An Independent Report on Sewage Disposal Practices and Policies
Relating to the Groundwater Supply
In Suffolk County, New York

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"A complex combination of physical, chemical, and biological phenomena occur from the entrance of domestic wastes into a subsurface sewage disposal system, and through the system, the unsaturated soil, and the saturated soil. Sorption, dilution, diffusion, chemical reaction, precipitation, filtration and biodegradation phenomena take place in varying degrees."

-Long Island Groundwater Pollution Study (1969)

In the beginning, Man created the Outhouse
In the end, Sewers depleted the Water Supply

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Introduction

My colleagues and I have completed a review of the sewage disposal practices in Suffolk County, which we had undertaken several years ago. The purpose of this report is to evaluate the sewage disposal practices in Suffolk County; and to present recommendations for a long range policy and plan for sewage disposal. Hopefully, our public officials will take these recommendations into consideration and establish a sustainable sewage disposal policy that prevents the depletion of our groundwater supply.

As part of this endeavor we reviewed numerous reports and studies involving water supply and sewage disposal. [See References, p.14] Of these references, two particular documents have been singled out to provide a platform for developing a sustainable sewage disposal policy in Suffolk County. The two reports that we focused on are the 2017 report "***Groundwater Resources Management Plan***", prepared by The Long Island Commission for Aquifer Protection supported by Nassau and Suffolk Counties [LICAP Report], and the 2016 report ***"Long Island South Shore Estuary Reserve Eastern Bays Project: Nitrogen Loading, Sources and Management Options",*** prepared by Stony Brook University and funded by the Department of State [Eastern Bays Report]. We prepared written reviews of both these documents which are available through the links: LICAP Report Review and Eastern Bays Report Review]. It is recommended that the reader familiarize him or herself with these documents. These documents have been made part of this policy report and will be referenced to substantiate various statements and conclusions.

In the review process, we evaluated the use of **sewage treatment plants**(STPs) and **on-site wastewater disposal systems (OWTSs)**; and how they impact the groundwater supply. The discussion of on-site systems includes both **conventional septic systems** and **innovative/ alternative on-site wastewater treatment systems** (I/A OWTSs). A large part of the discussion focuses on overcoming the lack of understanding about septic systems and the naturally occurring sewage treatment processes here on Long Island. First, we will look at the lessons learned from Nassau County's STPs and sewering program.

Nassau County's failure should be a lesson for Suffolk County

Our review of the LICAP Report, provided a good platform to focus on the relationship of water supply and sewage disposal practices in Nassau and Suffolk Counties. Lessons learned in Nassau County serve as a warning for Suffolk. Based upon the information in the LICAP Report, Nassau County is facing an ongoing water crisis involving the depletion of its groundwater supply; as the Nassau County water suppliers have exceeded the "sustainable yield". [Reference LICAP Report Review, pg. 4] The majority of Nassau County's population is served by sewers. In effect, Nassau County's sewer systems with their coastal discharges are depleting the groundwater supply; which is at the root of the problem. The majority of the water pumped from the ground in Nassau County is discharged through sewer outfalls to coastal waters and not recharged back into the groundwater. **Suffolk County is following in the foot-steps of Nassau County by expanding its sewer districts and discharging into coastal waters through sewer outfalls.** This discharge is resulting in more and more water being wasted or lost. In the long run, such practices are not sustainable; and are already showing detrimental effects

including: lowering of water table levels, reduction in stream flow, loss of surface water features and ecosystems that depend on them, reduction in coastal discharge, change in bay salinity, shifts in contaminant migration paths, a shift in the saltwater interface and the potential for saltwater intrusion, change in recharge zone boundaries and the rate of groundwater flow. [See LICAP Report Review, pgs. 3-6] Realizing the impacts from sewering, we considered the option of using conventional septic systems as a long range solution for sewage disposal in Suffolk County; but first we had to understand them.

Understanding Conventional Septic Systems

There are three basic alternatives for sewage disposal in Suffolk County: STPs, I/A OWTSs and conventional septic systems. Historically, conventional septic systems have been the predominant treatment in Suffolk County. [Reference LICAP Report Review, pg. 10] However recently, Suffolk County has strongly encouraged the elimination of conventional septic systems, in favor of STPs and I/A OWTSs. [Reference LICAP Report Review, pgs. 6-8] Before making decisions about the use of conventional systems, it is important to have a clear understanding of the workings of conventional systems, their benefits and the treatment processes involved.

There are benefits to using conventional septic systems.

There are benefits to using conventional septic systems and maintaining consistency in their designs. The design of conventional septic systems has been "standardized" over the last 50 years to include a septic tank, precast leaching pools and access for maintenance. The standardization of designs for conventional septic systems assures that the regulators, contractors and homeowners have a clear understanding of what is expected, how the system operates and how it can be repaired. The few times Suffolk County strayed from standardized systems and embarked on alternative system programs, they created maintenance problems and hydraulic failures on a large scale. Examples of this were the "aeration tanks", "plastic insert tanks" and "commercial subsurface denitrification systems". [Suffolk County Comprehensive Plan, p. 8-16]

The benefits of using the conventional septic systems include the relatively low cost for installation and maintenance. In addition, the systems are simple in operation, requiring no pumps or mechanical devices, and their standardization makes them relatively easy to understand and service. Conventional systems recharge water back to the aquifer, off-setting groundwater depletion and fostering water conservation. In addition, the treatment of the effluent is dependent on natural processes in the system and surrounding soils, which are relatively fool proof when compared to mechanical systems. Further discussion of this can be found at LICAP Report Review (pgs. 6-8 & 10-12) and hereafter.

Conventional septic systems foster water conservation

One of the overlooked benefits of using conventional septic systems is that they encourage water conservation. There probably isn't a homeowner in Suffolk County, who has a septic system that isn't concerned about it failing and "backing up". These homeowners are aware that if they use too much water, the septic systems (with limited holding capacities) are more subject to filling up and backing up into their homes. These homeowners tend to conserve water by limiting its use within their house; including shorter shower times, using water conservation devices and

preventing leaking faucets and toilets. On the other hand, homeowners connected to sewers have no such incentive to limit their water usage, since wastewater disposal is someone else's problem and they do not see the consequences of excessive water usage. Many homeowners anguish over the prospect of their septic systems failing ("fecal phobia"); and could use support in maintaining and upgrading them. Before establishing sewage disposal policies that affect the use of conventional systems, it is necessary to understand how they work and why they fail.

How does a conventional septic system treat wastewater?

The average homeowner may not understand what their septic system consists of or how it works; but is essential that public officials do. The 1969 ***Long Island Groundwater Pollution Study*** recognized the treatment processes of a septic system as: *"A complex combination of physical, chemical, and biological phenomena that occur from the entrance of domestic wastes into a subsurface disposal system, and through the system, the unsaturated soil, and the saturated soil. Sorption, dilution, diffusion, chemical reaction, precipitation, filtration and biodegradation phenomena take place in varying degrees."* (pg. 1-5). It is therefore frustrating that 50 years later, public officials are making statements such as "*conventional septic systems provide little to no reduction of contaminants poured down the drain or flushed*." [LICAP Report Review, p. 7] Such statements demonstrate the ignorance surrounding septic systems, and the need for more education and understanding. The typical **conventional septic system** in Suffolk County consists of a septic tank and leaching pools. The septic tank is designed to detain the wastewater from the home and capture the floatable and settleable solids (such as toilet paper, grease, feces and other organic material). Besides the physical removal of this solid matter, the septic tank also "digests" some of the organic matter contained in the wastewater. [Septic Tank Overview] The effluent from the septic tank then flows into the leaching pool(s) where additional settling and treatment occurs. Along the walls and bottom of the leaching pools a "slime layer" or "biological mat" forms, which promotes secondary treatment, removing dissolved and suspended organic materials. Besides providing secondary treatment, the leaching pool can provide tertiary treatment, removing inorganic compounds, and substances, including nitrogen. As much as a 35% reduction in nitrogen has been reported [Eastern Bays Report , pg. 43]

Once the wastewater passes through the bio-mat, it enters the surrounding soils, where it is further treated through processes such as aeration, filtration, adsorption and absorption. Eventually, the remaining effluent enters the groundwater system, where it is subject to dilution and further tertiary treatment, depending on the soil conditions and groundwater chemistry. A portion of the effluent will eventually migrate to shorelines where it will enter the surface waters, after passing through hyporheic zones that provide additional tertiary treatment. [See Eastern Bays Report Review, p. 7]

We need to know more about wastewater treatment and septic systems

Conventional septic systems provide treatment for certain wastewater contaminants, but we need to know more. Studies have shown that "**shallow groundwater systems**" provide a good degree of treatment for certain wastewater contaminants. [See references 1, 21, 22, 27, 31] In areas of shallow groundwater (i.e., a water table generally less than 10 feet below grade

surface), conventional septic systems are designed to maintain the leaching lines or pools above the groundwater table. Generally, these systems do not extend more than five feet below grade. The majority of the coastal areas along the south shore of Suffolk County (and Nassau County) are considered shallow groundwater areas; and many have exhibited groundwater chemistry and soil conditions that are conducive to naturally occurring denitrification. In studies of "shallow groundwater systems", the samplings of groundwater plumes have demonstrated a relationship between nitrogen removal and the presence of certain parameters, including low concentrations of dissolved oxygen, high concentrations of dissolved organic carbon and denitrifying bacteria. [See Xu Review] The studies have shown the ability of the shallow groundwater systems to treat contaminants such as nitrogen, COD, BOD and pathogens; however, many public officials have ignored this phenomenon and dismissed this natural water purification process. Further investigations are needed to re-confirm this phenomenon of naturally occurring denitrification in our coastal areas. [Eastern Bays Report Review, pgs. 4, 5 &12] Once this relationship between shallow groundwater areas and naturally occurring denitrification is clarified, then better decisions can be made in respect to the appropriateness of using sewers, I/A OWTSs or conventional systems in these areas. With this in mind, **Suffolk County should reevaluate its decision to promote and mandate the use of I/A OWTSs and sewers in coastal areas; which already provide naturally occurring denitrification.**

Furthermore, there is a void of information about the treatment processes in "**deep systems**" located in areas where the groundwater table is deep below the ground surface. These systems, for the most part, consist of leaching rings that extend well below the ground surface, some stacked as deep as twenty feet. Due to their depth, it is surmised that these systems operate mostly under anaerobic conditions, raising questions about their treatment processes. We need to know the extent and limitations for treatment of wastewater by conventional septic systems. Although the systems and surrounding soils have been shown to reduce or remove suspended solids, pathogens, nitrogen, COD and BOD; there are other contaminants, such as household solvents, pharmaceuticals and personal care products (PPCPs), that may pass through the bio-mat and eventually make its way to the groundwater. Also of concern are contaminants that are being found in groundwater, which are not normally associated with domestic wastewater; these include 1,4-Dioxane, Perfluorinated Compounds, Pesticides and Volatile Organic Chemicals. It is important to investigate these contaminants and their treatment in conventional septic systems, as well as I/A OWTSs and STPs; before making decisions about their appropriateness. Is it really necessary to ban certain household products because they have trace amounts of solvents? Are conventional septic systems able to retain trace amounts of solvents through absorption by scum (fats, soaps)? Are biological processes in the systems able to break down these trace amounts of contaminants? Once we have more empirical information about the ability of the septic systems to treat domestic wastewater [not based on theoretical modeling], we can make more informed decisions about sewage disposal policies and the need for I/A OWTSs and STPs.

Failure of septic systems

It is important for public officials to understand why septic systems "fail"; and how such failures can influence sewage disposal policies and homeowners. Septic systems have a limited life span and over time will hydraulically fail ("back-up" or "overflow"). These failures are usually due to

clogging, structural failure or soil saturation. **Clogging** can occur when the bio-mat or slime layer become so dense that water can not pass into the surrounding soil through the leaching pool walls or bottom; hence there is an eventual sewage back-up (hydraulic failure). Solutions to clogging include "aeration" of the leaching pools, adding chemicals or replacing leaching pools.

Besides clogging, septic systems can fail due to **saturated soil conditions**. In areas where the leaching pools are subject to flooding or shallow groundwater, the leaching pools may not be able to leach (discharge) properly. When the soil surrounding the leaching pools becomes saturated, wastewater will tend to back-up in the septic system; unable to over come the water pressures in the saturated soil. Solutions to these types of failures include diverting surface drainage away from the system and/or elevating the leaching facilities so they are not influenced by groundwater or saturated soil conditions. In extreme cases, relocating the system may be necessary.

There are many existing septic systems that were built prior to the 1970's without septic tanks and with block pool systems that are prone to **structural failure**, including collapse. There are also situations where systems settle during use, rendering them non functional and structurally unsound. The normal solution for structural failures is filling in or removing the failed components and replacing them. For old block pool systems, replacement of the entire system is recommended in conformance with standards; they should be considered as an immediate safety hazard. In spite of the interim failures, it is not uncommon for homeowners to get 40 years out of a conventional septic system, with a little help.

Guidance is needed for the repair and maintenance of existing septic systems

It is important that public officials understand the situation that homeowners are put into when their septic systems fail. With a failed system, they can not flush toilets, do laundry, wash dishes or use other water in their homes. In the meantime, homeowners are adding all types of chemicals to try and fix their problems, when what they really need to do is upgrade their systems. The decision on repair and maintenance is usually a reaction to the failure; with the homeowners under pressure to make a decision. Sometimes it as simple as unclogging a pipe; but more likely with older systems, the problems stem from clogged or collapsed leaching facilities. There are thousands of existing systems that do not have septic tanks, have dangerous block pools and require continuous treatment to prevent sewage back-ups. When offered solutions, the homeowner will most likely opt for the fastest and least expensive solution and not necessarily the best.

It is understandable, when a homeowner is offered an $800 chemical "treatment" (e.g., adding sulfuric acid) versus a $3,000 leaching pool addition or a $7,000 total replacement, they are more apt to go for the $800 "fix". Unfortunately, "you get what you pay for"; the $800 chemical treatment may buy another few years of life from the sewage disposal system, but subsequent chemical treatments will be less effective over time, until there is irreversible clogging; requiring structural additions. Besides being a short term solution to the sewage disposal problem, if not used properly, chemical treatments can be harmful to the septic system and groundwater supply. It would be helpful if Suffolk County made an effort to educate homeowners and aid them in maintaining their systems, so the systems remain viable and cost effective.

With changes in Article 6 of the Suffolk County Sanitary Code, the county appears to be encouraging the upgrade of older systems, though they are not exactly offering help. Article 6 now states that after July 1, 2019 you need a permit to upgrade an existing system, if it fails. What is meant by "upgrade" is open for interpretation. Installing septic tanks, where none exist, and replacing failed leaching pools would be a positive step forward, both to the homeowner and the environment. Such upgrades will be expensive (though not as expensive as installing the I/A OWTSs or sewers); and homeowners need support, both financially and technically, to upgrade their systems. Rather than septic systems being excluded from grant programs, and focusing only on sewers and I/A OWTSs, Suffolk County should support the upgrade of the thousands of existing septic systems, which have outlived their expected lifetime and which need replacement and upgrading. Upgrading these systems to conventional standards is an alternative that in many situations will improve wastewater treatment and provide more practical benefits than installing I/A OWTSs or sewers. Such fundamental upgrades will improve the ability of the septic systems to treat contaminants such as nitrogen, COD, BOD and pathogens and provide better access for maintaining and monitoring the systems. Suffolk County should turn its energy towards setting up a program with funding and aid for failed septic systems, where appropriate. Such a program must not be onerous (time consuming, red tape, surveys, fees, etc.), considering that many of the upgrades need to be done on an emergency basis (sewage backing-up). There's an old adage involving septic system installations, "We bury our mistakes." A good regulatory program is designed to correct mistakes, before they are buried. It is essential that there be trained technical staff, such as sanitarians or engineers, acting as advisors/inspectors to assure that the upgrades are properly designed and installed.

So what's gone wrong with sewage disposal policies in the past?

Prior to formulating sewage disposal policies for Suffolk County, public officials should look to the past. It appears that the primary driving force for sewering Nassau and Suffolk Counties has been economic development. With the installation of sewers, properties have been more intensely developed, creating higher density projects and increasing opportunities for developers. When sewers are installed, the limits on development, imposed by the limitations of on-site sewage disposal systems, are removed; and developers are freed to seek higher density zoning and increase the population densities and size of businesses. Historically, the installation of sewers has led to more urbanized environments. The urbanization of Queens and Nassau County are prime examples of this process; as sewers and poor planning have turned these once rural communities into high population density areas. As a result, it is no surprise that Queens "ran out of water" and Nassau is facing a water crisis; both exceeded their sustainable yields. Previous bad decisions about sewage disposal have resulted in the depletion of our groundwater supply and have caused harmful impacts on our estuaries. [Reference LICAP Report Review, pgs. 3-6] Knowing these ramifications, why is Suffolk County continuing to campaign for more of the same?

The campaign for sewering

Historically, the problem that public officials have faced, trying to expand sewers, is that the public does not want to pay for them. In addition, many view such expansions as harmful to the

character of their communities (urbanization) and only benefiting developers. On the other hand, many are experiencing problems with septic system failures; and they are more inclined to vote for them. In any event, public officials are faced with the task of convincing the majority of taxpayers to pay for the sewers. The concept of protecting the groundwater supply is a good tool to accomplish this. In Suffolk County, public officials have used nitrogen from septic systems to create a crisis; claiming it to be the largest threat to our water supply and environment (dubbing it as "Public Enemy #1"). This nitrogen crisis provides the reason to eliminate septic systems and install sewers (or I/A OWTSs).

This campaign for sewering, using septic systems as the culprit, is nothing new. Nassau County had used it to promote its massive sewering program in the 1960's; and Suffolk County used it most recently in its campaign in 2018 to expand the southwest sewer district. So, is nitrogen from septic systems really the culprit?

The claims about nitrogen are disconcerting.

In light of the recent campaign for sewers, we reviewed the claims by Suffolk County that nitrogen from septic systems was "Public Enemy #1". In doing so, we found a disturbing pattern of conjecture and manipulation, which exaggerated the role of nitrogen from septic systems. In one case, we found at least six assumptions that were changed in a computer modeling program, which increased the importance of nitrogen in groundwater. [Reference Eastern Bays Report Review, pgs. 3-9] In other cases, we found studies that showed the potential of septic systems to remove nitrogen and other contaminants (on par with STPs), [Eastern Bays Report Review, pgs. 4, 5 &12] which were ignored and dismissed by Suffolk County. [Coordinated response to EBR Review] [Comments on Response to EBR Review]

The attack on septic systems was stepped up when Suffolk County officials realized that there was federal grant money available as a result of Hurricane Sandy. Suffolk County joined with New York State to use the concept of nitrogen contamination from septic systems to acquire federal grant money and fund the installation of sewers. [Reference 1/21/19 Newsday Article]

In the grant process, New York State asserted that nitrogen leaching from septic systems was "degrading marshlands" and thereby decreasing coastal resiliency to storms (such as Hurricane Sandy). They theorized that if the nitrogen from conventional septic systems was eliminated, the marshlands (wetlands) would be improved; thereby increasing the coastal resiliency. This relationship was the basis for acquiring their federal grants. In our review, we found no evidence that properly operating conventional septic systems were "degrading marshlands"; or that eliminating them would have a beneficial impact on the estuaries. Case in point: Over the last 50 years, septic systems have been eliminated on a massive scale by sewering along the south shore of Nassau and Suffolk Counties; but their elimination has **not** proven to increase the health of the estuaries. [Reference LICAP Report Review, pg. 9] It is obvious that there are other influences more directly affecting the wetlands.

There are many other factors that may influence the health of the wetlands, which include: direct discharge of pollutants, loss of buffer areas, rising sea-level, increased water temperatures, poor circulation, mosquito ditching, filling of flood plains, hardening of the shorelines and the use of

herbicides and pesticides. In any event, Suffolk County succeeded in its 2018 campaign to expand the Southwest Sewer District by using the threat of nitrogen contamination; the ends will likely not justify the means. In the long run, such expansions will increase the coastal discharge of our water supply and prove detrimental on several public health and environmental levels. [Reference LICAP Report Review, pgs. 3-6]

Conventional septic systems have proven to be effective.

Over the last 30 years, conventional septic systems, installed in accordance with Article 6 of the Suffolk County Sanitary Code and its Construction Standards, have proven to be effective. As stated in the **2015 Suffolk County Comprehensive Water Resources Management Plan** (the Plan), *"Wellfields with contributing areas that comply with the population density goals established by Article 6 all meet the target nitrate concentrations".* For the most part, samples from selected wellfields indicated average nitrogen concentrations below 6 mg/l, which were within the target concentrations for Article 6. [Suffolk County Comprehensive Plan, Section 3] These relatively low concentrations were found even though many of the selected wellfields had contributing areas with population densities that exceeded those allowed under Article 6 (i.e., more than one dwelling per half acre). In addition, many of the contributing areas had dwellings that were being serviced by substandard septic systems (e.g., "cesspools"). The relatively low nitrogen concentrations, found in the groundwater of these high density areas, implies that septic systems are more effective than originally assumed. Replacing substandard systems with standard systems (septic tanks with leaching facilities) will facilitate the ability of the septic systems to treat contaminants, such as nitrogen, COD, BOD and pathogens. [See pages 4-6 for a discussion of septic system benefits and treatment.]

Furthermore, as discussed in the [LICAP Report Review, pg.11], the average nitrogen concentrations of the groundwater in Suffolk County's supply wells ranged between 1.76 and 3.58 mg/l-N, which are within the drinking water standard of 10mg/l-N. Are achieving lower nitrogen concentrations from I/A OWTSs really necessary; and are conventional septic systems capable of achieving the goal of protecting the groundwater? Why is the county designating the coastal areas, with their natural denitrification potential, as priority areas for installing I/A OWTSs; and not the deep recharge areas that are the main source of our drinking water supply? Until the need for alternative systems is proven and these questions are definitively answered, the County must rethink embarking on a program that mandates I/A OWTSs throughout the County.

So, what are Sewage Treatment Plants discharging?

So far this report has discussed wastewater treatment by conventional septic systems, but what about STPs? What are they discharging? The law requires that effluent from Sewage Treatment Plants (STPs) be periodically sampled and analyzed for certain parameters. In its 2017 report, "*STP 2016 Performance Evaluation",* SCDHS reported results of sampling from STP effluents, which included total N, BOD, Suspended Solids, Fecal Coliform and pH. [See 2016 STP Report] The STP plants are regulated under the terms and conditions of their State Pollution Discharge Elimination System (SPDES) Permit, which requires inspections and sampling. Data for contaminants such as pharmaceuticals, personal care products (PPCPs), 1,4-Dioxane, Perfluorinated Compounds, Pesticides and Volatile Organic Chemicals was not included in the

report, since it was not required as part of the performance evaluation. However, there is a need for analyses to know if any of these (or other relevant contaminants) are present or discharged into the groundwater and the coastal waters through STPs. [Suffolk County Comprehensive Plan, Section 8] The results of any studies should be presented in a public report prior to making decisions on expanding sewer districts and STPs.

Prevention is worth a pound of cure

What we had found surprising in the LICAP Report was the lack of distinct recommendations to acquire land in the water budget areas. It makes sense to limit development in areas that serve as our water supply; thereby reducing the risk of pollutants impacting it. The Suffolk County Comprehensive Plan (pg. 3-24) concluded that "*Nitrate levels were lowest in wells with contributing areas comprised primarily of open space*." Acquiring land for groundwater protection (open space) is the best way to do this and should be a priority. [See Comments LICAP Hearing]

"..to-day the latest work on sewage disposal shows us that our forefathers, in using the cesspool, were using, unawares, a most efficient method for the disposal of solid putrefying substances."

-Lemuel P. Kinnicutt, *The Cesspool*, October 1900.

Recommended Sewage Disposal Policies and Actions

Foremost in Suffolk County's sewage disposal policies should be actions that protect our water supply; this includes quantity and quality. Protecting the groundwater goes hand in hand with public health and protecting the estuaries and coastal waters. Economic Development is also an important concern, but secondary to a safe water supply. The sewage disposal practices in Suffolk County have regressed into de-facto policies that are not sustainable in respect to the water supply. In order to maintain a safe and potable water supply, Suffolk County must recognize the need to limit development, and take appropriate measures to assure a sustainable water supply. The following is a discussion of recommended steps and policies for achieving this goal.

1. **Suffolk County must take action to stop Nassau County from drawing groundwater from Suffolk County (over 9 MGD).** The over development in Nassau County and its pumping of water is inadvertently drawing groundwater underground from Suffolk County into Nassau County along the common border. As documented, Nassau County will be needing more water in the future and Suffolk County is already planning to supply it. Suffolk County must compel Nassau County to limit development and curtail the discharge of treated water through its sewage treatment plants into coastal waters; this discharge (loss of water) is at the root of the groundwater supply problem. Since Nassau County has been unable to curtail its groundwater loss of its own volition, action against Nassau County appears to be necessary to protect Suffolk County's groundwater supply. [LICAP Report Review, pgs. 4 & 5]
2. **Suffolk County must take action to stop the expansion of sewer districts in Suffolk County that discharge treated water into the coastal waters**. Discharges into coastal waters have been shown to deplete groundwater by not recharging water back into the groundwater supply. Such expansions of districts and losses of water, when considered individually, do not appear to be of great environmental significance; but when considered cumulatively, they have a disastrous effect on the groundwater supply and estuaries. [LICAP Report Review, pg. 6]
3. **Suffolk County must require all new projects with sewage treatment facilities in Suffolk County to recharge treated effluent back into the aquifer**. In the past, all new projects or developments located outside of existing sewer districts, were required to construct sewage disposal facilities that treated and recharged the effluent back into the groundwater (aquifer). However, this has been circumvented by allowing projects (outside a district) to connect into sewer districts that have coastal outfalls. This results in the effluent being discharged to coastal waters; further depleting groundwater. Such connections from outside the districts should not be permitted unless proven to be a public health emergency. These sewer connections, when considered individually, do not appear to be of great consequence, but when considered cumulatively, will have a detrimental effect on the groundwater supply and the estuaries.
4. **Suffolk County must reject the practice of "blanket sewering" that prevails in Nassau County and some areas of Suffolk.** In the past, sewers have been "blindly "constructed in areas where sewers were not necessary, primarily to promote economic development. Many communities are in need of sewering because of inherent groundwater or soil

conditions which have caused on-site septic systems to hydraulically fail (i.e., back-up or overflow). Such areas include those with high population densities, shallow groundwater, poor drainage and limited land areas, which physically restrict the installation and operation of on-site septic systems. Groundwater elevations, soil conditions, drainage issues and population densities are factors that must be taken into account when making determinations about eliminating on-site systems and installing sewers. Suffolk County needs policies that require investigations and evaluations of existing conditions and septic systems, before making decisions about sewering an area. [discussion, page 6]

5. **Suffolk County must stop promoting large centralized sewer districts.** The expression "don't put all your eggs in one basket" can be applied to large centralized sewer districts that depend on one sewage treatment plant and one outfall pipe. If something happens to the treatment plant or to the outfall, large regions would be without sewage disposal, causing the backup of sewage and a public health crisis. Suffolk County (as well as Nassau County) have demonstrated a lack of foresight and good planning in this regard. Ironically, Nassau County is in the process of abandoning its Bay Park Treatment Plant outfall and transporting all its effluent to the Cedar Creek Plant outfall. If something happens to the Cedar Creek outfall (or the transmission line to it) most of Nassau's population will be without sewage disposal.
6. **Suffolk County must take action to curtail increases of sewage production within existing sewer districts that discharge to coastal waters.** Changes in zoning, building use or the construction of new developments can increase sewage production (gallons per day) within existing sewer districts. These increases can be subtle and go "under the radar", since in many cases the changes do not require any additional sewerage infrastructure, other than perhaps a sewer connection. Such increases in the production of wastewater in districts with coastal outfalls, ultimately end up increasing discharges to coastal waters. These increases, when considered individually, may not appear to be significant; but cumulatively, can result in major impacts to the groundwater supply. Within these outfall districts, Suffolk County must take a hard stand against zoning changes, changes in use and projects that increase wastewater production. Until this is done, such sewer districts will continue to exponentially deplete the groundwater supply.
7. **Suffolk County must confirm its sewage disposal policy in respect to the practice of using conventional septic systems.** Recently, Suffolk County has designated septic systems and their nitrogen production, as the primary threat to the groundwater supply in Suffolk County. Based upon what is known about conventional systems, this position appears to be unsubstantiated. It is incumbent upon Suffolk County to review its present sewage disposal practices, which primarily involve the treatment and recharge of wastewater through septic systems. These systems have benefits: besides being economical to construct and operate, they encourage water conservation and assure a balanced recharge of treated water; promoting the sustainability of the groundwater supply. Rather than disregarding the benefits of conventional systems and veering away from their use based upon misinformation, Suffolk County should take measures to further investigate these systems, draw informed conclusions and then make decisions as to their appropriateness. [pgs. 4 & 8]
8. **Suffolk County officials must stop exaggerating the public health and environmental significance of nitrogen from conventional septic systems.** Based upon misinformation, public officials have conducted a campaign to promote the expansion of sewer districts and the construction of I/A OWTSs in Suffolk County. This campaign included a pattern of data

manipulation; used to exaggerate the "nitrogen problem" and to incorrectly designate conventional septic systems as a primary source of nitrogen pollution to the estuaries. This relationship between conventional septic systems and the estuaries has not been proven; and was presented by Suffolk County and New York State in their efforts to obtain federal grant money for sewers. Suffolk County's policies, involving the need for sewering should be based on informed decisions, not exaggerations, misinformation or presumptions. [page 8]

9. **Suffolk County must re-confirm its responsibility to provide sewage disposal support for all residents in Suffolk County, including those using septic systems.** Similar to the support given to residents in sewer districts, residents still served by septic systems should be be given support for wastewater disposal. Rather than excluding septic systems from maintenance programs, and focusing only on sewers and I/A OWTSs, Suffolk County should address the thousands of existing conventional systems, which have outlived their expected lifetime and which need replacement and upgrading. Upgrading these systems to conventional standards is an alternative that in many situations will improve wastewater treatment and provide more practical benefits than installing I/A OWTSs or sewers. Such fundamental upgrades will improve the ability of the conventional systems to treat contaminants (such as nitrogen, COD, BOD and pathogens) and improve access for maintenance and monitoring. Suffolk County should set up a program of funding to aid and foster the use of conventional septic systems, where appropriate. Such a program could include grants or septic system maintenance districts, where septic systems within the district would be eligible for routine funding of maintenance and replacement. It is essential that there be trained technical staff, such as sanitarians or engineers, acting as advisors/ inspectors to assure that the upgrades are properly designed and installed. [Page 7]
10. **Suffolk County must fill the gap of knowledge concerning conventional septic systems and their ability to treat the contaminants found in domestic wastewater.** More research is needed about conventional septic systems before veering away from the use of these systems. Unfortunately, Suffolk County has not focused on the ability of conventional septic systems to treat domestic wastewater. There are studies that indicate that conventional systems provide primary, secondary and tertiary degrees of treatment, which has been disregarded by Suffolk County officials. Suffolk County has not done in depth studies on the quality of effluent contained in plumes from conventional systems; instead relying on computer models to predict what will happen to the effluent. Empirical studies that capture and analyze the effluent in the unsaturated and saturated zones (with tracers) are necessary before making decisions on alternative methods of sewage disposal. [Pages 5 & 6]
11. **Suffolk County must further investigate the treatment of wastewater by conventional systems in areas of shallow groundwater and reevaluate the use of AWTSs in these areas.** Septic systems located in shallow groundwater areas have exhibited some of the best treatment of wastewater, rivaling that of STPs. These "shallow groundwater systems" are designed to maintain the leaching facilities (leaching lines or pools) above the groundwater table. Generally, the systems do not extend more than five feet below the ground surface. Studies of such systems have shown a relationship with nitrogen removal and their location in shallow groundwater areas. The majority of the coastal areas along the south shore are considered shallow groundwater areas and have exhibited groundwater chemistry and soil conditions that are conducive to naturally occurring denitrification. The studies have shown the ability of the shallow groundwater systems to treat contaminants such as nitrogen, COD, BOD and pathogens. Further investigations should be conducted to re-confirm the

phenomenon of natural denitrification in shallow groundwater areas (such as coastal areas). Once this relationship of natural denitrification in shallow groundwater areas is confirmed, then better decisions can be made in respect to the appropriateness of using sewers, I/A OWTSs or conventional systems. Suffolk County should reevaluate its decision to promote and mandate the use of I/A OWTSs in coastal areas in consideration of what is already known about naturally occurring denitrification in these areas. [page 5]

12. **Suffolk County must further investigate the treatment of wastewater by "deep" conventional septic systems**. In areas that area not restricted by shallow groundwater conditions, septic systems are installed deeper into the ground. These "deep systems", for the most part consist of a septic tank and leaching pools (stacked up) that extend well below the ground surface, some as deep as twenty feet. There is a void in information about the treatment processes in deep systems. Due to their depth, it is surmised that these systems operate under mostly anaerobic conditions, raising questions about their treatment processes. These types of systems need to be studied so they can be better understood, and so that better informed decisions can be made as to their appropriateness. [page 6]
13. **Suffolk County should focus on protecting the groundwater supply by obtaining land in the water budget areas.** It makes sense to prevent development in areas that contain our water supply; thereby reducing the risk of pollutants impacting it. Acquiring land for groundwater protection (open space) should be a priority. [page 10]
14. **Suffolk County should conduct a thorough investigation of all STPs to determine what contaminants are being treated and what is being discharged.** There is a need to know what contaminants are present in STP influent, the effectiveness of treatment and what contaminants are being discharged into the groundwater or the coastal waters. At present the SPDES permits for STPs only require sampling and analysis for a few parameters. These parameters only include total N, BOD, Suspended Solids, Fecal Coliform and pH. There are many other contaminants of interest, which need to be investigated. The results of any investigations should be presented in a public report, prior to Suffolk County making decisions on expanding sewer districts and STPs. [page 10]

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