.1	2	0.2	4	0.4	2	0.1	3.25
9	SUNY Stony Brook Campus	Suffolk County SD No. 21	3	0.9	4	0.8	3	0.45	2	0.2	4	0.4	4	0.4	2	0.1	3.25
10	Glen Head Country Club	Glen Cove WWTF	3	0.9	4	0.8	4	0.6	3	0.3	3	0.3	2	0.2	2	0.1	3.20
11	North Hills Country Club	Great Neck WPCD	3	0.9	3	0.6	4	0.6	4	0.4	4	0.4	1	0.1	3	0.15	3.15
12	Smithtown Landing Golf Course	Suffolk County SD No. 6	3	0.9	4	0.8	4	0.6	2	0.2	3	0.3	2	0.2	2	0.1	3.10
13	Mill River Club	Oyster Bay STP	3	0.9	3	0.6	4	0.6	3	0.3	3	0.3	2	0.2	3	0.15	3.05
14	Nassau Country Club	Glen Cove WWTF	3	0.9	3	0.6	4	0.6	3	0.3	3	0.3	2	0.2	2	0.1	3.00
15	North Shore Country Club	Glen Cove WWTF	3	0.9	3	0.6	4	0.6	3	0.3	3	0.3	2	0.2	2	0.1	3.00
16	Bay Park Golf Course	South Shore WRF	3	0.9	3	0.6	3	0.45	4	0.4	1	0.1	4	0.4	3	0.15	3.00
17	Lake Success Golf Club	Belgrave WPCP	3	0.9	3	0.6	3	0.45	4	0.4	4	0.4	1	0.1	3	0.15	3.00
18	Indian Hills Country Club	Northport VA Medical Center	3	0.9	3	0.6	4	0.6	2	0.2	3	0.3	2	0.2	3	0.15	2.95
19	Kurt Weiss Greenhouses	Suffolk County SD No. 26	3	0.9	4	0.8	4	0.6	1	0.1	2	0.2	2	0.2	3	0.15	2.95
20	Pine Ridge Golf Course	Suffolk County SD No. 11	3	0.9	4	0.8	4	0.6	1	0.1	2	0.2	2	0.2	3	0.15	2.95
21	Half Hollow Park	Suffolk County SD No. 26	3	0.9	4	0.8	3	0.45	1	0.1	2	0.2	4	0.4	2	0.1	2.95
22	Pantaleons Farms	Suffolk County SD No. 21	3	0.9	3	0.6	3	0.45	2	0.2	4	0.4	3	0.3	2	0.1	2.95
23	Kings Park High School	Suffolk County SD No. 6	3	0.9	3	0.6	3	0.45	2	0.2	3	0.3	3	0.3	3	0.15	2.90
24	M&F Farms	Suffolk County SD No. 26	3	0.9	4	0.8	3	0.45	1	0.1	2	0.2	3	0.3	3	0.15	2.90
25	Northport Golf Course	Northport VA Medical Center	3	0.9	3	0.6	3	0.45	2	0.2	3	0.3	3	0.3	3	0.15	2.90
26	Sands Point Golf Club	Port Washington WPCP	3	0.9	3	0.6	3	0.45	3	0.3	3	0.3	2	0.2	3	0.15	2.90
27	Sipp Ave Complex	Suffolk County SD No. 7P	3	0.9	4	0.8	3	0.45	1	0.1	2	0.2	4	0.4	1	0.05	2.90
28	City Stadium Park	Glen Cove WWTF	3	0.9	3	0.6	2	0.3	3	0.3	3	0.3	4	0.4	2	0.1	2.90
29	L. Delea & Sons Sod Farm	Suffolk County SD No. 2	3	0.9	4	0.8	4	0.6	1	0.1	2	0.2	2	0.2	2	0.1	2.90
30	Pine Hollow Country Club	Oyster Bay STP	3	0.9	3	0.6	4	0.6	3	0.3	3	0.3	1	0.1	2	0.1	2.90
31	Plandome Country Club	Port Washington WPCP	3	0.9	3	0.6	3	0.45	3	0.3	3	0.3	2	0.2	2	0.1	2.85
32	Crab Meadow Golf Course	Northport VA Medical Center	3	0.9	3	0.6	4	0.6	2	0.2	3	0.3	1	0.1	3	0.15	2.85
	Score Scale	4	$ 0.01	$ 0.30	$ 58	$ 500	30 M	150 M	Very High		Positive		0.00	0.50	SPDES or Upgrade		
		3	$ 0.31	$ 1.00	$ 501	$ 1,000	10 M	30 M	High		Future Positive		0.51	1.50	Share Force Main		
		2	$ 1.01	$ 5.00	$ 1,001	$ 5,000	3 M	10 M	Limited		Neutral		1.51	2.50	Multiple Users		
		1	$ 5.01	$ 60.00	$ 5,001	$ 65,000	0.35 M	3 M	Negligible		Negative		2.51	4.50	None		

Project Assessments

CAMERON ENGINEERING & ASSOCIATES, LLP

LI Water Reuse Road Map Action Plan Table
1. Prioritization Matrix

SEATUCK

		Weighting	30%		20%		15%		10%		10%		10%		5%		100%
ID	Project User	WWTP	Normalized Capital Cost		Cost of Nitrogen Reduction of WWTP Discharge		Annual Quantity of Potable Water Savings		Water Supply Pumping Concerns		Effect on Water Management at Project Location		Transmission Distance		Associated Projects		Total Score
33	Stonebridge Country Club	Suffolk County SD No. 22	3	0.9	4	0.8	3	0.45	1	0.1	2	0.2	3	0.3	2	0.1	2.85
34	Miller Place High School	Suffolk County SD No. 2	3	0.9	4	0.8	2	0.3	1	0.1	2	0.2	4	0.4	2	0.1	2.80
35	Group of Schools Next to Eachother	Forge River Sewer District *	3	0.9	3	0.6	4	0.6	1	0.1	2	0.2	1	0.1	4	0.2	2.70
36	Port Jefferson Country Club	Suffolk County SD No. 1	3	0.9	3	0.6	3	0.45	2	0.2	3	0.3	1	0.1	2	0.1	2.65
37	White Post Farms of Melville	Suffolk County SD No. 26	3	0.9	3	0.6	3	0.45	1	0.1	2	0.2	3	0.3	2	0.1	2.65
38	Manhasset Secondary School	Great Neck WPCD	2	0.6	2	0.4	2	0.3	4	0.4	4	0.4	3	0.3	3	0.15	2.55
39	Rockville Links Club	South Shore WRF	2	0.6	2	0.4	3	0.45	4	0.4	4	0.4	1	0.1	2	0.1	2.45
40	Calabro Ballfields	Forge River Sewer District *	2	0.6	3	0.6	2	0.3	1	0.1	2	0.2	4	0.4	4	0.2	2.40
41	Lions Field	Port Washington WPCP	2	0.6	2	0.4	2	0.3	3	0.3	3	0.3	4	0.4	2	0.1	2.40
42	Great Neck Public Schools	Belgrave WPCP	2	0.6	2	0.4	2	0.3	4	0.4	4	0.4	1	0.1	3	0.15	2.35
43	Martha Ave Recreation Park	Suffolk County SD No. 7W	2	0.6	3	0.6	3	0.45	1	0.1	2	0.2	2	0.2	2	0.1	2.25
44	Harborfields High School	Northport Village	2	0.6	2	0.4	3	0.45	2	0.2	3	0.3	1	0.1	3	0.15	2.20
45	Woodbourne Cultural Nurseries	Suffolk County SD No. 26	2	0.6	3	0.6	3	0.45	1	0.1	2	0.2	1	0.1	3	0.15	2.20
46	Chippewa Elem/Sagamore Middle	Suffolk County SD No. 12	2	0.6	3	0.6	2	0.3	1	0.1	2	0.2	3	0.3	2	0.1	2.20
47	Paul J Gelinas Jr High School	Suffolk County SD No. 21	2	0.6	2	0.4	2	0.3	2	0.2	4	0.4	2	0.2	2	0.1	2.20
48	BB & GG Farms & Nursery	Suffolk County SD No. 28	2	0.6	3	0.6	3	0.45	1	0.1	2	0.2	2	0.2	1	0.05	2.20
49	Sag Harbor Golf Course	Sag Harbor	2	0.6	2	0.4	3	0.45	2	0.2	3	0.3	2	0.2	1	0.05	2.20
50	Holbrook Country Club	Suffolk County SD No. 12	2	0.6	3	0.6	3	0.45	1	0.1	2	0.2	1	0.1	2	0.1	2.15
51	Seawane Club	South Shore WRF	2	0.6	2	0.4	3	0.45	4	0.4	1	0.1	1	0.1	2	0.1	2.15
52	Northport Middle School	Northport VA Medical Center	2	0.6	2	0.4	2	0.3	2	0.2	3	0.3	2	0.2	3	0.15	2.15
53	West Hollow Middle School	Suffolk County SD No. 26	2	0.6	3	0.6	2	0.3	1	0.1	2	0.2	2	0.2	3	0.15	2.15
54	SI Country Club and GW Injection	Shelter Island STP	2	0.6	2	0.4	2	0.3	2	0.2	3	0.3	3	0.3	1	0.05	2.15
55	North Service Nursery	Suffolk County SD No. 26	2	0.6	2	0.4	2	0.3	1	0.1	2	0.2	3	0.3	3	0.15	2.05
56	Port Jefferson High School	Suffolk County SD No. 1	2	0.6	2	0.4	1	0.15	2	0.2	3	0.3	3	0.3	2	0.1	2.05
57	Longwood Middle School	Suffolk County SD No. 23	2	0.6	2	0.4	2	0.3	1	0.1	2	0.2	2	0.2	4	0.2	2.00
58	Oyster Bay Memorial Stadium	Oyster Bay STP	2	0.6	2	0.4	1	0.15	3	0.3	1	0.1	3	0.3	3	0.15	2.00
59	Stagecoach Elementary School	Suffolk County SD No. 11	2	0.6	2	0.4	1	0.15	1	0.1	2	0.2	4	0.4	3	0.15	2.00
60	Great Hollows Middle School	Suffolk County SD No. 4	2	0.6	2	0.4	2	0.3	1	0.1	2	0.2	3	0.3	2	0.1	2.00
61	Diamond in the Pines	Suffolk County SD No. 11	2	0.6	2	0.4	2	0.3	1	0.1	2	0.2	2	0.2	3	0.15	1.95
62	Selden Middle/ Newfield High	Suffolk County SD No. 11	2	0.6	2	0.4	2	0.3	1	0.1	2	0.2	2	0.2	3	0.15	1.95
63	Smithtown East High School	Suffolk County SD No. 4	2	0.6	2	0.4	2	0.3	1	0.1	2	0.2	2	0.2	3	0.15	1.95
64	Half Hollow Hills High School East	Suffolk County SD No. 5	2	0.6	2	0.4	3	0.45	1	0.1	2	0.2	1	0.1	2	0.1	1.95
	Score Scale	4	$ 0.01	$ 0.30	$ 58	$ 500	30 M	150 M	Very High		Positive		0.00	0.50	SPDES or Upgrade		
		3	$ 0.31	$ 1.00	$ 501	$ 1,000	10 M	30 M	High		Future Positive		0.51	1.50	Share Force Main		
		2	$ 1.01	$ 5.00	$ 1,001	$ 5,000	3 M	10 M	Limited		Neutral		1.51	2.50	Multiple Users		
		1	$ 5.01	$ 60.00	$ 5,001	$ 65,000	0.35 M	3 M	Negligible		Negative		2.51	4.50	None		

		Weighting	30%		20%		15%		10%		10%		10%		5%		100%
ID	Project User	WWTP	Normalized Capital Cost		Cost of Nitrogen Reduction of WWTP Discharge		Annual Quantity of Potable Water Savings		Water Supply Pumping Concerns		Effect on Water Management at Project Location		Transmission Distance		Associated Projects		Total Score
65	Longwood Farms	Suffolk County SD No. 23	2	0.6	2	0.4	2	0.3	1	0.1	2	0.2	1	0.1	4	0.2	1.90
66	Longwood High School	Suffolk County SD No. 23	2	0.6	2	0.4	2	0.3	1	0.1	2	0.2	1	0.1	4	0.2	1.90
67	Swan Lake Golf Course	Calverton	2	0.6	2	0.4	2	0.3	1	0.1	1	0.1	3	0.3	2	0.1	1.90
68	Venetian Shores Park/ Harding Elem	Suffolk County SD No. 3	2	0.6	2	0.4	2	0.3	2	0.2	1	0.1	2	0.2	2	0.1	1.90
69	De Lalio Farms	Calverton	2	0.6	2	0.4	2	0.3	1	0.1	2	0.2	1	0.1	3	0.15	1.85
70	Deer Park Ave Nurseries	Suffolk County SD No. 5	2	0.6	2	0.4	2	0.3	1	0.1	2	0.2	1	0.1	3	0.15	1.85
71	Delea Sod Farms	Calverton	2	0.6	2	0.4	2	0.3	1	0.1	2	0.2	1	0.1	3	0.15	1.85
72	Satur Farms	Calverton	2	0.6	2	0.4	2	0.3	1	0.1	2	0.2	1	0.1	3	0.15	1.85
73	Holmes Farms	Suffolk County SD No. 5	2	0.6	2	0.4	1	0.15	1	0.1	2	0.2	3	0.3	2	0.1	1.85
74	New Beginnings of Kings Park	Suffolk County SD No. 6	1	0.3	2	0.4	1	0.15	2	0.2	3	0.3	3	0.3	3	0.15	1.80
75	Village Polo Groundwater Recharge	Greenport WWTP	1	0.3	1	0.2	1	0.15	2	0.2	4	0.4	4	0.4	1	0.05	1.70
76	Northport High School	Northport Village	1	0.3	1	0.2	2	0.3	2	0.2	3	0.3	2	0.2	3	0.15	1.65
77	SCCC Riverhead	SCCC (Riverhead)	1	0.3	2	0.4	1	0.15	1	0.1	2	0.2	4	0.4	1	0.05	1.60
78	Thomas Lahey Elementary School	Northport Village	1	0.3	1	0.2	2	0.3	2	0.2	3	0.3	1	0.1	3	0.15	1.55
79	Whisper Vineyards	Suffolk County SD No. 4	1	0.3	2	0.4	2	0.3	1	0.1	2	0.2	1	0.1	3	0.15	1.55
80	Albert Schmidt Farm	Suffolk County SD No. 26	1	0.3	2	0.4	1	0.15	1	0.1	2	0.2	3	0.3	2	0.1	1.55
81	Deckers Nursery	Northport Village	1	0.3	1	0.2	1	0.15	2	0.2	3	0.3	2	0.2	3	0.15	1.50
82	Del Vino Vineyards	Northport VA Medical Center	1	0.3	1	0.2	1	0.15	2	0.2	3	0.3	2	0.2	3	0.15	1.50
83	S. Scherer and Sons	Northport VA Medical Center	1	0.3	1	0.2	1	0.15	2	0.2	3	0.3	2	0.2	3	0.15	1.50
84	Gabreski Airport	Suffolk County SD No. 24	1	0.3	1	0.2	1	0.15	1	0.1	2	0.2	4	0.4	2	0.1	1.45
85	Great Neck Estates Park	Belgrave WPCP	1	0.3	1	0.2	1	0.15	4	0.4	1	0.1	2	0.2	2	0.1	1.45
86	Hauppauge Youth Org Baseball Fields	Suffolk County SD No. 22	1	0.3	2	0.4	1	0.15	1	0.1	2	0.2	2	0.2	2	0.1	1.45
87	Van Cott Nursery	Northport Village	1	0.3	1	0.2	1	0.15	2	0.2	3	0.3	1	0.1	3	0.15	1.40
88	Brookhaven Highway Dept	Suffolk County SD No. 11	1	0.3	1	0.2	1	0.15	1	0.1	2	0.2	3	0.3	2	0.1	1.35
89	Brookhaven Calabro Airport	Forge River Sewer District *	1	0.3	1	0.2	1	0.15	1	0.1	2	0.2	2	0.2	4	0.2	1.35
90	Nesaquake Middle School	Suffolk County SD No. 4	1	0.3	1	0.2	1	0.15	1	0.1	2	0.2	1	0.1	3	0.15	1.20
91	Bloomin Haus Nursery	Suffolk County SD No. 12	1	0.3	1	0.2	1	0.15	1	0.1	2	0.2	1	0.1	2	0.1	1.15
92	MacArthur Airport	Suffolk County SD No. 12	1	0.3	1	0.2	1	0.15	1	0.1	2	0.2	1	0.1	2	0.1	1.15
93	Westhampton Country Club	Suffolk County SD No. 24	1	0.3	1	0.2	1	0.15	1	0.1	1	0.1	2	0.2	2	0.1	1.15
	Score Scale	4	$ 0.01	$ 0.30	$ 58	$ 500	30 M	150 M	Very High		Positive		0.00	0.50	SPDES or Upgrade		
		3	$ 0.31	$ 1.00	$ 501	$ 1,000	10 M	30 M	High		Future Positive		0.51	1.50	Share Force Main		
		2	$ 1.01	$ 5.00	$ 1,001	$ 5,000	3 M	10 M	Limited		Neutral		1.51	2.50	Multiple Users		
		1	$ 5.01	$ 60.00	$ 5,001	$ 65,000	0.35 M	3 M	Negligible		Negative		2.51	4.50	None		

Project Assessments

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ID	Score	User	Project Type	WWTP	County	Area (ac)	Annual Usage (gal)	Distance (mi)	Capital Cost ($)	Normalized Cost ($/annual usage)
1	3.65	Village Club of Sands Point	Golf Course	Port Washington WPCP	Nassau	206	53,770,000	1	$5,310,000	$0.10
2	3.60	St. Georges Country Club	Golf Course	Suffolk County SD No. 21	Suffolk	132	34,450,000	0.7	$8,630,000	$0.25
3	3.45	Fresh Meadows Country Club	Golf Course	Great Neck WPCD	Nassau	160	41,760,000	1.5	$14,850,000	$0.36
4	3.40	Bergen Point Golf Course	Golf Course	Suffolk County SD No. 3	Suffolk	142	37,060,000	0.1	$5,360,000	$0.14
5	3.40	Willow Creek Country Club	Golf Course	Suffolk County SD No. 2	Suffolk	138	35,040,000	0.1	$5,110,000	$0.15
6	3.35	Wind Watch Golf Course	Golf Course	Suffolk County SD No. 13	Suffolk	140	32,850,000	0.1	$4,950,000	$0.15
7	3.25	Deepdale Golf Club	Golf Course	Great Neck WPCD	Nassau	173	45,150,000	2.3	$20,240,000	$0.45
8	3.25	Greens Golf Course	Golf Course	Suffolk County SD No. 26	Suffolk	86	22,450,000	0.1	$4,950,000	$0.22
9	3.25	SUNY Stony Brook Campus	Landscaping	Suffolk County SD No. 21	Suffolk	30	13,020,000	0.1	$4,370,000	$0.34
10	3.20	Glen Head Country Club	Golf Course	Glen Cove WWTF	Nassau	174	45,410,000	2	$18,220,000	$0.40
11	3.15	North Hills Country Club	Golf Course	Great Neck WPCD	Nassau	147	38,370,000	3.5	$28,310,000	$0.74
12	3.10	Smithtown Landing Golf Course	Golf Course	Suffolk County SD No. 6	Suffolk	160	41,760,000	1.6	$14,150,000	$0.34
13	3.05	Mill River Club	Golf Course	Oyster Bay STP	Nassau	122	31,840,000	2.4	$20,910,000	$0.66
14	3.00	Nassau Country Club	Golf Course	Glen Cove WWTF	Nassau	149	38,890,000	1.8	$16,870,000	$0.43
15	3.00	North Shore Country Club	Golf Course	Glen Cove WWTF	Nassau	156	40,720,000	2.1	$18,890,000	$0.46
16	3.00	Bay Park Golf Course	Golf Course	South Shore WRF	Nassau	43	11,220,000	0.1	$5,360,000	$0.48
17	3.00	Lake Success Golf Club	Golf Course	Belgrave WPCP	Nassau	112	29,230,000	2.6	$22,250,000	$0.76
18	2.95	Indian Hills Country Club	Golf Course	Northport VA Medical Center	Suffolk	128	32,850,000	2.5	$20,310,000	$0.62
19	2.95	Kurt Weiss Greenhouses	Nursery/ Greenhouse	Suffolk County SD No. 26	Suffolk	120	30,660,000	2.2	$17,120,000	$0.56
20	2.95	Pine Ridge Golf Course	Golf Course	Suffolk County SD No. 11	Suffolk	152	39,670,000	2	$17,140,000	$0.43
21	2.95	Half Hollow Park	Athletic Fields	Suffolk County SD No. 26	Suffolk	30	13,020,000	0.1	$4,230,000	$0.32

ID	Score	User	Project Type	WWTP	County	Area (ac)	Annual Usage (gal)	Distance (mi)	Capital Cost ($)	Normalized Cost ($/annual usage)
22	2.95	Pantaleons Farms	Tree/Shrub Farm	Suffolk County SD No. 21	Suffolk	23	12,490,000	1	$10,270,000	$0.82
23	2.90	Kings Park High School	Athletic Fields	Suffolk County SD No. 6	Suffolk	33	14,320,000	1.3	$12,720,000	$0.89
24	2.90	M&F Farms	Nursery/ Greenhouse	Suffolk County SD No. 26	Suffolk	24	12,140,000	1	$9,750,000	$0.80
25	2.90	Northport Golf Course	Golf Course	Northport VA Medical Center	Suffolk	48	12,530,000	0.5	$8,120,000	$0.65
26	2.90	Sands Point Golf Club	Golf Course	Port Washington WPCP	Nassau	112	29,230,000	1.5	$14,850,000	$0.51
27	2.90	Sipp Ave Complex	Athletic Fields	Suffolk County SD No. 7P	Suffolk	24	10,420,000	0.1	$4,230,000	$0.41
28	2.90	City Stadium Park	Athletic Fields	Glen Cove WWTF	Nassau	12	5,210,000	0.1	$4,230,000	$0.81
29	2.90	L. Delea & Sons Sod Farm	Sod Farm	Suffolk County SD No. 2	Suffolk	250	35,040,000	1.8	$15,640,000	$0.45
30	2.90	Pine Hollow Country Club	Golf Course	Oyster Bay STP	Nassau	128	33,410,000	2.8	$23,600,000	$0.71
31	2.85	Plandome Country Club	Golf Course	Port Washington WPCP	Nassau	104	27,140,000	2.5	$20,310,000	$0.75
32	2.85	Crab Meadow Golf Course	Golf Course	Northport VA Medical Center	Suffolk	125	32,630,000	2.8	$23,600,000	$0.72
33	2.85	Stonebridge Country Club	Golf Course	Suffolk County SD No. 22	Suffolk	110	21,900,000	1.4	$13,340,000	$0.61
34	2.80	Miller Place High School	Landscaping	Suffolk County SD No. 2	Suffolk	19	8,250,000	0.2	$5,000,000	$0.61
35	2.70	Group of Schools Next to Eachother	Athletic Fields	Forge River Sewer District *	Suffolk	71	30,810,000	3.7	$27,180,000	$0.88
36	2.65	Port Jefferson Country Club	Golf Course	Suffolk County SD No. 1	Suffolk	106	27,670,000	2.7	$22,930,000	$0.83
37	2.65	White Post Farms of Melville	Nursery/ Greenhouse	Suffolk County SD No. 26	Suffolk	22	11,130,000	1	$9,750,000	$0.88
38	2.55	Manhasset Secondary School	Athletic Fields	Great Neck WPCD	Nassau	10.5	4,560,000	0.7	$8,680,000	$1.90
39	2.45	Rockville Links Club	Golf Course	South Shore WRF	Nassau	106	27,670,000	4.5	$51,990,000	$1.88
40	2.40	Calabro Ballfields	Athletic Fields	Forge River Sewer District *	Suffolk	12	5,210,000	0.3	$5,460,000	$1.05
41	2.40	Lions Field	Athletic Fields	Port Washington WPCP	Nassau	9	3,910,000	0.1	$4,230,000	$1.08
42	2.35	Great Neck Public Schools	Athletic Fields	Belgrave WPCP	Nassau	15	6,510,000	2.7	$22,140,000	$3.40

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43	2.25	Martha Ave Recreation Park	Athletic Fields	Suffolk County SD No. 7W	Suffolk	25	10,850,000	2.2	$17,120,000	$1.58
44	2.20	Harborfields High School	Athletic Fields	Northport Village	Suffolk	25	10,850,000	3	$24,160,000	$2.23
45	2.20	Woodbourne Cultural Nurseries	Nursery/ Greenhouse	Suffolk County SD No. 26	Suffolk	40	20,240,000	4	$28,400,000	$1.40
46	2.20	Chippewa Elem/Sagamore Middle	Athletic Fields	Suffolk County SD No. 12	Suffolk	18	7,810,000	1.1	$11,370,000	$1.46
47	2.20	Paul J Gelinas Jr High School	Athletic Fields	Suffolk County SD No. 21	Suffolk	10	4,340,000	1.5	$13,240,000	$3.05
48	2.20	BB & GG Farms & Nursery	Nursery/ Greenhouse	Suffolk County SD No. 28	Suffolk	20	10,120,000	1.7	$15,410,000	$1.52
49	2.20	Sag Harbor Golf Course	Golf Course	Sag Harbor	Suffolk	43	11,220,000	1.8	$15,380,000	$1.37
50	2.15	Holbrook Country Club	Golf Course	Suffolk County SD No. 12	Suffolk	160	26,280,000	4	$29,820,000	$1.13
51	2.15	Seawane Club	Golf Course	South Shore WRF	Nassau	89	23,230,000	2.8	$34,040,000	$1.47
52	2.15	Northport Middle School	Athletic Fields	Northport VA Medical Center	Suffolk	9	3,910,000	1.5	$12,820,000	$3.28
53	2.15	West Hollow Middle School	Athletic Fields	Suffolk County SD No. 26	Suffolk	21	9,110,000	1.7	$14,050,000	$1.54
54	2.15	SI Country Club and GW Injection	Golf Course	Shelter Island STP	Suffolk	38	4,600,000	0.7	$11,350,000	$2.47
55	2.05	North Service Nursery	Nursery/ Greenhouse	Suffolk County SD No. 26	Suffolk	7	3,540,000	0.8	$8,530,000	$2.41
56	2.05	Port Jefferson High School	Athletic Fields	Suffolk County SD No. 1	Suffolk	6	2,600,000	1.1	$10,700,000	$4.12
57	2.00	Longwood Middle School	Athletic Fields	Suffolk County SD No. 23	Suffolk	10	4,340,000	2.1	$17,040,000	$3.93
58	2.00	Oyster Bay Memorial Stadium	Athletic Fields	Oyster Bay STP	Nassau	6	2,600,000	0.6	$10,070,000	$3.87
59	2.00	Stagecoach Elementary School	Athletic Fields	Suffolk County SD No. 11	Suffolk	6.5	2,820,000	0.4	$6,070,000	$2.15
60	2.00	Great Hollows Middle School	Athletic Fields	Suffolk County SD No. 4	Suffolk	11	4,770,000	1.2	$11,340,000	$2.38
61	1.95	Diamond in the Pines	Athletic Fields	Suffolk County SD No. 11	Suffolk	7	3,040,000	1.6	$13,870,000	$4.56
62	1.95	Selden Middle/ Newfield High	Athletic Fields	Suffolk County SD No. 11	Suffolk	17	7,380,000	2.1	$16,510,000	$2.24
63	1.95	Smithtown East High School	Athletic Fields	Suffolk County SD No. 4	Suffolk	19	8,250,000	2.4	$20,120,000	$2.44

ID	Score	User	Project Type	WWTP	County	Area (ac)	Annual Usage (gal)	Distance (mi)	Capital Cost ($)	Normalized Cost ($/annual usage)
64	1.95	Half Hollow Hills High School East	Athletic Fields	Suffolk County SD No. 5	Suffolk	30	13,020,000	2.9	$23,490,000	$1.80
65	1.90	Longwood Farms	Nursery/ Greenhouse	Suffolk County SD No. 23	Suffolk	60	8,760,000	3.3	$24,640,000	$2.81
66	1.90	Longwood High School	Athletic Fields	Suffolk County SD No. 23	Suffolk	23	8,760,000	3	$22,740,000	$2.60
67	1.90	Swan Lake Golf Course	Golf Course	Calverton	Suffolk	130	7,670,000	0.5	$9,750,000	$1.27
68	1.90	Venetian Shores Park/ Harding Elem	Athletic Fields	Suffolk County SD No. 3	Suffolk	18	7,810,000	2.4	$28,170,000	$3.61
69	1.85	De Lalio Farms	Sod Farm	Calverton	Suffolk	31	7,670,000	3.4	$25,770,000	$3.36
70	1.85	Deer Park Ave Nurseries	Nursery/ Greenhouse	Suffolk County SD No. 5	Suffolk	18	9,110,000	4	$30,890,000	$3.39
71	1.85	Delea Sod Farms	Sod Farm	Calverton	Suffolk	25	7,670,000	3.4	$25,770,000	$3.36
72	1.85	Satur Farms	Nursery/ Greenhouse	Calverton	Suffolk	28	7,670,000	3	$22,740,000	$2.96
73	1.85	Holmes Farms	Tree/Shrub Farm	Suffolk County SD No. 5	Suffolk	5	2,720,000	0.8	$9,560,000	$3.51
74	1.80	New Beginnings of Kings Park	Athletic Fields	Suffolk County SD No. 6	Suffolk	4	1,740,000	0.8	$9,350,000	$5.37
75	1.70	Village Polo Groundwater Recharge	Athletic Fields	Greenport WWTP	Suffolk	-	340,000	0.1	$4,230,000	$12.44
76	1.65	Northport High School	Athletic Fields	Northport Village	Suffolk	8	3,470,000	2	$17,430,000	$5.02
77	1.60	SCCC Riverhead	Landscaping	SCCC (Riverhead)	Suffolk	11	550,000	0.1	$4,230,000	$7.69
78	1.55	Thomas Lahey Elementary School	Athletic Fields	Northport Village	Suffolk	8	3,470,000	3	$24,160,000	$6.96
79	1.55	Whisper Vineyards	Vineyard	Suffolk County SD No. 4	Suffolk	10	4,160,000	3.3	$26,180,000	$6.29
80	1.55	Albert Schmidt Farm	Nursery/ Greenhouse	Suffolk County SD No. 26	Suffolk	4.5	2,280,000	1.3	$11,970,000	$5.25
81	1.50	Deckers Nursery	Nursery/ Greenhouse	Northport Village	Suffolk	1.2	610,000	2.5	$20,800,000	$34.10
82	1.50	Del Vino Vineyards	Vineyard	Northport VA Medical Center	Suffolk	6.2	2,580,000	1.9	$15,280,000	$5.92
83	1.50	S. Scherer and Sons	Nursery/ Greenhouse	Northport VA Medical Center	Suffolk	0.7	350,000	2.2	$18,780,000	$53.66
84	1.45	Gabreski Airport	Landscaping	Suffolk County SD No. 24	Suffolk	1	430,000	0.1	$4,230,000	$9.84

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85	1.45	Great Neck Estates Park	Athletic Fields	Belgrave WPCP	Nassau	5	2,170,000	2.4	$29,080,000	$13.40
86	1.45	Hauppauge Youth Org Baseball Fields	Athletic Fields	Suffolk County SD No. 22	Suffolk	6	2,600,000	1.5	$13,240,000	$5.09
87	1.40	Van Cott Nursery	Nursery/ Greenhouse	Northport Village	Suffolk	1	510,000	3	$24,160,000	$47.37
88	1.35	Brookhaven Highway Dept	Landscaping	Suffolk County SD No. 11	Suffolk	1	430,000	1.4	$12,210,000	$28.40
89	1.35	Brookhaven Calabro Airport	Landscaping	Forge River Sewer District *	Suffolk	2	870,000	2.5	$18,960,000	$21.79
90	1.20	Nesaquake Middle School	Athletic Fields	Suffolk County SD No. 4	Suffolk	6	2,600,000	3.3	$26,180,000	$10.07
91	1.15	Bloomin Haus Nursery	Nursery/ Greenhouse	Suffolk County SD No. 12	Suffolk	2	1,010,000	3	$22,740,000	$22.51
92	1.15	MacArthur Airport	Landscaping	Suffolk County SD No. 12	Suffolk	1	430,000	4	$29,080,000	$67.63
93	1.15	Westhampton Country Club	Golf Course	Suffolk County SD No. 24	Suffolk	138	1,310,000	2	$17,140,000	$13.08

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Table 3. Cost Support and Associated Projects

ID	Score	User	Storage Tanks	Flow Rate (gpm)	Dewatering Required?	Grade Difference of WWTP and STP?	Pass railroad, highway, or busy traffic?	Constructability Issues	Associated Projects
1	3.65	Village Club of Sands Point	2	300	No	69	Yes	Complex	Multiple End Users on Single Force Main
2	3.60	St. Georges Country Club	2	300	No	23	No	Typical	Multiple End Users w/in 2 mi Radius
3	3.45	Fresh Meadows Country Club	2	300	No	210	Yes	Complex	Multiple End Users on Single Force Main
4	3.40	Bergen Point Golf Course	2	300	Yes	0	No	Typical	Multiple End Users w/in 2 mi Radius
5	3.40	Willow Creek Country Club	2	300	No	46	Yes	Moderate	Multiple End Users w/in 2 mi Radius
6	3.35	Wind Watch Golf Course	2	300	No	0	No	Typical	None
7	3.25	Deepdale Golf Club	2	300	No	160	Yes	Complex	Multiple End Users on Single Force Main
8	3.25	Greens Golf Course	2	300	No	19	No	Typical	Multiple End Users w/in 2 mi Radius
9	3.25	SUNY Stony Brook Campus	1	100	No	0	Yes	Moderate	Multiple End Users w/in 2 mi Radius
10	3.20	Glen Head Country Club	2	300	No	157	Yes	Complex	Multiple End Users w/in 2 mi Radius
11	3.15	North Hills Country Club	2	300	No	223	Yes	Complex	Multiple End Users on Single Force Main
12	3.10	Smithtown Landing Golf Course	2	300	No	7	No	Typical	Multiple End Users w/in 2 mi Radius
13	3.05	Mill River Club	2	300	No	206	Yes	Complex	Multiple End Users on Single Force Main
14	3.00	Nassau Country Club	2	300	No	137	Yes	Complex	Multiple End Users w/in 2 mi Radius
15	3.00	North Shore Country Club	2	300	No	131	Yes	Complex	Multiple End Users w/in 2 mi Radius
16	3.00	Bay Park Golf Course	2	300	Yes	3	No	Typical	Multiple End Users on Single Force Main
17	3.00	Lake Success Golf Club	2	300	No	220	Yes	Complex	Multiple End Users on Single Force Main
18	2.95	Indian Hills Country Club	2	300	No	50	Yes	Moderate	Multiple End Users on Single Force Main
19	2.95	Kurt Weiss Greenhouses	1	100	No	39	No	Typical	Multiple End Users on Single Force Main
20	2.95	Pine Ridge Golf Course	2	300	No	4	Yes	Moderate	Multiple End Users on Single Force Main
21	2.95	Half Hollow Park	1	100	No	0	No	Typical	Multiple End Users w/in 2 mi Radius

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ID	Score	User	Storage Tanks	Flow Rate (gpm)	Dewatering Required?	Grade Difference of WWTP and STP?	Pass railroad, highway, or busy traffic?	Constructability Issues	Associated Projects
22	2.95	Pantaleons Farms	1	200	No	13	Yes	Moderate	Multiple End Users w/in 2 mi Radius
23	2.90	Kings Park High School	1	100	No	144	No	Complex	Multiple End Users on Single Force Main
24	2.90	M&F Farms	1	100	No	26	No	Typical	Multiple End Users on Single Force Main
25	2.90	Northport Golf Course	2	300	No	53	No	Complex	Multiple End Users on Single Force Main
26	2.90	Sands Point Golf Club	2	300	No	86	Yes	Complex	Multiple End Users on Single Force Main
27	2.90	Sipp Ave Complex	1	100	No	0	No	Typical	None
28	2.90	City Stadium Park	1	100	No	3	No	Typical	Multiple End Users w/in 2 mi Radius
29	2.90	L. Delea & Sons Sod Farm	1	300	No	49	Yes	Moderate	Multiple End Users w/in 2 mi Radius
30	2.90	Pine Hollow Country Club	2	300	No	210	Yes	Complex	Multiple End Users w/in 2 mi Radius
31	2.85	Plandome Country Club	2	300	No	19	Yes	Moderate	Multiple End Users w/in 2 mi Radius
32	2.85	Crab Meadow Golf Course	2	300	No	82	No	Complex	Multiple End Users on Single Force Main
33	2.85	Stonebridge Country Club	2	300	No	23	Yes	Moderate	Multiple End Users w/in 2 mi Radius
34	2.80	Miller Place High School	1	100	No	49	Yes	Moderate	Multiple End Users w/in 2 mi Radius
35	2.70	Group of Schools Next to Eachother	1	100	No	30	Yes	Moderate	SPDES Modification/Plant Upgrade
36	2.65	Port Jefferson Country Club	2	300	No	99	Yes	Complex	Multiple End Users w/in 2 mi Radius
37	2.65	White Post Farms of Melville	1	100	No	0	No	Typical	Multiple End Users w/in 2 mi Radius
38	2.55	Manhasset Secondary School	1	100	No	108	Yes	Complex	Multiple End Users on Single Force Main
39	2.45	Rockville Links Club	2	300	Yes	27	Yes	Moderate	Multiple End Users w/in 2 mi Radius
40	2.40	Calabro Ballfields	1	100	No	3	No	Typical	SPDES Modification/Plant Upgrade
41	2.40	Lions Field	1	100	No	26	No	Typical	Multiple End Users w/in 2 mi Radius
42	2.35	Great Neck Public Schools	1	100	No	227	Yes	Complex	Multiple End Users on Single Force Main

Project Assessments

CAMERON ENGINEERING & ASSOCIATES, LLP

LI Water Reuse Road Map Action Plan
Project Assessment
Table 3. Cost Support and Associated Projects

ID	Score	User	Storage Tanks	Flow Rate (gpm)	Dewatering Required?	Grade Difference of WWTP and STP?	Pass railroad, highway, or busy traffic?	Constructability Issues	Associated Projects
43	2.25	Martha Ave Recreation Park	1	100	No	3	No	Typical	Multiple End Users w/in 2 mi Radius
44	2.20	Harborfields High School	1	100	No	230	Yes	Complex	Multiple End Users on Single Force Main
45	2.20	Woodbourne Cultural Nurseries	2	100	No	49	No	Typical	Multiple End Users on Single Force Main
46	2.20	Chippewa Elem/Sagamore Middle	1	100	No	52	No	Complex	Multiple End Users w/in 2 mi Radius
47	2.20	Paul J Gelinas Jr High School	1	100	No	3	Yes	Moderate	Multiple End Users w/in 2 mi Radius
48	2.20	BB & GG Farms & Nursery	1	100	No	62	Yes	Complex	None
49	2.20	Sag Harbor Golf Course	2	300	No	16	No	Typical	None
50	2.15	Holbrook Country Club	2	300	No	13	Yes	Moderate	Multiple End Users w/in 2 mi Radius
51	2.15	Seawane Club	2	300	Yes	6	Yes	Moderate	Multiple End Users w/in 2 mi Radius
52	2.15	Northport Middle School	1	100	No	7	No	Typical	Multiple End Users on Single Force Main
53	2.15	West Hollow Middle School	1	100	No	33	No	Typical	Multiple End Users on Single Force Main
54	2.15	SI Country Club and GW Injection	2	300	No	108	No	Complex	None
55	2.05	North Service Nursery	1	100	No	13	No	Typical	Multiple End Users on Single Force Main
56	2.05	Port Jefferson High School	1	100	No	36	Yes	Moderate	Multiple End Users w/in 2 mi Radius
57	2.00	Longwood Middle School	1	100	No	16	Yes	Moderate	SPDES Modification/Plant Upgrade
58	2.00	Oyster Bay Memorial Stadium	1	100	Yes	4	Yes	Moderate	Multiple End Users on Single Force Main
59	2.00	Stagecoach Elementary School	1	100	No	7	No	Typical	Multiple End Users on Single Force Main
60	2.00	Great Hollows Middle School	1	100	No	36	Yes	Moderate	Multiple End Users w/in 2 mi Radius
61	1.95	Diamond in the Pines	1	100	No	14	Yes	Moderate	Multiple End Users on Single Force Main
62	1.95	Selden Middle/ Newfield High	1	100	No	10	No	Typical	Multiple End Users on Single Force Main
63	1.95	Smithtown East High School	1	100	No	65	Yes	Complex	Multiple End Users on Single Force Main

Project Assessments

CAMERON ENGINEERING & ASSOCIATES, LLP

LI Water Reuse Road Map Action Plan
Project Assessment
Table 3. Cost Support and Associated Projects

ID	Score	User	Storage Tanks	Flow Rate (gpm)	Dewatering Required?	Grade Difference of WWTP and STP?	Pass railroad, highway, or busy traffic?	Constructability Issues	Associated Projects
64	1.95	Half Hollow Hills High School East	1	100	No	108	Yes	Complex	Multiple End Users w/in 2 mi Radius
65	1.90	Longwood Farms	1	100	No	23	Yes	Moderate	SPDES Modification/Plant Upgrade
66	1.90	Longwood High School	1	100	No	33	Yes	Moderate	SPDES Modification/Plant Upgrade
67	1.90	Swan Lake Golf Course	2	300	Yes	0	Yes	Moderate	Multiple End Users w/in 2 mi Radius
68	1.90	Venetian Shores Park/ Harding Elem	1	100	Yes	0	No	Typical	Multiple End Users w/in 2 mi Radius
69	1.85	De Lalio Farms	1	300	No	13	Yes	Moderate	Multiple End Users on Single Force Main
70	1.85	Deer Park Ave Nurseries	1	100	No	120	Yes	Complex	Multiple End Users on Single Force Main
71	1.85	Delea Sod Farms	1	300	No	30	Yes	Moderate	Multiple End Users on Single Force Main
72	1.85	Satur Farms	1	100	No	13	Yes	Moderate	Multiple End Users on Single Force Main
73	1.85	Holmes Farms	1	200	No	82	Yes	Complex	Multiple End Users w/in 2 mi Radius
74	1.80	New Beginnings of Kings Park	1	100	No	105	No	Complex	Multiple End Users on Single Force Main
75	1.70	Village Polo Groundwater Recharge	1	100	No	5	No	Typical	None
76	1.65	Northport High School	1	100	No	219	Yes	Complex	Multiple End Users on Single Force Main
77	1.60	SCCC Riverhead	1	100	No	0	No	Typical	None
78	1.55	Thomas Lahey Elementary School	1	100	No	222	Yes	Complex	Multiple End Users on Single Force Main
79	1.55	Whisper Vineyards	1	100	No	72	Yes	Complex	Multiple End Users on Single Force Main
80	1.55	Albert Schmidt Farm	1	100	No	19	Yes	Moderate	Multiple End Users w/in 2 mi Radius
81	1.50	Deckers Nursery	1	100	No	190	Yes	Complex	Multiple End Users on Single Force Main
82	1.50	Del Vino Vineyards	1	100	No	40	No	Typical	Multiple End Users on Single Force Main
83	1.50	S. Scherer and Sons	1	100	No	92	Yes	Complex	Multiple End Users on Single Force Main
84	1.45	Gabreski Airport	1	100	No	0	No	Typical	Multiple End Users w/in 2 mi Radius

ID	Score	User	Storage Tanks	Flow Rate (gpm)	Dewatering Required?	Grade Difference of WWTP and STP?	Pass railroad, highway, or busy traffic?	Constructability Issues	Associated Projects
85	1.45	Great Neck Estates Park	1	100	Yes	3	Yes	Moderate	Multiple End Users w/in 2 mi Radius
86	1.45	Hauppauge Youth Org Baseball Fields	1	100	No	3	Yes	Moderate	Multiple End Users w/in 2 mi Radius
87	1.40	Van Cott Nursery	1	100	No	233	Yes	Complex	Multiple End Users on Single Force Main
88	1.35	Brookhaven Highway Dept	1	100	No	19	No	Typical	Multiple End Users w/in 2 mi Radius
89	1.35	Brookhaven Calabro Airport	1	100	No	10	No	Typical	SPDES Modification/Plant Upgrade
90	1.20	Nesaquake Middle School	1	100	No	69	Yes	Complex	Multiple End Users on Single Force Main
91	1.15	Bloomin Haus Nursery	1	100	No	13	Yes	Moderate	Multiple End Users w/in 2 mi Radius
92	1.15	MacArthur Airport	1	100	No	19	Yes	Moderate	Multiple End Users w/in 2 mi Radius
93	1.15	Westhampton Country Club	2	300	No	36	Yes	Moderate	Multiple End Users w/in 2 mi Radius

Project Assessments

CAMERON ENGINEERING & ASSOCIATES, LLP

LI Water Reuse Road Map Action Plan
Project Assessment
Table 4. Water Supply, Management, and Nitrogen Removal

SEATUCK

ID	Score	User	Project Water Table High?	Salt Water Intrustion Concern	Effect on Water Mgmt at Discharge	Water Extraction Cap?	Water Supply Pumping Concerns	WWTP Discharge	lb N removed annually	$/lb N removed Lifetime
1	3.65	Village Club of Sands Point	No	Future	Future Positive	Yes	High	Surface Water	2239	$118.59
2	3.60	St. Georges Country Club	No	Critical	Positive	No	Limited	Surface Water	1435	$300.79
3	3.45	Fresh Meadows Country Club	No	Critical	Positive	Yes	Very high	Surface Water	1739	$427.00
4	3.40	Bergen Point Golf Course	Yes	Critical	Negative	No	Limited	Surface Water	1543	$173.66
5	3.40	Willow Creek Country Club	No	None	Neutral or N/A	No	Negligible	Groundwater	2918	$87.56
6	3.35	Wind Watch Golf Course	No	None	Neutral or N/A	No	Negligible	Groundwater	2736	$90.47
7	3.25	Deepdale Golf Club	No	Critical	Positive	Yes	Very high	Surface Water	1880	$538.26
8	3.25	Greens Golf Course	No	None	Neutral or N/A	No	Negligible	Groundwater	1869	$132.40
9	3.25	SUNY Stony Brook Campus	No	Critical	Positive	No	Limited	Surface Water	542	$403.03
10	3.20	Glen Head Country Club	No	Future	Future Positive	Yes	High	Surface Water	1891	$481.75
11	3.15	North Hills Country Club	No	Critical	Positive	Yes	Very high	Surface Water	1598	$886.03
12	3.10	Smithtown Landing Golf Course	No	Future	Future Positive	No	Limited	Groundwater	3478	$203.44
13	3.05	Mill River Club	No	Future	Future Positive	Yes	High	Surface Water	1326	$788.53
14	3.00	Nassau Country Club	No	Future	Future Positive	Yes	High	Surface Water	1619	$520.90
15	3.00	North Shore Country Club	No	Future	Future Positive	Yes	High	Surface Water	1695	$557.10
16	3.00	Bay Park Golf Course	Yes	Critical	Negative	Yes	Very high	Surface Water	467	$573.48
17	3.00	Lake Success Golf Club	No	Critical	Positive	Yes	Very high	Surface Water	1217	$913.98
18	2.95	Indian Hills Country Club	No	Future	Future Positive	No	Limited	Surface Water	1368	$742.40
19	2.95	Kurt Weiss Greenhouses	No	None	Neutral or N/A	No	Negligible	Groundwater	2553	$335.25
20	2.95	Pine Ridge Golf Course	No	None	Neutral or N/A	No	Negligible	Groundwater	3304	$259.39
21	2.95	Half Hollow Park	No	None	Neutral or N/A	No	Negligible	Groundwater	1084	$195.06

ID	Score	User	Project Water Table High?	Salt Water Intrustion Concern	Effect on Water Mgmt at Discharge	Water Extraction Cap?	Water Supply Pumping Concerns	WWTP Discharge	lb N removed annually	$/lb N removed Lifetime
22	2.95	Pantaleons Farms	No	Critical	Positive	No	Limited	Surface Water	520	$987.43
23	2.90	Kings Park High School	No	Future	Future Positive	No	Limited	Groundwater	1193	$533.23
24	2.90	M&F Farms	No	None	Neutral or N/A	No	Negligible	Groundwater	1011	$482.03
25	2.90	Northport Golf Course	No	Future	Future Positive	No	Limited	Surface Water	522	$778.29
26	2.90	Sands Point Golf Club	No	Future	Future Positive	Yes	High	Surface Water	1217	$610.00
27	2.90	Sipp Ave Complex	No	None	Neutral or N/A	No	Negligible	Groundwater	867	$243.82
28	2.90	City Stadium Park	No	Future	Future Positive	Yes	High	Surface Water	217	$975.29
29	2.90	L. Delea & Sons Sod Farm	No	None	Neutral or N/A	No	Negligible	Groundwater	2918	$267.98
30	2.90	Pine Hollow Country Club	No	Future	Future Positive	Yes	High	Surface Water	1391	$848.25
31	2.85	Plandome Country Club	No	Future	Future Positive	Yes	High	Surface Water	1130	$898.46
32	2.85	Crab Meadow Golf Course	No	Future	Future Positive	No	Limited	Surface Water	1358	$868.61
33	2.85	Stonebridge Country Club	No	None	Neutral or N/A	No	Negligible	Groundwater	1824	$365.72
34	2.80	Miller Place High School	No	None	Neutral or N/A	No	Negligible	Groundwater	687	$364.05
35	2.70	Group of Schools Next to Eachother	No	None	Neutral or N/A	No	Negligible	Groundwater	2566	$529.59
36	2.65	Port Jefferson Country Club	No	Future	Future Positive	No	Limited	Surface Water	1152	$995.23
37	2.65	White Post Farms of Melville	No	None	Neutral or N/A	No	Negligible	Groundwater	927	$525.85
38	2.55	Manhasset Secondary School	No	Critical	Positive	Yes	Very high	Surface Water	190	$2,287.20
39	2.45	Rockville Links Club	No	Critical	Positive	Yes	Very high	Surface Water	1152	$2,256.51
40	2.40	Calabro Ballfields	No	None	Neutral or N/A	No	Negligible	Groundwater	434	$629.44
41	2.40	Lions Field	No	Future	Future Positive	Yes	High	Surface Water	163	$1,300.39
42	2.35	Great Neck Public Schools	No	Critical	Positive	Yes	Very high	Surface Water	271	$4,083.77

Project Assessments

LI Water Reuse Road Map Action Plan
Project Assessment
Table 4. Water Supply, Management, and Nitrogen Removal

ID	Score	User	Project Water Table High?	Salt Water Intrustion Concern	Effect on Water Mgmt at Discharge	Water Extraction Cap?	Water Supply Pumping Concerns	WWTP Discharge	lb N removed annually	$/lb N removed Lifetime
43	2.25	Martha Ave Recreation Park	No	None	Neutral or N/A	No	Negligible	Groundwater	904	$947.35
44	2.20	Harborfields High School	No	Future	Future Positive	No	Limited	Surface Water	452	$2,673.82
45	2.20	Woodbourne Cultural Nurseries	No	None	Neutral or N/A	No	Negligible	Groundwater	1686	$842.45
46	2.20	Chippewa Elem/Sagamore Middle	No	None	Neutral or N/A	No	Negligible	Groundwater	651	$873.84
47	2.20	Paul J Gelinas Jr High School	No	Critical	Positive	No	Limited	Surface Water	181	$3,663.22
48	2.20	BB & GG Farms & Nursery	No	None	Neutral or N/A	No	Negligible	Groundwater	843	$914.23
49	2.20	Sag Harbor Golf Course	No	Future	Future Positive	No	Limited	Surface Water	467	$1,645.55
50	2.15	Holbrook Country Club	No	None	Neutral or N/A	No	Negligible	Groundwater	2189	$681.27
51	2.15	Seawane Club	Yes	Critical	Negative	Yes	Very high	Surface Water	967	$1,759.64
52	2.15	Northport Middle School	No	Future	Future Positive	No	Limited	Surface Water	163	$3,941.12
53	2.15	West Hollow Middle School	No	None	Neutral or N/A	No	Negligible	Groundwater	759	$925.55
54	2.15	SI Country Club and GW Injection	No	Future	Future Positive	No	Limited	Surface Water	192	$2,963.44
55	2.05	North Service Nursery	No	None	Neutral or N/A	No	Negligible	Groundwater	295	$1,445.89
56	2.05	Port Jefferson High School	No	Future	Future Positive	No	Limited	Surface Water	108	$4,934.09
57	2.00	Longwood Middle School	No	None	Neutral or N/A	No	Negligible	Groundwater	361	$2,357.30
58	2.00	Oyster Bay Memorial Stadium	Yes	Future	Negative	Yes	High	Surface Water	108	$4,643.58
59	2.00	Stagecoach Elementary School	No	None	Neutral or N/A	No	Negligible	Groundwater	235	$1,291.87
60	2.00	Great Hollows Middle School	No	None	Neutral or N/A	No	Negligible	Groundwater	398	$1,426.15
61	1.95	Diamond in the Pines	No	None	Neutral or N/A	No	Negligible	Groundwater	253	$2,741.09
62	1.95	Selden Middle/ Newfield High	No	None	Neutral or N/A	No	Negligible	Groundwater	614	$1,343.52
63	1.95	Smithtown East High School	No	None	Neutral or N/A	No	Negligible	Groundwater	687	$1,464.94

ID	Score	User	Project Water Table High?	Salt Water Intrustion Concern	Effect on Water Mgmt at Discharge	Water Extraction Cap?	Water Supply Pumping Concerns	WWTP Discharge	lb N removed annually	$/lb N removed Lifetime
64	1.95	Half Hollow Hills High School East	No	None	Neutral or N/A	No	Negligible	Groundwater	1084	$1,083.19
65	1.90	Longwood Farms	No	None	Neutral or N/A	No	Negligible	Groundwater	730	$1,688.77
66	1.90	Longwood High School	No	None	Neutral or N/A	No	Negligible	Groundwater	730	$1,558.55
67	1.90	Swan Lake Golf Course	Yes	None	Negative	No	Negligible	Surface Water	319	$1,527.41
68	1.90	Venetian Shores Park/ Harding Elem	Yes	Critical	Negative	No	Limited	Surface Water	325	$4,330.01
69	1.85	De Lalio Farms	No	None	Neutral or N/A	No	Negligible	Surface Water	319	$4,037.07
70	1.85	Deer Park Ave Nurseries	No	None	Neutral or N/A	No	Negligible	Groundwater	759	$2,036.24
71	1.85	Delea Sod Farms	No	None	Neutral or N/A	No	Negligible	Surface Water	319	$4,037.07
72	1.85	Satur Farms	No	None	Neutral or N/A	No	Negligible	Surface Water	319	$3,562.40
73	1.85	Holmes Farms	No	None	Neutral or N/A	No	Negligible	Groundwater	226	$2,114.09
74	1.80	New Beginnings of Kings Park	No	Future	Future Positive	No	Limited	Groundwater	145	$3,233.67
75	1.70	Village Polo Groundwater Recharge	No	Critical	Positive	No	Limited	Surface Water	14	$15,162.12
76	1.65	Northport High School	No	Future	Future Positive	No	Limited	Surface Water	145	$6,028.12
77	1.60	SCCC Riverhead	No	None	Neutral or N/A	No	Negligible	Groundwater	46	$4,638.64
78	1.55	Thomas Lahey Elementary School	No	Future	Future Positive	No	Limited	Surface Water	145	$8,355.68
79	1.55	Whisper Vineyards	No	None	Neutral or N/A	No	Negligible	Groundwater	346	$3,778.42
80	1.55	Albert Schmidt Farm	No	None	Neutral or N/A	No	Negligible	Groundwater	190	$3,156.21
81	1.50	Deckers Nursery	No	Future	Future Positive	No	Limited	Surface Water	25	$41,133.53
82	1.50	Del Vino Vineyards	No	Future	Future Positive	No	Limited	Surface Water	107	$7,113.82
83	1.50	S. Scherer and Sons	No	Future	Future Positive	No	Limited	Surface Water	15	$63,666.57
84	1.45	Gabreski Airport	No	None	Neutral or N/A	No	Negligible	Groundwater	36	$5,851.74

Project Assessments

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LI Water Reuse Road Map Action Plan
Project Assessment
Table 4. Water Supply, Management, and Nitrogen Removal

SEATUCK

ID	Score	User	Project Water Table High?	Salt Water Intrustion Concern	Effect on Water Mgmt at Discharge	Water Extraction Cap?	Water Supply Pumping Concerns	WWTP Discharge	lb N removed annually	$/lb N removed Lifetime
85	1.45	Great Neck Estates Park	Yes	Critical	Negative	Yes	Very high	Surface Water	90	$16,091.59
86	1.45	Hauppauge Youth Org Baseball Fields	No	None	Neutral or N/A	No	Negligible	Groundwater	217	$3,052.68
87	1.40	Van Cott Nursery	No	Future	Future Positive	No	Limited	Surface Water	21	$57,333.81
88	1.35	Brookhaven Highway Dept	No	None	Neutral or N/A	No	Negligible	Groundwater	36	$16,891.19
89	1.35	Brookhaven Calabro Airport	No	None	Neutral or N/A	No	Negligible	Groundwater	72	$13,114.54
90	1.20	Nesaquake Middle School	No	None	Neutral or N/A	No	Negligible	Groundwater	217	$6,036.19
91	1.15	Bloomin Haus Nursery	No	None	Neutral or N/A	No	Negligible	Groundwater	84	$13,491.01
92	1.15	MacArthur Airport	No	None	Neutral or N/A	No	Negligible	Groundwater	36	$40,228.98
93	1.15	Westhampton Country Club	Yes	None	Negative	No	Negligible	Groundwater	109	$7,831.59

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LI Water Reuse Road Map Action Plan
Project Assessment
Assumptions

SEATUCK

Project Type	Flow Rate (gpm)	Water Usage Rate		Annual Usage (rounded to nearest 1,000)	
Golf Course	300	0.8	ac-ft of water per irrigated acre per year	261,000	gal/acre/year
Sod Farm	300	22.0	inches of irrigation per dry year	597,000	gal/acre/year
Athletic Fields	100	27154	gal of water per acre irrigated per week	434,000	gal/acre/year (16 weeks a year)
Landscaping	100	-	same as athletic	434,000	gal/acre/year (16 weeks a year)
Vineyard	100	15.3	inches of irrigation per dry year	416,000	gal/acre/year
Tree/Shrub Farm	200	20.0	inches of irrigation per dry year	543,000	gal/acre/year
Greenhouse	100	18.65	inches of irrigation per dry year	506,000	gal/acre/year

*Final annual usage rounded to nearest 10,000 gallons

COST ASSUMPTIONS				
Flow Rate (gpm)	UV Disinfection	Filtration	Pump Station	Estimated Cost (Installed)
100	$375,000	$373,000	$75,000	$1,646,000
200	$375,000	$373,000	$125,000	$1,746,000
300	$375,000	$373,000	$200,000	$1,896,000
25,000 gallon Storage Tank w/ Appurtenances				120,000
Distribution Pipe - open cut w/ restoration per foot.			No	600
Dewatering Required?			Yes	1000
20'x20' Equipment Building				100,000
Contingency				50%
Constructability Issues				varies - see table below
Engineering/Administration/Permitting				25%

*Final capital cost rounded to nearest $10,000

Constructability Issues	Typical	5%	Basic construction complexity
	Moderate	10%	Passes highway/railroad/high traffic roads
	Complex	20%	Greater than 50' grade differential

Storage Tanks	2 storage tanks for golf course
	1 for everything else

N removed annually	Groundwater	10	mg/l
	Surface Water	5	mg/l

Depth to Groundwater	<11' is high groundwater table	https://ny.water.usgs.gov/maps/li-dtw/
	Dewatering required?	Yes if high water table between WWTP and project
	Project High Water Table?	Yes if high water table at project location

Salt Water Intrusion Concern	Critical	Published reports/studies and/or water distribution area has elevated max Chloride concentration over 100 mg/L
	Future	Located near body of salt water.
	None	STP discharges to Groundwater

Effect on Water Management at Discharge	Positive	Salt water: Critical and Water table: Low (>11')
	Future Positive	Salt water: Future and Water table: Low (>11')
	Neutral	Salt water: None and Water table: Low (>11')
	Negative	Water table: High (<11')

Water Supply Pumping Concerns	Very high	Water cap-yes and Critical salt water concern
	High	Water cap-yes and Future salt water concern
	Limited	Water cap-no and Critical or Future salt water concern
	Negligible	No water cap and no salt water concern

Existing Project?	SPDES Modification/Plant Upgrade
	Multiple End Users on Single Force Main
	Multiple End Users w/in 2 mi Radius
	None

Project Lifetime	20 years

APPENDIX C

Nature Preserves

LI Water Reuse Road Map and Action Plan
Nature Preserves

Nassau County

WWTP	Nature Preserve	Owner
Great Neck WPCD	Leeds Pond Preserve	Nassau County
	Greentree	Greentree Foundation
Belgrave WPCP	Pond Park	Village of Great Neck Estates
Cedar Creek WPCP	Twin Lakes Preserve	Town of Hempstead
	Mill Pond Preserve	State of New York
	Tackapausha Nature Preserve	Nassau County
Glen Cove WWTF	Welwyn Preserve	Nassau County
Oyster Bay STP	Tiffany Creek Preserve	Nassau County
	Planting Fields Arboretum	State of New York
Port Washington WPCP	Sands Point Preserve	Nassau County
	Hempstead Harbor Woods	Town of North Hempstead

Suffolk County

WWTP	Nature Preserve	Owner
Calverton	Calverton Nature Preserve	Suffolk County
	Robert Cushman Murphy County Park	Suffolk County
Greenport WWTP	Paul Stoutenburgh Preserve	Town of Southold
Northport STP	Betty Allen Twin Ponds Park	Town of Huntington
	Edwin and Gertrude Grace Nature Preserve	Town of Huntington
Northport VA Medical Center	Makamah Nature Preserve	Suffolk County
	Meadowlark Park/ Veteran's Nature Study Area/ Knolls Park	Town of Huntington
Patchogue STP	Swan River Preserve	Suffolk County
	Blue Point Nature Preserve	State of New York
Riverhead WWTF	Peconic Estuary	Suffolk County
	Indian Island County Park	Suffolk County
	David A Sarnoff Preserve	State of New York
	Maple Swamp/ Birch Creek Owl Pond/Hubbard	Suffolk County
	County Parks	Suffolk County
	Peconic Bog County Park	Suffolk County
Sag Harbor STP	Linda Gronlund Memorial Nature Preserve	Suffolk County
SCCC-Riverhead STP	Long Island State Pine Barrens Preserve	State of New York
	David A Sarnoff Preserve	State of New York
	Manorville Hills County Park	Suffolk County
Shelter Island Heights	Mashomak Nature Preserve	Nature Conservancy
SCSD No. 5	Strathmore Park	Town of Huntington
	Butterfly Park	Town of Huntington
SCSD No. 6	Kings Park Bluff	Town of Smithtown
	Nissequogue River State Park	State of New York
	Arthur H Kunz County Park	Suffolk County
	Sunken Meadow State Park	State of New York
SCSD No. 13 / 15	Lakeland County Park	Suffolk County
	Lake Ronkonkoma County Park	Suffolk County

Nature Preserves

LI Water Reuse Road Map and Action Plan
Nature Preserves

Suffolk County

WWTP	Nature Preserve	Owner
SCSD No. 16	Southhaven County Park	Suffolk County
	Wertheim National Wildlife Refuge	USA
SCSD No. 18	Brentwood State Park	State of New York
	Hoyt Farm Nature Preserve	Town of Smithtown
SCSD No. 20 W/E	Rocky Point Pine Barrens State Forest	State of New York
	Brookhaven State Park	State of New York
SCSD No. 21	West Meadow Wetlands Reserve	Town of Brookhaven
	Avalon Nature Preserve	Suffolk County
SCSD No. 22	Blydenburgh County Park	Suffolk County
	Caleb Smith State Park	State of New York
SCSD No. 23	Catherdral Pines County Park	Suffolk County
	Longwood Pine Barrens State Forest	State of New York
	Rocky Point Pine Barrens State Forest	State of New York
SCSD No. 24	Hampton West Park	Suffolk County
	Westhampton Dwarf Pine Plains Preserve	Suffolk County
	Quogue Wildlife Refuge	Village of Quogue
SCSD No. 26	West Hills Nature Preserve/County Park	Suffolk County
	Dr. Jeffrey Wenig Memorial Park	Town of Huntington

GREENTREE

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SEATUCK

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