0. EXECUTIVE SUMMARY

0.1 Project Description

Peconic Green Growth's (PGG) intent is to introduce enhanced wastewater treatment to environmentally sensitive areas in critical watersheds. The focus is on the challenges of introducing enhanced treatment to existing neighborhoods, especially those that exhibit nonconformance to current regulations, as these areas are sources of excess pollutants. Since the project is focused on areas that do not have the densities that support central sewer plants, construction costs, disruptions, aesthetics and maintenance costs are important considerations.

This project builds on PGG's efforts to identify need and plan for enhanced wastewater treatment in existing communities using a decentralized, integrated approach that balances community systems with enhanced onsite systems using Orient, a hamlet on the North Fork of Long Island, as a pilot test case. The project was supported by grants from the Suffolk County Water Quality Protection and Restoration Program and Land Stewardship Initiatives, the National Fish and Wildlife Foundation – Long Island Sound Futures Fund 2014, and the Henry Phillip Kraft Family Memorial Fund at the Long Island Community Foundation.

Orient was chosen, not only for its compact density based on historic development patterns and its being surrounded by two estuaries of national importance, but also for the engagement of a caring community -- one that has fought to preserve the natural beauties of its location, which have defined its character over the centuries. The fact that Orient residents still rely on individual wells for drinking water, while still using onsite cesspools and septic systems for wastewater disposal, helps influence an interest in water quality issues. Building upon an earlier study that mapped conditions contributing to the negative impact of onsite wastewater on surface water quality, priority areas were defined for clustered treatment, as well as individual onsite upgrades for Orient.

Using consultant engineering firms, the team analyzed sites, restructured districts for clustered systems based on the cost and ability to site onsite enhanced systems, compared treatment options, surveyed the populace, and estimated costs for a community system.

0.2 Problem Statement

Declining Water Quality – Nitrogen

Clean water resources are especially important for Orient with its water-dependent economy founded in maritime, agricultural and tourist/second home industries. Orient is surrounded by two estuaries of national importance, the Peconic and the Long Island Sound Estuaries, both of which are important for shellfish/fish propagation and harvesting for food, as well as recreation. This study focuses on nitrogen mitigation, as water qualities in the two estuaries are degrading. Action is needed to turn the tide on water quality before it is too late.

Excess nitrogen feeds a variety of algal blooms that are depleting dissolved oxygen to levels that threaten the survival of marine life. While the waters around Orient are relatively healthy, being one of the few success stories for the reseeding of eelgrass on the Long Island Sound shore and shellfish in Orient Harbor, water quality is degrading. Evidence of this is the total loss of healthy eelgrass beds in Orient Harbor by 2008. The degradation is documented in the Peconic Water Quality Status and Trends Analysis. A continuous monitor in Orient Harbor documents declining dissolved oxygen levels and increases in nitrogen compounds and acidification, with levels of concern occurring in late summer, early autumn.

Existing, onsite wastewater systems have been identified as significant sources of existing nitrogen loadings for both estuaries. Orient also has the dubious honor of being ranked sixth out of 43 subwatersheds in the Peconic Estuary, for having the highest concentration of nitrogen loading per area.[1] Since both estuaries have Total Maximum Daily Load (TMDL) targets for nitrogen mitigation, any improvements in Orient will help realize these goals.

Assuming a 19% target reduction of nitrogen in the Long Island Sound, up to 104 homes would need 50% mitigation. If the homes were to treat to the same 83% reductions as the level of treatment proposed at the school, only thirty-five homes need enhanced treatment in addition to the school to attain a fair share of TMDL goal in the LI Island Sound watershed.

However the story is entirely different in the Peconic Estuary watershed. Addressing loading at its source, to address Orient's share of the TMDL target reduction from onsite system loading of 4,649 pounds of nitrogen annually, ALL properties in the Peconic Estuary in Orient need to mitigate nitrogen by the best achievable means. Systems rated at 50% reductions (NSF 245 standards) will not be enough.

[1] The Nature Conservancy

0.3 Public Acceptance

The lack of central wastewater treatment systems in Orient limits the amount and type of development that can occur. While Orient has land use regulations and zoning, there could be significantly more pressure for development, if community sewers were available. Many would object to the environmental impacts such as loss in open space, growth inducing impacts, and changes to the character of the community. At the same time many are concerned about water quality.

Since central wastewater treatment systems were traditionally used for increased development, this concern is strong in a community trying to preserve its rural character. It is therefore important to separate regulation and solutions by ensuring strong zoning regulations and establishing new restrictions based on environmental objectives, such as limiting nitrogen mass loading per acre and aligning zoning regulations with TMDL mitigation goals.

In partnership with the Orient Association, a survey was developed to assess receptivity to enhanced treatment and the favored manner – a clustered or single enhanced system. Of the 114 responses received 50% were in high priority areas. There was some dissatisfaction (43%) in water quality for drinking water among the respondents. Most (73%) experienced no operating problems with the function of their onsite wastewater treatment systems. Part of the issue of enhanced treatment on the East End is that the onsite wastewater systems function well for disposal, are therefore “unseen,” but contribute to the degrading water quality. The urgency of the issue is not felt viscerally by most residents. Unfortunately, if often takes a drastic event like the fish and turtle kills that occurred this year in Flanders Bay to raise public awareness of the issues and personal contributions to the decline in water quality.

Of the respondents, 49% would consider a clustered system, and 49% would consider an enhanced onsite system. Thirty-five percent wanted to be in a district where they could opt in to an improvement in the future. Twenty-three percent did not want to participate but were willing to contribute $120/year to enhancements taking place in the hamlet. When asked which enhancement they would be willing to consider if a 75% subsidy were available, the percentage of people considering a cluster did not change, but those interested in onsite enhanced systems rose to 62%. Twelve percent continued to prefer to do nothing. The problem with the responses was that those interested in a clustered option were scattered across Orient.

0.4 Decentralized Clusters

Since Orient has a combination of isolated clusters of small lots with a predominance of larger lots, this project originally defined seven areas for potential clusters. After amending the criteria with a focus on parcels less than 15,000 SF and shallow depths to groundwater, two districts were explored. The eastern district was ultimately dropped due to lack of interest in the target communities and the challenges for regulatory approval for treatment sites. The final focus was the historic hamlet of Orient, the school and churches, where sites were particularly challenging as well as in an environmentally sensitive area.

Community systems were explored as they can obtain higher levels of treatment, can be evaluated and adjusted centrally to maximize treatment, are built only to need, can be expanded as are usually modular, are relocated out of the flood zones and effect a coordinated impact on the environment. Together with enhanced onsite systems, an integrated approach was explored.

0.5 Site Evaluation

Selecting sites for collective treatment was the most difficult aspect of this study. Initially we evaluated potential sites by identifying either vacant parcels of at least three acres or occupied parcels with five acres, defining 200-foot buffers around existing buildings, and selecting sites out of flood plains and SLOSH areas, without steep slopes, and outside of wetlands. Many of the parcels were protected. After working with the town, the only protected lands they were comfortable considering for wastewater treatment were those reserved for open space as part of a standard subdivision process that clusters development. Unfortunately these sites were either too small, in flood plains, SLOSH zones or encompassed wetland areas. Any protection program that used public funds to subsidize purchase of development rights or reduced densities was not considered eligible. Changes in the Community Preservation Fund guidelines would allow up to 20% of funds to be used for wastewater purposes if the Town adopted the changes.

Another challenge was owner support. A few owners refused to be considered. Others volunteered sites, but usually these were too small or located remotely from areas of need. Any site used for active agricultural purposes, especially for food production was avoided. The school has considerable land in a central location. The administration was receptive to being a site but did not want to become responsible for the plant operation. They also didn't want to be the only site being considered. Approval from the NYS Education Department would be needed, if the project were to advance. Most of the general public liked the idea of the school, as it was already in the public domain. Elected town officials did not like the idea of supporting wastewater treatment on property associated with children. It was purely perceptual,

as they were comfortable with the location if under another jurisdiction. There were two parcels east of the school that were unprotected and used for personal horses and livestock. We chose to combine part of the school property and the smallest, adjacent lot for collective treatment.

0.6 Collection System

A Septic Tank Effluent Pump system with a small diameter pressure sewer collection system, was selected due to its cost effectiveness and low maintenance needs. This type of system is also less invasive for retrofitting an existing neighborhood and can handle difficult site conditions, such as upgradient flows and shallow depths to groundwater. Each home would retain a septic tank for the processing of solids.

0.7 Treatment System

The project focused on intermediated-sized systems capable of treating up to 30,000 gallons per day (GPD) with the goal of treating below 10 mg/L for Total Nitrogen as part of a STEP system. A small footprint, reasonable cost, odor control and aesthetics were also considerations. Of the six systems evaluated, three were considered potentially viable for the use and site conditions:

- AquaPoint Aqua CELL MBBR and BioClere fixed film trickling filter has been used extensively with good results. The BioClere has be preapproved by SCDHS for 15,000 gpd systems.

- Presby Environmental's Advanced Enviro-Septic (AES) passive recirculating system using a geotextile enhanced pipe and carbon enhanced equalization tank. It is H-20 rated for vehicle traffic. Advantages are the passive movements, low maintenance, and the fact that the system is mostly underground, with a few vent pipes. There is only one test site with available data for a large installation, but the data is promising. This proposal has the lowest operating costs.

- Orenco AX-MAX Packed Bed Media Filter and MAX- BBR, which works well with intermittent flows that a seasonal community may experience. Since the media filter replaces the aeration tanks, energy use is less. A final media filter polished the denitrified wastewater before it is discharged, to ensure final water quality. This is a relatively new configuration for the company, which has thousands of global installations.

0.8 Discharge

This project advocates a lower hydraulic loading rate and shallower system than the County typically uses. While this requires more space than the leaching pits, there is a better chance for additional plant uptake and additional treatment in the soil. Two versions of pressurized absorption beds are recommended: either a traditional adsorption trench or GeoMat Leaching System by Geomatrix Systems Inc.

0.9 Regulatory Acceptance

There will be a need for variances. We will likely be using some of the SCHDS Appendix A, Table A-2 modified separation distance setbacks, which typically apply to systems less than 15,000 GPD. These variances are in line with recommended changes to the regulations being considered by the County.

A variance and technology review will be needed. This is a chance to add to the options the County uses to deal with the nitrogen issue, ones suited to existing neighborhoods, where aesthetics and operating costs are of paramount concern.

0.10 Costs

Capital costs can be expected to be roughly six million or higher, depending upon the source and payment of the site.

Estimated Cost			Amount
STEP system, 94 Parcels		$	940,000
Collection System		$	1,125,000
Wastewater Treatment System		$	1,800,000
Disposal System		$	360,000
	Subtotal	$	4,225,000
Contingency (10%)		$	422,500
	Subtotal	$	4,647,500
Soft Costs (25%)		$	1,161,875
Land		$	700,000
	Total Project Cost	**$**	**6,509,375**

Annual operating costs are expected to be $35,000. This equates to $65,000 capital cost per dwelling unit and $350 of operating costs. If one adds the cost of debt

service, the estimated annual cost is $4,585, way above the $829 - $1,658 estimated to be reasonable for the local income levels. Subsidies covering 89% would be needed to meet the $829 target. While the level of treatment is expected to be higher at roughly 83% mitigation versus 50% for onsite systems, the cost for onsite systems will be considerably less, ranging from $15,000 to $30,000 per dwelling unit, with and expected maintenance costs of $100-240 in energy costs and $250-500 maintenance contract. Also, new approaches to onsite treatment, including soil-based systems, may be able to reach higher levels of treatment than the traditional 50%.

0.11 Process

Before a project can commence a sewer district needs to be formed. Normally this would be initiated by either the Town Board or the County. The other alternative is a petition by owners of real property within the proposed district. For this project it is unlikely that the Town will initiate action, based on previous meetings with the Town. It either needs to be through the County or by petition. Based on feedback from the survey we estimate that the chances of acceptance of a sewer district by property owners if subsidized is basically 50/50. We anticipate that substantial subsidy (89%) will make this a viable project. We anticipate the next steps to be:

1. Identification of subsidy and funding sources
2. Negotiations/approvals of sites (school and property owner of the treatment site)
3. Calculation of costs to the homeowner
4. Survey of property owners
5. Development of Map, Plan and Report
6. Town approval and public hearing to establish the district

0.12 Issues and Recommendations

- There is a strong, documented need for nitrogen mitigation in the hamlet of Orient. A decision needs to be made whether heavy subsidy and incorporation of clusters in existing neighborhoods of nonconforming lots will be supported. If not, coordinated efforts incorporating cesspool phase-outs and the introduction of enhanced onsite treatment are needed.

- This project identified two to three very viable additions to the technologies available for intermediate-sized treatment systems. These took into consideration aesthetics, low maintenance needs and costs.

- The County should identify a system for review and allowance of pilots for intermediate systems.

- Changes to codes are needed to facilitate adoption of community systems in existing neighborhoods.

- Currently land use, zoning and sanitary regulations do not address nitrogen mitigation for marine environmental benefits or even drinking water in existing, nonconforming communities. Especially if proactive, coordinated projects are not enacted, there is need for regulation change to trigger protection and action.

- There is a need for the identification, acquisition and/or protection of lands that target use for collective wastewater treatment. These lands can be complimentary to other protection programs, but the criteria will differ.