LONG ISLAND NITROGEN ACTION PLAN SCOPE

Long Island Sound Study

South Shore Estuary Reserve

Peconic Estuary Program

New York State Department of Environmental Conservation
Long Island Regional Planning Council

LONG ISLAND REGIONAL PLANNING COUNCIL

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

LONG ISLAND NITROGEN ACTION PLAN
SCOPE

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1 Overview

This planning scope will be used to develop a plan envisioned by the New York State Governor and Legislature. In the 2015-16 State Budget they appropriated $5,000,000:

> "For services and expenses related to a Long Island nitrogen management and mitigation plan. Not less than $1,875,000 of this appropriation shall be made available for services and expenses of the Long Island regional planning council (LIRPC). Notwithstanding, and other provision of law, the director of the budget is hereby authorized to transfer up to $3,125,000 of this appropriation to state operations."

The New York State Department of Environmental Conservation (DEC) and the Long Island Regional Planning Council (LIRPC), in consultation with the Indian Nations, and in partnership with numerous local governments and interested organizations on Long Island, including environmental justice organizations, are embarking on development of the plan, dubbed the *Long Island Nitrogen Action Plan*, or LINAP.

The LINAP will provide an assessment of conditions based on existing data including data on groundwater quality and quantity, and surface water quality. The plan will determine nitrogen load reduction targets as well as alternatives and strategies to meet those targets. This scope may be modified as conditions evolve or more information becomes available.

1.1 Background

Long Island is home to over 2.85 million people, 1.352 million people in Nassau County, and 1.5 million people in Suffolk County. These people are dependent on, and benefit from, the precious water resources of the region.

The sole source aquifer is the only source of water for all human activity on the island.

Rising levels of nitrogen in groundwater are a concern where such groundwater will be used as a drinking water source. Average levels of nitrogen in the upper glacial and magothy aquifers on Long Island have been trending upward. In some isolated areas on Long Island, high total nitrogen concentrations in groundwater the upper glacial aquifer actually exceed the drinking water standard (10 parts per million (ppm) nitrate + nitrite, expressed as N) precluding its use as a drinking water source. The main sources of nitrogen in Long Island groundwater are residential wastewater and fertilizer from homes and agriculture.

In addition to being the home of a sole source aquifer, Long Island is home of many embayments and significant ocean front waters that provide spectacular beaches, boating, fin-fishing, and once great shell-fishing. Unfortunately, groundwater containing nitrogen from wastewater and fertilizers naturally migrates to surface waters that are affected by nitrogen and at significantly lower concentrations than are of concern in drinking water (e.g. 0.3 to 0.4 parts per million total nitrogen).

That migration of nitrogen in groundwater is impairing surface water embayments at levels that are driving state and local action.

Surface waters require nutrients, such as nitrogen, to support healthy ecosystems.

However, excessive nitrogen can limit or preclude opportunities for swimming and fishing, and destroy habitat which in turn harms aquatic life, and reduces storm resiliency. Swimming is harmed by when high levels of nitrogen in waters produce nuisance algal blooms and increase aquatic weed growth.

Nitrogen and resulting plant growth and die off can draw oxygen from the water and produce "dead zones" where dissolved oxygen levels are so low that aquatic life cannot survive. This condition is referred to as hypoxia. Shallow, well-mixed estuaries are less susceptible to this phenomenon because wave action and circulation patterns supply the waters with plentiful oxygen. Excessive nitrogen fueled algae growth also shades submerged aquatic vegetation (SAV) reducing their ability to photosynthesize. Excessive nitrogen is also a key contributor in wetland degradation. Low dissolved oxygen, reduced SAVs, and wetland degradation lead to many areas having poor marine habitats that do not adequately support fin fish and shellfish populations. Degraded marine wetlands and aquatic vegetation reduces coastal areas natural storm buffering capacity, thereby reducing resiliency. .

Recognition of the role of nitrogen in the destruction of water resources and commensurate effects on economic viability on Long Island has grown recent years. LINAP will integrate many local initiatives, and evaluate additional alternative solutions to address water quality degradation on Long Island.

1.2 Goal Statement

The goals of the Long Island Nitrogen Action Plan (LINAP) include:

1. Assess Nitrogen Pollution in Long Island Waters
2. Identify sources of nitrogen to impaired and non-impaired water bodies
3. Establish nitrogen reduction endpoints
    1. Identifying ecological endpoints (desirable conditions in surface waters) for individual estuaries or embayments around Long Island to restore/protect estuarine health and function as well as groundwater resources.
    2. Establishing estuarine or embayment specific nitrogen loading targets based on:
        a. preliminary rapid assessments for immediate reduction actions to restore or protect water bodies
        b. development of more specific reduction targets based on higher precision estuarine modeling for meeting ecological endpoints
4. Develop implementation plan to achieve reduction endpoints.
    a) Developing sub-watershed plans including:
        a. Action plans which contain near term actions that will reduce nitrogen pollution to groundwater and surface waters
        b. Long term strategies for mitigating nitrogen pollution, prioritizing/targeting areas based on the more rigorous analytical

analysis for achieving/protecting estuarine specific ecological endpoints and cost effective analysis of mitigation/protection alternatives.

1.3 Groundwater

Groundwater is essential to the health and quality of the rivers, wetlands and estuaries throughout Long Island. USGS estimates that around 60% of the water recharged into Long Island's aquifer system eventually discharges to surface water through outflow to streams, nearshore estuarine seepage, coastline discharge, and subsea discharge (USGS SOTA website). Both the quality of groundwater and the rate at which it is recharging have a significant impact on surface waters. As such, LINAP will consider both the positive and negative impacts of all nitrogen reduction actions proposed, including, but not limited to:

- Improvements to groundwater quality;
- Improvements to the health and quality of surface waters;
- Loss of base flow into freshwater systems; and
- Reduction in available groundwater quantity.

1.4 Work Plans and Macro-Planning Areas

The state budget appropriated funds to be distributed between the LIRPC and DEC to develop LINAP. Mechanisms, including scopes of work, must be developed for all planning activities in accordance with required financing processes.

The LINAP will also make maximum use of past planning and engineering studies to build on previous work. The plan will identify where gaps need to be filled and to prioritize watershed planning and implementation. Local governments, existing estuary programs and protection committees as well as local, state and federal agencies will be identified to assist in the development and implementation of the LINAP.

For the purposes of developing planning partners and task distribution and preparation of geographic specific chapters to the plan, the planning areas to be considered will follow existing watershed boundaries under:

1. the Long Island Sound Study (including Little Neck Bay; Manhasset Bay; Hempstead Harbor; Oyster Bay; Huntington-Northport Complex; Nissequoque River; Stony Brook Harbor; Port Jefferson; Mount Sinai Harbor; and Mattituck Creek);
2. the Peconic Estuary Complex (including numerous embayements);
3. the Western South Shore Estuary Reserve (including Hempstead, Middle, and East Bay);
4. the Middle and Eastern South Shore Estuary Reserve (including the South Oyster Bay, Great South Bay and tributaries, Moriches Bay and Shinnecock Bay);
5. and will include an additional category of other waters (including Mecox Bay)).

These planning areas are presented in Figure 1 and Figure 2.

FIGURE 1: Planning Areas – Nassau County

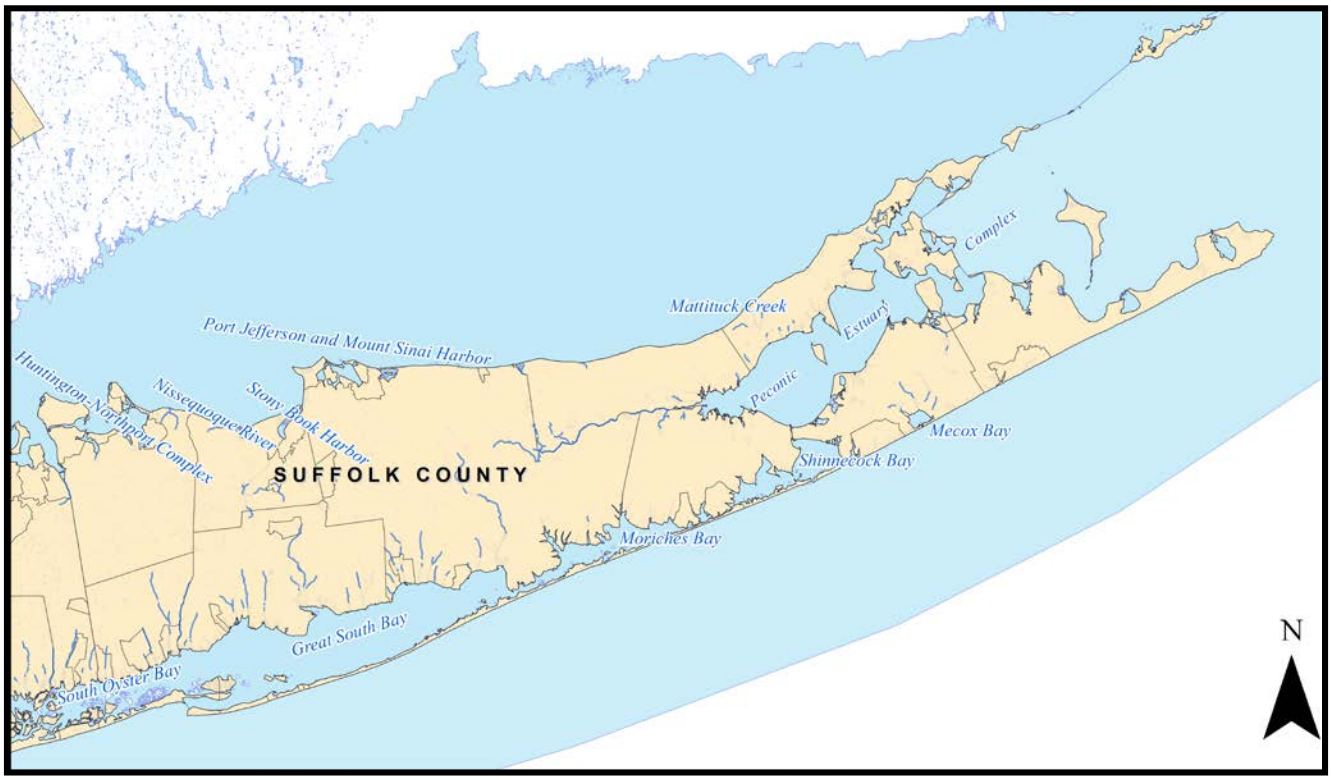

FIGURE 2: Planning Areas – Suffolk County

Early Action LINAP

The LINAP will be developed to address common issues and near term management strategies that would be appropriate for implementation, without waiting for rigorous watershed analysis expected to be completed over the next 12 to 18 months. These will be presented in the initial phase of the LINAP development (LINAP Early Action) and will include assembling available studies and data, sub-watershed delineation, development of nitrogen loading estimates, characterization of waterbody residence times, identification of tiered priority areas, estimation of preliminary load reductions for surface waters, evaluation of and development of load reduction goals for public water supply wells, review of wastewater alternatives and preparation of a draft wastewater plan.

Additional considerations for Early Action LINAP include, where feasible, development of wastewater reuse regulations, fertilizer control recommendations, a nitrogen smart communities program, map based planning tools and display tools, countywide wastewater management district analysis, wastewater treatment plant potential analysis, existing wastewater treatment plant performance assessment, agricultural best management practices recommendations, simple/broad land use planning recommendations, simple/broad wetland restoration recommendations, simple/broad green infrastructure recommendations, and simple hydro-modifications. Tasks not completed in Early Action LINAP can be completed in Long Term LINAP.

Full Term LINAP

A more intensive analysis will be completed over the next 36 to 48 months (Full Term LINAP). Full Term LINAP will include prioritization of sub-watersheds within each study area, for sub-watershed plans including more rigorous waterbody assessment and modeling, refined load reduction targets, and refined alternatives for load reduction. Sub-watershed plans are expected to include all the elements of Clean Water Act Total Maximum Daily Load plans or EPA 9 Key Element Watershed Plans.

Additional considerations for Full Term LINAP include full development of financing options, a long term ambient monitoring program, updates to the Long Island 208 plan, ecosystem based management recommendations, and recommendations for more involved hydro-modifications based on hydrodynamic modeling

The schedules for preparation of sub-watershed plans will be developed separately, with direction and input from local partners including protection committees and estuary programs.

1.5 Planning Structure

For the plan to be successfully implemented, local input, including from environmental justice communities, and the Indian Nations of Long Island (Unkechaug and Shinnecock) is essential to its development. Based on discussions with stakeholders, DEC is proposing that LINAP's development would be guided by a structure that includes an Executive Council, a Project Management Team and a LINAP Working Group. A draft structure is included at Attachment A that is intended to be used in the near term, but may be modified based on input from interested parties.

As the planning process matures, use of existing outreach and input structures will be maximized, including those of the estuary programs and protection committees.

1.6 Partners

LINAP is expected to build upon and support local nitrogen mitigation efforts of local entities including the Counties, municipalities, non-governmental organizations, and protection committees. Examples of efforts to build upon and support are the Suffolk County Comprehensive Water Resources Management Plan http://www.suffolkcountyny.gov/Departments/HealthServices/EnvironmentalQuality/WaterResources/ComprehensiveWaterResourcesManagementPlan.aspx as well as Nassau County's North Shore sewering study.

LINAP has the best chance for success if local organizations including environmental justice communities, are involved in project development and implementation. The partners that are expected to directly prepare aspects of the plan are included on the project management team. Nonetheless, mitigating the effects of nitrogen on Long Island will require direction from and collaboration with members of the LINAP Working Group as well.

Throughout the LINAP process, representatives of the Indian Nations of Long Island (Unkechaug and Shinnecock) will be consulted on a government to government basis in order to facilitate mutually beneficial priorities, programs and interests.

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Environmental justice communities – minority and low-income - suffer disproportionately from adverse environmental impacts, however, they tend to be excluded from environmental discussions that affect their health, outdoor environment and quality of life.

1.7 Schedules

An Early Action LINAP Gantt chart is presented in Attachment B.

A generic sub-watershed Gantt chart is also presented in Attachment B for preparation of sub-watershed plans that will be tailored to each sub-watershed based on assessments of existing data, information and available studies.

Also included in Attachment C is a generic TMDL development scope, including all the elements of TMDL development and a checklist of EPA 9 Key Element Watershed Plans.

1.8 Budget

Funding for the planning component will come from the state budget appropriation for LINAP, as well as other available funding sources, such as Project Management Team staffing contributions, Environmental Protection Funds from the Oceans and Great Lakes and South Shore Estuary Reserve categories.

1.9 1978 208 Plan

One goal for the LINAP is for it to be an update to the 1978 208 plan.

The 1978 208 plan contains many useful summaries of information that, if updated would be topical for the LINAP, including[1]:

- summary of Nassau-Suffolk percentage of Land Uses by Town and County (page 12, Volume I),
- summary of Domestic Wastewater Treatment Plant Discharges to Bays (page 17, Volume I),
- Estimated Stormwater Runoff Loadings to Long Island Bays (page 18, Volume I),
- Comparison of Nitrogen Loadings to Long Island Bays by Source (page 20, Volume I),
- Gross Summary of Estimated Sources and Fate of Nitrogen in the Bi-County Region
- Estimated Annual Loads Originating on an Acre of Residential Land with Three

[1] Page numbers referenced are in the 1978 208 Plan.

Houses (page 22, Volume I),

- Quality of Nassau and Suffolk Streams (page 27, Volume I
- Maps of existing service areas and potential 1995 service areas (page 51, Volume I).

The 1978 Long Island 208 plan, is available on the DEC LINAP website.

208 planning efforts are governed by 40 CFR Part 130.6. A copy of which is included in Attachment D.

2 Compile Existing Data and Display

The LINAP will provide an assessment of conditions based on existing data. Groundwater quality and quantity, and surface water quality need to be summarized by watershed. These data are necessary to provide an assessment of existing conditions. Data sources will include monitoring data, and past, ongoing, or planned studies.

These data will be used throughout the planning process. Data will provide the ability to assess conditions, assist with prioritization, and aid in the calibration and evaluation of models that will be used in the planning process.

2.1 Environmental Data

Data may be derived from numerical model outputs or historical monitoring data as shown in the following table:

Table 1: Environmental Data Needs

	Category	**Useful Types of Data**	**Potential Sources**
Quality	Groundwater	Quality, Quantity, Uses	USGS, NYSDEC, Suffolk County
	Surface Water	Quality, Uses	EPA, NOAA, Suffolk County, USGS, Nassau County, NYSDEC, SUNY SOMAS, local watershed groups, Estuary Programs and Cornell Cooperative Extension
Ecosystem	Submerged Aquatic Vegetation (SAV)	Coverage, location, types	NYSDEC, NYSDOS, Nassau County, Suffolk County, SUNY SOMAS, local watershed groups, Estuary Programs and Cornell Cooperative Extension
	Harmful Algal Bloom Information (HAB)	Coverage, location, duration, types	NYSDEC, Nassau County, Suffolk County, SUNY SOMAS, local watershed groups, NY Sea Grant,,

			Estuary Programs and Cornell Cooperative Extension
	Marine Life	Fish, Shellfish, distribution, productivity, susceptibility	NYSDEC, SUNY SOMAS, local watershed groups, Estuary Programs and Cornell Cooperative Extension, Towns
	Wetland	Coverage, location, types	NYSDEC, local watershed groups, Estuary Programs and Cornell Cooperative Extension, Towns, US Fish and Wildlife
	Upland Environment	Diversity, animal populations	NYSDEC, local watershed groups, Estuary Programs and Cornell Cooperative Extension
Pollution	Land use	Types, distribution, changes	LIRPC, Nassau County, Suffolk County, local watershed groups, Towns
	Transport Mechanisms	Precipitation, evapotranspiration, recharge, groundwater flow, surface runoff	NOAA, USGS, NYSDEC, local watershed groups, Estuary Programs and Cornell Cooperative Extension
	Point source	Flow, loads, location	NYSDEC, Nassau County, Suffolk County, local watershed groups, Estuary Programs and Cornell Cooperative Extension
Assimilation	Waterbody	Tidal ranges, residence time, freshwater inflow, tidal exchange, bathymetry	NOAA, NYSDEC, local watershed groups, USGS, SUNY SOMAS, Estuary Programs and Cornell Cooperative Extension
Study	Reports	Past, ongoing, planned	NYSDEC, Nassau County, Suffolk County, SUNY SOMAS, USGS, EPA, local watershed groups, Estuary Programs and Cornell Cooperative Extension

2.1.1 Relevant Studies

A framework needs to be established for the sharing of information by watershed or

planning unit as well as island wide. Information that needs to be shared include completed and ongoing studies related to: 1) water quality: 2) ecology; and 3) coastal resiliency. The purpose would be to utilize available work and to not duplicate any previous efforts or those that are currently underway.

2.1.2 Issues

For most of the data types listed above data exists, whether it is derived from historical data, reports, or numerical models. The primary issue is that the data does not exist in one centralized location, and is not readily accessible. For example surface water quality monitoring data exists but is located in various locations including but not limited to; Suffolk County Department of Ecology, USEPA National Costal Assessment program, NOAA National Center for Coastal Ocean Science, USGS, Nassau County, SUNY SOMAS, etc. A prospective path forward would be to create a new or leverage an existing system to store this type of information which is viable for planning and assessment purposes.

2.1.3 Identification of Data Gaps

After the collection of existing data, selection of ecological targets, and selection of models and evaluation of new data requirements needs to be completed. Data needed could include assessment data or data needed for model input, calibration, or verification.

2.2 Existing Wastewater Infrastructure Information

An important part of waterbody and groundwater loading sources are wastewater treatment plants. Additionally, wastewater treatment plants can be resources for nitrogen mitigation. To account for these sources/resources, the LINAP will include collection or creation of a geographic inventory of treatment plants and their attributes. Areas that are sewered with surface water discharges will be removed as wastewater contributions to groundwater from watershed models, but treated as loads to surface waters. The LINAP will include collection or creation of a geographic inventory of sewered areas. Individual on-site systems and wastewater treatment facilities which discharge to groundwater will be modeled as sources of wastewater contributions to groundwater. LINAP will include collection or creation of a geographic inventory of Individual Onsite Systems and their attributes as well as wastewater treatment facilities which discharge to groundwater. Municipal Separate Storm Sewer System sewersheds are source areas that will also be collected for LINAP. Assembling land use data will also be an important part of the LINAP preparation.

2.3 Displaying Information

An important component of the LINAP includes identifying and making available all existing data sets, research efforts and models that will be used to provide the public, researchers and local governments with the tools necessary to implement actions and ensure efforts are coordinated and complimentary.

A map based webpage (similar to the recently developed New York State Department of State New York Geographic Information Gateway or the Watershed MVP as has

been developed and used on Cape Cod) is being considered to satisfy this important part of the plan. The goal of this task is to provide the public access to free and reliable geographic data, a map viewer and access to research that has been or is being developed to address nitrogen pollution in Long Island waters. The intent of this task will be to aid a variety of audiences who are planning for the future and ensure that all actions are coordinated and complementary. The DEC also wants to make sure that available models are used throughout development of LINAP.

2.4 Develop New Water Quality Data

A need for additional water quality data may be identified for some of the planning areas following review of existing available data. For those areas LINAP development will include development and implementation of water quality monitoring programs, in collaboration with other entities already monitoring water quality like Suffolk County, United States Geological Survey, South Shore Estuary Reserve Program, Long Island Sound Study and Peconic Estuary Program.

2.5 Incorporating Citizen Science

There are many data needs to assess the current nitrogen loading from the watersheds, to assess the existing water quality conditions in Long Island waters and for future monitoring to assess the effectiveness of actions taken to mitigate the effects of nitrogen pollution. Citizen science is an opportunity for citizens and various citizen based organizations to fulfill some of the LINAP data needs. It is also an opportunity for public education and outreach; the same people that collect samples for citizen science are also people who can become more engaged and knowledgeable about water quality protection.

Citizen Science will be defined, for the purpose of LINAP, as data collected from local watershed organizations. LINAP will look to partner with such organizations that can provide data of an acceptable quality.

2.5.1 Usability of Existing Data

LINAP will consider data collected by various types of organizations which would fall in the category of “Citizen Science”. The degree to which the data is usable for this project will be determined based on the expected use, and the quality assurance which can be placed on the data

2.5.2 New Data Collection

As data needs are identified, the LINAP team will reach out to the various Citizen Science groups to identify opportunities to partner to fill data gaps and to measure progress from implementation of nitrogen pollution mitigation actions.

3 Characterize and Prioritize Waterbodies

Characterization of Watershed and Waterbodies: Watershed and waterbodies differ in characteristics across the island. Once waterbodies have been identified, historical water quality and ecology data needs to be documented to the maximum extent

practical. Historical water quality should be tied to ecological conditions. In a similar way each watershed for the waterbodies should be characterized including historical land uses and changes.

Prioritization: Existing data will be used to prioritize waterbodies and watersheds.

The LINAP will develop and implement a GIS-based analytical methodology to identify the most cost-effective and logistically feasible means of wastewater treatment in priority areas. Factors will include, but not be limited to, proximity to existing sewage treatment plants with surplus or expansion capacity, space for treatment and recharge, lot size and sub-regional density, flood zone status, depth to groundwater, and distance from shoreline. Initial capital, annual operation and maintenance, and long-term replacement costs will be included.

Available data will be used to analyze cost per pound of nitrogen removed and will be included as part of the analytical framework for the recommended management plan. Benefits to fisheries, tourism/beaches, recreation/boating, and property values will be included. Economic impacts on non-market resources such as marshes will also be incorporated.

Based on the potential environmental justice areas identified by DEC's Office of Environmental Justice, LINAP will give consideration to Environmental Justice communities in accordance with DEC's Environmental Justice policy when making decisions.

Public Water Supply Wells: Areas of influence around public water supply wells will be identified as priority areas for management actions.

3.1 Boundary Conditions

All embayments are bounded by some other waterbody: an incoming stream; an adjacent/connecting embayment; the Long Island Sound or the Atlantic Ocean. The quality of the water exchanging with the targeted embayment will have an impact on the water quality of that embayment. This will affect many of the modeling elements including the hydrodynamics and water quality

When determining the nitrogen loads coming into an embayment, the nitrogen load from the boundary conditions will be estimated based on the best available data.

3.2 Benthic Conditions

The benthic conditions can be very different from embayment to embayment. The benthic conditions can be an overall indicator of the health of a system, can dictate what types of systems are expected and can act as either a sink or source of nitrogen.

3.2.1 Benthic substrate

Data, where available, will be complied on the benthic substrate of the surface waters of Long Island. This will help characterize these waters in terms of both what the habitats would be expected to be in a healthy condition and if the substrate is expected to be a

sink or source of nitrogen. The presence of historic activities that could alter the substrate (i.e. duck farming in the area) will be identified to help characterize the substrate. This information could also be helpful in making assessments about groundwater discharges to the surface water

3.2.2 Macro invertebrates

Data, where available, will be compiled to understand the macro invertebrate communities of the surface waters and to help assess the overall health of the system

3.2.3 Benthic Flux

Data gathered in section 2.1 will help identify areas where benthic flux could be a significant contributor to the nutrient load to the system.

Data regarding sediment or benthic flux will be gathered and incorporated as it is available. This will be incorporated into estimating the nitrogen loading to the system as data is available.

The selected water quality model will be able to simulate sediment oxygen demand and nutrient releases, i.e., benthic flux.

3.3 Subwatershed Boundaries

To better understand the groundwater contributing areas (groundwatersheds) of Long Island, the United States Geological Survey (USGS) is currently developing a groundwater model to determine the groundwatersheds for the various surface waters of Long Island. This is a critical step for evaluating the management options for the Long Island waterbodies.

Identification of the surface waters for which groundwatershed will be delineated is an important task. The existing DEC Priority Water Body List (PWL) identification numbers will act as the basis for identifying surface waters. This list will be adjusted to include any waters that were not identified and will also be disaggregated when more than one waterbody was given the same PWL number. Similarly, large waterbodies with one PWL number will be divided into segments based on justifiable reasons such as known surface water hydrodynamics.

3.4 Endpoints and Indicators

The nitrogen end point for protection of water supplies is set by regulation at 10 parts per million total nitrogen. However, given the long lead time needed to protect from violating the standard, and the critical importance of protecting drinking water supplies, some factor of safety may be applied to the regulatory end point to determine load reduction targets for protection of drinking water supplies.

The LINAP will include development and implementation of a methodology to assess surface water and ecosystem impacts and prioritize areas in need of wastewater upgrades. This effort will be based on sensitivity of receiving waters (e.g., flushing rates, existing or potential impacts) in relation to nitrogen loads (existing and future),

and will draw on existing resources (e.g., pre-existing models) to the extent possible. Dissolved oxygen impairments and nitrogen TMDLs will be important criteria. Water quality preservation priorities will also be identified. Recent research on impacts to marshlands and eelgrass (i.e., coastal resiliency), harmful algal blooms, and shellfish will also be used to identify priority areas and needs. LINAP will also include integration of the Suffolk County HAB action plan recommendations and recommendations/actions from the three estuary programs.

EPA's Indicator Development for Estuaries, February 2008 describes ecological indicators as follows:

> *Indicators are used to summarize complex information into a simplified and useful form to facilitate the measurement of status and trends. Indicators communicate information, quantify responses, and simplify information about complex data. Indicators can be a cost-effective, accurate alternative to monitoring the individual components of a system. Therefore, indicators can be an effective means of assisting groups in tracking the progress of their programs (EPA, 2003a).*
>
> *Environmental Indicators are specific, measurable markers that help assess the condition of the environment and how it changes over time. Both short term changes and general trends in those markers can indicate improved or worsening environmental health."(Based on Barbara Keeler, personal communication, April 18, 2006).*

In other words these indicators or ecological indicators will be specific measurable parameters that will provide insight into complex interactions that occur in the natural environment. In addition, careful consideration needs to be given to some of these indicators to ensure the ability to model these numerically, in order to predict changes in the environment due to management actions.

There have been many efforts to develop a list of indicators to evaluate environmental health. Rather than develop a set of ecological indicators, the plan is to lean on the science that has been done and select a comprehensive set of indicators as a set of water quality and ecological goals. If these goals are achieved there will be an improvement in both water quality and ecology.

3.4.1 Potential Endpoints and Indicators

Distinguished from the regulatory standard for nitrogen in drinking water, the following list is considered a list of potential 'Primary Endpoints'. This is not meant to be an exhaustive list, but is believed to capture the most essential parameters that are related to water quality, and can be most readily used in numerical models to calculate allowable pollutant loadings. LINAP is expected to utilize waterbody specific endpoints or ranges, based on existing science, to calculate allowable pollutant loadings.

Additional 'Secondary Indicators' may provide useful information to qualitatively assess the water quality and ecosystem. Many of these indicators may not be good "regulatory" indicators they are more difficult to use in numerical models, but rather are good long-term ecological indicators of the health of the system.

Primary Endpoints – numeric, easily measurable

- **Total Nitrogen (TN)**: is an essential nutrient for plants and animals. However, an excess amount of nitrogen in a waterway may lead to low levels of dissolved oxygen and negatively alter various plant life and organisms. TN is the sum of total kjeldahl nitrogen (ammonia, organic and reduced nitrogen) and nitrate-nitrite.
- **Dissolved Inorganic Nitrogen (DIN):** is a necessary nutrient in estuaries; too much nitrogen this can lead to excess algae growth, hypoxia, or anoxia, and degrade habitat and clarity. DIN is made up of ammonia, nitrate, and nitrite. Various forms of algae use ammonia and nitrate to grow. Nitrite is rapidly converted to nitrate in the presence of oxygen and is not considered in most models as a variable that controls algae growth. Ammonia is readily assimilated by algae and aquatic vegetation, however it is generally rapidly converted to nitrate in the environment. DIN has been the focus of most of the nutrient research, however there is evidence that dissolved organic nitrogen (DON) is also a significant contributor to water quality impairments and it is a significant component of the total nitrogen discharged from wastewater treatment. To date however, it has not been used as an indicator.
- **Dissolved Inorganic Phosphorus (DIP):** Is also referred to as soluble reactive phosphorus or orthophosphate, but for constancy this will be referred to as dissolved inorganic phosphorus or DIP.
- **Chlorophyll *a* (CHL-a)**: is usually used as a measure of algae. Often there are dozens of different types of algae species in a water column and chlorophyll a provides us with an easier and reasonable estimate of algal biomass. There are multiple studies that have identified chlorophyll a as an indicator of primary production. Estuaries with highest annual chlorophyll *a* less than 5 ug/L appear to be un-impacted. At 20 ug/L, Submerged Aquatic Vegetation (SAV) shows declines and community shifts from a diverse mixture to a monoculture). At 60 ug/L high turbidity and low bottom water dissolved oxygen are observed.
- **Water Clarity (WCL)**: has a dual purpose, it is valued by society and contributes to the maintenance of a healthy ecosystem. In addition, light penetration into estuarine waters is important for submerged aquatic vegetation (SAV)... Water clarity can be measured in several ways for example EPA's NEP report measured it as the clarity divided by the clarity for a given reference condition, other measurements include, secchi disk depth, turbidity. While secchi, turbidity, etc. are very useful for citizen monitoring programs, the scientific standard for clarity is the light attenuation coefficient (a.k.a. vertical attenuation coefficient, diffuse attenuation coefficient, Kd, etc.). This is the parameter that will be used to indicate water clarity, and by extension Submerged Aquatic Vegetation habitat suitability.

- **Dissolved Oxygen (DO):** is necessary for all estuarine life. The New York State ambient water quality standards for DO for Class SA, SB and SC waters are 4.8 mg/L, with allowable excursions to not less than 3.0 mg/L for certain periods of time. The standards can be found at 6 NYCRR 703.3. Guidance for interpreting compliance with the chronic DO standard can be found in the NYSDECs Technical & Operational Guidance Series (TOGS) 1.1.6.

Secondary Indicators – narrative or numeric, difficult, expensive, or time intensive to measure

- **Macro algae:** Important primary producers in intertidal and shallow sub-tidal estuaries, providing food and refuge for invertebrates, juvenile fish, crabs and other species. However, some species of macro-algae thrive in nutrient-enriched waters, outcompeting other primary producers. For this reason, macro-algae have been proven to be useful indicators of eutrophication in estuaries. Blooms of macro-algae are stimulated by high nitrogen (N) and phosphorus (P) loading. In Long Island it appears that Ulva is the primary macro algae of concern. This might be due to the characteristics of the plant that allow them to dominate in a dynamic estuary environment, which include, rapid nutrient uptake and growth rates and a high tolerance for a wide range of temperature and salinities (Sutula M. 2011). Potential indicators include biomass, or percent cover. However, these indicators may not be a viable option as it is labor intensive to measure.
- **Sea Grasses and Submerged Aquatic Vegetation (SAV): An important** variable for aquatic plants is adequate irradiance (light availability). Without adequate light, regardless of the cause, aquatic macrophytes will not survive. Underwater irradiance is indirectly linked to nutrient loading, since the water column phytoplankton and algae stimulated by nutrients rapidly reduce light availability to aquatic plants (Sutula M. 2011). Light availability reduction from algae is exacerbated by light reduction from suspended non-biologic particles, similar to macro algae, potential indicators include percent cover, extent, or biomass. However, it is recommended that indicators associated with reduced light availability be pursued for use in protection of seagrass / SAV habitat.
- **Nuisance Algae / Toxic Algae:** Nutrient input changes nutrient ratios that can promote growth of nuisance and toxic algae. Threshold determinations of appropriate toxic algae metrics can be difficult because of the numerous species that may be present. A potential indicator could be as simple as presence, absence, or prevalence (e.g. presence of some algae is a natural, desirable condition, prevalence of excessive algae is not desirable).
- **Wetland Health:** Tidal wetlands provide many beneficial uses to coastal communities. Possible indicators include diversity, coverage, or trends in gains or losses.

- **Benthic Health:** Ecological impacts of nutrient enrichment are direct and indirect. Primary water quality drivers can cause conditions that change trophic structure example phytoplankton/ zooplankton production and species mixes, to changes in fish assemblages and benthic structure. Trophic structure changes cause changes in trophic interactions. Potential indicators may include dominant taxonomic groups, diversity, trends
- **Fish and Shellfish**: Ecological impacts of nutrient enrichment are direct and indirect. Primary water quality drivers can cause conditions that change trophic structure example phytoplankton/ zooplankton production and species mixes, to changes in fish assemblages and benthic structure. Plankton type can also effect forage fish available which can change fish assemblages. Water quality can also change habitat which may change fish assemblage. Potential indicators may include presence, absence, population, trends, fish community structure

3.4.2 Use of Endpoints

The following indicators have been used by **EPA National Estuary Program (NEP)** to evaluate coastal conditions. Table 1 provides the values used to assess the ecological condition for each one of the indicators. In addition the NEP report also provided the ability to assess the overall condition of the estuary by combining the individual indicators, e.g., the overall health is considered the be good if no one of the single indicators was rated poor and a maximum of one indicator was rated fair.

Table 2: Ranges for Indicators according to Ecological Health (EPA 2005)

Indicator	Good	Fair	Poor
DIN	< 0.1 mg/L	0.1 – 0.5 mg/L	> 0.5 mg/L
DIP	<0.01 mg/L	0.01 – 0.05 mg/L	> 0.05 mg/L
CHL-a	<5 ug/L	2 - 20 ug/L	> 20 ug/L
WCL	> 2 m	1 – 2 m	< 1 m
DO	> 5 mg/L	2 – 5 mg/L	< 2 mg/L

Tampa Bay utilized a combination of Chl-a and water clarity to establish necessary load reductions for total nitrogen.

Peconic Bay and Long Island Sound TMDLs used dissolved oxygen as the endpoint to reduce nitrogen loads.

The **Buzzards Bay** Eutrophication Index was created by Dr. Joe Costa in 1992 as a tool

to summarize water quality monitoring data collected in the Citizen's monitoring program. The 0 point value represent poor water quality whereas the 100 point value represents excellent water quality.

Table 3: Buzzards Bay Eutrophication Index Information

Parameter	0 point value	units	100 point value	units
Oxygen saturation (min of lowest 20%)	40	%	90	%
Transparency	0.6	m	3	m
Chlorophyll	10	ug/l	3	ug/l
DIN	10	uM	1	uM
Total Organic N	0.6	ppm	0.28	ppm

1978 Long Island 208 study indicated that a **total nitrogen** concentration of 0.35 or 0.4 mg/L can be used as a guide of overall biological state of the system**.**

Massachusetts Estuary Project: The water quality indicators that are central to evaluating the nutrient related habitat health for eelgrass and benthic in-faunal communities are the degree of oxygen depletion in bottom waters and the level of phytoplankton biomass (blooms) as determined from total chlorophyll a measurements. These parameters (dissolved oxygen and chlorophyll a) were then utilized to determine threshold total nitrogen concentrations to maintain acceptable habitat quality throughout and embayment system.

4 Modeling

In order to develop an action plan, the planners need to understand the biological system. At the most basic level, planners must be able to understand the hydrologic processes and associated fluxes of materials. Figure 3 below provides an overview of the processes that need to be considered. Many of these processes can be simulated through the use of models.

In order to simulate these process LINAP would need the following suite of models to predict effects on surface waters:

a. Watershed model - used to represent pollutant loads from the area draining to the modeled waterbody (the watershed). Pollutant loads can include direct discharges (e.g. industrial, municipal) as well as runoff from land activities (e.g. developed land, agriculture) and atmospheric deposition.

b. Groundwater model - used to represent pollutant loads to the modeled waterbody transported via groundwater, analogous to and sometimes combined in the watershed model.
c. Coupled Hydrodynamic/hydraulic and water quality model - used to describe processes that assimilate or process pollutants in the waterbody (e.g. resuspension, tidal flushing, algal growth and atmospheric deposition).

To understand ecological processes we would need a water quality model. Sometimes this model is incorporated within the hydrodynamic model, i.e., CE-QUAL-W2 can simulate hydrodynamics and water quality, in this case we are treating this model separately.

A single groundwater model will be used to determine effects on public drinking water supplies.

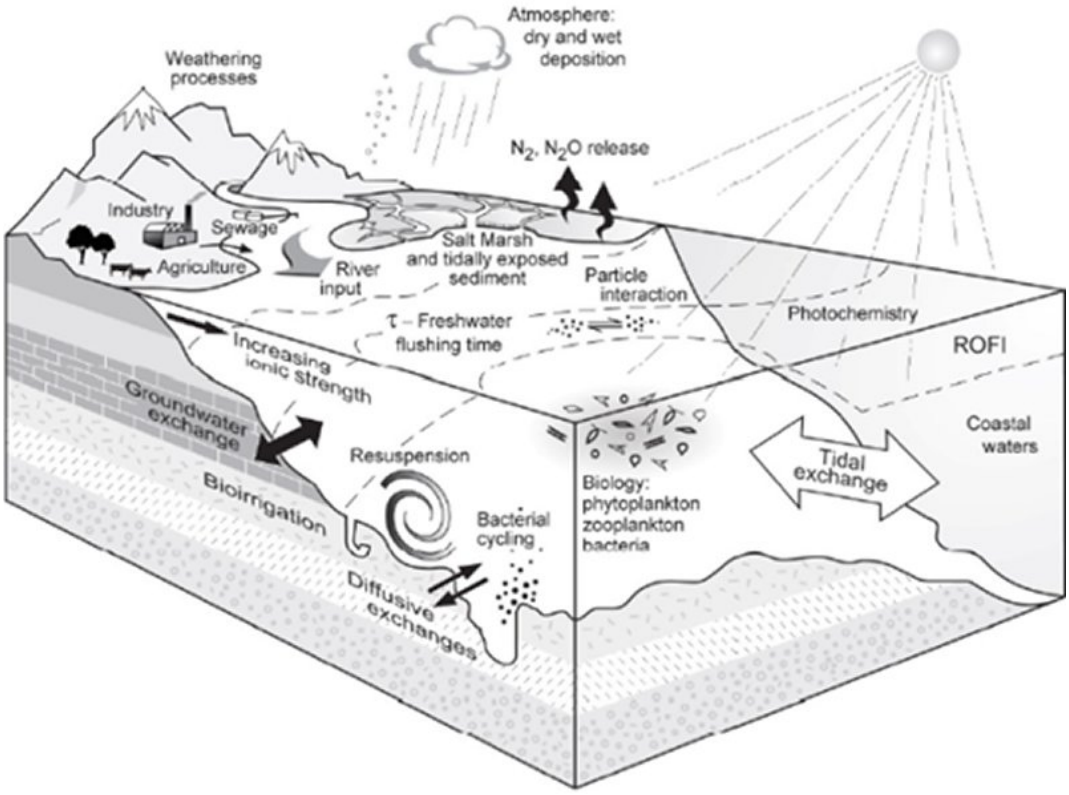

Figure 3: Conceptual Model Diagram

Model Interaction is a key consideration. The schematic below demonstrates how the suite of models would need to interact.

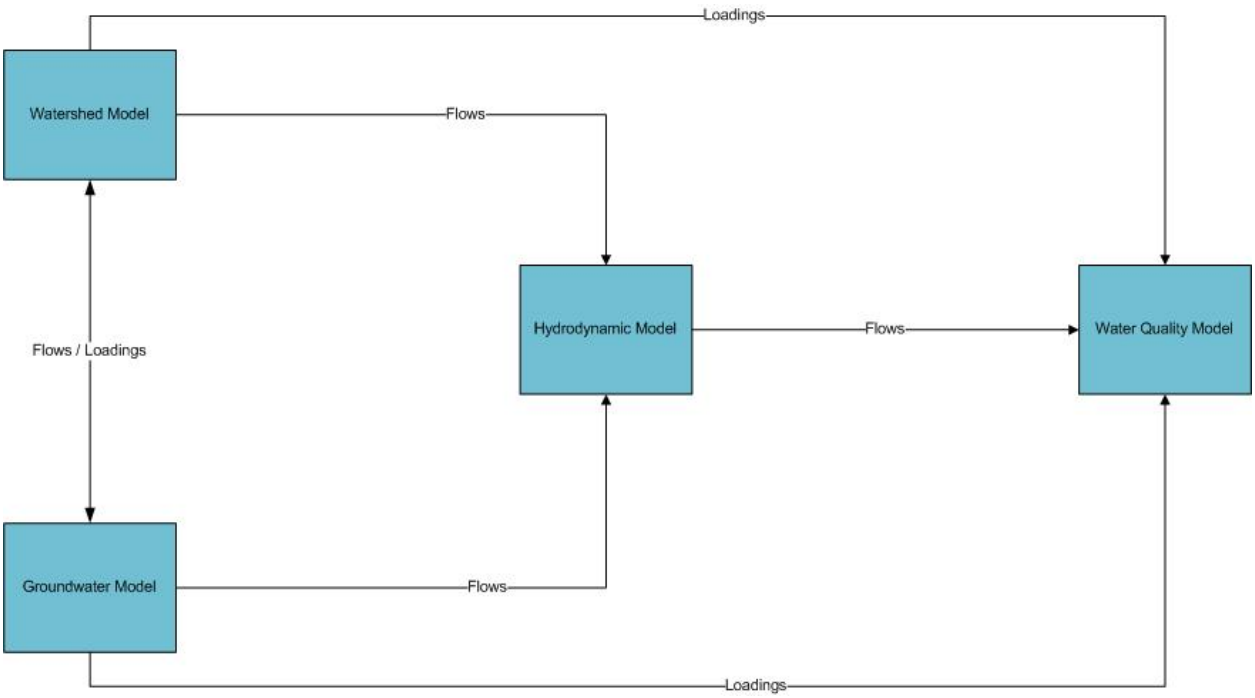

Figure 4: Generalized Model Interaction

4.1 Model Development and Selection

Open source models are preferred. The purpose behind using open source software is that professionals with the technical expertise may be able to cross-check, update, or take the analysis to the next level. Groundwater, watershed, hydrodynamic, and a water quality models are needed to properly assess waterbodies and to evaluate ecological indicators. Useful examples/lessons can be found in the estuary program studies. Regardless of the models chosen, careful consideration needs to be given to input, output, and linkage.

4.1.1 Considerations

Consideration needs to be given to the complexity of the model necessary to completely meet the goals of the LINAP. More complex models are more time intensive and require expert knowledge to use properly. In any event the following needs to be considered when selecting the appropriate model(s).

a. Available data
b. Parameters of interest
c. Size of model domain
d. 0D, 1D, 2D, or 3D
e. Steady state or dynamic
f. Model spatial resolution (element/grid spacing feasible)

More complex models are not always better, and typically cost more money and take longer to complete. It is important to set goals and determine specific needs first and then select models best suited to those needs.

4.1.2 Basic Tenets

a. All modeling would require a NYSDEC approved QAPP.
b. The Ground water model for refined modeling has been set.
c. The watershed model should be consistent throughout Long Island in order to ensure equivalent loadings,
d. The hydrodynamic and water quality models may differ by waterbody.
e. Models would have to be selected based on hydraulic and ecological properties of the waterbody; different conditions may require different models.
f. Boundary conditions, (e.g. an incoming stream; an adjacent/connecting embayment), will be established and representative of the pollutant loadings from outside the area modeled.

4.2 Groundwater Model

The NYSDEC has already secured USGS to utilize a groundwater model to delineate groundwater-sheds on Long Island. This same model can be used to provide information about groundwater discharge, volumes, and transport processes. The USGS is using MODFLOW. This model is considered the standard in predicting groundwater conditions and groundwater/surface water interactions. This model is open source and can be downloaded for use directly from USGS.

4.3 Watershed Model

Much about the general model requirements for Long Island nitrogen modeling is known. Each watershed model needs to be able to provide loadings at the tax parcel level to account for individual onsite septic's, known to be a major source in most watersheds. The model needs to be able to provide loadings and recharge information that is easily assimilated in the USGS MODFLOW model. In addition the model needs to consider surface water runoff, fertilizer runoff and infiltration. The output of this model needs to be a combination of surface water loads and groundwater loads.

4.4 Hydrodynamic Model

Each hydrodynamic model should accurately and appropriately simulate the hydrodynamics of the system. Some consideration needs to be given to the type and complexity of the model. Model dimensions range from 0-D to 3-D. Zero dimensional models include the tidal prism or the fraction of freshwater, both of which provide only an indication of overall mixing. An example of a model that has varying level of dimensionality is the Environmental Fluid Dynamics Code (EFDC) this model has the ability to be applied on 1, 2, or 3 dimensions. This model has been the underlying model in many applications including the Peconic Estuary TMDL, and the recent Anchor QEA HAB modeling. Some version of this model, e.g., the Anchor QEA and Tetra Tech's EFDC models have built in water quality models. Note EFDC is an open source model and can be downloaded from EPA, however this version does not have graphical user interface yet.

4.5 Water Quality Model

This model needs to be able to accurately represent the system and the indicators selected, whether these indicators are nitrogen, clarity, chlorophyll a, etc. In addition, the selected water quality model needs to be able to simulate sediment oxygen demands and nutrient releases. If a water quality model is not provided within the hydrodynamic model, the water quality model needs to be able to utilize the hydrodynamic model output. A current linkage that has been used in many applications and provides all the needed functionality is the linkage between EFDC and EPA's Water Quality Simulation Program (WASP). Other linkages exist, but this is the best known open source linkage.

5 Load Reduction Targets

Initial load reduction targets to protect both surface waters and public drinking water supplies will be developed in Early Action LINAP, with more refined reduction targets developed based on more rigorous sub-watershed modeling in Full Term LINAP.

Initial load reduction targets will be based on desired ambient conditions. Reductions are likely to be based on a target ambient nitrogen value that will be related to ecosystem response, (e.g. a DIN concentration less than 0.1 mg/L represents good ecological condition, or a TN concentration of less than 0.35 mg/l is expected to be supportive of eelgrass). A more robust analysis of indicator selection will need to be completed by reviewing indicators listed in section 3.4.

6 Management Options Feasibility and Cost Effectiveness

The intent of LINAP is to present a suite of management options that will protect or restore ecosystem balance. Listed below are examples of management options related to improving the ecosystems.

6.1 Existing Regulation and Policy Review

Existing regulations and policies that affect wastewater disposal, fertilizer use, breach closures and possibly other actions that could affect nitrogen pollution and system hydrodynamics will be identified and evaluated to determine potential regulatory/policy barriers to implementing LINAP suggested management actions. Where appropriate, LINAP will recommend changes.

6.2 Public Education

LINAP will work with the existing estuary programs, protection committees the environmental justice community and other groups to further public education on topics including, but not limited to:

- The importance of healthy ecosystems: What's in it for you!
- How human activities affect the health of ecosystems
- Actions that can be taken to reduce nitrogen pollution

Note also that, as stated in the section on citizen science, citizen science is a good

opportunity for public education that will be explored as part of LINAP.

6.3 Existing Sanitary Discharges

Beyond individual onsite systems (residential only), there are many existing sanitary discharges operating on Long Island from intermediate sized wastewater disposal systems to small package plants to the large facilities such as the Bay Park WWTP which services a significant portion of Nassau County. LINAP activities will include evaluations of the following.

6.3.1 Capacity

Global review of existing discharges to identify current operational capacity as well as identifying opportunities for expansion

6.3.2 Upgrade Opportunities

Existing discharges will be reviewed for upgrade opportunities.

6.4 Stormwater Control

Urban stormwater (conveying pollutants from the landscape) is a source of nitrogen loading to embayments. Where determined to be significant, potential mitigation actions will be identified.

6.5 Residential Wastewater

Consistent with recommendations in the Suffolk County Comprehensive Wastewater Management Plan, and in coordination with Suffolk and Nassau Counties and other local initiatives/municipalities, LINAP will develop wastewater maps and plans by sub-watershed, which:

1) Identifies the location and number of parcels requiring advanced nitrogen removal based on land use, available load reduction targets, time of travel to waterbodies and public water supply wells; and

2) Specifies the recommended means of wastewater treatment for each parcel (sewering, cluster decentralized, advanced individual onsite systems, and traditional onsite systems) based on density, soils, depth to groundwater, and proximity to existing treatment systems.

Consideration will be given to sewer expansions which could be served by existing wastewater plants; new collection and treatment systems in areas which are densely populated, within short travel time to surface waters, and with minimal depth to groundwater. Sewers in these areas should be considered as the density may allow for reasonable costs to be shared among parcels and replacement on-site systems may not be effective due to shallow groundwater and short travel times to surface waters.

Providing improved nitrogen treatment could potentially lead to increase development density, thus negating any potential load reductions. The outcomes of sewage treatment policies can affect land use and development. LINAP will also consider protection of community character in recommendations about what alternatives to pursue to reduce

loads from wastewater.

For each sub-watershed, additional nitrogen reduction alternatives as follows will also be included for consideration.

A map based representation of the alternatives for nitrogen load reduction will be provided for each sub-watershed.

6.6 Evaluating Other Wastewater Technologies

Section 6.5 discusses options for managing sanitary wastewaters including sewering and the use of innovative/alternative onsite treatment systems, which has been loosely defined as individual septic systems that are designed to actively remove nitrogen from wastewater.

LINAP will evaluate the nitrogen reduction benefits and technical and economic feasibility of the following options for managing wastewater.

6.6.1 Grey water separation

"Greywater" means untreated wastewater from bathtubs, showers, washing machines, dishwashers and sinks, but does not include discharges from toilets or urinals or industrial discharges.

6.6.2 Composting toilets

Composting toilets are currently allowed under State regulations.

6.6.3 Urine Separation

Urine separation is a new concept which will be explored as a potential nitrogen pollution mitigation action.

6.6.4 Other Alternative Technologies

Other alternative technologies that are identified as part of the LINAP process will also be evaluated as potential management options.

6.7 Agricultural Best Management Practices

LINAP will work with the agriculture community and its representatives to identify actions to reduce nitrogen loading from agricultural activities on Long Island, where identified as a significant source.

Modeling of sub-watersheds will identify the relative contribution of agricultural activities to the groundwater load and subsequent nitrogen loads to surface waters.

The LINAP will include a chapter on implementation of agricultural BMPs appropriate for Long Island agriculture, in coordination with the Long Island Farm Bureau and the Suffolk and Nassau County Soil and Water Conservation Districts. Where appropriate, plan area chapters will include alternatives for reductions of nitrogen loadings from agricultural activities.

6.8 Density and Land Use Planning

The LINAP will include an analysis of Land Use Planning Alternatives for prevention of future nitrogen load increases based on a survey of successful land use planning in other coastal communities, particularly Ocean/Estuary communities.

6.9 Fertilizer Management

Fertilizer management. LINAP will evaluate existing strategies that have been adopted to minimize usage and mitigate the effect of fertilizers on Long Island's water bodies.

Strategies that have been adopted in New York and on Long Island include:

1. Law and policies to limit/manage chemical fertilizer use on municipal properties, including athletic fields, parks, and cemeteries;
2. In 2014, Cornell University prepared "Best Management Practices for New York State Golf Courses" as part of the New York State Golf Course Best Management Practices project and with support from many affected partners. This effort will be incorporated into LINAP activities as appropriate.
3. Establishment of a buffers to wetlands and water bodies;
4. Pursuit of outreach and education techniques for year-round residents, second-home owners, and landscape professionals to encourage improved fertilizer practices; and
5. Training for turf grass managers to encourage fertilizer and landscaping practices to minimize use of nitrogen;

LINAP will evaluate potential additional strategies including;

- More robust enforcement of existing laws;
- Improved specification of topsoil requirements, fertilizer formulations and application rates, and use of native species;
- Use of composted seaweed;
- Public/Private partnerships for product development; and
- Possible fee structure or incentive to reduce fertilizer use.

6.10 Hydro-Modifications

LINAP will include evaluations of the water quality/ecological/coastal processes and technical and economic feasibility of potential hydro-modification projects identified to mitigate water quality concerns, primarily based on increased system flushing.

Hydro-modifications to be evaluated could include, but are not limited to:

- Barrier removal

- Inlet modifications
- Engineered controls (e.g. tide gates)
- Other enhanced connectivity alternatives

6.11 Nutrient Bio-Extraction

The LINAP will include an evaluation of potential bio-extraction activities and, where appropriate, include management alternatives in geographic chapters. The plan will evaluate costs and potential benefits, collate and summarize the results of recent and ongoing pilot projects locally and elsewhere, assess potential negative impacts and regulatory hurdles, and recommend evaluations necessary to determine their feasibility and appropriate uses on Long Island.

Bio-extraction activities to be evaluated could include various types of:

- Shellfish aquaculture
- Mariculture (seaweed aquaculture)

6.12 Groundwater Intercept Technologies

While the emphasis for LINAP will be on reducing pollutant loads to groundwater, the long term nature of remediating groundwater loads makes interim measures appropriate as well. The LINAP will include an evaluation of ground water intercept technologies, such as permeable reactive barriers and, where appropriate, include intercept technology alternatives in geographic chapters as an interim measure.

6.13 Green Infrastructure

Green infrastructure, in the context of this plan, includes the use of natural systems, or strategically sited constructed systems, to help mitigate the impacts of human activities. Unlike a conventional gray infrastructure approach, which relies on piping networks and centralized treatment facilities, green infrastructure technologies mimic the processes of the natural environment by using vegetation and soil to minimize the impacts of land use on water quality.

6.14 Riparian Buffers

Protection and restoration of riparian areas is an important management tool for water quality. Riparian areas that have been restored with vegetation (trees, shrubs, or grass) provide a variety of water quality benefits, including stream bank stabilization, sediment control, filtration of nutrients and other pollutants, and flood attenuation. It has been estimated that riparian buffers provide nutrient reductions efficiencies of up to 48% for nitrogen, 40% for phosphorus and 53% for sediment. Riparian buffers also provide valuable upland wildlife habitat and improve in-stream habitat for macroinvertebrates and fish. Protection and restoration of riparian buffers is considered a cost effective best management practice that will be used as a LINAP management action option.

6.15 Open Space Preservation and Restoration

From a regional planning perspective, Long Island's natural open spaces, conserved lands, ponds, wetlands, estuaries, and the buffering woodlands adjacent to these areas—could be enhanced to provide a cohesive network of natural systems that improve the natural attenuation of pollutants. The reestablishment of a natural network could be achieved through restoration of natural habitats and ecosystem functions, creating habitat linkages between currently fragmented resource areas, and enhancing open space protection. The burden on natural wetlands of processing pollutants could be reduced through the strategic placement of constructed wetlands, natural stormwater systems (rain gardens and other bio-retention and filtration systems), and other "green" technologies. Depending on design and location, these systems could provide added benefits such as pathogen reduction, carbon sequestration, air quality improvements, educational and recreational opportunities, and wildlife habitat. The LINAP will identify potential locations for such "green" infrastructure enhancements.

6.16 Coastal Wetland Restoration

The LINAP will identify potential projects to restore coastal estuaries and wetland systems. Coastal restoration projects, while generally not initiated with nitrogen removal in mind, can improve tidal exchange within impacted embayments and the improved function of coastal wetlands and ecosystems can contribute to the improved water quality and overall health of these systems.

6.17 Water Reuse

Title 6 in Environmental Conservation Law Article 15--Water Efficiency and Reuse the purpose of which was established to actively "promote the reuse of reclaimed wastewater for landscape irrigation, and wetland maintenance, as well as suitable industrial, commercial, residential, and agricultural purposes."

On November 23, 2010, NYSDEC prepared a report entitled 'Potential Reuses of Greywater and Reclaimed Wastewater in New York State' issued pursuant to Chapter 619 of the Laws of 2005. The 2005 Law also calls for establishment of regulations as follows:

§ 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.

1. Such rules, regulations and standards shall specify:

> *a. 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.

As part of the LINAP, draft regulations and supporting regulatory documents will be prepared for draft water reuse regulations to facilitate wider adoption of this practice for additional nitrogen removal.

7 Implementation

Implementing the LINAP is a critical piece of the equation. As was illustrated with the 1978 208 Plan, planning is good, but without implementation it will not be very effective. LINAP will be implemented by local, state, federal and private entities. We will work with watershed groups, like the Estuary Programs, to identify implementing partners for all aspects of the plan.

7.1 Public Private Partnerships

An important LINAP Task will include identifying public/private partnership opportunities. Targeted outreach to environmental justice communities will help in identifying Environmental Justice partnership opportunities.

There are many opportunities for public private partnerships to reduce nitrogen pollution that range from:

- working with local marinas to improve boat pump-out facilities
- working with the fertilizer industry to improve fertilizer formulations and application practices
- working with septic system manufactures to facilitate the development of more cost effective innovative/alternative onsite sewage disposal systems.

An alternative means of addressing wastewater nitrogen discharging from residential lots that do not have access to community sewers are innovative/alternative onsite sewage disposal systems (I/A OWTS). These types of systems are currently being evaluated by Suffolk County to reduce nitrogen discharges from on-site wastewater treatment systems. Development and Pilot Programs have been split between the Suffolk County Septic/Cesspool Upgrade Program (SCUPE) and the SUNY Center for Clean Water Technology (CCWT)

7.1.1 Suffolk County Septic/Cesspool Upgrade Program Enterprise (SCUPE)

Suffolk County has proposed and is implementing an ambitious program to inventory priority areas, digitize files, purchase needed software, finalize a comprehensive wastewater management plan, model sub-watersheds, audit sewage capacity, investigate formation of a county wide sewer district, develop a financing plan, prepare a responsible management entity business plan (assuring systems maintenance, tracked by purchased software), and start up for innovative/alternative onsite disposal system program.

Suffolk County is also developing a training program for architects, engineers, town officials, County Health Department staff on design, installation and maintenance of

innovative/alternative systems, 18 months of advanced systems monitoring, and demonstration grants.

7.1.2 Center for Clean Water Technology

In consultation with the Town of Southampton and Suffolk County, the State University at Stony Brook has developed a research and development program to support Suffolk County with Onsite System Research and Development. To this end, Stony Brook University is establishing the Center for Clean Water Technology (hereafter referred to as the "Center"). The Research and Development Program launched by the Center will focus on three inter-related goals, namely: (1) Development of a Clean Water Technology Initiative Incubator Strategic Plan; (2) Development of affordable, reliable and effective innovative/alternative on-site wastewater treatment systems (I/A OWTS) to reduce nitrogen loads to groundwater and surface water from these sources; and (3) Establish a program for Outreach and Business Development to catalyze the creation of new business focused on clean water technology in the region. The activities in goals (1) and (2) and the administration of the Center are expected to be supported through Environmental Protection Funds. Goal (3) is expected to be supported through funds from the Bloomberg Foundation. Additional funds from the Bloomberg Foundation will also be allocated to Goal (1) to supplement the DEC funds, if needed.

Initially, the CCWT will be performing a comprehensive technology classification and ranking of existing and emerging on-site wastewater technology. CCWT will work with Suffolk County and other stakeholders to describe, classify, and rank existing and emerging on-site wastewater technology. While other studies have been carried out to rank on-site wastewater technology, the results of these studies are highly dependent on the weighting factors applied to the various ranking criteria. As a result, the outcomes may differ for different regions using different weighting criteria. A survey of the peer-reviewed literature will be carried out in order to develop a comprehensive list of available and emerging technologies and various performance attributes. Ranking criteria and weighting factors will be established in consultation with Suffolk County. Possible criteria include cost, percent nitrogen removal, effluent nitrogen concentration, system reliability, operation and maintenance, footprint, energy use, complexity, BOD removal, TSS removal, installation complexity, and other criteria. At the conclusion of this study, a report will be developed that describes the function of existing and emerging on-site wastewater technology. This report will also provide a ranking of existing on-site wastewater technologies for immediate deployment or further development, as well as a description of knowledge gaps and future research needs.

Following the initial technology evaluation, CCWT will engage a variety of stakeholders, including government, academia, business leaders, and other relevant groups to organize and run a "strategic planning symposium," The symposium will ensure the planning phase is thorough, coordinated and inclusive. The symposium may consist of technical information sharing, presentation of proposed avenues of research, goal setting, brainstorming sessions, and an announcement of a research competition. After the symposium, the presentation commentary and feedback will be complied and synthesized. This information, along with any additional feedback or information identified through the symposium, will form the basis of the strategic plan which will

inform the continued development of the work plan.

7.2 Nitrogen Smart Communities

The NYSDEC initiated the Climate Smart Communities program, and to be A Climate Smart Community, a municipality prepares and demonstrates various levels of commitment to climate-smart activities and practices (silver, gold, platinum).

A similar concept will be evaluated for the LINAP, where a Nitrogen Smart Communities program would be established and communities could be rated Nitrogen Smart Communities to spur planning and commitments to nitrogen loading reduction and prevention.

7.3 Financing Options

Aside from initiating the development of the LINAP, the DEC has been partnering with local governments and agencies to reduce nitrogen, including:

- repair and upgrade of the Bay Park Wastewater Treatment Plant by Nassau County
- replacement of the Bergen Point Wastewater Treatment Plant's outfall pipe in the bay
- innovative/advanced septic system pilot program under Suffolk County,
- sewer extensions to high nitrogen loading areas of the Forge River, Patchogue River, Carlls River, Great South Bay, Connetquot, and Great River Watersheds,
- creation of a Center for Clean Water Technology at Stony Brook University to investigate the next generation of nitrogen removal septic systems.

Other known existing funding opportunities include:

1. Wastewater Infrastructure Engineering Planning Grant

   This is a competitive process administered by the DEC and the New York State Environmental Facilities Corporation with $30,000 or $50,000 awards depending on whether the subject population is above or below 50,000.

2. Community Development Block Grant Program

   Funding is through the Office of Community Renewal and the program has the following requirements:

   a. At least 51% of the persons who would benefit from implementation of the plan are low and moderate income persons; or

   b. Plan addresses a slum or blighted area in the community

3. Water Quality Improvement Project

   DEC administers an annual grant program for wastewater, stormwater, and non-point source controls.

4. Empire State Development Grant Funds

Funding is available through the local Regional Economic Development Council.

5. Clean Water State Revolving Fund Program ("CWSRF")

   Several categories of funding are available such as hardship grants and low interest loans to local governments for sewer engineering studies provided it is a part of the overall project, including construction.

6. New York State Water Grants

   Eligible activities include planning, design and construction for projects that qualify for hardship financing under the CWSRF program and resiliency projects. Applications are available through the New York Environmental Facilities Corporation.

Potential additional funding sources include:

1. Those funding sources identified by local governments
2. Litigation settlements and Environmental Benefit Projects from compliance and natural resource damages settlements
3. Any other potential funding source

The LINAP will include an evaluation of these and other programs with potential to fund projects that reduce nitrogen loading or otherwise mitigate nitrogen in groundwater and waterbodies.

7.4 Legal and Governmental Considerations

Legal Determination for 208 Planning

Under federal regulations for development 208 plans, management agencies (those agencies that would implement the plan) are required to be identified and to demonstrate ability to implement the plan as follows:

> "Identification of agencies necessary to carry out the plan and provision for adequate authority for intergovernmental cooperation in accordance with sections 208(b)(2)(D) and 303(e)(3)(E) of the Act. Management agencies must demonstrate the legal, institutional, managerial and financial capability and specific activities necessary to carry out their responsibilities in accordance with section 208(c)(2)(A) through (I) of the Act."

The LINAP will evaluate whether the management agencies are adequately authorized to implement the plan and, if not, prepare alternatives to obtain adequate authorization.

County wide Wastewater Management Districts

The LINAP will prepare an analysis of alternatives and processes for implementation of County wide wastewater management districts.

7.5 Monitoring and Assessment

A plan and framework for monitoring success of implementation of management actions, including outputs (compared against schedule of implementation) and water quality outcomes (based on wastewater performance, surface water monitoring and a

monitoring well network). LINAP will coordinate with other entities who monitor surface water outcomes to ensure an integrated network of surface water monitoring is put in place.

Island wide status and projected trends maps will be developed for the upper glacial and magothy aquifers, by aquifer segments to be developed in cooperation with Suffolk and Nassau Counties (e.g., hydro-geologic zones, Towns).

7.6 Stakeholder Engagement

The need for and early scope development of LINAP has been heavily influenced by broad stakeholder interest and activism. It cannot be overstated how important working with partner organizations represented in the planning structure is to attaining LINAP goals. Although many organizations are very capable of leading and contributing to the LINAP effort, no one organization (EPA, DEC, County governments, local governments) have the resources, knowledge, ability and commitment to determine the necessary pollutant load reductions, provide alternatives to achieve reductions, and develop public and leadership support to assure the LINAP goals are achieved.

Positive stakeholder engagement, including providing updates and soliciting input is a key goal for the Project Management Team. At each key milestone, the Project Management Team will provide updated information and seek input from the LINAP Working Group. Early outreach efforts will include broad outreach on ongoing planning efforts utilizing existing venues (e.g. Latitude 41, Water We Going to Do?, etc.) .

More tailored stakeholder engagement programs will be provided as part of the various LINAP tasks including watershed planning, water re-use regulation development, fertilizer reduction recommendation development, and management options evaluation workgroups. Such engagement will leverage existing outreach and input mechanisms such as estuary programs and protection committees to the extent practicable.

7.7 Leveraging Related Projects

ESTUARY PROGRAM PROJECTS

The estuary programs have been developing action plans for nitrogen load reduction as part of long term planning. LINAP will integrate the estuary program efforts into the plan to avoid waste and duplication.

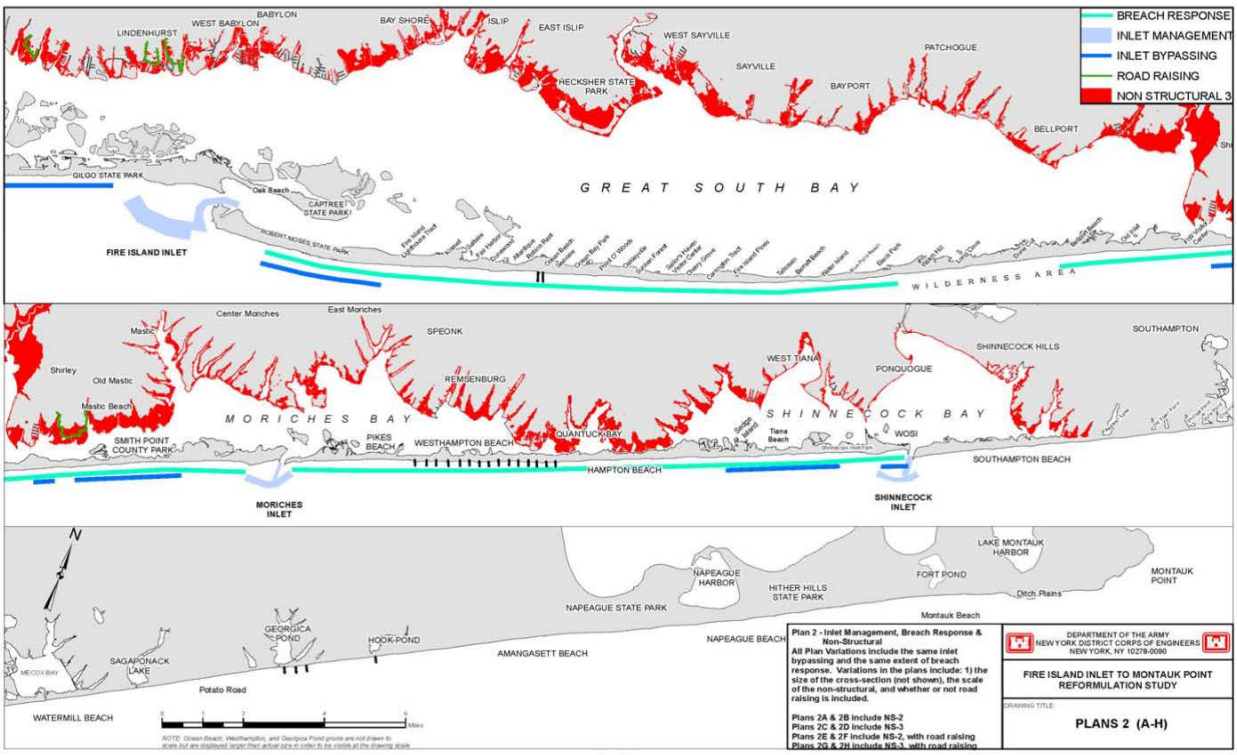

Figure 5: Fire Island to Montauk Point

The Fire Island to Montauk Point (FIMP) coastal Storm Risk Management Study is a United States Army Corps of Engineers (Corps) project which is being undertaken to identify a long-term solution to reduce the risk of coastal storm damages in the study area in a manner which considers the risks to human life and property, while maintaining, enhancing, and restoring ecosystem integrity and coastal biodiversity. New York State Department of Environmental Conservation (Department) is the non-federal sponsor for this project, with Suffolk County being the State's local sponsor. The project will include beach and dune re-nourishment, breach closure planning, elevation of homes on mainland Long Island, and possible elevation of utilities and roads. FIMP is an old and continuing evaluation of coastal storm reduction efforts spanning 83 miles of Suffolk County's coast. There are a number of more focused, yet very large-scale coastal storm reduction projects within this stretch of coast, such as the West Hampton Dunes project, West of Shinnecock Inlet project, the proposed Fire Island Inlet to Moriches inlet project, and the proposed Montauk Village project.

Included in the project are approximately 4400 building retrofits on the bay shoreline, including building elevations, retrofits, flood proofing, relocations, and acquisitions.

One concept that has been raised is to use the timing of home elevation to also sewer these areas. The army corps has agreed that, when homes are elevated, they can be connected to sewers rather than back to existing onsite systems, chiefly cesspools. .

The areas where homes are to be potentially elevated (see above) are of variable feasibility for sewering. Many areas are somewhat remote and less feasible, whereas

other areas are nearer to treatment plants, or otherwise have density that could make sewering or clustering more feasible.

Development of LINAP will include coordination with the Army Corps to evaluate options to fund these upgrades and to assess the potential to require such improvements. The LINAP will evaluate the feasibility of such connections and recommend alternatives.

7.8 Long Term Monitoring and Assessment

LINAP will evaluate and recommend alternatives for long term monitoring and assessment, including an evaluation of the role of citizen science, county monitoring programs, monitoring by education institutions, and contract monitoring.

8 Plan Preparation

Plan preparation is expected to take the form of (1) an Early Action Long Island Nitrogen Action and Recommendations Web Based Report, (2) A Full Term Long Island Nitrogen Action Report including (a) Web Based chapters with island wide applicability, and (b) Web Based sub-watershed plan chapters devoted to study areas broken out by sub-watershed areas.

REFERENCES

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Sutula M. (2011). Review of Indicators for Development of Nutrient Numeric Indicators in California Estuaries. Southern California Coastal Water Research Project Technical Report No. 646.

Bricker, S. B., Ferreira, J. G., & Simas, T. (2003). An integrated methodology for assessment of estuarine trophic status. Ecological modelling, 169(1), 39-60

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J. E. Costa, B. L. Howes, D. Janik, D. Aubrey, E. Gunn, A. E. Giblin. 1999. Managing anthropogenic nitrogen inputs to coastal embayments: Technical basis of a management strategy adopted for Buzzards Bay. Buzzards Bay Project Technical Report. 56 pages. Draft Final, September 24, 1999.

Attachment A
Long Island Nitrogen Action Planning (LINAP) Structure

June 8, 2016

Committee Organization

The New York State Department of Environmental Conservation (DEC), the Long Island Regional Planning Council (LIRPC), Nassau County, Suffolk County, and local stakeholders are developing a Long Island Nitrogen Action Plan (LINAP) to address impairments caused by nitrogen pollution in the groundwater and estuaries around Long Island. For the plan to be successful, local ownership and direction in its development and subsequent implementation is key. Based on input from stakeholders, DEC, LIRPC and the counties are proposing that the LINAP's development would be guided by a structure that includes an executive council, a project management team and a LINAP Working Group (see chart at end of attachment).

Development of the LINAP is planned to occur in two phases: one which focuses on short term actions (Early Action LINAP) and another which will require a greater degree of technical and policy attention, which will require a longer timeframe (Full Term LINAP).

LIRPC and DEC expect to retain project management support, but will seek to actively move this effort forward while procurement is undertaken.

Executive Council (EC)

Responsibility: Overall Development of Goals, Plan Production, Adoption, Implementation, Outreach, Reporting, and Assessment

Conceptual Membership

John Cameron, Jim Tierney, Carrie Meek Gallagher, Peter Scully, Rob Walker

Project Management Team (PMT)

Responsibility: Administrative and Management of Plan Development including: Committee Structure, Scope, Budget, Schedule, Contracts, Consultant Assessment & Oversight, Annual Work Plan, Interagency Agreements and Coordination, and Timeline Compliance

Conceptual Membership

John Cameron (LIRPC), Sarah Lansdale (Suffolk Co.), Shila Shah-Gavnoudias (Nassau Co.), Tony Leung (DEC Region 1), Angus Eaton (DEC Central), Alternates and staff will participate as well.

LINAP Working Group (LWG)

Responsibility: At the direction of the PMT, develop or evaluate options for modeling, monitoring and assessment, financing, regulations and legislation for the PMT.

Conceptual Membership

Local Government Mayors and Supervisors

- City of Glen Cove, Mayor (Reginal Spinello)
- City of Long Beach, City Manager (Jack Schnirman)
- Town of Hempstead, Supervisor (Anthony Santino)
- Town of North Hempstead, Supervisor (Judy Bosworth)
- Town of Oyster Bay, Supervisor (John Venditto)
- Town of Babylon, Supervisor (Richard Schaefer)
- Town of Brookhaven, Supervisor (Edward Romaine)
- Town of East Hampton, Supervisor (Larry Cantwell)
- Town of Huntington, Supervisor (Frank Petrone)
- Town of Islip, Supervisor (Angie Carpenter)
- Town of Riverhead, Supervisor (Sean Walter)
- Town of Shelter Island, Supervisor (James Dougherty)
- Town of Smithtown, Supervisor (Patrick R. Vecchio)
- Town of Southampton, Supervisor (Jay Schneiderman)
- Town of Southhold, Supervisor (Scott Russell)

- Nassau Village Officials Association (Barbara Donno)
- Suffolk Village Officials Association (Ralph Scordino)

Estuary Program Directors

- South Shore Estuary Reserve Program (Jeff Herter, Nancy Rucks)
- Peconic Estuary Program (Alison Branco, Julie Nace, Sarah Schaefer)
- Long Island Sound Study (Mark Tedesco)

Protection Committees Directors

- Manhassett Bay Protection Committee (Sarah Deonarine)
- Hempstead Harbor Protection Committee (Eric Swenson)
- Oyster Bay Cold Spring Harbor Protection Committee (Rob Crafa)
- Northport Harbor Water Quality Protection Committee (Supervisor Petrone/ Adrienne Esposito)
- Peconic Estuary Protection Committee (Rachel Gruzen)
- Moriches Bay Project (Laura Fabrizio)
- Shinnecock Bay Restoration Program (Roz Edelman)
- Setauket Harbor Taskforce (George Hoffman)
- Stony Brook Harbor Association (Gloria Rokio)
- Carmans River Watershed Trust Fund
- Coalition to Save Hempstead Harbor (Carol Dipaulo)
- Fire Island Association, Inc (Suzy Goldhirsch)

Environmental Organizations

- Long Island Clean Water Partnership (Any and all)
- Citizens Campaign for the Environment (Adrienne Esposito, Maureen Murhpy)
- The Nature Conservancy (Kevin McDonald, Marci Bortman, Amanda Lefton)
- Group for the East End (Bob Delucca)
- Long Island Pine Barren Society (Dick Amper)
- Seatuck Environmental Association (Enrico Nardone)
- Concerned Citizens of Montauk (Jeremy Samuelson)
- North Fork Environmental Council (Bill Toedter)
- Peconic Baykeeper (Dan Gulizio)

- Friends of the Bay (Paul Deorsay)
- Peconic Green Growth (Glynis Berry)
- North Shore Land Alliance (Lisa Ott)
- Eastern Long Island Audubon Society (Byron Young)
- League of Conservation Voters (Mitch Pally)
- League of Women's Voters (Jody Samulson)
- Water for Long Island (Gerald Ottavino)
- Sport Fishing Representative (Charlie Witek)
- Recreational Fishing Representative (John McMurry)
- Sludge Stoppers (Scott Bochner)
- Operation Splash (Rob Weltner)
- Save the Sound (Tracy Brown)
- Defend H2O (Kevin McAllister)
- Open Space Council (Karen Blumer)
- Long island Environmental Voters Forum (David Reisfield)

Public Water Suppliers

- Suffolk County Water Authority (Jeffrey Szabo)
- Long Island Commission for Aquifer Protection (Stan Carey, Frank Koch)

Academia, Planners and Engineers

- USGS (Stephen Terracciano, Chris Schubert)
- American Council of Engineering Companies (Paul Grosser)
- CDM Smith (Daniel O'Rourke)
- American Planning Association (Sean Sallie)
- SUNY Stony Brook (Chris Gobler, Bob Carpenter, Larry Swanson, Bob Wilson, Charles Flagg, Harold Walker, Henry Bokeniewicz, Gilbert Hanson)
- Center for Clean Water Technology (Jennifer Garvey)
- NYIT (Sarah Meyland)
- Long Island University (Kimberly R. Cline)
- Adelphi University (Beth Christensen)
- American Institute of Architects, Peconic Chapter (Luis Peris)

- American Institute of Architects, Long Island Chapter (Joseph Iannucci)
- Battelle Memorial Institute (Thomas Gulbramson)

Agricultural and Landscaping Service Groups

- Long Island Farm Bureau (Rob Carpenter)
- Nassau County Soil and Water Conservation District (Corey Humphrey)
- Suffolk County Soil and Water Conservation District (Polly Weigand)
- NYAFEC: New York Alliance For Environmental Concerns (Rick Zimmerman)
- LINLA: Long Island Nursery & Landscape Association (Carol Saporito)
- NSLGA: Nassau Suffolk Landscape Gardeners Association (Pat Voges)
- LIGSCA: Long Island Golf Course Superintendents Association (Peter Cash)
- NSA: The New York State Arborists Association (Trevor Hall)
- NYSTA: New York State Turfgrass Association (Elizabeth Seme)
- LIAA: Long Island Arboricultural Association (Linda Campbell)
- LIFGA: Long Island Flower Growers Association (Bianca Sullivan)
- Long Island Wine Council & LI Sustainable Wine Growers Assn (Steve Bate)
- Long Island Vegetable Growers (Sandy Menasha)
- CCE: Cornell Cooperative Extension (Nora Caitlin)
- Southold Baymen's Association
- LI Shellfish Growers Association (Mike Osinski)
- NYSDEC Shellfish Advisory Committee (Gregg Rivara)
- SUNY Farmingdale Dept of Horticulture (Jonathan Lehrer)

Outreach

- Cornell Cooperative Extension (Matthew Scalfani, Dale Moyer, Vito Minei, Chris Pickerell)
- NY Sea Grant (Cornelia Schlenk, Bill Wise)

Trade and Civic Organizations

- Long Island Liquid Waste Association (Andrew Andreola)

- Long Island Builders Institute (Mitch Pally)
- Scotts (Brian Herrington)
- Vision Long Island (Eric Alexander)
- Long Island Business Council (Bob Fonti, Rich Bivone)
- Long Island Association (Kevin Law)
- Rauch Foundation (Nancy Rauch Douzinas)Association of Marine Industries (AMI)
- Hauppague Industrial Association (Lilia Factor)
- East Hampton Town Baymen (Arnold Leo)
- Southampton Town Baymen (Sam Rispoli)
- Sustainable Long Island (Ann Fangmann)
- RISE (Aaron Hobbs, Barbara Ahern)

State, Tribal and Federal

- EPA (Rick Balla, Kristina Heinemann, Ruth Izraeli, and Robert Nyman)
- Environmental Facilities Corporation (Tim Burns)
- Shinnecock Nation (Shavonne Smith)
- Unkechaug Indian Nation (Harry Wallace)
- Long Island Regional Economic Development Council (Kevin Law, Stuart Rabinowitz)
- Fire Island National Seashore/National Park Service

New York Rising Community Contacts

- Governor's Office of Storm Recovery (Valerie Scopaz)
- Oakdale-West Sayville (Richard Remmer)
- West Islip (Larry Donohue)
- Mastic Beach & Smith Point (Mayor Maura Spery)
- Village of Amityville, Copiague (Everrett Ken Budd)
- Village of Babylon, West Babylon (Ray Accettella)
- West Gilgo to Captree (James Schappert)
- Fire Island (Susie Goldhirsch)
- Village of Lindenhurst (David Collins)
- Village of Ocean Beach (Mayor James S. Mallott)

LINAP Working Group Charge (LWG)

The LWG is being established by DEC and LIRPC as an advisory group to advise and support DEC, LIRPC, Nassau, and Suffolk Counties in the development and implementation of a Long Island Nitrogen Plan (LINAP). Each member will represent a certain constituency, and they will seek to coordinate and speak for their constituency. As such, it is expected that they will talk with others in their group before meetings and carry the results of the committee meetings back to their members. At times, members may be asked to research ideas, review draft or conceptual documents, talk with their members and gather ideas. The committee is expected to promote information exchange and share ideas. The committee is not a decision making body.

Ad Hoc Working Groups are expected to be formed from the LWG to focus on specific tasks for LINAP.

Long Island Nitrogen Action Plan (LINAP) Proposed Planning Structure

Executive Council (EC)

Responsibility: Overall Development of Goals, Plan Production, Adoption, Implementation, Outreach, Reporting, and Assessment

Members: Chairman of Long Island Regional Planning Council (LIRPC), New York State Department of Environmental Conservation, Suffolk County Executive, Nassau County Executive

Project Management Team (PMT -Weekly to monthly)

Responsibility: Administrative and Management of Plan Development including: Committee Structure, Scope, Budget, Schedule, Contracts, Consultant Assessment & Oversight, Work Plans, Interagency Agreements and Coordination, and Timeline Compliance

Members: Suffolk County Executive, Nassau County Executive, NYSDEC Commissioner, LIRPC Chair, NYSDEC Regional Director

LINAP Working Group (LWG- Ad Hoc)

Responsibility: At the direction of the PMT, form ad-hoc work groups to develop or evaluate options for modeling, monitoring and assessment, financing, regulations and legislation for the PMT. Report out to PMT

Members: Towns, Cities, and Protection Committee Directors; Peconic, Long Island Sound, and South Shore Estuary Programs Directors; Long Island Farm Bureau; Environmental Organizations; Academia, Planners and Engineers; Public Water Suppliers; Agricultural and Landscaping Service Groups; Outreach Groups; Trade and Civic Organizations; State, Tribal, and Federal; NY Rising Community Contacts;

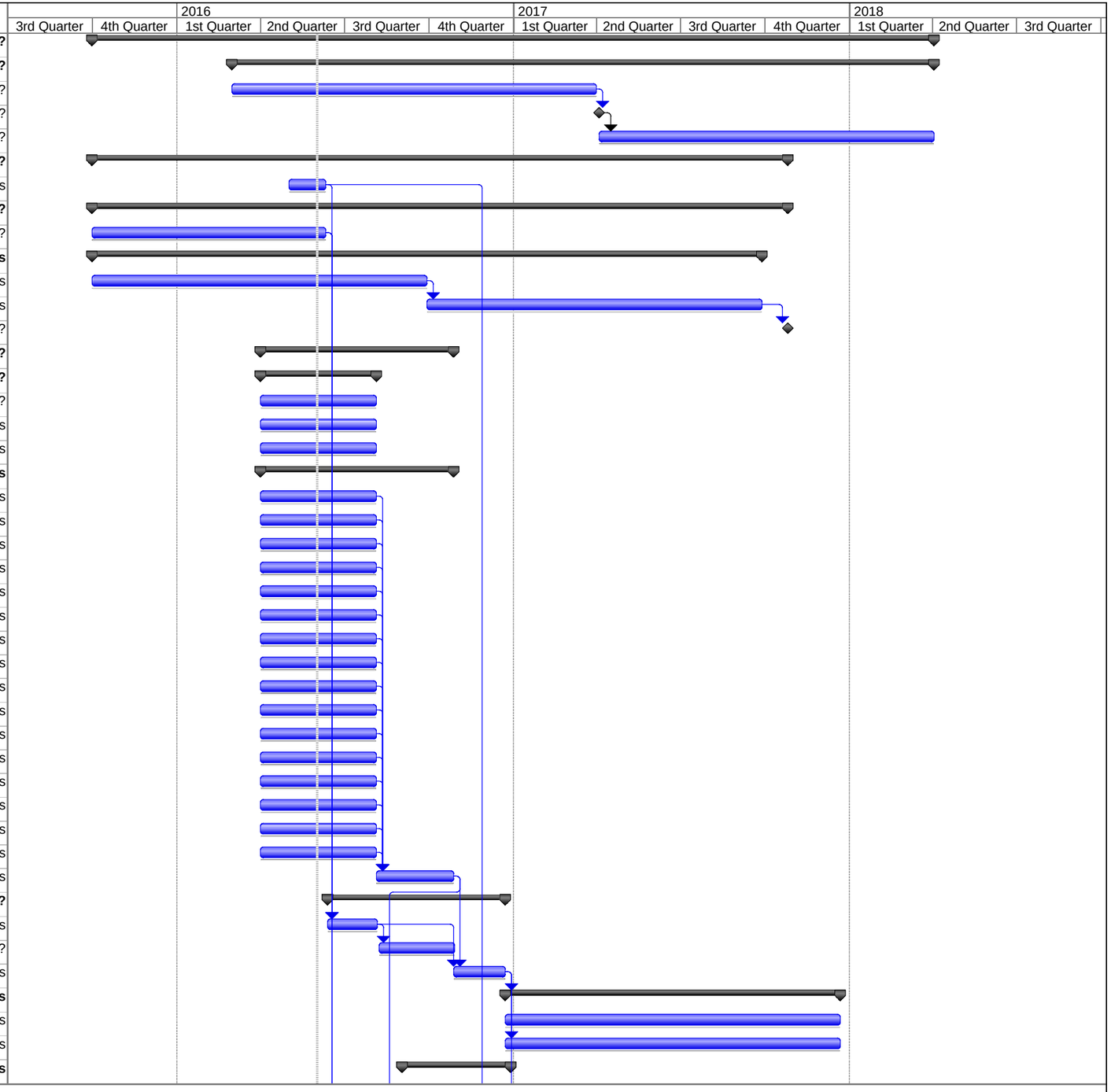
Project Management

Project management support is expected to be hired for this project, either procured from the ranks of private consulting firms, or hired on a short term work assignment. It is expected the Project Management Team will directly oversee project management activities with daily contact with the Project Management Team.

Project Management support will be expected to oversee and execute designated tasks and projects. Tasks would include:

- schedule update and outreach meetings for the Project Management Team,
- procure services to complete the various chapters to the plan, and
- procure services to support update and outreach and public meetings.

ID	Task Name	Duration
1	**Early Action LINAP**	**653 days?**
2	**LINAP Website (GIS Based)**	**545 days?**
3	Establish Framework for a GIS based website (like DOS Gateway)	284 days?
4	Web page available for public use	1 day?
5	Continue to update website	260 days?
6	**Determine the Sub-Watershed Boundaries**	**540 days?**
7	CDM groundwatershed delineation	30 days
8	**USGS Groundwatershed Delineation**	**540 days?**
9	Preliminary sub watershed from USGS - Alternate Way	182 days?
10	**development of New model sub groundwatersheds from USGS**	**520 days**
11	Submit draft products	260 days
12	Submit final product	260 days
13	Make groundwater model available on GIS tool	20 days?
14	**Compile Existing Data For Suffolk County**	**150 days?**
15	**Identify All Relevant Studies/Modeling Efforts**	**90 days?**
16	Identify Completed Studies	90 days?
17	Identify Ongoing Studies	90 days
18	Identify Coastal Resiliency Projects	90 days
19	**Compile Existing Data Sets**	**150 days**
20	Groundwater quality data	90 days
21	Surface water quality data	90 days
22	sediment data	90 days
23	benthic data	90 days
24	shellfish	90 days
25	SAV	90 days
26	HAB	90 days
27	marine life biodiversity	90 days
28	wetlands	90 days
29	bird populations	90 days
30	tidal ranges	90 days
31	fresh water dominance	90 days
32	septic system data	90 days
33	WWTP data	90 days
34	MS4 sewersheds	90 days
35	upland preservation areas	90 days
36	Synthesize data by embayment	60 days
37	**Embayment Evaluations/Characterizations**	**139 days?**
38	Identify embayment/waterbody boundaries	40 days
39	Historical Ecological Condition	60 days?
40	Identify current status of ecological health for each embayment	40 days
41	**Update 303(d) List**	**260 days**
42	Update 303(d) list as needed	260 days
43	Update Section 305(b) reports as needed	260 days
44	**Endpoints**	**84 days**

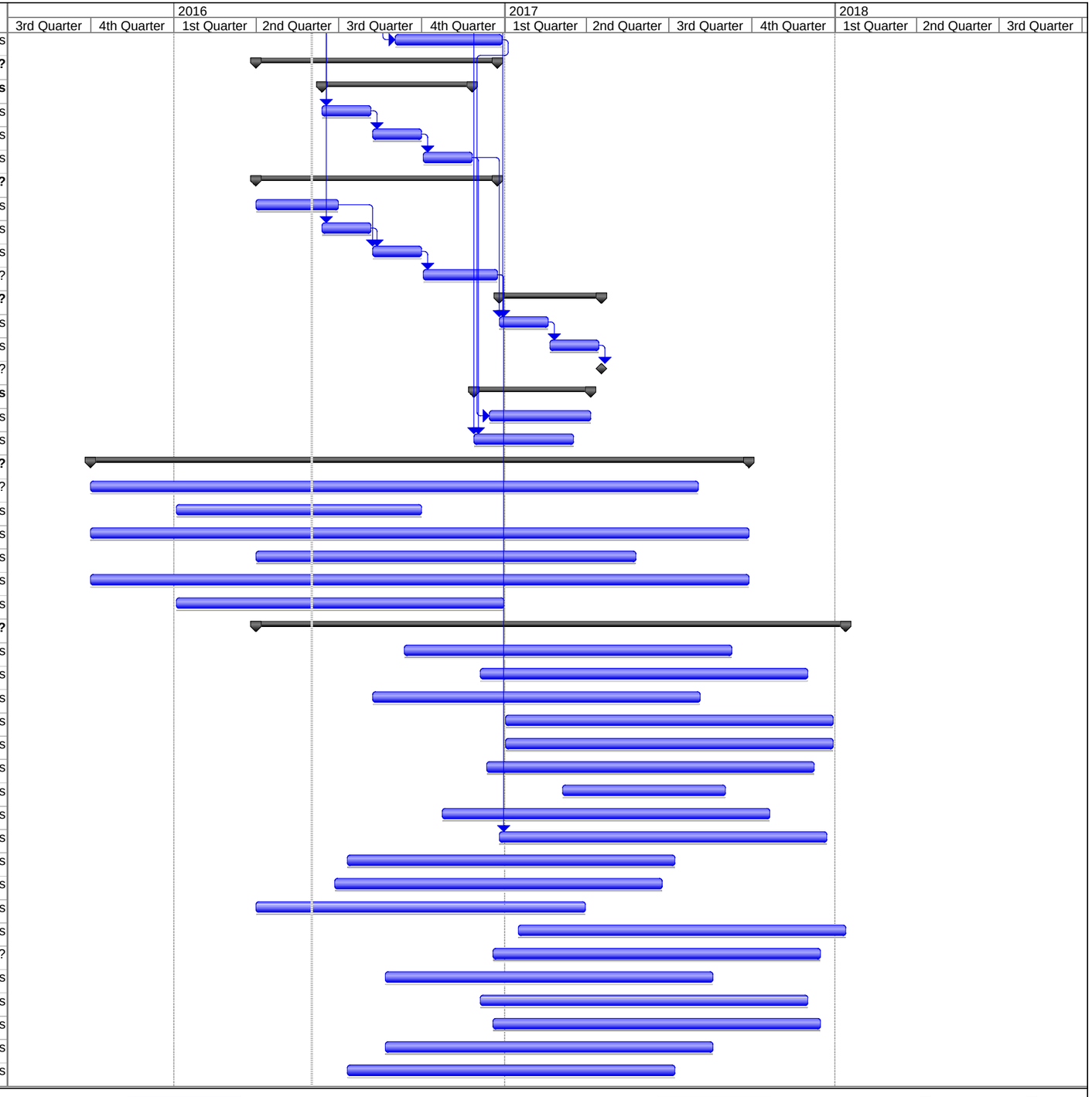


Project: EARLY LINAP SOW 6-1-16
Date: Wed 6/1/16

Task | Milestone | Rolled Up Task | Rolled Up Progress | External Tasks | Group By Summary
Progress | Summary | Rolled Up Milestone | Split | Project Summary | Deadline

November 2, 2015

ID	Task Name	Duration
45	Evaluation and Selection of endpoints for Early Action	84 days
46	**Early Action Modeling**	**191 days?**
47	**Early Action Watershed Model**	**120 days**
48	Select watershed model for estimating N loads to waterbodies	40 days
49	Develop QAPP for watershed model	40 days
50	Run Models for Subwatersheds	40 days
51	**Hydrodynamic Modeling**	**191 days?**
52	Select hydrodynamic model	65 days
53	Establish Boundary Conditions for Embayment's	40 days
54	Develop hydrodynamic modeling QAPP	40 days
55	Run hydrodynamic models for all embayment's	60 days?
56	**Embayment Prioritization**	**81 days?**
57	Compile embayment characterization with loading and hydrodynamic modeling to	40 days
58	Develop Prioritization Matrix to Prioritize Embayment's	40 days
59	Embayment priority matrix complete	1 day?
60	**initial/rapid assessment nitrogen load reduction target**	**93 days**
61	for surface water	80 days
62	for public water supply	80 days
63	**No Regrets Actions**	**520 days?**
64	Suffolk County Septic Upgrade Pilot Program (SCUPE)	480 days?
65	county wide wastewater management district analysis	195 days
66	SBU Center for Clean Water Protection	520 days
67	Nassau County Septic Codes upgrades (working with SC)	300 days
68	Bay Park WWTP Planned Nitrogen Reductions	520 days
69	Nassau County North shore sewering feasibility	260 days
70	**Early No regrets management tools guidance**	**466 days?**
71	Existing Regulations and Policy Review	260 days
72	Public Education	260 days
73	Existing WWTP capacity/performance analysis	260 days
74	Stormwater Control	260 days
75	Evaluate emerging wastewater technologies	260 days
76	Ag BMPs	260 days
77	land use planning	130 days
78	fertilizer recommendations	260 days
79	Simple Hydro-modification recommendations	260 days
80	Nutrient Bio-extraction	260 days
81	Groundwater Intercept Technology	260 days
82	General Stormwater GI practices	260 days
83	Riparian Buffers	260 days
84	Open Space Preservation and Restoration	260 days?
85	Coastal Wetland Restoration	260 days
86	wastewater reuse regulations	260 days
87	nitrogen smart communities	260 days
88	FIMP Assessment	260 days
89	SAV Mapping	260 days



Project: EARLY LINAP SOW 6-1-16
Date: Wed 6/1/16

Task | Milestone | Rolled Up Task | Rolled Up Progress | External Tasks | Group By Summary
Progress | Summary | Rolled Up Milestone | Split | Project Summary | Deadline

Assumptions for schedule

1. This schedule is for Early Action LINAP only. Items to be addressed in long term LINAP will have schedules developed as the tasks are identified.
2. The Contract with USGS for the groundwatershed delineation started October 1, 2015 and is a two year contract.
3. All other “subwatershed” work is displayed using a start date of April 1, 2016.
4. Some subwatershed work may be completed sooner than shown on the chart as set forth in relevant consultant services contracts.
5. Schedules for Items identified as No Regrets Management Tool Guidance will be refined over time as new information becomes available, such as responses to requests for proposals for consultant services. .

Watershed Reviewer Guidance

This guidance is intended to help staff to complete the Nine Key Element Watershed Plan Assessment Form (Appendix A) to ensure watershed plans meet the nine key elements established by USEPA. A copy of the completed form will be sent to the watershed plan preparers.

Section 1. Qualifications of the plan preparer

Watershed plan preparers should attach resumes and complete the qualifications form (Appendix B) to describe their experience with the models used in the development of the watershed plan and other experience relevant to the development of the watershed plan to demonstrate that the plan was thoughtfully developed. [A *simple form, posted on the website, to be completed when a watershed plan is submitted for review*]

Section 2. Evaluation of watershed plan's consistency with nine elements

Overview of the 9 elements

A) pollution loads sources identified & quantified in watershed
B) identify target or goal to reduce pollutant load to reach water quality goal(s)
C) BMPs to get reductions (estimated load reduction/BMP to achieve total reduction needed to improve WQ
D) how to pay for and implement BMPs identified in C
E) how to get help at local level to implement BMPs
F) schedule to implement C
G) progress on implementation of BMPs
H) criteria to assess water quality improvement due to implementation of BMPs
I) monitoring plan to collect water quality data to measure water quality improvement against criteria in H

Element A. Causes/Sources of Pollution Identified

Element A provides the basis for developing effective management strategies to meet water quality goals. This element helps to develop the other eight elements. The plan should describe how the sampling data was collected; water quality monitoring, field surveys, and landuse characterization—to identify and quantify the sources of pollution. Sampling must adhere to a state approved QAPP. This data will serve as the baseline to evaluate implementation of practices to improve water quality. This part of the plan needs to indicate the pollutants addressed by the plan; describe the locations and extent of the impairments caused by the pollutants; include an inventory of point and nonpoint sources; describe the sources of the impairments. This element should adequately link the sources of pollution and the extent to which they cause water quality problems with maps, modeling, monitoring and field assessments. Reports (including TMDLs) and data gathered from other sources may be used for as the basis to identify sources and loads, as long as the documentation is adequate and properly referenced.

Modeling Note: Various modeling approaches can be used to conduct the loading analysis. There is no one model that fits all watersheds and/or pollutants of concern. Several key factors should be evaluated about the model used:

- complexity of the system (e.g., watershed size, coastal influence)
- pollutant fate and transport (i.e., model takes into account p cycle; or is a runoff model),
- time scale of the analysis in relation to the pollutant of concern (i.e., pathogens—daily; DO—hourly, P—daily, monthly, annual),
- what source loads types are considered by model (i.e., how does model perform with different land uses; assumptions of source load contributions from land uses),
- model inputs (i.e., models requires data a daily or monthly or annual time scale; land use map currentness, soils data resolution),
- model output is sufficient to show water quality goals can be achieved, and
- user experience with model (based on description of model required in this section).

This section should include an explanation of the model used, a discussion of model limitations and model inputs including assumptions.

Watershed analysis at a minimum should evaluate and quantify the following point and nonpoint sources of pollution if present in the watershed:

- Land use
    - Developed, low intensity
    - Developed, medium intensity
    - Developed, high intensity
    - Forest
    - Pasture/Hay
    - Cultivated crops
- Septic system loads
    - Number within watershed
    - Number within a specified distance of the waterbody (e.g., 250 ft)
    - Number of seasonal homes with septic systems within a specified distance of waterbody (e.g., 250 ft)
- Point sources
    - Wastewater treatment plants
    - Concentrated Animal Feeding Operations (CAFOs)
    - Other permitted facilities that discharge pollutant of concern

Element B. Expected Load Reductions for Solutions Identified

This section should use the information collected in Element A to estimate the pollutant source loads and determine the point and nonpoint source load reductions needed to meet/improve water quality. This information will then be used to determine the NPS measures needed (Element C).The plan must describe how the best management practices (BMPs) will reduce the pollutant and provide an estimate of the expected load reductions from the BMPs and the basis of this determination (include references). t is important that the expected load reductions from BMPs be clearly identified to ensure appropriate selection of BMPs (Element C) to achieve water quality goals.

Modeling may be simple or complex depending on the understanding of the pollutant fate and transport, time scale of the model (hourly, daily, etc…), source load model performance, resolution of input data, and the objectives of the plan or pollutants of concern. This section should include an explanation of the model used to determine the estimated load reductions, a discussion of model limitations and model inputs. This section should be well developed to identify appropriate BMPs (Element C) to implement to achieve water quality goals.

Element C. Nonpoint Source Management Measures Identified

The plan must describe the BMPs that need to be implemented to achieve the load reductions in Element B. This section should also describe BMPs that will be used to address other watershed goals identified in the plan.

Pollutant loads may vary among land use types; load reductions will be dependent on the use of sufficient water quality data and appropriate modeling for determining BMP type and location. If the plan targets appropriate measures at the most significant sources of pollution, it is expected that pollution loads will be reduced and water quality will improve.

The methods used to quantify load reductions should be logical and understandable—methods don't have to be overly detailed or sophisticated, but should be reasonable. Analysis does not have to be based on the same model used for Element A and B; for example Element A and B could be based on a complex model, while Element C may be based on a simple spreadsheet model that determines the relative reduction in a pollutant for a given management practice (for example, STEPL, WTM, Simple Method).

Element D. Technical and Financial Assistance

Detailed characterization and understanding of the baseline watershed condition (addressed in Elements A-C) will provide the basis for determining the appropriate technical and financial needs to support the implementation actions. Plans must describe available funding sources and how they will be secured; leveraging of funding and collaboration concerning technical and financial assistance are a plus and should be included in the plan.

Estimates for implementation of the entire plan should include: implementation of practices, long-term operation and maintenance of the practices, information and educational activities, monitoring, and evaluation activities.

Element E. Education/Outreach

Information gained from Elements A-C should be used to strengthen stakeholders (including the public) support. The plan must identify the main audiences and how the plan intends to engage the audiences to adopt/support the watershed plan, long term operation and maintenance of practices, promote involvement and relay information to stakeholders, encourage/support voluntary implementation by targeted land-owners, and identification of barriers and possible solutions to overcome barriers.

Element F. Implementation Schedule

The plan must include a schedule for implementing the management measures outlined in the watershed plan and should reflect the milestones that are indicated in Element G and include how the milestones align with the technical and financial assistance identified in Element D. The schedule may need to be long-term to achieve the water quality goals. The schedule should

include a timeline for watershed plan review and updates. Because much of the implementation of watershed plans are contingent on availability and award of funding, implementation schedules may include broad timeframes--short-term (3 yrs), mid-term (3-5 yrs) and long-term (5-10 yrs). More detailed information should be presented for short-term activities; mid- and long-term activities may be described in less detail. It is expected that schedules will need to be revised to updated or amended as implementation is completed.

Recommendation: For experienced watershed groups, implementation schedules could be estimated based on past experience.

Element G. Milestones Identified

This element is closely tied to Element F. The plan must include interim, measurable milestones to track progress in implementing the BMPs in the watershed plan. The interim milestones should ensure that the BMPs are implemented on schedule and in the most critical areas of the watershed to address water quality concerns. Milestones must include an assessment of the effectiveness of the control measures implemented. The level of detail depends on how well the plan characterized the watershed and targeted appropriate BMPs.

Element H. Criteria to Evaluate Load Reductions (performance)

The plan must clearly state the criteria to be used to determine if the load reductions are being achieved over time, if progress is being made toward improving water quality, and if/when the plan should be revised. The criteria used in this element should be the same or equivalent to the criteria used to determine loadings for elements A & B; for example direct measurements to of monitoring data (nutrients, bacteria) or indirect (beach closures). The criteria must be measurable and quantifiable and appropriately measure progress towards the reduction goals. In addition, this section should include a review process to assess progress and explain how the plan will be adaptively managed. The plan must include a mechanism to track and report measureable progress on the implementation of BMPs.

Element I. Monitoring

This section is closely linked to elements A (pollution sources), F (implementation schedule), G (milestones) and H (criteria to evaluate load reductions). This element must include at a minimum, baseline (before) and post-project (after) monitoring. Evaluation of BMP implementation is needed to obtain credible data and information to assess effectiveness in achieving load reductions through modeling and water quality sampling. The monitoring program should be designed to determine if loading reductions are being achieved over time and if progress in meeting water quality standards are being made. A monitoring program may include a reference to DEC RIBs monitoring (plan must describe how and when they will inform and follow-up with DEC), water quality trend analysis, upstream/downstream comparisons, paired watershed designs, and tracking beach and shellfishing closures. The monitoring data collected should support the criteria described in Element H and be used to assess BMP effectiveness in reducing loads to the waterbody. This section should reference the sampling QAPP.

Section 3. Additional Documentation

A sampling and modeling QAPP, if referenced, must be attached or a link to an electronic copy must be included in the document. Also, the QAPP documentation must describe if the plan was approved by NYSDEC or other state or federal agency.

If the watershed plan was developed using information from other reports (TMDL, technical report, planning report) or reference other plans as the basis for any of the elements in Section 2, the preparers must include a copy or a link to an electronic copy of the reports. Also, the reference must indicate if the TMDL was finalized and approved by EPA.

DEC recommends that a geodatabase is created and maintained for all geospatial data and an electronic database to store data used in the development of the watershed plan. Data should consist of model input, output, monitoring, maps, and other relevant information to watershed plan development.

DEC recommends maintaining databases because this information can be used by plan developers to update and revise the analysis, track trends and ensure consistency of the data. In addition data is more easily transferable to interested parties and stakeholders. These databases should be made available upon request.

Appendix A. Nine Key Element Watershed Plan Assessment Form Checklist

New York State Department of Environmental Conservation, Division of Water is responsible for reviewing and approving watershed plans to ensure the plans meet the Nine Key Elements established by the USEPA. This form is to be completed by NYSDEC staff to ensure each of the Nine Key Elements are addressed in plans that are designated as State Approved Plans.

Watershed plan title: _____

Pollutant(s) addressed by plan: _____

Prepared by: _____

Submitted by: _____

Reviewer 1: _____

Reviewer 2: _____

☐ Addresses watershed with an existing TMDL

☐ Update to previously approved plan

☐ New plan

Comments:

☐ Watershed plan is **approved** as a State Approved Nine Key Element Watershed Plan

Date Approved: _____

☐ **Not approved.** Comment letter sent. Date: _____

Directions to the reviewer

For each item on the form, indicate if the item is present. If an item is not applicable, indicate N/A and explain in the comments section. Where possible, indicate the page number or section in the plan where the item is found. Each of the nine key elements must be satisfactorily addressed for the plan to receive approval. The reviewer is directed to the Handbook for Developing Watershed Plans to Restore and Protect our Waters (USEPA Office of Water Nonpoint Source Control Branch, 2008; EPA 841-B-08-002) to assist in determining if each element is adequately addressed. Additional comments or concerns can also be included in the comments sections.

Section 1. Qualifications of the plan preparer(s)

Refer to Summary of Qualifications form [I'm thinking about reworking the title]

Qualifications of plan preparers	Item present (Y/N/NA)		Page or section number
1. Was a form submitted?			
2. Preparers' qualifications adequate to complete plan tasks?			
Comments:			

Section 2. Nine Elements Checklist

Element A. Causes/Sources of Pollution Identified

Identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed plan.	Item present (Y/N/NA)		Page or section number
2. Pollutant(s) to be addressed by watershed plan are clearly stated?			
2. Are sources of pollution identified, mapped and described? Are causes identified?			
3. Are loads from identified sources quantified?			
4. Does plan state water quality goal or target?			
5. Are there any sub-watershed areas? If so, are the sources broken down to the sub-watershed level?			
6. Are data sources indicated? Are estimates and assumptions reasonable?			
Comments:			

Element B. Expected Load Reductions for Solutions Identified

Estimate of the load reductions expected for the management measures described under Element C.	Item present Y/N/NA		Page or section number
1. Are expected load reductions within the accepted range to ensure water quality standards and/or other goals will be achieved (see guidance)?			
2. Are expected load reductions linked to a pollution cause/source identified in Element A?			

3. Is the complexity of modeling used appropriate for the watershed characteristics, the scale and complexity of the impairment, and the extent of water quality data identified in Element A?			
4. Does the plan explain why the BMPs were selected? Will the BMPs described in the plan effectively achieve load reductions?			
5. Are estimates, assumptions, and other data used in the analysis reasonable?			
Comments:			

Element C. Nonpoint Source Management Measures Identified

A description of the NPS management measures that will be implemented to achieve the load reductions estimated in Element B and identification of the critical areas for implementation.	Item Present (Y/N/NA)		Page or section number
1. Does the plan list and describe BMPs that will address the causes/sources of pollution identified in Element A?			
2. Have critical and priority areas been identified? Is the methodology for identifying critical and priority areas explained?			
3. Is the rationale given for the selection of BMPs? Will the BMPs described in the plan effectively achieve load reductions?			
4. Are BMPs applicable to the pollutant causes and sources?			
5. In selecting and siting the BMPs at the sub-watershed level, are the estimates, assumptions and other data used in this analysis technically sound?			
Comments:			

Element D. Technical and Financial Assistance

An estimate of the amounts of technical and/or financial assistance needed, associated costs, and/or the sources and parties that will be relied upon to implement this plan.	Item present (Y/N/NA)		Page or section number
1. Estimate of Technical Assistance Needed			
a. Are potential sources of technical assistance included?			
b. Does the watershed plan describe the anticipated involvement of assisting agencies, watershed groups or volunteers?			
c. Are additional technical assistance needs identified?			
2. Estimate of Financial Assistance Needed			
a. Is a detailed cost estimate included?			
b. Does the cost estimate include a reasonable estimate of all planning and implementation costs?			
c. Are potential funding sources included?			
Comments:			

Element E. Education/Outreach

An information/education component that will be used to enhance public understanding of the project and encourage their early and continued participation.	Item present (Y/N/NA)		Page or section number
1. Does the watershed plan identify relevant stakeholders?			

2. Does the watershed plan include methods to inform and engage stakeholders and landowners in continued participation and implementation?			
3. Were stakeholders involved in development of the plan? Does the plan provide describe the stakeholders? Do the stakeholders referenced in the plan seem appropriate for the objectives of the watershed plan?			
4. Does the watershed plan identify potential partners who may be involved in implementation?			
5. Do the education components emphasize the need to achieve water quality standards?			
6. Does the education components prepare stakeholders for continued proper operation and maintenance of the BMPs after the project is completed?			
Comments:			

Element F. Implementation Schedule

A schedule for implementing nonpoint source management measures identified in this plan that is reasonably expeditious.	Item present (Y/N/NA)		Page or section number
1. Does the schedule/timeline present projected dates for the development and implementation of the actions needed to meet the goals of the watershed plan?			
2. Is the schedule appropriate based on the complexity of the impact and the size of the watershed?			
3. Does plan schedule include when plan will be reviewed and updated?			
Comments:			

Element G. Milestones Identified

A description of interim, measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented.	Item present (Y/N/NA)		Page or section number
1. Are the identified milestones measurable and attainable?			
2. Does the watershed plan identify incremental milestones with anticipated completion dates?			
3. Does the watershed plan include progress evaluations and possible "course corrections" as needed?			
4. Are the milestones appropriately linked with the proposed schedule in Element F?			
Comments:			

Element H. Criteria to Evaluate Load Reductions

A set of criteria that will be used to determine whether loading reductions are being achieved over time and substantial progress is being made towards attaining water quality standards.	Item present (Y/N/NA)		Page or section number
1. Are criteria measureable and quantifiable?			
2. Do the proposed criteria effectively measure progress towards the load reduction goal?			
3. Are the types of data to be collected identified?			
4. Does the watershed plan include a review process to determine if anticipated reductions are being met?			
5. Is there a commitment to adaptive management in the watershed plan?			
6. Does plan include mechanism to track and report progress on BMP implementation to estimate progress toward achieving reduction targets; and to assist with updates to plan?			
Comments:			

Element I. Monitoring

A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under Element H.	Item present (Y/N/NA)		Page or section number
1. Explanation of how monitoring fits into Plan			
a. Does the plan describe how monitoring will effectively measure the evaluation criteria identified in Element H?			
b. Does the watershed plan include a routine reporting element in which monitoring results are presented?			
2. Monitoring Methods			
a. Are the parameters appropriate?			
b. Is the number of sites adequate?			
c. Is the frequency of sampling adequate?			
d. Is the monitoring tied to a quality assurance plan?			
Comments:			

Section 3. Additional documentation

Documentation and References

Additional information and documentation preferred to be included in the 9 element plan by the Department	Item present (Y/N/NA)	Page or section number
1. Does the plan include a copy or link to a data monitoring quality assurance project plan (QAPP)? Was the QAPP approved by NYS DEC or other state or federal agency?		
2. Does the plan include a copy or link to an electronic copy of a modeling QAPP? Was the QAPP approved by NYS DEC or other state or federal agency?		
3. If the plan referenced other reports or plans as the basis for any of the elements in Section 2, did the plan preparers provide links to electronic copies or paper copies?		
4. Electronic filing. Does the plan indicate that data is stored and available? Geospatial data is stored in a geodatabase? Data is stored in an electronic editable format? Is the data readily available?		
Comments:		

Appendix B. Summary of Qualifications

Watershed plan preparers should attach resumes and complete the qualifications form (Appendix B) to describe their experience with the models used in the development of the watershed plan and other experience relevant to the development of the watershed plan to demonstrate that the plan was thoughtfully developed.

Watershed plan title: _____

Prepared by: _____

Submitted by: _____

Date plan submitted: _____

Email contact: _____

Phone: _____

Complete where applicable.

Role	Name
Modeling	
Best Management Practices	
Outreach	
Monitoring	
Partnerships	
QAPP preparation	

Documentation and References

Please include the following documents/references, if relevant, when your watershed plan is submitted to DEC for refer:

- Copy or link to water quality monitoring data QAPP
    - Indicate if QAPP was approved by NYSDEC or other state or federal agency
- Copy or link to modeling QAPP
    - Indicate if QAPP was approved by NYSDEC or other state or federal agency
- Copy or link to other reports or plans that were used to satisfy any of the nine elements

In addition, DEC recommends that a geodatabase be created to document and maintain the geospatial data and an electronic database to store data used in the development of the watershed plan. Data should consist of model input, output, monitoring, maps, and other relevant information to watershed plan development. Cataloging watershed plan information will help plan developers to update and revise analyzes, track trends and share data.

TMDL or Interim Alternative Clean Water Plan Milestones

This table outlines the major and minor tasks and estimated time (1.5-2 years) needed to complete a basic TMDL plan. The tasks listed were derived from experience completing several small lake phosphorus TMDLs during 2012-2014. It is anticipated that additional tasks and time allotted to complete the plan may be required for large watersheds, flowing waters, and coastal waters. The tasks are generally chronological, although some may be completed concurrently. Some tasks are contingent on completion of previous tasks, as noted.

Task	Description	Estimated Duration (months)	Notes
1	**Review waterbody priority lists**	**1**	
1.1	Discuss/coordinate with Monitoring & Permits (individual & general) Staff		
1.2	Monitoring Kickoff meeting		
2	**Decision to Do a TMDL or interim alternative clean water plan**	**-**	
3	**Scoping/Additional data gathering**	**1**	
3.1	Source Identification/Understand impairment		
3.2	Determine appropriate models		
3.3	Refine data needs		
3.4	Outreach to DEC regional contacts (gather information about local groups)		
3.5	Identify agency partners & local groups		
4	**QAPP development**	**2-4**	Includes development of Sampling and/or Modeling QAPPs
4.1	Draft QAPP		
4.2	Submit draft for internal review and comment		
4.3	Finalize and obtain approval of QAPP		
5	**Collect target data**	**4**	Sampling QAPP must be written and approved prior to this task
5.1	Schedule sampling trips		
5.2	Conduct sampling		
5.3	Source of impairment verification		
6	**Outreach—Internally & Agency Partners (e.g., Soil & Water District, Department of Health, Municipal Officials)**	**1**	
6.1	Meeting with agency partners (inform partners, start aligning coordination)		

Task	Description	Estimated Duration (months)	Notes
6.2	Determine/Develop communication tool for informing the target watershed's property owners (email, postcard, listserv, via partner) ; timing of interactions --seasonal residency		
6.3	Inform target watershed community about TMDL process/meeting info.		
7	**Compile TMDL inputs--characterize watershed**	**2-4**	Modeling QAPP must be written and approved prior to this task
7.1	Characterize watershed		
7.2	Delineate watershed boundary		
7.3	Define land use		
7.4	Determine point sources		
7.5	Assess septic systems		
7.6	Define soils, streams, topography		
7.7	Compile/update weather data		
8	**Recommended Watershed Community Outreach Meeting - introduction to TMDLs & community input**	**1-2**	
8.1	Plan meeting location, date & time		
8.2	Develop meeting materials & announce meeting		
8.3	Execute meeting		
8.4	Meeting follow-up (ongoing until TMDL completed)		
9	**TMDL analysis**	**4-8**	Contingent on completion and approval of modeling QAPP
9.1	Identify critical conditions (temporal variability: seasonal residency, growing season)		
9.2	Calibrate/verify model results		
9.3	Assess source loading		
9.4	Analyze different scenarios to evaluate reasonable assurance for meeting water quality standards		
9.5	Waste load allocation - discuss with Permits Staff		
9.6	Load allocation		
9.7	Margin of safety		
10	**Alternative 2nd Watershed Community Outreach Meeting - review of data**	**5-10 days**	Meeting held before draft TMDL is written
11	**Complete draft TMDL**	**2-4**	
11.1	Development of implementation plan		
11.2	Development of monitoring plan		

Task	Description	Estimated Duration (months)	Notes
12	**Review of Draft TMDL**	**2-4**	Contingent on Task 11
12.1	Internal review		
12.2	EPA review		
12.3	Revise load allocations & implementation text per internal & EPA comments		
13	**Public Comment Period**	**1-2**	Contingent on Task 12
13.1	Public notice draft TMDL (ENB)		
13.2	**Alternative 3rd Watershed Community Outreach Meeting--explanation of draft**		
14	**Comment Response**	**1-2**	Contingent on Task 13
14.1	Respond to public comments		
15	**Finalize TMDL**	**2-3**	Contingent on Task 14
15.1	Revise draft TMDL to address public comments, submit to EPA for approval		

(7) The process for assuring adequate controls over the disposition of all residual waste from any water treatment processing.

(8) The process for developing an inventory and ranking, in order of priority of needs for construction of waste treatment works required to meet the applicable requirements of sections 301 and 302 of the Act.

(9) The process for determining the priority of permit issuance.

(c) *Regional Administrator review.* The Regional Administrator shall review approved State CPPs from time to time to ensure that the planning processes are consistent with the Act and this regulation. The Regional Administrator shall not approve any permit program under Title IV of the Act for any State which does not have an approved continuing planning process.

§ 130.6 Water quality management plans.

(a) *Water quality management (WQM) plans.* WQM plans consist of initial plans produced in accordance with sections 208 and 303(e) of the Act and certified and approved updates to those plans. Continuing water quality planning shall be based upon WQM plans and water quality problems identified in the latest 305(b) reports. State water quality planning should focus annually on priority issues and geographic areas and on the development of water quality controls leading to implementation measures. Water quality planning directed at the removal of conditions placed on previously certified and approved WQM plans should focus on removal of conditions which will lead to control decisions.

(b) *Use of WQM plans.* WQM plans are used to direct implementation. WQM plans draw upon the water quality assessments to identify priority point and nonpoint water quality problems, consider alternative solutions and recommend control measures, including the financial and institutional measures necessary for implementing recommended solutions. State annual work programs shall be based upon the priority issues identified in the State WQM plan.

(c) *WQM plan elements.* Sections 205(j), 208 and 303 of the Act specify water quality planning requirements. The following plan elements shall be included in the WQM plan or referenced as part of the WQM plan if contained in separate documents when they are needed to address water quality problems.

(1) *Total maximum daily loads.* TMDLs in accordance with sections 303(d) and (e)(3)(C) of the Act and §130.7 of this part.

(2) *Effluent limitations.* Effluent limitations including water quality based effluent limitations and schedules of compliance in accordance with section 303(e)(3)(A) of the Act and §130.5 of this part.

(3) *Municipal and industrial waste treatment.* Identification of anticipated municipal and industrial waste treatment works, including facilities for treatment of stormwater-induced combined sewer overflows; programs to provide necessary financial arrangements for such works; establishment of construction priorities and schedules for initiation and completion of such treatment works including an identification of open space and recreation opportunities from improved water quality in accordance with section 208(b)(2) (A) and (B) of the Act.

(4) *Nonpoint source management and control.* (i) The plan shall describe the regulatory and non-regulatory programs, activities and Best Management Practices (BMPs) which the agency has selected as the means to control nonpoint source pollution where necessary to protect or achieve approved water uses. Economic, institutional, and technical factors shall be considered in a continuing process of identifying control needs and evaluating and modifying the BMPs as necessary to achieve water quality goals.

(ii) Regulatory programs shall be identified where they are determined to be necessary by the State to attain or maintain an approved water use or where non-regulatory approaches are inappropriate in accomplishing that objective.

(iii) BMPs shall be identified for the nonpoint sources identified in section 208(b)(2)(F)–(K) of the Act and other nonpoint sources as follows:

(A) *Residual waste.* Identification of a process to control the disposition of all residual waste in the area which could

affect water quality in accordance with section 208(b)(2)(J) of the Act.

(B) *Land disposal.* Identification of a process to control the disposal of pollutants on land or in subsurface excavations to protect ground and surface water quality in accordance with section 208(b)(2)(K) of the Act.

(C) *Agricultural and silvicultural.* Identification of procedures to control agricultural and silvicultural sources of pollution in accordance with section 208(b)(2)(F) of the Act.

(D) *Mines.* Identification of procedures to control mine-related sources of pollution in accordance with section 208(b)(2)(G) of the Act.

(E) *Construction.* Identification of procedures to control construction related sources of pollution in accordance with section 208(b)(2)(H) of the Act.

(F) *Saltwater intrusion.* Identification of procedures to control saltwater intrusion in accordance with section 208(b)(2)(I) of the Act.

(G) *Urban stormwater.* Identification of BMPs for urban stormwater control to achieve water quality goals and fiscal analysis of the necessary capital and operations and maintenance expenditures in accordance with section 208(b)(2)(A) of the Act.

(iv) The nonpoint source plan elements outlined in §130.6(c) (4)(iii)(A)(G) of this regulation shall be the basis of water quality activities implemented through agreements or memoranda of understanding between EPA and other departments, agencies or instrumentalities of the United States in accordance with section 304(k) of the Act.

(5) *Management agencies.* Identification of agencies necessary to carry out the plan and provision for adequate authority for intergovernmental cooperation in accordance with sections 208(b)(2)(D) and 303(e)(3)(E) of the Act. Management agencies must demonstrate the legal, institutional, managerial and financial capability and specific activities necessary to carry out their responsibilities in accordance with section 208(c)(2)(A) through (I) of the Act.

(6) *Implementation measures.* Identification of implementation measures necessary to carry out the plan, including financing, the time needed to carry out the plan, and the economic, social and environmental impact of carrying out the plan in accordance with section 208(b)(2)(E).

(7) *Dredge or fill program.* Identification and development of programs for the control of dredge or fill material in accordance with section 208(b)(4)(B) of the Act.

(8) *Basin plans.* Identification of any relationship to applicable basin plans developed under section 209 of the Act.

(9) *Ground water.* Identification and development of programs for control of ground-water pollution including the provisions of section 208(b)(2)(K) of the Act. States are not required to develop ground-water WQM plan elements beyond the requirements of section 208(b)(2)(K) of the Act, but may develop a ground-water plan element if they determine it is necessary to address a ground-water quality problem. If a State chooses to develop a ground-water plan element, it should describe the essentials of a State program and should include, but is not limited to:

(i) Overall goals, policies and legislative authorities for protection of ground-water.

(ii) Monitoring and resource assessment programs in accordance with section 106(e)(1) of the Act.

(iii) Programs to control sources of contamination of ground-water including Federal programs delegated to the State and additional programs authorized in State statutes.

(iv) Procedures for coordination of ground-water protection programs among State agencies and with local and Federal agencies.

(v) Procedures for program management and administration including provision of program financing, training and technical assistance, public participation, and emergency management.

(d) *Indian Tribes.* An Indian Tribe is eligible for the purposes of this rule and the Clean Water Act assistance programs under 40 CFR part 35, subparts A and H if:

(1) The Indian Tribe has a governing body carrying out substantial governmental duties and powers;

(2) The functions to be exercised by the Indian Tribe pertain to the management and protection of water resources which are held by an Indian Tribe, held by the United States in trust for Indians, held by a member of an Indian Tribe if such property interest is subject to a trust restriction on alienation, or otherwise within the borders of an Indian reservation; and

(3) The Indian Tribe is reasonably expected to be capable, in the Regional Administrator's judgment, of carrying out the functions to be exercised in a manner consistent with the terms and purposes of the Clean Water Act and applicable regulations.

(e) *Update and certification.* State and/or areawide agency WQM plans shall be updated as needed to reflect changing water quality conditions, results of implementation actions, new requirements or to remove conditions in prior conditional or partial plan approvals. Regional Administrators may require that State WQM plans be updated as needed. State Continuing Planning Processes (CPPs) shall specify the process and schedule used to revise WQM plans. The State shall ensure that State and areawide WQM plans together include all necessary plan elements and that such plans are consistent with one another. The Governor or the Governor's designee shall certify by letter to the Regional Administrator for EPA approval that WQM plan updates are consistent with all other parts of the plan. The certification may be contained in the annual State work program.

(f) *Consistency.* Construction grant and permit decisions must be made in accordance with certified and approved WQM plans as described in §§ 130.12(a) and 130.12(b).

[50 FR 1779, Jan. 11, 1985, as amended at 54 FR 14360, Apr. 11, 1989; 59 FR 13818, Mar. 23, 1994]

§ 130.7 Total maximum daily loads (TMDL) and individual water quality-based effluent limitations.

(a) *General.* The process for identifying water quality limited segments still requiring wasteload allocations, load allocations and total maximum daily loads (WLAs/LAs and TMDLs), setting priorities for developing these loads; establishing these loads for segments identified, including water quality monitoring, modeling, data analysis, calculation methods, and list of pollutants to be regulated; submitting the State's list of segments identified, priority ranking, and loads established (WLAs/LAs/TMDLs) to EPA for approval; incorporating the approved loads into the State's WQM plans and NPDES permits; and involving the public, affected dischargers, designated areawide agencies, and local governments in this process shall be clearly described in the State Continuing Planning Process (CPP).

(b) Identification and priority setting for water quality-limited segments still requiring TMDLs.

(1) Each State shall identify those water quality-limited segments still requiring TMDLs within its boundaries for which:

(i) Technology-based effluent limitations required by sections 301(b), 306, 307, or other sections of the Act;

(ii) More stringent effluent limitations (including prohibitions) required by either State or local authority preserved by section 510 of the Act, or Federal authority (law, regulation, or treaty); and

(iii) Other pollution control requirements (e.g., best management practices) required by local, State, or Federal authority are not stringent enough to implement any water quality standards (WQS) applicable to such waters.

(2) Each State shall also identify on the same list developed under paragraph (b)(1) of this section those water quality-limited segments still requiring TMDLs or parts thereof within its boundaries for which controls on thermal discharges under section 301 or State or local requirements are not stringent enough to assure protection and propagation of a balanced indigenous population of shellfish, fish and wildlife.

(3) For the purposes of listing waters under § 130.7(b), the term ''water quality standard applicable to such waters'' and ''applicable water quality standards'' refer to those water quality standards established under section 303 of the Act, including numeric criteria,