



## **Town of Mashpee's 2021 Clean Water Plan – Draft – December 2021**

**Overview:** The Town of Mashpee currently has a Comprehensive Watershed Nitrogen Management Plan approved by the Massachusetts Department of Environmental Protection in 2015. This plan was enacted in order to access federal, state and local funds required to rehabilitate our dying estuaries. The estuaries are dying because nitrogen and phosphorus added to groundwater by thousands of septic systems, stormwater and fertilizer usage have caused excessive algal growth that leads to cyanobacteria blooms and a lack of oxygen necessary to sustain life in our estuaries and our ponds. Since 2015 the citizens of Mashpee have become increasingly aware that the same problems that exist in our estuaries also exist in our freshwater lakes and ponds. Several of the ponds have experienced cyanobacteria blooms in the past few years and have been closed for recreational contact usage. This is occurring with increased frequency.

It is for this reason that Mashpee is amending the 2015 plan by making it a plan that addresses both estuarine and fresh water quality: A Mashpee Clean Water Plan.

The 2015 plan was anticipated to take 25 years to sewer the portions of watersheds contributing groundwater to Popponesset and Waquoit Bays. The goal was to remove enough pollution through sewerage and stormwater management to allow the estuaries to meet their respective Total Maximum Daily Loads (TMDL). TMDLs are a water quality standard assigned each individual water body that allows it to achieve the water quality necessary to support the ecosystems associated with that particular body. Currently, the estuaries in Mashpee are far too polluted to be anywhere close to meeting their TMDL.

Although our freshwater lakes and ponds do not currently have approved TMDLs' the degradation of water quality is readily visible and requires remediation.

The evolution to a comprehensive nutrient management plan modifies the original sewerage plan for the second phase of sewerage. Now instead of focusing sewerage strictly for the benefit of the estuaries we will also be focusing on freshwater bodies.

**Introduction:** The following modifications to the MA DEP approved 2015 Town of Mashpee Comprehensive Nitrogen Management Plan are aimed at including and improving the health of estuaries, freshwater lakes and ponds in Mashpee. Completion and approval of this revised plan is necessary in order to acquire state funding for repairing freshwater bodies as well as the estuaries considered in the 2015 plan. In the original Massachusetts Estuaries Project (MEP) lakes and ponds were considered nitrogen "sinks." This meant that the freshwater bodies retained some of the nitrogen that flowed into them via groundwater which is the predominant source of water for the ponds. This phenomenon reduces nitrogen flowing into the estuaries, but intensifies the problem for the ponds. This retention was included in models that helped establish Total Maximum Daily Loads (TMDLs) for the estuaries fed by Mashpee's watersheds.



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**Rationale:** Most freshwater bodies in Mashpee exhibit high levels of eutrophication (pollution) caused by an overabundance of nutrients which are feeding the excessive growth of algae and rooted aquatics. Two of the ponds (Santuit and Mashpee-Wakeby) have for the last several years had forced closures to swimming due to the presence of cyanobacteria. Many species of cyanobacteria create neurotoxins that can cause a multitude of health issues for humans and animals contacting and/or ingesting the polluted water. The goal of this document is describe how the Town of Mashpee plans to address this hazardous situation and restore the water quality in our estuaries, lakes and ponds.

**Pollutants and their sources:** The two nutrients that are causing the decay of our fresh and marine waters are phosphorus and nitrogen. Historically the assumption has been made that phosphorus is the nutrient that accelerates excessive cyanobacteria growth which pollutes our lakes and ponds. High nitrogen levels in fresh water bodies has recently been confirmed to be an influence in supporting cyanobacteria blooms and is considered the growth limiting nutrient in our estuaries. Unnatural ratios of nitrogen to phosphorus have been shown to be a determinant in prompting algal and weed growth. And nitrogen levels in ponds have recently been shown to be influences in stimulating cyanobacteria blooms. For these reasons the goal of our nutrient management plan is to address both nutrients that are degrading our marine and fresh waters.

The primary sources of nutrients to ponds and marine environments are septic systems, stormwater and fertilizers.

Septic systems far outweigh the other two sources. Septic systems and cesspools do not treat either nutrient. They are designed to remove bacteria only and avoid hydraulic failure. A fully complying Title V system releases both nitrogen and phosphorus to the ground in concentrations similar to the wastewater entering the Title V system. Population growth using Title V systems, the volume of flow allowed per unit land area under Title V and the increasing duration of time they have been in use are why our estuaries and ponds are so polluted.

Stormwater contains both nitrogen and phosphorus. The degree to which stormwater influences water quality has been increasing with climate change. More intense storms increase loads to waterways. Road runoff from both paved and unpaved roads add nutrients to waters in the form of suspended solids to which phosphorus is bound and nitrogen is dissolved. Lawn fertilizers generally contain both nitrogen and phosphorus. With increased storm intensity lawn fertilizers are washed into storm drains, seep into groundwater or are washed directly into the fresh water bodies and estuaries. Controlling stormwater runoff is an element of this new plan as well as management of lawn fertilizers.

**Sewering:** Since on-site septic systems and cesspools are the predominant source of nutrients to our ponds, we propose to modify the coverage of our approved Phase Two Plan to include portions of watersheds in Mashpee that contribute nutrient rich groundwater to our estuaries and ponds. Phase 1 and the newly proposed Phase 2 provide sewerage coverage for Ashumet and John's pond and areas contributing polluted groundwater to Santuit and Mashpee-Wakeby ponds. These areas are identified in Figure One. The sewerage of these areas (2A, 2B, 2C and 2D and Phase 1 will significantly decrease



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pollutants flowing into the Mashpee River, Poppaneset Bay, Shoestring Bay and both Mashpee-Wakeby and Santuit ponds. In the Waquoit watershed Phase 2 (2E) will reduce pollutants flowing into John's and Ashumet Ponds and Waquoit Bay. Table 1 demonstrates the anticipated flows associated with sewerage Phase 1 and the modified Phase 2 as well as the nitrogen removal associated with these areas. The towns of Sandwich and to a lesser degree Barnstable contribute groundwater flow to Santuit and Mashpee-Wakeby ponds as shown in Figure 2. Discussions have already commenced with both towns to sewer their portions of the watersheds in time frames matching Mashpee's new proposed Phase 2. These will be on-going discussions for the next year.

**Stormwater Management:** Sources of stormwater pollution to each of the four ponds will be identified, assessed and addressed during Phase One and Phase Two timeframes.

**Lawn Fertilization:** The Town of Mashpee will institute a by-law banning the use of lawn fertilizer around the periphery of all water bodies. This "no fertilizer" zone will extend 300 feet from the shoreline of all waters, fresh and marine. Controlling lawn fertilizer runoff and sources of stormwater are actions that can be implemented much more quickly than sewerage and will reduce the flow of nutrients to our water bodies.

**Santuit Pond:** Santuit is a very shallow pond suffering from severe eutrophication. Algae blooms and presence of cyanobacteria are annual events that last longer each year. A number of corrective actions are under consideration for implementation in the near term before sewerage can be brought to Santuit.

Recycling of nitrogen and phosphorus from a substantial build-up of polluted bottom sediments has prompted discussions about dredging with the Army Corps of Engineers. According to the Corps, dredging is predicated on the town(s) sewerage around the pond. The Corps is currently evaluating the feasibility of dredging Santuit, and a report is expected in early 2022. The density of development around Santuit, the extreme number of Title 5 systems and the physical characteristics of the pond indicate that a multi-pronged approach of sewerage and dredging are necessary to improve Santuit's water quality.

**Mashpee-Wakeby:** Mashpee's Department of Natural Resources is currently preparing a proposal for a diagnostic feasibility study to be undertaken on the lake. The results of this study will be used to support acquisition of state SRF funding for sewerage around portions of the Lake. Mashpee-Wakeby has had closures for the last two years related to cyanobacteria blooms. Funds for this study will hopefully be approved at our October Town Meeting.



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**Explanation of Phase 2:** The areas selected for Phase 2 (Figure 1 2A-2E) are based on their ability to connect to Phase 1, their removal of nutrients from both Popponeset and Waquait Bays and their treating sewage that would otherwise flow into Mashpee-Wakeby, Santuit, John's and Ashumet ponds. Phase 2 has a design flow from all 5 areas of 1,051,000 gallons per day (gpd). Flows from Phase 1 and 2A-2D (838,000gpd) will be piped to the treatment plant at the transfer station built under Phase 1. It is anticipated that we will send flows from 2E (213,000gpd) in the Waquait watershed to the Joint Base Cape Cod wastewater treatment plant which has an additional 250,000 gpd of space. The sewerage of areas 2A-2C will collect sewage that flows into groundwater and rapidly feeds not only Santuit and Mashpee-Wakeby but also the Mashpee River. This is important because polluted groundwater flowing into the river makes its way into Popponeset Bay within hours. On the west side of town the sewerage of the dense development around the periphery of Ashumet and John's pond will collect sewage that would otherwise flow quickly via groundwater into the two ponds.

Area 2D, directly upgradient of Santuit pond, includes portions of Sandwich. It is anticipated that subsequent discussion with Sandwich will result in Sandwich sewerage the watershed areas to the north and west of Wakeby pond in exchange for Mashpee picking up this portion of Sandwich that lies in the Popponeset watershed.

**Summary:** Changes to Mashpee's currently approved Comprehensive Nitrogen Management Plan are necessary in order to address escalating water quality problems in our freshwater ponds and Lakes. These changes include modifying our currently proposed Phase 2 to include sewerage around both Santuit Pond and Mashpee-Wakeby Lake. We propose to call our future amended plan **2021 Mashpee Clean Water Plan**. This document will be submitted to the Massachusetts Department of Environmental Protection and MEPA for approval.