

Summary of Madaket / Warrens Landing and Somerset Sewer Extensions Special Town Meeting, Fall 2016

The Madaket / Warrens Landing and Somerset Needs Areas Sewer Extension Project, from the 2014 CWMP Update that is proposed to go before voters at the fall 2016 Special Town Meeting, is planned as a two-phase sewer extension with Somerset Needs Area the first phase and Madaket / Warrens Landing the second phase. The plan to send all wastewater to the Town's Surfside Wastewater Treatment Facility (WWTF) requires the infrastructure to be constructed in the Somerset Needs Area first, with the Madaket / Warrens Landing Needs Areas flow utilizing the route through Somerset, thus the need for Somerset to lead the construction phasing. The wastewater flow from the two phases is approximately 300,000 Gallons Per Day / Average Day Flow (summer season). The maps on pages 4 and 5 detail the geographic areas for this Sewer Extension.

The following paragraphs summarize the two phases:

Phase 1 – Somerset Needs Area

The Somerset Needs Area was evaluated in the 2004 and the 2014 CWMP studies and based on qualifying criteria was determined to be an area needing an off-site wastewater solution. The Somerset Needs Area immediately abuts the Town Sewer District to the southwest. The geographic area is a predominantly residential area, with small, dense lot sizes.

The Needs Area encompasses approximately 196 acres, of which 181 are developed. There are 243 total parcels, with 209 developed. There are 31 undeveloped residential parcels, with 30 potentially developable. There are 18 municipal/conservation parcels within this Needs Area. With few available developable parcels, sewerage this Needs Area does not promote any unwanted sprawl. The Needs Area is plagued with severe soils, with over 84 percent that are extremely fast perching and do not afford time in the soil layers to cleanse before discharging into groundwater and thus travel fast to water resources, which leads to potential groundwater contamination. The other predominant soil associations in this Needs Area have qualities posing severity for on-site wastewater systems of permeability, depth to seasonal high groundwater and susceptibility to flooding.

There are approximately 7 acres out of the total 151 acres of severe groundwater limitation, which limits the proper absorption of effluent and leads to potential groundwater contamination. Over 67 percent of the area's systems' are located on lots less than or equal to ½ acres and approximately 7 percent were built before 1978 (Creation of Title 5).

This Needs Area is proposed as the first phase of two due to its location to the Surfside WWTF and the necessary infrastructure route Madaket / Warrens Landing must traverse to reach the WWTF.

Final Recommended Plan – Phase 1

The Recommended Plan for Somerset consists of the installation of approximately 20,500 linear feet of sewer composed of both gravity pipe and low-pressure sewer. The extent of each sewer type will be determined during final design. The need for any new pump stations will also be determined during preliminary design and any pump stations identified will be submersible and installed in the existing right of way. The attached Figure 3- 15 on page 4 from the CWMP Update, shows a conceptual Somerset Collection System layout.

Somerset's collection system will join the Town's existing gravity sewer on Bartlett Road and be pumped to the Surfside Road Pump Station via Pine Valley Pump Station or possibly a new pump station with a location TBD during the design phase. The Surfside Road Pump Station will pump the wastewater flow to the Surfside Wastewater Treatment Facility for treatment and disposal.

Phase 2 - Madaket / Warrens Landing Needs Areas

The *Madaket Needs Area* was evaluated in the 2004 CWMP and determined to be an area needing an off-site wastewater solution based on the existing criteria at that time. The 2004 CWMP did not have the advantage of years' worth of water quality testing that is showing significant and rising degradation to Madaket Harbor, Hiiter Creek, Long Pond and other water resources in this geographical area since then. A major change is the completed and approved Madaket Harbor/Long Pond Massachusetts Estuaries Program (MEP) Report and subsequent Draft Total

Maximum Daily Load (TMDL) noting the degradation in this area due to nitrogen loading from on-site wastewater disposal systems. The Madaket Harbor MEP adds significant weight to the existing 2004 criteria to maintain this as a "Needs Area" and needing an off-site wastewater solution. New zoning since 2004 in this area has further reduced potential for unwarranted growth due to introduction of sewer infrastructure

The Madaket Harbor-Long Pond Embayment System, as depicted in the MEP Report, is a complex estuary with full tidal basins (Madaket Harbor, Hither Creek) connected via Madaket Ditch to the brackish waters of Long Pond that is influenced greatly by wetlands. Madaket Harbor is approximately 746 acres, semicircular in shape, open to Nantucket Sound on its western edge, and open to the Atlantic on its southwest corner via a cut between Smith's Point and Tuckernuck. The Harbor is relatively a shallow water body, 4-5 feet deep, with a deeper channel (6-9ft.) running east and north to the coastline of the Sound. There are a few deeper channels that pre date Hurricane Esther (1961), but much of the harbor has filled in as a result of the opening that was created by this storm. This condition existed until Hurricane Gloria (1985), which enabled a closure of the gap to Smith's Point via drifting sand bars. Because the southwest edge is open, circulation is high (flushing every 3 days), and water quality is good. Epiphytic, and macro algae are limited in presence and density, and eelgrass beds are healthy. Madaket Harbor and Long Pond make up a unique ecosystem encompassing approximately 9 square miles. These two systems are hydrologically connected via Hither Creek and the Madaket Ditch. Long Pond is somewhat isolated from the whole system, and has been evaluated as having separate water quality issues. It is relatively narrow and winding with depths of 4-6 feet with no deep basins.

Water quality results from 2010 to present show Hither Creek, Long Pond and North Head of Long Pond as not meeting water quality standards, per the Clean Water Act. Madaket Harbor, which is an open marine basin, is not as degraded as the other water resources in the area due to its high flushing component. The Clean Water Act and TMDL processes that followed the MEP Report mandate that the Town develop and implement solutions for restoration of these water resources. The MEP included the development of a target nitrogen load to determine the amount of total nitrogen mass loading reduction required for system restoration. This included reducing the nitrogen load from the landfill, which is an on-going process. In addition, a reduction of septic loading, 100 percent in the Hither Creek Watershed, resulted in a 72 percent reduction in the entire Watershed.

The overall plan to meet the water quality standards is to continue with the landfill mining where water quality testing is showing potential improvement. Annual Water Quality sampling results detail that Long Pond showed significantly lower total nitrogen levels, 40 percent, in 2012 versus results shown in 2010, with 2015 final results detailing the lowest N levels in 5 years at one of the two stations tested. However, Long Pond as a whole continues to be eutrophic and impaired. The trend of lower nitrogen results at Station 6 is being further evaluated in subsequent Annual Water Quality Program results to determine whether it is as a direct result of the landfill mining and can be credited as such.

The Madaket and Warrens Landing Needs Area encompasses approximately 342 acres, of which 222 are developed. There are 572 total parcels, with 381 developed. Out of the total 572 parcels, 120 are municipal and/or conservation parcels and 71 are undeveloped with only 17 of these potentially developable. With few available developable parcels, sewerage this Needs Area does not promote any unwanted sprawl. The Needs Area is plagued with severe soils, over 96 percent per very fast and do not afford time in the soil layers to cleanse before discharging into groundwater and thus travel fast to the water resources in the area. Also over 30 percent of severe groundwater limitation plague this geographic area of the Island.

The majority of this Needs Area is serviced with private water, thus posing additional threat from inadequately operating on-site wastewater disposal systems. Over 53 percent of the area's systems' are located on lots less than or equal to ½ acres and over 55 percent were built before 1978 (Creation of Title 5).

Warren's Landing is part of the overall Madaket Watershed. According to the Town's 1990 Water Resources Plan Report, the groundwater in Warren's Landing flows directly towards Long Pond and Madaket Ditch, which are both impacted with nutrient degradation per the MEP Report.

The Warren's Landing Needs Area is north of the Madaket Needs Area just east of Long Pond and north of Madaket Ditch in the Madaket Harbor Watershed. Madaket Harbor and Long Pond make up a unique ecosystem encompassing approximately 9 square miles. These two systems are hydrologically connected via Hither Creek and

the Madaket Ditch. Long Pond is somewhat isolated from the whole system, and has been evaluated as having separate water quality issues. It is relatively narrow and winding with depths of 4-6 feet with no deep basins.

Data from 2004 details this Needs Area encompasses approximately 49 acres, of which 26 are developed. There are 99 total parcels, with 68 developed. There are 19 undeveloped parcels of which 8 are developable. With few available developable parcels, sewerage this Needs Area does not promote any unwanted sprawl. New zoning since 2004 in this area has further reduced potential for unwarranted growth due to introduction of sewer infrastructure. The Needs Area is plagued with severe soils as they perc very fast and do not afford time in the soil layers to cleanse before discharging into groundwater and thus travel fast to the Pond. Properties of this soil association are permeability, depth to seasonal high groundwater and susceptibility to flooding. The soil associations in this geographic area do not adequately filter the effluent, which leads to groundwater contamination.

Final Recommended Plan – Phase 2

The ***Final Recommended Plan for the Warren's Landing Needs Area*** consists of installation of approximately 6,300 linear feet of low-pressure sewer with sizes ranging from 1-1/4 to 4-inch diameter pipe. All low-pressure sewers will attempt to be located in pre-disturbed, existing right of ways and roadways. The sewers will connect to the proposed pump station to be located on Town-owned land at the DPW on Madaket Road, which will then pump the wastewater from both Warren's Landing and Madaket Needs Areas via an approximately 16,800 linear foot forcemain that discharges to new sewer within the Hummock North and Somerset Needs Areas. Sewer within the Somerset Needs Area will connect to the existing collection system around the intersection of Bartlett Road and Mizzenmast Road, and then be pumped to the Surfside WWTF by the Pine Valley (or new pump station) and Surfside Road Pump Stations. Figure 3-14 from the CWMP Update includes the conceptual Warren's Landing Collection System layout.

The ***Final Recommended Plan for the Madaket Needs Area*** consists of the construction of approximately 40,700 linear feet of low-pressure sewer with sizes ranging from 1-1/4 to 4-inch diameter pipe. All low-pressure sewers will be attempted to be located in existing, pre-disturbed roadways. The sewers will connect to the proposed new pump station to be located at the municipally-owned DPW parcel on Madaket Road, which will then pump the wastewater from the Madaket / Warren's Landing Needs Areas via an approximately 16,800 linear foot force main that discharges to new sewer within the Hummock North and Somerset Needs Areas. Sewer within the Somerset Needs Area will connect to the existing collection system around the intersection of Bartlett Road and Mizzenmast Road, and then be pumped to the Surfside WWTF by the Pine Valley and Surfside Road Pump Stations. Figure 3-14 shows the conceptual Madaket/Warrens Landing Collection System. All sewers are presently proposed to be located in the pre-disturbed right of ways and/or roadways and are proposed to be constructed with no trenches utilizing directional drilling. This method of construction will avoid any open trenches, roadway disturbances on many small and one-vehicle travel lanes and eliminates any potential impact to multiple resources.

Based on Woodard & Curran's preliminary evaluation of the downstream sewer infrastructure using the Town's GIS mapping, approximately 1,500 linear feet of sewer on Mizzenmast Road and approximately, 3,500 linear feet on Bartlett Road and Surfside Road will need to be upgraded to allow adequate capacity for wastewater flows from Madaket, Warren's Landing and Somerset. Upgrades for the Pine Valley (or a new TBD pump station) and Surfside Road Pump Stations may be necessary. The capacity analysis completed during Final Design will determine the extent of and timing of upgrades.



