

Memo

To: Manchester by the Sea Zoning Board of Appeals
From: David Formato, P.E.
CC: Carlton Quinn, P.E., Allen&Major Associates, Inc., SLV School Street, LLC
Date: April 27, 2022
Re: SLV School Street – Manchester by the Sea Sewer System Capacity

Dear Madam Chairman;

We have reviewed the Town of Manchester-by-the-Sea's Comprehensive Wastewater Management Plan (CWMP) filed with MassDEP for approval in August of 2016, prepared by CDR Maguire Inc. The CWMP process involves a detailed assessment of both the Town's sewer system and wastewater treatment facility (WWTF) relative to current flows, loads and potential future flows, as well as loads to assess both areas of need that should be targeted for expansion of the system in addition to identifying if the system has capacity available to accommodate such expansion and additional flows. This assessment is relative to both system capacity and the ability to receive, process and treat existing and additional sewage flows while remaining within the current Discharge Permit requirements for the Town system issued jointly by the EPA and MassDEP.

As noted, the CWMP presents an in-depth analysis of the current condition of the sewers and treatment system relative to the flows, loadings and treatment system performance. While the sewer system has had historic issues with non-sanitary flows from rain and/or groundwater infiltration (infiltration and inflow (I/I)), the CWMP did note that mitigation efforts to reduce these loadings, when undertaken as they have since been, would restore capacity in the system and WWTF such that additional connections, within the framework of the CWMP, could be permitted.

Based upon the identified issues, MassDEP issued a sewer moratorium that prevented the Town from approving and allowing any new sewer connections until such time that results for I/I removal were obtained and documented to the satisfaction of MassDEP personnel. It is our understanding based on discussions with the Town that the I/I removal program has been underway for several years now and that MassDEP has, or will be, lifting their imposed connection moratorium as a result of the progress made. At that point, the remaining issue related to if the proposed SLV School Street project would be able to connect into the system would be relative to the configuration of the proposed connection and if the existing sewer and WWTF system has capacity to convey and treat the additional flow.

It is on this front that we have focused our efforts relative to the information contained in the CWMP. To assist with the presentation of our review and analysis, we have included several pages and text sections with tables from the CWMP report that provides specific information relative to the ability of the Town to accept a connection from this project and provide sewer service.

As part of their analysis, CDR Maguire divided the Town into sewer service areas and assigned them each a designation. Each area was then evaluated from not only an existing sewer system configuration and flow perspective, but also in order to assess if the service area should be considered for expansion of the system (if there was already sewer) or if it would be both feasible and advantageous to extend/expand the current sewer system to serve these un-sewered areas. Specific to School Street north of Route 128, this part of Manchester by the Sea was designated as “Study Area 6 LCD Area”. Based on information presented, back in 2016 it was envisioned that this area might be suitable for development as an industrial or commercial section of Town and that either providing for a small area specific sewer system and individual treatment facility or expansion of the sewer to connect these parcels to the existing system would be potential options for wastewater disposal. Further, it was estimated that the anticipated flow from any development of the parcels in this area of Town would most likely result in approximately 60,000 gallons per day of sewage flow. Ultimately, the CDR Maguire analysis, as shown in Table VIII-1 Recommended Plan from the report (below), indicated that Study Area 6 was targeted for having the sewer system expanded and connected into the existing WWTF as the preferred/primary option for wastewater disposal.

An outline of the Recommended Plan by needs area is presented in Table VIII-1 below.

Table VIII-1. Recommended Plan		
Study Area	Preferred/Primary	Alternative/Secondary
Study Area 1 West Manchester	On-Site Wastewater Management with Limited Sewer Extensions	-
Study Area 2 Smith's Point	On-Site Wastewater Management with Limited Sewer Extensions	-
Study Area 3 Coolidge Point Road	On-Site Wastewater Management	-
Study Area 4 Raymond Street	On-Site Wastewater Management *	Sewer Expansion
Study Area 5 Hickory Hill	On-Site Wastewater Management	-
Study Area 6 LCD Area	Sewer Expansion	On-Site Wastewater Management

* The town should consider small neighborhood communal systems or a more expansive communal system with Gloucester should that opportunity arise.

Furthermore, as shown in Table VIII-2 Wastewater Flow Projections for the Recommended Plan below, Study Area 6 was specifically assigned a sewage flow in the CWMP recommended plan of 62,000 gallons per day with a further recommendation that 31,000 gallons per day of capacity at the WWTP be specifically set-aside for projected sewage flow when this area is developed.

SEWER EXTENSIONS, SEWER MORATORIUM, and the OCEAN SANCTUARY ACT

The Town of Manchester-by-the-Sea (MBTS) is currently prohibited from extending sewers beyond those areas currently served by the collection system. Although the town was released from the 1992 ACO which prohibited sewer extensions, the release was conditional on addressing I/I issues within the system to ensure compliance with the town's NPDES permit. More recent correspondence from MADEP indicates that releasing the town from the sewer moratorium would be considered upon completion of this CWMP, presuming that the CWMP would demonstrate the need for the sewer extensions and the availability of plant capacity.

Further, the OSA limits any increase in the NPDES permitted flow from the town's wastewater plant. Therefore it must be demonstrated that any proposed sewer extensions will not cause an increase in flows discharged from the plant in violation of the permitted flow capacity. It is anticipated that MassDEP would expect that the town's I/I removal program has demonstrated that I/I issues have been or will be sufficiently addressed so that peak flows at the plant do not and will not exceed the NPDES permitted discharge flows even with the additional wastewater flows that would come from the proposed sewer extensions.

Table VIII-2. Wastewater Flow Projections for the Recommended Plan		
Study Area	Full Build-out ADF (gpd)	Planning Period ADF (gpd)
Infill	15,000	11,250
Study Area 1 West Manchester (Forster & Wood Crest Sewer Ext)	3,360	2,100
Study Area 2 Smith's Point (Beach Street Sewer Extension)	6,930	3,990
Study Area 3 Coolidge Point	-	-
Study Area 4 Raymond Street Sewer Expansion	35,070	19,530*
Study Area 5 Hickory Hill	-	-
Study Area 6 LCD	62,000	31,000*
TOTAL	122,360	67,870

*Capacity for these flows should be reserved at the WWTF.

Table VIII-2 summarizes the estimated wastewater flows that would be added to the system from the recommended limited sewer extensions in West Manchester and Smith's Point area and expansion to the Raymond Street and LCD areas. The proposed sewer extensions listed are

estimated to add a maximum of approximately 122,360 gpd to the plant's average daily flow at full build-out. It is noted that the design flows upon which the design capacity of the plant was based included some of the additional flows the proposed sewer extensions would add. For example, the 2014 design flows of the plant accounted for flows from 60 homes or 11,300 gpd in the Raymond Street area.

The existing wastewater treatment plant is designed for an annual average daily flow of 670,000 gpd. Average annual flows between 2010 and 2014 have averaged 460,000 gpd. The maximum 12 month rolling average annual flow during that period was 650,000 gpd; since 2011 the maximum 12 month rolling average was 550,000 gpd.

A detailed review of the current wastewater flows to the plant was presented in Section V. By all indications, there is between 96,000 and 200,000 gpd of available capacity at the plant for additional sanitary wastewater flows. With a programmed plan for sewer extensions in conjunction with the town's ongoing I/I removal program, the limited sewer extensions proposed in this CWMP will not cause the town to violate the current NPDES permit nor require a variance to the Ocean Sanctuary Act for an increase in the permitted discharge limit.

Given this information, it appears that the Town, via the CWMP planning process, specifically identified this area as a section of Town that should be provided with a connection to the existing municipal sewer system as well as having a portion of the existing excess flow capacity at the WWTP reserved for flow from this area. As noted, this reserved WWTF capacity is above the currently proposed Title 5 sewage flow (maximum day flow) from the proposed SLV School Street Development.

Lastly, while that section of the CWMP addressed planned sewer system expansions and the ability to make new sewer connections once the MassDEP lifted the Moratorium on new connections (after I/I removal efforts and the CWMP approval process was complete), CDR Maguire was also tasked with assessing the existing WWTF's ability to receive and process additional flows. To complete that process, they performed an in depth analysis of the WWTF's condition, performance and capacity, as well as assessed if connecting additional flow to the system would violate the provisions in the Permit that prevent additional flows being discharged to the ocean outfall for the system, which is regulated as part of the Oceans Sanctuary Act.

As shown in the various sections of the CWMP included herein below from Section V of the report, the existing WWTF has a permitted capacity of 670,000 gallons per day and lows and highs of their rolling average of flow between 460,000 and 550,000 gallons per day respectively. Given this, CDR Maguire estimated that the existing WWTF has approximately between 96,000 gallons per day on the low side and 200,000 gallons per day on the high side (see below) of existing excess capacity (prior to any additional I/I removal efforts). This information was based on their analysis presented herein for both flows and the condition of the system relative to permit compliance.

Available WWTF Capacity Analysis

Despite the issue with excessive I/I in the system, it is apparent that there is some available capacity at the Manchester WWTF which may allow for extension of sewers beyond the current sewer collection service area or expansion of sewers to some of the study areas. Some noted items that support this conclusion include:

- The annual average flow over the past 5 years was 470,000 gpd compared to the permitted annual average flow of 670,000 gpd. The highest annual average flow over the past 5 years occurred in 2011 and was 550,000, still well below the permitted annual average flow amount.
- Based on 2.5 persons/household (1229 parcels), the current estimated service population is 3070. This population is less than not only the 2014 future residential service population of 4600 but also the 1994 residential service population of 3500 as documented in the 1994 Wastewater Treatment Facility Preliminary Design Documentation Report.
- The 2014 future design flows accounted for planned development and future growth that has not happened, particularly of note were possible future extensions into the Raymond Street and Hickory Hill areas.

Just looking at the 5 year average of the annual average flow to the plant compared to the permitted value would indicate that there is approximately 200,000 gpd of flow capacity available at the plant. However, the annual average flow to the plant is heavily influenced by the I/I entering the system and a significant stretch of storm and rainfall events could diminish the available capacity for additional domestic flows. Therefore, using the highest annual average flow over the past 5 years may be a better measure of the available flow capacity of the plant. By that analysis, there is approximately 120,000 gpd of flow capacity available.

A more detailed evaluation of the flows to the plant is presented in Table V-6. It presents the Average Monthly Flow, the Maximum Monthly Flow, and Minimum Monthly Flow on a month by month basis for the WWTF flow data between 2010 and April 2015. Of interest in determining available capacity are the flows in the summer months (in particular the months of July through September) as these are least influenced by I/I issues and provide a measure of the base domestic flow in the system. Depending upon whether all 3 months are used or just the month of September, comparing these flows to the 2014 Design Base Domestic Flow of 382,000

gpd indicates that there is 96,000 gpd to 117,000 gpd of capacity available for additional domestic flows to the plant.

Table V-7 presents a summary of the various methodologies used in estimating the available capacity at the plant. The estimate ranges from a low of 96,000 gpd to a high of 200,000 gpd. It would be reasonable to conclude that additions to the sewer service area of the town that result in flows of that order of magnitude could be accommodated within the currently permitted flows.

Table V-7. Estimated Available Flow Capacity	
Basis of Estimate	Gpd
Permitted Annual Average Flow	670,000
2010-2014 Annual Average Flow	470,000
HIGH Estimate Available Flow Capacity	200,000
Permitted Annual Average Flow	670,000
2011 Annual Average Flow (high value last 5 years)	550,000
MODERATE Estimate Available Flow Capacity	120,000
2014 Design Base Domestic Flow	382,000
2010-2014 Average Flow September	265,000
MODERATE Estimate Available Flow Capacity	117,000
2014 Design Base Domestic Flow	382,000
2010-2014 Summer Average Flow (3 months, Jul-Sep)	286,000
LOW Estimate Available Flow Capacity	96,000

Based upon the information reviewed and presented herein, it appears that, as part of the Comprehensive Wastewater Management Planning, which resulted in the 2016 CWMP report, the Town of Manchester-by-the-Sea identified School Street north of Route 128, as a specific study area that should have existing capacity within the sewer and WWTF system reserved, which is greater than the anticipated maximum day flow from the proposed project. Furthermore, prior to any I/I removal efforts that have been undertaken by the Town since the CWMP was issued, the Town had a minimum excess WWTF capacity at the existing facility of almost 100,000 gallons per day, which could accommodate the flows and loadings from the proposed SLV development on School Street.

Lastly, it should be noted that, as part of the design and approval of a connection between the proposed project and the existing sewer system, a capacity analysis that would identify any specific sewer pipes that might require capacity upgrades in order to accommodate the additional flow from the proposed sewage lift station at the project site would typically be commissioned and performed by or for the Town.

We are hopeful that this memorandum summarizing the Town's wastewater planning efforts and CWMP report provides the ZBA with additional context and information as to the capacity of the municipal system and the ability of the Town's WWTF to accept and treat additional sewage flow generated from the proposed 40B development