

## Section 5

# Estimated Water Usage and Wastewater Flows

The purpose of this section is to develop wastewater flow projections for the Areas of Concern, identified in Section 4, to be used in the development of a recommended wastewater program. Using available data, this section also presents a methodology for converting water usage to wastewater flow and for estimating peaking factors. The estimates presented in this section are used in subsequent report sections to aid in the development and costing of Littleton’s wastewater management alternatives.

### 5.1 Data Summary

The Littleton Water Department provided Littleton Water Customer Usage data for the 5-year period of 2015 through 2019. Annual total gallons of water use were provided for each location ID, representing a water meter for each unit, and were linked to the corresponding parcel in GIS. All irrigation water meters were removed from the wastewater flow analysis.

### 5.2 Baseline Water Usage – Existing Conditions

**Figure 5-1** shows the existing water usage dataset on a parcel-by-parcel basis, to illustrate general trends in water usage across town.

#### 5.2.1 Water Usage by Zone

Water usage was broken down by zoning category using the parcel-by-parcel water usage data. Each zoning category’s water usage was then divided by the number of parcels within that category, to arrive at an average daily usage per parcel in gallons-per-day by category. This information is presented in **Table 5-1**.

**Table 5-1**  
**Total Average Daily Water Usage and Average Parcel Water Use per Zone**

Zoning	Total Average Daily Water Usage (gpd)	Average Daily Water Usage per Parcel (gpd) <sup>1</sup>
Residential	460,000	180
Business	72,000	770
Industrial	75,000	920

Note: <sup>1</sup>Vacant and undeveloped parcels were removed from the total parcel count when calculating the average water usage per parcel.

#### 5.2.2 Water Usage by Area of Concern

**Table 5-2** presents water usage for each of the Environmental and Economic Areas of Concern. Although the areas are approximate and are not intended to have distinctive boundaries, the information in **Table 5-2** reflects the water usage based on the shaded areas shown in **Figure 4-1**. Therefore, the water use values are approximations of average and total water usage within each Area of Concern.

**Table 5-2**  
**Total Water Usage and Average Water Use per Area of Concern**

Area of Concern	Total Water Usage (gpd)	Average Water Usage per Parcel (gpd) <sup>1</sup>
Beaver Brook (includes the Point Planning Area)	30,000	390
Beaver Brook Connection	4,400	150
Colonial Drive	310	110
Forge Pond	13,000	140
Fort Pond	6,900	200
Great Road & Littleton Common Planning Area	85,000	510
Grist Mill Road	52,000	300
Industrial Park Planning Area	7,400	820
Littleton Depot Planning Area	56,000	1,280
Long Pond	89,000	130
MBTA Station Planning Area	16,000	460
Mill Pond	22,000	170
Mill Pond East	21,000	1,130
Spectacle Pond	17,000	280
Taylor Street Industrial Area	55,000	1,040
Taylor/Foster Street Planning Area	7,800	310
<b>Grand Total</b>	<b>480,000</b>	<b>290</b>

Note: <sup>1</sup>Vacant and undeveloped parcels were removed from the total parcel count when calculating the average water usage per parcel.

### 5.3 Estimated Wastewater Flows

Wastewater flows can be estimated on a per-parcel basis by using a percentage of water usage. A typical estimate used for wastewater generation is to utilize 90 percent of water usage as wastewater. This accounts for outdoor uses such as lawn watering, where the water does not end up becoming wastewater, as well as consumptive uses. Seasonal variations exist in water usage due to lawn watering. Therefore, the 90 percent factor is applied as an annual average, with the knowledge that a greater proportion of the 10 percent difference between water use and wastewater generation is likely used in the summer versus the winter, due to the increase in outdoor uses. Wastewater flows by Area of Concern are presented in **Table 5-3**. These are calculated from the parcel-by-parcel water usage discussed in **Section 5.2** and using the 90 percent factor. Patriot Beverage LLC, located at 20 Harvard Road, is a bottling company within the Taylor Street Industrial Area and is one of Littleton's largest water users. However, much of the water consumption is for cleaning purposes and therefore would not enter the proposed sewer system for treatment. Also, prior to 2017 the parcel was not owned by Patriot Beverages, thus the water use data from 2015 through 2017 is not an accurate measure for projecting estimated wastewater flows. Through discussions with the Town and Patriot Beverage staff, it was estimated that 25 percent of the water used on-site becomes wastewater and projected wastewater flows were developed based only on the water use data from 2018 and 2019.

**Table 5-3**  
**Estimated Wastewater Flow per Area of Concern**

Area of Concern	Existing Wastewater Flow (gpd)	Average Wastewater per Parcel (gpd) <sup>1</sup>
Beaver Brook (includes the Point Planning Area)	27,000	350
Beaver Brook Connection	3,900	130
Colonial Drive	300	100
Forge Pond	12,000	130
Fort Pond	6,200	170
Great Road & Littleton Common Planning Area	76,000	460
Grist Mill Road	47,000	270
Industrial Park Planning Area	6,700	740
Littleton Depot Planning Area	27,000	610
Long Pond	80,000	110
MBTA Station Planning Area	14,000	420
Mill Pond	20,000	160
Mill Pond East	19,000	1,060
Spectacle Pond	15,000	250
Taylor Street Industrial Area	26,000	490
Taylor/Foster Street Planning Area	7,000	280
<b>Grand Total</b>	<b>390,000</b>	<b>230</b>

Note: <sup>1</sup>Vacant and undeveloped parcels were removed from the total parcel count when calculating the average wastewater generated per parcel.

### 5.3.1 Buildout Wastewater Flows

Buildout wastewater flows were also calculated for each of Littleton's Areas of Concern as shown in **Table 5-4**. The buildout information used was developed through collaboration with the Littleton Town Planner and the Littleton Water Department. The buildout assumptions are reasonable approximations of future buildout within each of the areas. The information presented herein is preliminary and only intended to show order of magnitude projected increases in wastewater flows. Also included in **Table 5-4** is the total projected wastewater flow for each Area of Concern. This was developed for each Area of Concern by adding the existing wastewater flow from **Table 5-3** to the estimated buildout flow.

**Table 5-4  
Buildout Wastewater Flow per Areas of Concern**

<b>Area of Concern</b>	<b>Estimated Buildout Flow (gpd)</b>	<b>Total Projected Wastewater Flow (gpd)</b>
Beaver Brook (includes the Point Planning Area)	44,000	71,000
Beaver Brook Connection	600	4,500
Colonial Drive	40	400
Forge Pond	1,700	14,000
Fort Pond	930	7,200
Great Road & Littleton Common Planning Area	68,000	150,000
Grist Mill Road	6,900	53,000
Industrial Park Planning Area	990	7,700
Littleton Depot Planning Area	4,000	31,000
Long Pond	11,900	92,000
MBTA Station Planning Area	33,000	47,000
Mill Pond	2,900	22,000
Mill Pond East	2,700	21,000
Spectacle Pond	2,200	17,000
Taylor Street Industrial Area	3,900	30,000
Taylor/Foster Street Planning Area	33,000	40,000
<b>Grand Total</b>	<b>220,000</b>	<b>610,000</b>

### 5.3.2 Infiltration and Inflow

Infiltration is only a concern in areas that will be sewer with gravity pipe. Infiltration occurs due to groundwater entering a sewer through pipe joints over time, house service connections, defective pipes and manholes. *Technical Review - 16, Guide for the Design of Wastewater Treatment Works*, prepared by the New England Interstate Water Pollution Control Commission, recommends an average infiltration estimate for gravity sewers of 250 gallons per day per inch-diameter-mile for new pipe (gpd/idm), and as the sewers age that estimate increases to 500 gpd/idm. Actual infiltration flows will change as the groundwater table elevation fluctuates throughout the year and as the gravity pipes age.

Inflow can occur in older sewer systems due to illegal connections from roof leaders, sump pumps, foundation drains, and surface drains connected to the sewer. It can also occur due to cross-connections with storm drains and catch basins. Because the proposed sewer system will be a new sewer system, no inflow should occur. Efforts will be made to prevent these illegal connections during and after the start-up of the sewer system. Extensive public education regarding illegal inflow will accompany sewer connection information for residents and businesses to ensure the public understands the issue and the ramifications of making illegal connections. The Town will require each parcel owner seeking a tie-in permit to sign a form acknowledging that they were informed about illegal connections and that they will not connect their sump pumps, downspouts, etc., to their sewer services. The form will also have them acknowledge that they were informed that it is against the State Plumbing Code, as well as local sewer use ordinances.

Once the sewer system scenarios are developed, as discussed in Section 8, the additional flow from I/I will be estimated based on gravity pipe lengths and sizes.

## 5.4 Peaking Factors

The Town of Littleton water use data from 2015 through 2019 has been analyzed to determine the average month flows, along with the peak and low monthly flows. The peaking factors for the Town's water data are shown in **Table 5-5**.

**Table 5-5**  
**Seasonal Variation in Water Use**

Parameter	Monthly Flow (gallons)	Average Daily Flow (gpd)	Peaking Factor (Monthly/Avg)
Average Peak Flow Month of Record	40,040,000	27,960,000	1.43
Average Lowest Flow Month of Record	19,350,000	27,960,000	0.69

Water use in Littleton follows a seasonal pattern year after year, peaking in July or August and dropping around December to February. The main reason for increasing water use during the summer months is due to additional outdoor water use needs such as lawn and garden watering, car washing, etc. It is important to note, however, that most of the water used for these outdoor needs does not enter the sewer system; it infiltrates through the ground or runs off to surface waters and drainage structures. Littleton Water Department customers typically have a steady baseline of water use that results in wastewater driven by basic living functions such as bathing, cooking, and cleaning. Therefore, there is little to no seasonal variation in Littleton's wastewater volume and the flows are assumed to be constant.