

# WASTEWATER CAPACITY

## WASTEWATER CAPACITY DEFINITIONS

Capacity is simply defined as “the extent of space.” Capacity in the existing centralized sewer system is limited by three main factors:

1. The WWTP NPDES discharge permit issued by the federal government, which limits the quantity and quality of treated water that may discharge to the Concord River;
2. The WWTP design treatment capacity of various unit processes necessary to meet NPDES permit requirements; and
3. Physical constraints in the collection and transmission systems (pipelines and pump stations) that transport flow.

## DISCHARGE CAPACITY

As stated previously in the Background section, the Concord WWTP operates under National Pollutant Discharge Elimination System (NPDES) Permit No. MA0100668, which allows for surface water discharge of effluent to the Concord River. Specific information about the NPDES Permit limitations is presented in a report by Woodard & Curran, titled, “Wastewater Treatment Facilities Plan, Town of Concord, February 2004,” and pertinent information is summarized in the CWMP.

The main NPDES permit limitation for focus in this Integrated Planning Initiative is the flow limit for discharge, which is 1.20-mgd, calculated on a 12-month rolling average basis. The 12-month rolling average normalizes fluctuations in wastewater flow that occur from day to day and month to month. Normalizing the flow value allows the reviewing authority (the Department of Environmental Protection) to observe trending of overall flows and compare the values to those permitted.

## TREATMENT CAPACITY

The Concord WWTP’s NPDES permit was recently renewed and took effect in 2006. This NPDES permit renewal included a notable change affecting treatment parameters to meet more stringent phosphorus discharge standards. The present permit requires a phased phosphorus reduction program, which must be implemented over a period of several years. To help meet these regulatory requirements, a major WWTP rehabilitation and upgrade project was initiated.

The WWTP rehabilitation and upgrade project has been designed to include:

- Addition of a new headworks facility.
- Replacement of grit removal equipment.
- Upgrades to the septage receiving area.
- Significant modifications to the sludge handling components.
- Creation of a new building addition to house a tertiary treatment process (CoMag) for advanced removal of phosphorus and other solids.
- Installation of new ultraviolet disinfection equipment.
- Improved chemical storage and feed systems.
- Electrical system upgrades.
- HVAC system upgrades, including provision of a new odor control system.
- Integration of a Supervisory Control and Data Acquisition (SCADA) system.

Where possible in the WWTP rehabilitation and upgrade design, unit processes were upgraded to treat a potential future flow of 1.36 mgd versus existing design parameters of 1.20 mgd. The increases in treatment capacity were based on the potential future flow at the WWTP as calculated in the CWMP considering full implementation of future phase sewer extensions and no reduction in extraneous sewer system flows (inflow and infiltration). As discussed in the Background section of this document and in keeping with one of the main tenets of the CWMP, any future flows that exceed NPDES discharge permit allowances will require the construction of a supplemental groundwater disposal system. The location of this groundwater disposal

system, whether it be at the WWTP or elsewhere in town, may be driven by water balance interests. Several treatment processes and other equipment/components that are not being replaced under the current WWTP work may also need upgrade to meet any flow increases above the 1.20 mgd.

### **SEWER COLLECTION AND TRANSMISSION SYSTEM CAPACITY**

With more than 33 miles of sewer pipeline, four sewer pump stations and four small ejector stations, capacity in the existing sewer system varies greatly.



PHOTO: MATT KACKLEY (GDM INC.)

**CONSTRUCTION OF CONCORD WWTP IMPROVEMENTS.**

Capacity in the sewer collection and transmission system can be created more easily than capacity in the existing WWTP, so it is not directly a limiting factor in system expansion. One consideration associated with increasing capacity in the collection system is the potential increase in future extraneous flows.

One of the sewer connection policies updated in the 2004 Sewer Rules and Regulations was the requirement to compile a Sewer Impact Assessment for significant flow additions to the sewer system (flows greater than 1,000-gallons per day). A major portion of each Sewer Impact Assessment involves reviewing the existing capacity in pipeline and pump stations where flow is proposed to be contributed to determine limitations and document the impact of increased flows. This measure was adopted to provide the Town with detailed information on sewer system capacity impacts (pipelines and pump stations included) associated with proposed development for consideration prior to permit issuance and to encourage reductions in flow where possible.

Based on information presented in a recent Sewer Impact Assessment for the Conant Crossing development, the two older pump stations (Lowell Road PS and West Concord/Assabet PS) are nearing capacity. Similarly, some of the existing smaller diameter (8-inch and 10-inch) pipeline has reached 60% of its design capacity with intermittent pipeline segments at 100% of their design capacity in some older areas of West Concord.

## **CWMP FLOWS**

The summary in Table 1 is provided to illustrate flow values as they were presented in the CWMP. The second column in this table uses the WWTP flows in 2004, when the CWMP was completed, as a baseline. At that time, the annual average daily flow was typically around 0.93 mgd. The CWMP also included a flows and loads analysis as part of

the February 2004 WWTP Facilities Plan, which was attached as an appendix. This analysis used 1.1 mgd as the benchmark for existing flows, based on the highest annual average flow calculated at the Lowell Road Pump Station between 1990 and 2001. The flows calculated using this 1.1 mgd baseline are shown in the third column.

**TABLE 1**  
**CWMP RECOMMENDED PLAN FLOW ALLOCATION**  
**PLANNED CONTRIBUTION TO THE CENTRALIZED SEWER SYSTEM**

Flow Contributor	CWMP		
	Anticipated Average Daily Flow in GPD	Cumulative Average Daily Flow in GPD	Cumulative Average Daily Flow in GPD
WWTP Flow		930,000 <sup>(1)</sup>	1,100,000 <sup>(2)</sup>
Sewer Area Infill Allocation	49,875	979,875	1,149,875
Previously Bettered Sewer Parcels	8,610	988,485	1,158,485
<b>CWMP Phase 1 Flow Allocation</b>			
Bedford Street Area	74,309		74,309
Prairie Street Area	19,892		19,892
<b>Total Phase 1</b>	<b>94,201</b>	<b>1,082,686</b>	<b>1,252,686</b>
<b>CWMP Phase 2 Flow Allocation</b>			
Walden Street Area	1,089		1,089
Great Meadows/Martin Road	2,837		2,837
Magnolia Street	1,468		1,468
White Pond Area (local system)	0		0
<b>Total Phase 2</b>	<b>5,394</b>	<b>1,088,080</b>	<b>1,258,080</b>
<b>CWMP Phase 3 Flow Allocation</b>			
Lexington Road Area	41,751		41,751
Hayward Mill Road Area	15,987		15,987
MacArthur Street	2,556		2,556
Sunnyside Lane	1,659		1,659
Meadow Ridge Road	2,040		2,040
<b>Total Phase 3</b>	<b>63,993</b>	<b>1,152,073</b>	<b>1,322,073</b>
<b>CWMP Phase 4 Flow Allocation</b>			
Barnes Hill Road Area	1,886		1,886
Harrington Avenue Area	5,243		5,243
North Branch Road Area	8,257		8,257
Fairhaven Road Area	9,956		9,956
Coolidge Road Area	4,309		4,309
<b>Total Phase 4</b>	<b>29,651</b>	<b>1,181,724</b>	<b>1,351,724</b>
<b>TOTAL</b>		<b>1.19 MGD</b>	<b>1.36 MGD</b>

Note: The chronology of the potential flow contributors listed above has been assumed for this 'snapshot' of flow allocation. Actual contributions may occur in a different order, changing the cumulative total and remaining capacity values at the time of next review.

(1) Annual average WWTP daily flow as of 2004 (when the CWMP was completed.)

(2) Maximum annual 12-month rolling average WWTP daily flow as of 2004.