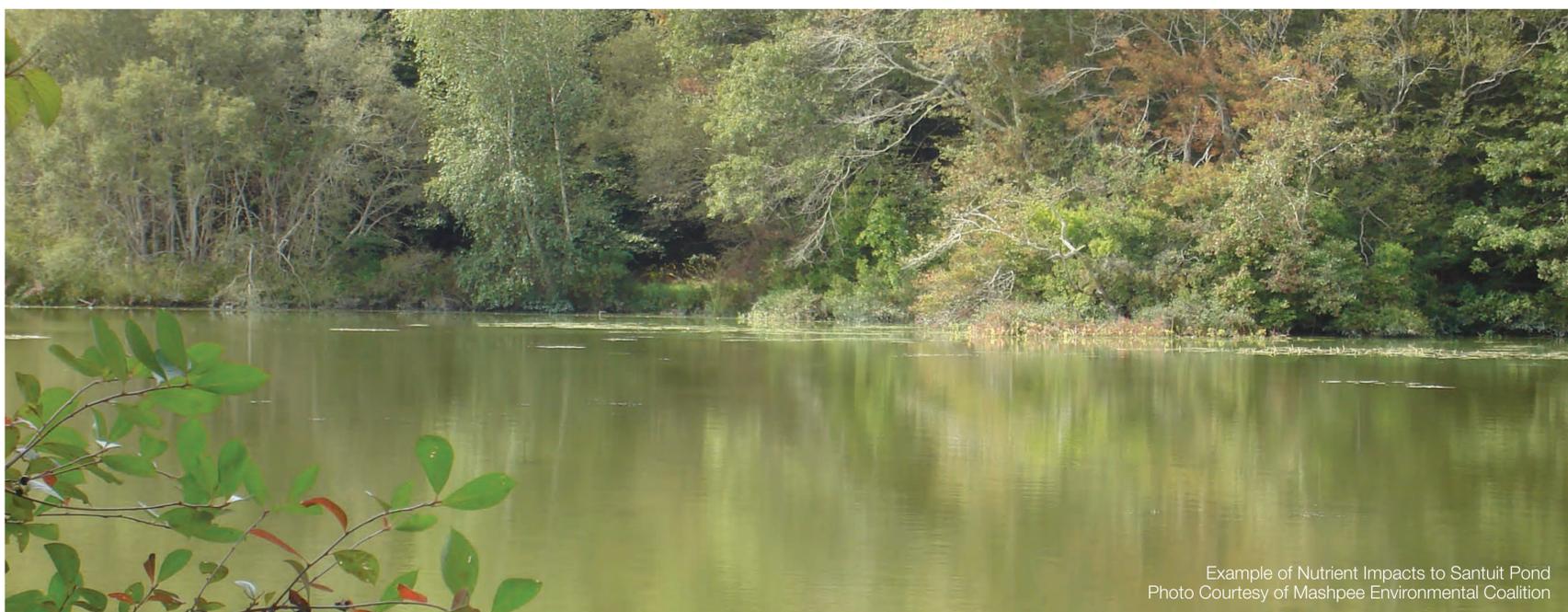


About the Project

As a community, we treasure Mashpee's beautiful coastal ponds and estuaries, yet we are responsible for their poor water quality. Excess nutrients – nitrogen, in particular – come from septic systems and wastewater treatment plants, surface runoff after rain storms or snow melt, lawn fertilizer, stormwater drainage system discharges, and other sources. Nitrogen is present in the environment naturally; however, in excess, it is considered a pollutant. This problem can't be overcome without a comprehensive plan that will include sewerage, changes in how we treat our wastewater and better controls on our stormwater discharges and fertilizer use.



Example of Nutrient Impacts to Santuit Pond
Photo Courtesy of Mashpee Environmental Coalition

Project Goals

- Provide an environmentally and economically sound plan for nitrogen reduction and wastewater treatment.
- Recommend areas appropriate for discharging treated wastewater into the ground.
- Develop a recommended plan to reduce the Town's nitrogen contributions - and those of its neighbors - in the Popponesset Bay and Waquoit Bay watersheds.



Moody Pond
Photo Courtesy of Mashpee Environmental Coalition

Overview

Nutrients feed aquatic plants, including algae, which consume oxygen as they grow and die off. When this happens in excess, there is no longer enough oxygen in the water for aquatic life, causing fish kills and harming plants such as eelgrass that serve as a nursery for many important species. The decomposition of organic matter creates odors and is unsightly, resulting in growing layers of muck on the bottoms of our water bodies, impacting recreational uses such as swimming and boating, as well as the economic backbone of the Cape economy – tourism and fishing.

As part of this project, the Massachusetts Estuaries Project (MEP) has estimated the maximum amount of nitrogen that each estuary in Mashpee can receive and still meet water quality standards. The Federal Clean Water Act mandates that the Town of Mashpee and its neighbors do not exceed these maximum amounts.

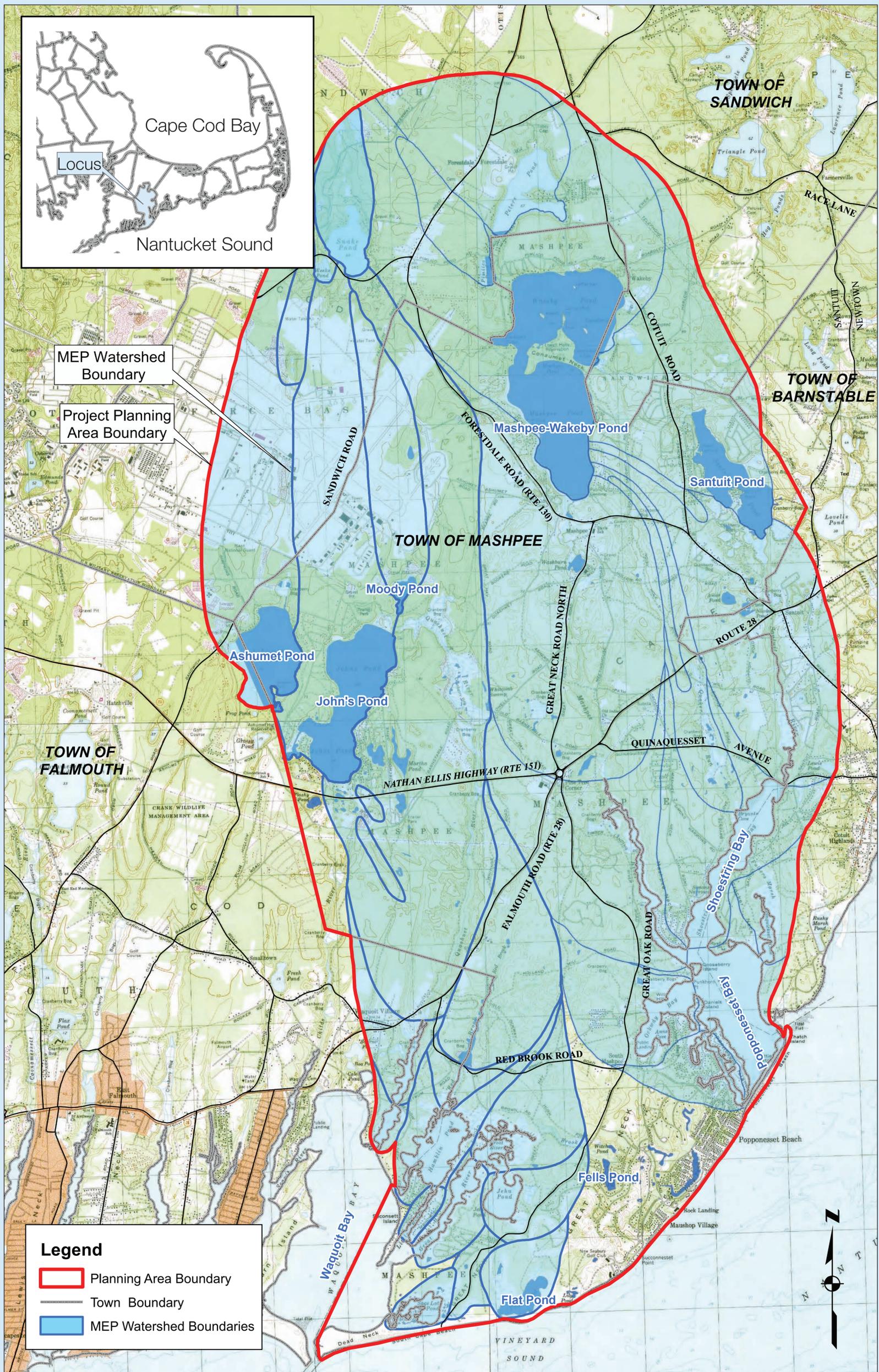
The WNMP focuses on specific estuaries. The Project Planning Area (PPA) includes the entire town of Mashpee, the Popponesset Bay watershed that extends into the towns of Barnstable and Sandwich, and the Waquoit Bay East watershed that extends into the towns of Falmouth and Sandwich.

The WNMP is being completed in the following general steps:

1. Needs Assessment – Report issued in April 2007,
2. Technology Screening – Report issued in November 2007,
3. Alternative Screening Analysis Report – currently being developed, and
4. A Recommended Plan – to address the nitrogen removal needs.

Town of Mashpee, Massachusetts

Watershed Nitrogen Management Plan (WNMP)



What's the Problem?

Our water resources have become contaminated due to over-abundance of nutrients – nitrogen and phosphorus – that stimulates excessive algae growth.

Simply put:

- There is too much nitrogen in our coastal salt waters
- There is too much phosphorus in our fresh waters

What are the primary sources of these nutrients?

- Wastewater (from septic systems and wastewater treatment plants)
- stormwater runoff
- lawn fertilizer

What are the impacts of these nutrients?

- An example is the Mashpee River – a once swimmable river that is no longer fit for this human recreational activity.
- Algae blooms - that destroy eel grass beds (scallop and flounder nurseries) by blocking light necessary for their survival. Algae eventually settle on the bottom and decompose, resulting in build-up of muck affecting the clarity of the water and causing offensive odors. Fish and shellfish are at risk due to the depletion of oxygen dissolved in the water.
- Fish kills and habitat loss - some of these impacted waterbodies no longer support year-round shellfishing or blue crab netting.

Mashpee's degraded water bodies include the following that are listed as impaired under the Clean Water Act:

- Mashpee River
- Popponeset Bay
- Eastern Waquoit Bay
- Santuit Pond

Who's responsible?

We all are. Most of our town is served by conventional septic systems. If you flush a toilet, you contribute to the problem. Conventional Title 5 septic systems do not remove any significant amount of nitrogen. Even if your household's sanitary waste system is connected to a wastewater treatment plant, you are part of the problem. Although wastewater treatment plants provide a much greater level of treatment than a conventional system, only a very limited number of these treat to the levels necessary to improve our waters.



What can we as citizens do about this problem?

The good news is that **we can all be part of the solution!**

Begin by:

- Becoming informed about ongoing efforts to address nitrogen in wastewater; visit our web page for more information – **www.mashpeewaters.com**.
- Tuning into Channel 18 to follow Sewer Commission meetings or come down to Town Hall and attend regularly scheduled monthly meetings.
- Supporting efforts to preserve the remaining open space in Mashpee.
- Limiting the use of products containing nitrogen and phosphorus, such as fertilizers and laundry detergents.
- Reducing the size of your lawn, this in turn reduces your fertilizer use.
- Reducing your property's stormwater runoff. Water is a valuable resource. Use it and re-use it. Don't let the precipitation falling on our properties become storm water runoff, which carries fertilizers and pet waste to rivers and streams.
- Picking up after your dog.



Get Involved:

The Town is doing its part to improve and protect Mashpee's waters by developing its **Watershed Nitrogen Management Plan (WNMP)**. It's critical for Mashpee residents and businesses to be involved in developing the Plan as well.

- Read the WNMP reports.
- Attend Sewer Commission meetings.
- Talk to your neighbors about the issues and importance of the Plan.

When the WNMP is finalized, it will come before Town Meeting for a vote by residents. Please be sure you're prepared to cast an informed vote.

You can learn more about the problem of excess nutrients in Mashpee's waters by visiting our web page:

www.mashpeewaters.com

or if you have questions or comments please contact us at:

Mashpee Sewer Commission
16 Great Neck Road, Mashpee, MA 02649
Or email mashpeesewer@verizon.net

visit us at

www.mashpeewaters.com

We are the Problem

If you have a cesspool, septic system or are connected to a sewer, fertilize your lawn, or don't properly manage your property's stormwater runoff – you are part of the problem. Conventional Title 5 and older septic systems do not remove enough nutrients from the wastewater before it is discharged to the groundwater. Even if your sanitary waste is treated at a wastewater treatment plant, you are part of the problem. Although treatment plants discharge nitrogen at much lower levels than conventional septic systems they still discharge nitrogen that is contributing to the problem. All of Mashpee's treatment plants need to be upgraded to reduce nitrogen down to the allowable amounts that can safely flow to our waterways and fresh water aquifer to restore them to health.

What We do makes a Difference

The good news is that even though we are part of the problem, we are also part of the solution. By working to reduce the amount of nitrogen that we discharge into the ground from our wastewater, stormwater and landscaping maintenance, we can minimize the amount of nutrients reaching our bays and waterbodies.

The Role of the Town

Mashpee is doing its part to improve and protect our waters by implementing the Watershed Nitrogen Management Plan (WNMP). The planning area includes Mashpee, the Popponneset Bay watershed that includes Barnstable and Sandwich, and the Waquoit Bay East watershed that includes Falmouth and Sandwich. The WNMP is being completed in four phases: (1) Needs Assessment, (2) Technology Screening, (3) Alternatives Analysis and Site Evaluation and (4) Recommended Plan. Details on these phases are available at www.mashpeewaters.com.

The Mashpee Sewer Commission hired the engineering firm GHD Inc. to prepare the WNMP, with the UMass-Dartmouth School of Marine Science and Technology. Earlier phases of the WNMP were presented at Sewer Commission meetings for public review and comment. The Recommended Plan will meet the Town's future wastewater treatment needs and protect the watersheds Mashpee shares with Barnstable, Falmouth and Sandwich. GHD, working with the Town and its other consultants, is finalizing the alternatives analysis and will submit a draft of the Recommended Plan to the Sewer Commission this winter. The Sewer Commission will submit a plan for federal, state, county and town approvals.

Be part of the Solution

It's critical for us to be involved in developing the solution – the Recommended Plan. Learn more about Mashpee's efforts to restore our watersheds by visiting the WNMP website, www.mashpeewaters.com. More information on the problem with excess nutrients can be found at www.ccwpc.org. Participate in Sewer Commission meetings and add your voice to our community's discussion about the options. Residents and businesses will be asked to fund implementation of the plan, so please stay informed.

Visit us at www.mashpeewaters.com or Contact Us at:
Paul Gobell PE - Sewer Commission Administrator
Mashpee Sewer Commission
16 Great Neck Road, Mashpee, MA 0264
(508) 539-1400 ext 8598, fax: (508) 539-1142
PGobell@mashpeema.gov

Process Snapshot

It's taken a generation to pollute our waters. It will take years to restore them following the process below.

- Identify alternatives to stop the pollution – **COMPLETE**
- Evaluate potential alternatives for effectiveness– **COMPLETE**
- Develop recommended plan; the Sewer Commission will present for approval(s) – **WE ARE HERE**
- Develop implementation plans, in phases, with funding costs for each phase for presentation to the voters.
- Once approved by the voters, each phase will be implemented by the new Mashpee Water & Sewer District

The entire process from alternatives identification to cleaner water will take 10 years or more. Mashpee voters will be asked to vote to fund each phase of implementation. If we fail to support the Recommended Plan and fund implementation, the water quality in our bays will continue to decline. The Town is also in jeopardy of having fines levied for not complying with the Clean Water Act and of legal action by regulators and environmental groups. The fines will be costly, as will the ecological damage. A lawsuit will be costly and further delay restoring our valuable water resources. **Be part of the solution, and lets all join together in support of cleaning up our precious water resources.**



Popponneset Bay



Our Waterways are Polluted!

You should care about Mashpee's water resources and the efforts to save and restore them

Many of us have chosen Mashpee as home because we treasure its beautiful estuaries, lakes, ponds and rivers. Sadly, these valuable water bodies are now being polluted by too many nutrients (nitrogen and phosphorus). Decreasing water quality affects our enjoyment of these important resources, our property values, and our tourism-dependent economy.

Many residents and visitors have observed that the quality of our salt and fresh water ponds, rivers and streams has deteriorated over the past several decades. The water grows greener and murkier in the summer. Slime algae proliferate on rocks and dock ladders. Valuable fish and shellfish stocks have declined. Studies by local scientists and shellfish wardens confirm that areas in some bays lack enough oxygen to sustain life. It is a fact that the environmental and public health and economic well-being of the Cape is intimately linked to the health of its water bodies.

The Problem is Nitrogen and Phosphorus Pollution

Many of our current water quality problems result from land use practices, rapid development and population growth that have caused an increase in the release of nitrogen and phosphorus into our groundwater. These nutrients are carried by the groundwater and released into bays and streams. For salt water, excess nitrogen is the problem; for fresh water, it's excess phosphorus.

While nutrients are necessary and present in the environment naturally, in excess they are pollutants. Acting as fertilizers, they cause excess plant and algae growth, consuming oxygen and smothering other life. When the plants die, they consume more oxygen as they decompose, leaving less oxygen to support other life. This causes fish kills and harms plants such as eelgrass; home and nursery for many important species of fin and shellfish. Decomposing organic matter creates odors and is unsightly, leaving thick layers of muck on the bottom of the water bodies. Swimming, boating, fishing and shell fishing are impacted by poor water quality effecting tourism, water dependent businesses and property values. Our critical task is to reduce the amount of nutrients entering groundwater and restore our water resources.



Algal bloom in Mashpee River



Mashpee River

Where do Nitrogen and Phosphorus come from?

The major source of nutrient pollution is our septic systems, which discharge more than 70-percent of the total nutrients entering groundwater. Other sources include wastewater treatment plants, surface runoff after rain storms or snow melt and lawn fertilizers.

Mashpee's Popponneset Bay and Waquoit Bay

Our two main bays, Popponneset and Waquoit, have been the focus of several studies, including those recently done by the Massachusetts Estuaries Project. Results show signs in both bays of low oxygen levels and loss of habitat and organisms that live in and on the bottom of the bay floor including worms, clams, crabs and scallops. An almost total loss of eel grass has also been documented. Excess nitrogen has produced an overgrowth of algae and other plants that blocks out light and consumes oxygen needed by other organisms.

The Mashpee River is part of the Popponneset Bay Watershed. It has also been a primary focus of many studies dating back to concerns raised in the early 1980s, which resulted in the Town purchasing land for conservation protection to slow the pollution.

Mashpee Watershed Nitrogen Management Plan (WNMP) Comprehensive Planning Project
www.mashpeewaters.com

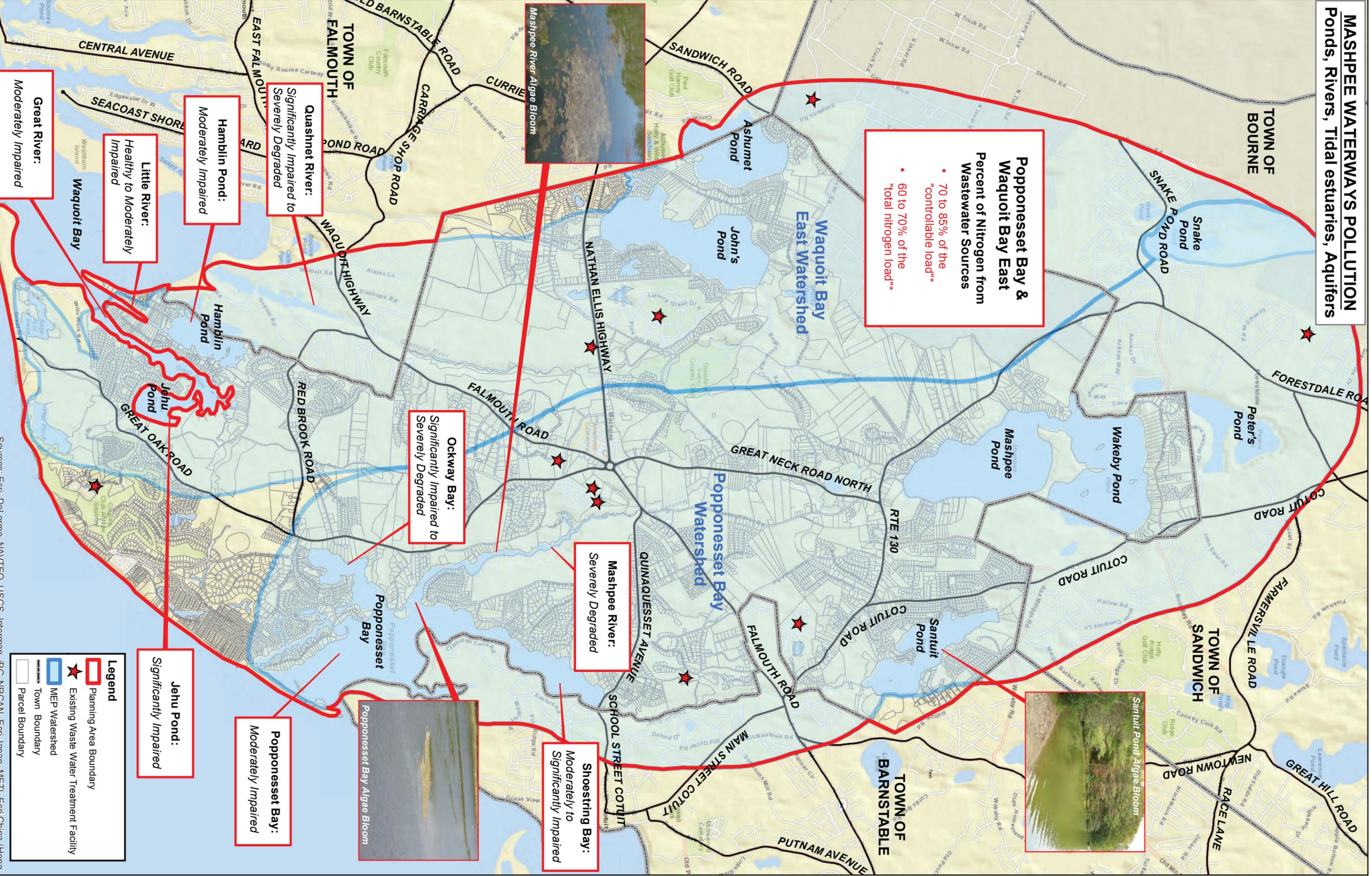
Volumne I | October 2013
All photos are courtesy of the Mashpee Environmental Coalition



MASHPEE WATERWAYS POLLUTION
Ponds, Rivers, Tidal estuaries, Aquifers

Poppoinesset Bay & Waquoit Bay East
Percent of Nitrogen from Wastewater Sources

- 70 to 85% of the "controllable load"*
- 60 to 70% of the "total nitrogen load"***



Great River:
Moderately Impaired

Little River:
Healthy to Moderately Impaired

Hamblin Pond:
Moderately Impaired

Quashnet River:
Significantly Impaired to Severely Degraded

Ockway Bay:
Significantly Impaired to Severely Degraded

Mashpee River:
Severely Degraded

Shoestring Bay:
Moderately to Significantly Impaired

Jehu Pond:
Significantly Impaired

Poppoinesset Bay:
Moderately Impaired

Legend

- Red outline: Planning Area Boundary
- Red star: Existing Waste Water Treatment Facility
- Blue outline: MEP Watershed
- Black outline: Town Boundary
- White outline: Parcel Boundary

*Data and impairment levels based on Massachusetts Estuaries Project Final Reports for Poppoinesset Bay and Waquoit Bay East dated 2004 and 2005 respectively.
Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong

Annual Report of the Sewer Commission

To the Honorable Board of Selectmen and
the Citizens of the Town of Mashpee:

As reported in previous years, the Massachusetts Department of Environmental Protection (DEP) and the U. S. Environmental Protection Agency have established nitrogen loading targets for both the Popponeset Bay (including Shoestring Bay, Mashpee River, Ockway Bay, Popponeset Creek and Pinquikset Cove) and “East Waquoit” (including Sedge Lot Pond, Jehu Pond, Great and Little Rivers, Hamblin Pond and the Quashnet / Moonakis River) estuaries. (Final targets have not yet been established for the main body of Waquoit Bay or the Childs River.) These formal nitrogen targets, referred to as TMDLs (Total Maximum allowed Daily Loads of nitrogen), are required by the federal Clean Water Act. The Town is faced (along with the other towns which share the Bays’ watersheds) with the need to determine how we will meet those targets. Mashpee’s *Watershed Nitrogen Management Plan* (WNMP) project is intended to identify the most cost-effective approach to reducing nitrogen in each of our coastal watersheds to levels that meet the targets, while also dealing with phosphorus impacts to our ponds and protection of overall water quality.

During 2014 the Commission made significant progress toward completing the WNMP. Following up on the work done and the reports completed in previous years, including the Needs Assessment Report, the Technology Screening Analysis Report, the Draft Alternative Screening Evaluation and Site Evaluation Report, the Final Alternatives Screening Analysis Report and the Massachusetts Estuaries Program (MEP) reports analyzing the ability of a series of alternative scenarios for reducing nutrient contamination to meet the TMDL nitrogen targets, the major product of this year’s efforts by the Commission and our consultants was the “Draft Recommended Plan / Draft Environmental Impact Report”. The Plan describes work to be done in five 5-year phases, plus a preliminary phase regarding completion of the Plan review and approval process by Mass. DEP and the Cape Cod Commission. As each phase is completed, the condition of our waterways and other factors will be analyzed to determine how well the plan is working toward achieving the TMDLs and whether or not adjustments need to be made to the Plan (a process referred to as “adaptive management”).

This adaptive management approach has become particularly important as the Plan has come to rely heavily on the proposal by our Shellfish Constable Rick York to remove a significant portion of the water column nitrogen load through seeding and commercial harvesting of large numbers (millions) of shellfish, using Littlenecks in Hamblin and Jehu Ponds, Great and Little Rivers and Shoestring Bay, and a significant expansion of current oyster propagation efforts in the Mashpee River and Popponeset Bay. In conjunction with sewerage and other nitrogen reduction measures such as stormwater bio-retention areas, development controls and land purchases to reduce “buildout” population and other measures, shellfish seeding and commercial harvesting on a large scale may make meeting the TMDL targets for Hamblin and Jehu Ponds and Great River possible, and also ultimately reduce the area of the Town that has to be sewerage in other watersheds (thus reducing resulting costs by about half from previous estimates) while providing local jobs and economic development. Should the shellfish proposal prove as effective as hoped, only the first two phases of sewer facility construction would be required to meet the TMDLs (shellfish cannot meet the TMDLs on their own in the Mashpee River and Shoestring Bay sub-watersheds, or at all in the Quashnet / Moonakis River sub-watershed, meaning that significant sewer construction will still be required in those sub-watersheds and is proposed in Phases I and II). As each 5-year phase is

completed and water quality results become known, it may be necessary to construct portions or all of the later phases of the proposed sewer facilities if the shellfish option does not produce the hoped-for results.

Of some assistance in meeting the TMDLs was the October Town Meeting adoption of fertilizer management regulations by the Town, as made possible by the Cape Cod Commission's Cape-wide fertilizer DCPC and related legislation put forth by Senator Wolf. Although the Massachusetts Estuaries Program models on which the TMDLs and our Plan are based do not anticipate significant nitrogen reduction through fertilizer reduction or stormwater facilities, for both of which there is inadequate information to provide a solid basis for model calculations, they clearly have some level of benefit at minimal cost to taxpayers. The Commission is also following closely the studies being done in Falmouth and other places regarding on-site alternatives to sewers, although, to date, none has demonstrated its feasibility at the scale required to meet our mandated nitrogen targets.

The Draft Recommended Plan / Draft EIR was submitted for review by the Executive Office of Energy & Environmental Affairs (EOEEA) and other state agencies, through the Massachusetts Environmental Policy Act (MEPA) process, at the end of June. The Secretary of Energy & Environmental Affairs issued his Certificate that the Draft Plan / Draft EIR complies with the Massachusetts Environmental Policy Act on September 12, and included extensive comments, as well as attached comment letters from other agencies and organizations, to which the Commission must respond in a Final Recommended Plan / Final EIR. The Commission and our primary consultant GHD, Inc. have been working on the required responses and the Final Recommended Plan / Final EIR, with completion and submission anticipated in late winter of 2015. That will lead to a final MEPA review by EOEEA, anticipated approval of the Plan by the Mass. Department of Environmental Protection (DEP) and review and hoped-for approval of the Plan as a Development of Regional Impact (DRI) by the Cape Cod Commission. As part of the latter process, the Plan will have to be found consistent with the Commission's "208 Plan", scheduled for completion itself in early summer 2015. If all goes as hoped, we will have an approved Plan and can begin implementation in late summer of 2015.

In order to keep Mashpee's residents informed of the problem we face and the steps we are taking to deal with it, our primary consultant GHD and its sub-consultant Regina Villa Associates, working with Commissioner Joe Lyons and former Community Advisory Committee member Beverly Kane, developed a public information program. One result of that work is a web site, www.mashpeewaters.com, which explains the nitrogen problem, the WNMP and where our work stands. The site includes links to all the documents generated as part of the WNMP as well as the MEP reports for our estuaries and other web sites dealing with the nitrogen issue, along with minutes of all the Commission's meetings. There is also an information kiosk at the rear entrance to Town Hall and a brochure available at Town Hall, the Library and the Senior Center to keep Mashpee residents informed on the issue and our progress. You may also refer to the Mashpee Blue Book, a citizen's guide to our nutrient-related water quality problems and what needs to be done about them. Recordings of television broadcasts of our meetings can also be viewed on the Town's web site at <http://www.mshpeema.gov>.

Our part-time Sewer Commission Administrator, Paul Gobell, PE, retired from the Massachusetts Water Resources Authority and previously employed by EPA, continued his work to coordinate our planning with the adjacent towns, the County and state and federal agencies. Paul is the primary public contact person for the Commission and a valuable technical asset as we finalize our plans. He can be contacted at (508)539-1400 ext. 8598 or at PGobell@mashpeema.gov. Paul has also become familiar with the town's existing private wastewater treatment plants and has participated in discussions with some of their owners relative to municipal acquisition, expansion and operation. Paul had been appointed by the Selectmen as Mashpee's representative to Barnstable's Wastewater Community Advisory Committee and is also the

Commission's point person regarding proposed County wastewater planning efforts and a study being conducted with regard to alternatives for the future of the MMR's wastewater collection, treatment and disposal facilities, which may provide an opportunity for dealing with wastewater nitrogen loads from a significant portion of the town, primarily the Quashnet / Moonakis River watershed, for which shellfish mitigation is not possible.

The County's Cape Cod Water Protection Collaborative continued its work on seeking state and federal funding assistance for wastewater facilities on the Cape, on coordinating wastewater facilities planning by the towns and on otherwise dealing with our water quality improvement needs. Selectman Mike Richardson serves as the Town's representative on the Collaborative. The most important achievement of the Collaborative to date has been its role in the development and passage by the state legislature of former Senator O'Leary's bill (Chapter 312 of the Acts of 2008) which provides 0% interest loans for wastewater facilities primarily intended to prevent nutrient enrichment of water bodies or water supplies. The loans, however, are only available to applicants who have a Comprehensive Wastewater Management Plan (CWMP) approved by DEP (the plan we are working on) and have adopted land use controls intended to limit wastewater flows to the amount authorized by zoning and wastewater regulations as of the date DEP approves the CWMP (so-called "growth neutral" regulations). The 0% loans are available only until 2019, in competition with other similar projects around the state, so we have a strong incentive to complete and implement our wastewater plan as soon as possible and to adopt the required regulations (as was done by Falmouth in 2014).

With regard to the proposed conversion of the Mashpee Water District to a Water & Sewer District, legislation was approved by the House of Representatives and State Senate and signed by the Governor. As written, it will only take effect after approval on the ballot of the May 2015 Town election and after the signature by the Selectmen and Water District Commissioners of an inter-municipal agreement specifying the transfer process of Town wastewater facilities and other properties to the District and an understanding of what roles each entity will play in meeting the nitrogen TMDLs and dealing with other water quality issues. At this writing, the status of the proposed District is in doubt.

The Commission still finds itself two members short. With the resignations of former members Bevelry Kane, Ted Theis and Mark Davini, whose work was much appreciated, there are also now Community Advisory Committee vacancies for all five Precincts and the Mashpee Wampanoag Tribal Council, for which the Commission would greatly appreciate volunteers as we move into the critical final stages of planning.

The Commission and Mashpee officials and residents have serious work cut out for us over the next year to complete the WNMP and to identify funding and financing strategies for developing the facilities and practices needed to clean up our waterways. Among other issues, we will have to devise a fair division of the large costs involved between individual betterments and general property taxes, and determine how best to deal with developments that already have private sewer systems (which would need to be upgraded to help meet the TMDLs). The WNMP will have major water quality, land use and fiscal ramifications for the Town, so we invite all residents to actively participate in its development through our meetings and public hearings, by visiting our www.mashpeewaters.com web site, by applying to the Selectmen to fill the above-mentioned vacancies and by reviewing and commenting on the reports we generate. It took decades for our waterways to get into their current poor condition and it may take a longer time to clean them up, but we are now at the point when we must decide how to do it and how to fund it. Your continued support for our work and participation in this decision making process will be sincerely appreciated.

Respectfully submitted,

F. Thomas Fudala, *Chairman*

Joseph N. Lyons, *Vice Chairman*

Mark N. Gurnee, *Clerk*

Thomas F. Burns

L. Glenn Santos

Paul Gobell, *Administrator*

