

**COMPREHENSIVE WASTEWATER
MANAGEMENT PLAN**

FUTURE CONDITIONS CHAPTER

FOR

TOWN OF NORTH ANDOVER

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3. FUTURE CONDITIONS

3.1 Population Projection

The historical population of North Andover was reviewed as part of the Chapter 1 - Existing Conditions chapter of this CWMP. Table 3.1 – Historic and Projected Population lists the historic and projected populations of North Andover extended through the 20-year planning period of this report. As discussed in Chapter 1, if the population grows at the 1.8% historic annual growth rate, the projected population of 36,431 would exceed the Town’s projected build-out population of 34,034. It is not likely that the Town will exceed its build-out population. Therefore, for the purposes of this study, the projected build-out population of 34,034 is being used as the 2027 projected population for the Town.

**Table 3.1
Historic and Projected Population**

Year	Population	Average Annual Percent Change
1920	6,265	---
1930	6,961	1.11%
1940	7,524	0.81%
1950	8,429	1.20%
1960	10,908	2.94%
1970	14,000	2.83%
1980	21,300	5.21%
1990	22,333	0.50%
2000	27,202	2.18%
2007	30,145	1.55%
2010*	30,082	-0.07%
2020*	32,153	0.70%
2027**	34,034	0.83%

* Projections conducted by MISER (“Middle” Projection) based on 2000 Census Data.

** Population based on project build-out population.

3.2 Future Land Use

Based on information provided by the Town Planner and zoning documents, it is evident that the northern industrial section of the town (Study Area 11 - Bradford Street) is likely to become more developed. The Town currently has a proposal from Ozzy Properties, Inc. to redevelop 1600 Osgood Street into a combined commercial and residential development. This project would consist of over 500,000 square feet of office space, 200,000 square feet of business/retail space, and approximately 100,000 square feet of residential space. The number of residential units is not known at this time. As discussed in Chapter 1 – Existing Conditions, this property was formerly owned by Western Electric, then Lucent Technologies and is currently owned by Ozzy Properties, Inc. The reuse of this significant property is critical to the Town’s overall planning goals because of anticipated tax revenue for the Town. This property has a private sewer connection directly to the Greater Lawrence Sanitary District (GLSD) facility. Therefore, its redevelopment would not affect the Town’s flows to the GLSD facility.

With the exception of the anticipated increase in commercial and industrial development in the north section of Osgood Street, future land patterns are not anticipated to change dramatically over the next twenty years in North Andover. Conservation and recreation land constitute over 35 percent of the Town. The southern portion of Town is highly residential and most of its domestic waste discharges to septic systems. A few areas within this unsewered area of the Town have undeveloped lots that could be subdivided in the next twenty years.

The planning board currently has a proposals to develop land off of Turnpike Street, near Berry Street. This proposal is for a 35,000 square foot commercial building. The developer of this project is proposing to construct sewer that would to flow to the closest existing sewer.

3.3 Waste Load Forecast

There are three drainage areas in North Andover that collect the Town's wastewater flows and direct it to the GLSD facility. These drainage areas are identified as the Eastside, Westside and Central Interceptors and are highlighted in Figure 3.1 – North Andover Sewer Drainage Areas. The GLSD currently receives an average daily flow of 30 million gallons per day (MGD) and is designed for an average flow of 52 MGD. North Andover has contributed an average daily flow of 3.78 MGD for the past three years. The Town's max day flow in the past three years was 9.97 MGD.

3.3.1 Projected Residential Wastewater Flow

Residential wastewater flows were estimated for the eleven study areas identified in the Needs Analysis chapter of this CWMP. Table 3.1 – Existing and Future Residential Wastewater Flow for All Study Areas lists the estimated residential wastewater flows based on existing development and potential future development. Existing wastewater flow refers to the residential wastewater flow the study area would generate if it were sewered based on existing development. Residential flows were calculated by using four people per parcel and 70 gallons per person per day.

Future wastewater flows were estimated by adding the total land area of the undeveloped parcels within each study area and dividing the total land area by the minimum lot size requirement based on the current zoning regulation. The calculation did not consider wetlands or parcels that are currently developed and could be potentially be subdivided. Flows were calculated by using four people per parcel and 70 gallons per person per day. Future wastewater flow estimates include the calculated existing wastewater flow.

**Table 3.2
Existing and Future Residential Wastewater Flow for All Study Areas**

Study Area		Residential Wastewater Flows (people)		Wastewater Flows (gpd)	
		Existing	Future ¹	Existing ²	Future ³
1	Bruin Hill Road	200	293	14,000	20,500
2	Winter Street	624	624	43,700	43,700
3	Bridges Lane	408	449	28,600	31,400
4	Boxford Street	644	668	45,100	46,800
5	Forest Street	572	679	40,000	47,500
6	Salem Street	844	898	59,100	62,900
7	Laconia Circle	700	716	49,000	50,100
8	Farnum Street	1,468	1,540	102,800	107,800
9	Boston Street	968	1,456	67,800	101,900
10	Ash Street	192	596	13,400	41,700
11	Bradford Street	224	656	15,700	45,900
Total Wastewater Flows				479,200	600,200

¹ Projection to year 2027

² Flows that would be generated if area were sewered today

³ Flows that would be generated if area were sewered by 2027

3.3.2 Future Commercial and Industrial Wastewater Flow

Commercial and industrial wastewater flows were estimated for the two study areas containing commercial and industrial zoned land. These areas include Study Areas 9 – Boston Street and Study Area 11 – Bradford Street. The majority of the commercial and industrial land in these two areas is undeveloped or, if currently developed, growth of the existing development is currently prohibited by the difficulty to meet Title V requirements. If sewer were to be extended in these areas, the anticipated use of the type of business or industry is unknown at this time. Therefore, the wastewater flows were determined by calculating 1,000 gpd per acre of business and industrial land area, which is a common rule of thumb based on the average wastewater flows from typical businesses in New England. Table 3.3 – Future Commercial and Industrial Wastewater Flow lists the estimated commercial and industrial wastewater flow for the two study areas containing commercial and industrial zoning.

**Table 3.3
Future Commercial and Industrial Wastewater Flow**

Study Area		Land Area (acres)	Industrial and Commercial Wastewater Flow (gpd)
9	Boston Street	0.8	1,000
11	Bradford Street	155.06	155,100
Total Estimated Future Commercial and Industrial Average Daily Wastewater Flow (gpd)			156,100

3.3.3 Projected Flow for Priority Areas

Based on the final wastewater need assessments discussed in the Needs Analysis Chapter, there are four study areas that demonstrate a high priority for sewer within the next twenty years. These areas include Study Area 6 - Salem Street, Study Area 7 - Laconia Circle, Study Area 8 - Farnum Street and Study Area 11 - Bradford Street. Additionally, Study Area 9 – Boston Street was assigned a moderate priority which demonstrates a need. Therefore, Study Area 9 - Boston Street is included in the projected future wastewater flows for planning purposes.

Table 3.3 – Future Average Daily Wastewater Flow lists the projected industrial, commercial and residential average daily wastewater flows for the five needs areas. The table also includes estimated infiltration and inflow (I/I) for each area. I/I was accounted for by using the TR-16 Guides for Design of Wastewater Treatment Work (TR-16) of 500 gpd/inch diameter/mile of sewer, and estimating lengths of future gravity sewer in the five needs areas.

**Table 3.3
Future Average Daily Wastewater Flow**

Study Area		Wastewater Flows (gpd)			
		Industrial and Commercial	Residential	I/I	Total
6	Salem Street	-	62,900	18,400	81,300
7	Laconia Circle	-	50,100	13,100	63,200
8	Farnum Street	-	107,800	37,800	145,600
9	Boston Street	1,000	101,900	21,300	124,200
11	Bradford Street	155,100	45,900	15,200	216,200
Total Estimated Future Average Daily Wastewater Flow (gpd)					630,500

Extending sewer to the five needs areas will increase North Andover’s contribution to the Greater Lawrence Sanitary District (GLSD) facility by an average daily flow of 0.63 MGD. The Town’s total average daily flow contribution would be 4.41 MGD. Table 3.4 – Existing and Future Wastewater Flow lists the existing and future average daily and max day flows for the Town.

**Table 3.4
Existing and Future Wastewater Flow**

	Wastewater Flow	
	Average Daily Flow (gpd)	Maximum Daily Flow (gpd)
Existing Wastewater Flow		
Residential	1,456,000	3,640,000
Industrial & Commercial	260,000	650,000
Municipal	16,000	40,000
Infiltration / Inflow	2,048,000	5,120,000
Total Existing Wastewater Flow	3,780,000	9,450,000
Future Wastewater Flow		
Residential	368,600	921,500
Industrial & Commercial Flow	156,100	390,250
Infiltration/Inflow	105,800	264,500
Total Future Wastewater Flow	630,500	1,576,250
Total Projected Wastewater Flow	4,410,500	11,026,250

3.4 Septage Production and Disposal

Septage is generally defined as the liquid or solid material pumped from a septic tank or cesspool during cleaning. Septage is normally characterized by large quantities of grit and grease, highly offensive odor, great capacity to foam upon aeration, high solids and organic content and generally a very difficult waste to treat.

In addition to being a highly concentrated waste, septage characteristics vary widely from one location to another. This variation is due to several factors, including the number of people utilizing the septic tank and their cooking and water use habits, tank size and design, climatic conditions, pumping frequency and washing machines. Septage from North Andover can be reliably categorized as residential septage. Residents of non-sewered areas will continue to rely on individual septic tanks for treatment and disposal of domestic wastewater.

Septic system septage disposal is contracted directly between the septic system owners and the pump-out companies. The Town's Department of Public Health began to track septic system pump-out frequencies and volumes in 2002. This relatively new septic system pump-out tracking system helps the Department of Public Health determine the septic systems that are potentially failing.

The records provided by the Department of Public Health show that, on average, 240,000 gallons of septage are pumped out every year. Over 45% of this septage is treated at a privately owned wastewater treatment plant in Bradford, MA, while the remainder is treated at GLSD.

Assuming the identified "Priority Study Areas" are connected to sewer in the next twenty years, and considering population growth, the anticipated yearly average of pumped septage in the remaining unsewered areas by 2027 is approximately 114,000 gallons.