

# Water Resources Analysis and Plan

## Overview and Background

Growth of population and jobs in a community can present challenges to protecting ground and surface water resources, while ensuring the needs of residents and businesses are adequately met. One of the key elements in addressing this challenge is the planning, construction, and maintenance of adequate wastewater collection systems. A Wastewater and Comprehensive Sewer Plan is a useful tool for defining the strategies the City will use to accomplish planning, construction, and maintenance of the wastewater system.

Under the state Metropolitan Planning Act, local governments are required to submit a Wastewater and Comprehensive Sewer Plan element as part of their overall comprehensive plan. This includes describing service needs from the regional system in support of planned growth. Prior to any expansion of sanitary sewer service, this plan must be found consistent with the regional 2040 Water Resources Policy Plan produced by the Metropolitan Council.

The City of Waconia's previous Comprehensive Plan update was completed in 2008. Since then the City has grown and the wastewater system has increased. No planning efforts including the entire growth area of the City have been completed since this previous update. However, multiple large developments have occurred or were proposed which resulted in a regional review of the City's wastewater system.

## Existing Wastewater System

### Description of Municipal System

The existing municipal sanitary sewer system is shown on Figure 6-1. The City of Waconia's conveyance system primarily consists of clay pipes in the older part of town that have been rehabilitated via Cured-In-Place Pipe (CIPP) lining. The City began reconstructing the older part of town in 2013. Since then approximately 10 blocks of clay pipes have been replaced with PVC pipes. The conveyance system primarily consists of polyvinyl chloride (PVC) pipes in the newer sections of the City. The City of Waconia's wastewater treatment is provided by the Metropolitan Council Environmental Services (MCES) Blue Lake Wastewater Treatment Facility located in Shakopee. Conveyance of wastewater to the treatment facility is provided by a series of MCES trunk facilities, including L-70. L-70 is a MCES owned lift station located on the eastern edge of Waconia. L-70 was constructed in 1997. Portions of the downstream dual discharge forcemains of the lift station were upgraded in 2007 and in 2015. Another upgrade of these forcemains through the Lake Waconia Regional Park is planned for 2019. 355.1 million gallons of wastewater was pumped through the L-70 lift station in 2017.

The City is currently divided into three Sanitary Districts as shown on Figure 6-1. All flow from Sanitary District 1 is conveyed to the MCES lift station by the L-52 lift station. There are four secondary lift stations and one privately owned pump station that pump wastewater to the L-52 lift station. All flow

from Sanitary District 2 is conveyed to the MCES lift station by the H-284 lift station. There are three secondary lift stations and two school owned pump stations that pump wastewater to the H-284 lift station. The third Sanitary District discharges directly to the MCES lift station via gravity flow. This district contains one primary lift station, the Southeast Area Lift Station. There are no secondary lift stations in Sanitary Sewer District 3.

The first of the main lift stations is known as L-52, or the Harms Lakeview Terrace Station. This facility provides service to the “old part of town” of Waconia, as well as newer developments located north of Burandt Lake and east of CSAH 10. The total area of this Sanitary District is approximately 750 acres. This lift station discharges into a 36-inch trunk gravity line which discharges directly to L-70. This lift station (L-52) has a wet well / dry well configuration and was formerly owned and operated by MCES. In 1999, the City took over ownership and operation of L-52. L-52 was upgraded in 2008 and currently discharges through a 16-inch forcemain. The current lift station and forcemain capacity is approximately 1,500 gpm.

The second lift station is known as H-284, or the Highway 284 Station. This facility provides service to the remainder of the existing city limits with the exception of the newer developments along the east side of the City. The service area encompasses approximately 1,600 acres. This lift station has a wet well configuration with submersible pumps, and discharges through a 12-inch forcemain. Pump upgrades over the years and the separation of the L-52 forcemain from the H-284 forcemain in 2012 result in a current capacity of approximately 1,300 gpm. This lift station was designed to be able to be upgraded to an ultimate capacity of 2,500 gpm.

The remaining primary lift station is the Southeast Area Lift Station. This station was constructed in 2008 to serve a portion of the planned growth area. This lift station has a wet well configuration with submersible pumps and discharges through a 16-inch forcemain. The current capacity of the lift station is 1,500 gpm, but it was designed to be able to be upgraded to an ultimate capacity of 5,200 gpm. The remainder of the City, including Legacy Village, the Pinehill / Pine Industrial Park area, the Interlaken / Interlaken Woods area, and Crosswinds flow by gravity to the 36-inch trunk sewer that discharges directly to L-70. This area is included in Sanitary District 3. A summary of the existing lift stations is included in the following Table 6-1.

**Table 6-1  
Existing Lift Stations**

Service Area	Name	Location	Discharges To	Forcemain Size (Inches)
1A	L-52	Lakeview Terrace Blvd	Birch Street / L-70	16
1B	Lake Street	Lake Street & Oak Street	Lake Street / L-52	4
1C	Sunset	Sunset Blvd, East of Burandt Lake	Second Street / L-52	4
1D	Willowbrook	Dunsmore Drive	Woodlawn Circle / L-52	4
1E	Sterling Hills	Park Point Road	Woodlawn Circle / L-52	4
2A	H-284	T.H. 284, North of C.S.A.H 10	Eighth Street / SL-70	12
2B	Pheasant Ridge	Stein Drive	C.S.A.H. 10 / H-284	6
2C	Clearwater Mills	Lift Station abandoned in 2007 due to the Waterford Development. Service area now gravity flows to 2A.		
2D	Sierra	Silver Street, West of Diamond Point	Fountain Lane / L-70	4
2E	Green Meadow	Oriole Drive	Mockingbird Drive / L-70	4
3D	SE Area	C.S.A.H. 10, SE of Interlaken Court	Somerwood Drive / L-70	16

**Existing Wastewater Flows**

The existing flow of the entire City is metered at the MCES lift station (L-70). There is only one connection point to the City’s conveyance system to L-70. This is a 36-inch main located along Hwy. 5 to the west of the lift station. The 2017 total was 355.1 million gallons which equates to 0.973 MGD. The flows to individual lift stations can be estimated by multiplying the pump running time, which is recorded at each station, times the pump capacity. Using the pump running times recorded for 2017 results in the flows shown in Table 6-2.

**Table 6-2  
Existing Lift Station Flows**

Service Area	Name	Pump Capacity (gpm)	Avg. Daily Flow (MGD)	Avg. Daily Flow to L-70 (MGD)
1A	L-52	1,500	0.280	0.280
1B	Lake Street	100	0.010	NA
1C	Sunset	100	0.004	NA

1D	Willowbrook	390	0.041	NA
1E	Sterling Hills	100	0.002	NA
2A	H-284	1,300	0.523	0.523
2B	Pheasant Ridge	500	0.098	NA
2D	Sierra	350	0.020	NA
2E	Green Meadow	100	0.004	NA
3D	SE Area	1,500	0.037	0.037
Total Flow			1.020	0.840

In addition to the existing average daily flows above, an estimated amount of 0.133 MGD gravity flows directly to the MCES lift station. Therefore, the total existing wastewater flows for the City of Waconia are estimated to be broken out as follows:

- 0.280 MGD L-52 Lift Station (pumped from Sanitary District 1)
- 0.523 MGD H-284 Lift Station (pumped from Sanitary District 2)
- 0.037 MGD SE Area Lift Station (pumped from Sanitary District 3)
- 0.133 MGD Service Area 3 (gravity from Sanitary District 3)
- 0.973 MGD Total

The evaluation of the existing sewer system revealed that the trunk mains north of T.H. 5 are undersized to handle future growth to the west and northwest. Therefore, no development is planned in Sanitary District 1 to the west of Lake Waconia and County Road 10. Currently the City can only expand to the east, south, and southwest until improvements are made to the existing trunk mains on the western edge of the City. The future wastewater system plan is included on Figure 6-2 and is discussed later in this section. In general, the City is able to grow outward from the existing city limits. The exceptions to this are that Sanitary Sewer Sub-District 2B-2 cannot be developed until a forcemain upgrade and upsizing project occurs and Sanitary Sewer Sub-Districts 2A-5 and 2A-8 cannot be developed until the construction of the Future District 2-A Lift Station. The remaining city trunk mains are adequate to serve future development as planned.

There are no on-site sewage disposal facilities within the current city boundaries. On-site systems of surrounding areas are likely to be eliminated as the city boundaries are expanded through annexations. There are no public or private wastewater treatment plants in the current city boundary or the planned area. All maintenance pertaining to private wastewater treatment plants located outside of the city boundary has been transferred to Carver County. No inter-community connections of the sanitary system currently exist and none are anticipated as part of the ultimate system.

### Inflow and Infiltration

Surface water inflow and groundwater infiltration, often called inflow and infiltration (I&I), may contribute a substantial amount of municipal wastewater volume. I&I can occur through leaking joints, broken pipes, foundation drains, or cross-connects between the sanitary and storm sewer systems. Reducing I&I through proper design, construction, and maintenance can reduce the strain this added water puts on municipal wastewater systems. Table 6-3 below contains flow metering data provided by the Metropolitan Council Environmental Services staff. The 3-year average of the total flow from the City of Waconia is 353.9 MG. When projecting the flow from the lowest flow month (December to March) and prorating the average to 12 months, the estimated total flow becomes 320.7 MG. Therefore, an annual amount of 33.2 MG is estimated to be clearwater flow, or I&I, entering the sanitary sewer system. This amounts to roughly 10% of the total flow as clear water flow.

**Table 6-3  
Inflow and Infiltration Estimate**

Year	Total Flow (MG)	Average Annual Flow (MGD)	*Base Sanitary Flow (MGD)	Average Annual I/I (MGD)	Annual I/I (MG)	Average Annual I/I (%)	Peak Month Flow (MGD)	Peak Month I/I (%)
2015	344.5	0.944	0.823	0.121	44.3	13%	1.113	26%
2016	362.1	0.992	0.935	0.057	20.6	6%	1.107	15%
2017	355.1	0.973	0.877	0.095	34.8	10%	1.242	29%
Avg. (15-17)	353.9	0.970	0.878	0.091	33.2	9%	1.154	24%

*\*Calculated as annualized flow of lowest month (December, January, February, or March)*

The City’s goal is to reduce the amount of I&I to the extent practical. The City has made several efforts to locate and reduce the sources of I&I. The City has utilized cured-in-place pipe (CIPP) lining to rehabilitate all of the clay municipal sewer mains in town except for a few blocks at the west end of the downtown area. The City implemented an I&I Reduction Program in 2009 to evaluate all the private sewer services in the old part of town and repair them as necessary. This project area includes all homes that were constructed prior to the late 1970’s. Approximately 15% of the City’s housing stock was constructed prior to the late 1970s. To date the City has televised and evaluated 576 of the 629 targeted private properties (or about 92%). Of these 576 properties, 264 (46% of the evaluated properties) have been found to be non-compliant and 222 (84% of the non-compliant properties) of these have been repaired or replaced through October 2018. To assist in the repair of these private service laterals, the City puts the first \$7,000 toward any repair or lining. The City recently entered into a construction agreement with a service lining contractor to complete this work for the next two years. This agreement also has an option to extend the contract into a third year. Additionally, as a part of ongoing street and utility rehabilitation projects, the City has replaced approximately 10 blocks of sewer mains and sewer

services since 2013. Finally, the City has replaced or lined many manholes located in areas susceptible to I&I.

The City has budgeted and spent approximately \$200,000 per year since 2010 strictly for the purpose of reducing I&I. An annual sanitary sewer rate increase of 2% to 3% is planned for the foreseeable future in order to continue to combat I&I. The sources of I&I are assumed to come from a combination of infiltration from cracked/leaking mains and manholes, as well as inflow from foundation drains where older homes have a drain tile system that is connected directly to the sanitary sewer system. 59 foundation drains have been located thus far as part of the I&I Reduction Program and 49 of these have been disconnected. The entire targeted area resides in Sanitary District 1 flowing to the L-52 lift station. This is the older portion of town and contains all of the homes built prior to the late 1970's. The I&I in this service area is assumed to come from a combination of cracked/leaking manholes, cracked mains/laterals, and foundation drains. The land use of this area remains unchanged since the previous Comprehensive Plan update other than a few new homes being built near Lake Waconia. Since the previous update the annual flow has been reduced by 0.041 MGD or about 13% to this lift station. An analysis of the entire wastewater system is planned to be completed in approximately 2023 after all of the currently planned evaluation and repair work will be completed.

The City also has provisions written into their ordinances to further protect the system from I&I intrusion. These provisions are generally as follows:

- No roof runoff, sump pump, footing tile or drain, swimming pool discharge, or surface water drainage shall be connected to the sanitary sewer system and no building shall be constructed nor shall any existing buildings be altered in such a manner that any source of discharge or drainage other than sanitary sewer shall connect with the sanitary sewer system inside or outside the building.
- All new residential construction having a sump pump basket shall have the sump pump installed in the sump basket with permanent fittings and discharged to the outside of the foundation wall.
- Every person owning improved real estate that discharges or drains into the City's sanitary sewer system shall, from time to time and within thirty days of receiving written notice from the City, allow the City's employees or agents to enter upon and inspect the buildings and pipes on the property to confirm that no sump pump or other prohibited source on the property discharges or drains into the sanitary sewer system.
- The owner of any property found to be in violation by reason of having a foundation drain connected to the sanitary sewer system shall take all actions required to correct the violation within 180 days of the date of the City's inspection or the plumber's report, and such correction shall be verified by employees or agents of the City.
- A surcharge of \$75 per month is hereby imposed and shall be added to every sewer billing to property owners who are found not in compliance and who fail to correct the violation within the applicable time period provided.

A full copy of Section 403, Use of Sewers, of the City's ordinances is included in Appendix 6-A.

The City intends to continue with their street reconstruction program which will include the replacement of old sewer mains susceptible to infiltration with new PVC pipes. A project for 2019 was authorized which includes the removal and replacement of another two blocks of old sanitary sewer main along Lake Waconia near Waconia Parkway North. The City also intends to continue with their I&I Reduction

Program targeting infiltration from damaged services and inflow from foundation drains. Based on the properties identified that still need repair, this program will need to remain in place for a minimum of another 5 years.

**Community and Subsurface Treatment Systems Management**

As of 2018, no properties in Waconia city limits utilize on-site subsurface sewage treatment systems (SSTS), also known as individual sewage treatment systems (ISTS). Construction of these systems are prohibited by city code. Attached in Appendix 6-B is a copy of Section 404, Private Sewer Disposal, of the City’s ordinances. A SSTS may exist in town if annexed into the City and no public sewer is available. These systems must be removed and the property connected to City sewer within 60 days of City sewer being made available.

**Compliance with Minnesota Pollution Control Agency Regulations**

If necessary, the City of Waconia utilizes Carver County for regulation of SSTS facilities in their jurisdiction. The County’s regulations are based on Minnesota Pollution Control Agency (MPCA) regulations. In accordance with Minnesota Rules Chapters 7080, 7081, 7082, and 7083, the City/County will continue to implement a comprehensive SSTS management program. Collectively known as the Subsurface Sewage Treatment Systems Program, the intent of these regulations is to “protect the public health, safety, and general welfare by the discharge of adequately treated sewage to the groundwater.”

**Future Wastewater System**

**Population, Household, and Employment Forecasts**

The municipally owned sanitary sewer system provides service to all residents and businesses in the City. According the Metropolitan Council population, household, and employment forecasts, the City of Waconia will have the following sewer demands, as detailed in Table 6-4.

**Table 6-4  
Population, Household, and Employment Forecasts**

	Forecast Component	2010	2020	2030	2040
Population	Sewered	10,697	14,200	20,600	24,000
	Unsewered	0	0	0	0
Households	Sewered	3,909	5,400	8,000	9,500
	Unsewered	0	0	0	0
Employment	Sewered	5,578	7,600	8,700	10,200
	Unsewered	0	0	0	0

**Design Criteria**

Municipal wastewater is comprised of a mixture of domestic sewage, commercial/industrial wastewater, and inflow and infiltration (I&I). For existing flows, this plan uses flows calculated from lift station

capacity and pumping data. For new growth areas and future flow projections this plan uses the future flow rates for the various proposed land uses as shown in Table 6-5.

**Table 6-5  
Sanitary Sewer Flow Rates**

Land Use	Gal/Day/Acre
Low Density Residential	500
Medium Density Residential	1,000
High Density Residential	1,500
Commercial	1,000
Industrial	1,000
Business Park	1,000
Institutional / Public	1,000
Mixed Use	750
Park / Golf Course	100
Urban Reserve / Wetland / Open	0

Sanitary sewer flow varies from month to month depending on weather, precipitation, I&I, etc. The flow also varies during the day with peak flows generally occurring in the mornings and evenings. The sanitary sewer system capacity must accommodate these peak flows. Therefore, the system is sized utilizing a peak factor. This peak factor typically ranges from 2.5 for major trunk facilities with a large service area to 4.2 for small mains with smaller service areas. This peak factor is dependent on population. The lower the population of a service area, the higher the peak factor.

**Projected Wastewater Flow**

The City is divided into Sanitary Districts as shown of Figure 6-2. These districts generally correspond to the lift station which collects their flow. The exceptions to this are as follows:

- District 1A also includes a small private pumping station which serves a few lake homes.
- District 2A also includes two small pumping stations which serve school district facilities.
- District 2C connects to District 2A via gravity sewer since the abandonment of the Clearwater Mills lift station.
- Districts 3A, 3B, and 3C gravity flow to the Metropolitan Council’s L-70 lift station.



The planning area for the sanitary sewer system is the 2040 growth boundary. To expand service to these areas will require a combination of expanding several existing sewer service districts, the creation of one new district, and the future removal/abandonment of the sanitary pipe that runs through/under Reitz Lake. This new district will consist of a new primary lift station to be located near Airport Road to the northwest of Reitz Lake. This new district will also require a new secondary lift station near Island View Road located north of Hwy 5. This secondary lift station will service future Sanitary District 3E and will pump the wastewater to the trunk gravity system near the MCES L-70 lift station. This new primary lift station will service future Sanitary District 4A. Another secondary lift station is also needed in the southwestern portion of the City in Sub-District 2A-5. This lift station is needed in order to serve Sub-District 2A-5 and Sub-District 2A-8 as the flow is required to be pumped to an existing trunk sewer main located south of T.H 5 in District 2A. Depending on the timing and sequencing of future developments, temporary lift stations may be required in the interim prior to the full buildout of the 2040 growth boundary. Figure 6-2 shows the permanent primary lift station locations necessary to serve the 2040 planning area. Figure 6-2 also contains sub-districts as required for the analysis of existing facilities or the preliminary design of new facilities.

Table 6-6 shows projected flows for the City’s wastewater system, in millions of gallons per day (MGD). The current system has sufficient capacity to meet the demands of population forecasts with the exception of the following:

- Lift station and forcemain upgrades are required at the Southeast Area lift station and Pheasant Ridge lift station
- Pump upgrades are required to the H-284 lift station

The remaining lift stations / forcemains along with the gravity conveyance system are sized adequately to allow for the growth to occur as planned and shown in Table 6-7 and Table 6-8.

**Table 6-6  
Projected Wastewater Flows (MGD)**

Sanitary District	2017	2020	2030	2040
1A	0.223	0.223	0.246	0.246
1B	0.010	0.010	0.010	0.010
1C	0.004	0.004	0.004	0.004
1D	0.041	0.041	0.041	0.041
1E	0.002	0.002	0.002	0.002
<b>District 1 Subtotal</b>	<b>0.280</b>	<b>0.280</b>	<b>0.303</b>	<b>0.303</b>
2A	0.401	0.510	0.574	0.574
2B	0.098	0.131	0.160	0.160
2D	0.020	0.029	0.042	0.042
2E	0.004	0.004	0.004	0.004
<b>District 2 Subtotal</b>	<b>0.523</b>	<b>0.674</b>	<b>0.779</b>	<b>0.779</b>
3A	0.047	0.070	0.070	0.070

3B	0.038	0.046	0.046	0.046
3C	0.047	0.151	0.151	0.151
3D	0.037	0.061	0.328	0.386
3E	0.000	0.000	0.220	0.277
<b>District 3 Subtotal</b>	<b>0.170</b>	<b>0.328</b>	<b>0.815</b>	<b>0.930</b>
4A	0.000	0.000	0.132	0.321
<b>District 4 Subtotal</b>	<b>0.000</b>	<b>0.000</b>	<b>0.132</b>	<b>0.321</b>
<b>Total City</b>	<b>0.973</b>	<b>1.282</b>	<b>2.030</b>	<b>2.334</b>

*\*Flows from Sanitary District 2C are Included with Sanitary District 2A*

**Table 6-7  
Projected 2040 Trunk Sewer Wastewater Capacity**

Segment ID	Districts Collected	2040 Flows (MGD)	Peak Factor	Peak Flow (GPM)	Pipe Size (in)	*Full Pipe Capacity (GPM)	Percent Pipe Full
1AS	South Half 1A, 1A-1, 1B-1C	0.149	3.9	403	15	1,460	28%
1	1A-1E	0.303	3.6	758	21	1,917	40%
2AS	South Half 2A, 2A-2-2A-8	0.366	3.6	914	15	1,460	63%
2AN	North Half 2A, 2A-1, 2B	0.368	3.6	920	15	1,460	63%
3B	3B, 3B-1	0.046	4.0	129	12	975	13%
2&3B	All of 2 and 3B	0.826	3.2	1,835	18	7,087	26%
1&2&3B	All of 1 and 2 and 3B	1.129	3.1	2,431	18	7,087	34%
3C&3D	All of 3C and 3D	0.537	3.4	1,268	36	7,783	16%
3C&3D&4A	All of 3C and 3D and 4E	0.858	3.2	1,906	36	7,783	24%
3E	All of 3E	0.277	3.7	712	21	2,924	24%
4A	All of 4A	0.321	3.6	802	36	7,783	10%
Town	All of Town to L-70	2.334	2.7	4,376	30	5,862	75%

*\*Pipe grades assumed to be minimum except for Segments 2&3B and 1&2&3B, actual grades were used*

**Table 6-8  
Projected 2040 Lift Station Flows**

Service Area	Name	Pump Capacity (GPM)	2040 Ave. Daily Flow (MGD)	2040 Peak Flow (GPM)
1A	L-52	1,500	0.303	758
1B	Lake Street	100	0.010	28
1C	Sunset	100	0.004	11

1D	Willowbrook	390	0.041	114
1E	Sterling Hills	100	0.002	6
2A	H-284	<sup>1</sup> 1,300	0.779	1,786
2B	Pheasant Ridge	500	0.160	433
2D	Sierra	350	0.042	116
2E	Green Meadow	100	0.004	11
3D	SE Area	1,500	0.386	966
2A-5 & 2A-8	Future 2A		0.055	154
3E	Future 3E		0.268	688
4A	Future 4A		0.321	802
All	L-70	<sup>2</sup> 2,200	2.334	4,376

<sup>1</sup>Station ultimate capacity of 2,500 GPM

<sup>2</sup>Firm capacity provided by MCES

### System Improvements for Planning Area

The schedule for the majority of the sewer system improvements is dependent on the timing and location of individual development proposals. Table 6-9 summarizes the approximate schedule for major sanitary sewer system improvements.

**Table 6-9  
Improvement Schedule**

Improvement	Sanitary Sewer District	Triggering Event	Timing
Main Line and Service CIPP / Rehabilitation	All	NA	Ongoing
Main Line and Service Replacements	All	Street Project	Ongoing
Lift Station Rehabilitations	All	NA	Ongoing
Construction of School Area Lift Station	2A	Development of School, Koch/Meuwissen, and Burandt Parcels (Sub-Districts 2A-5 and/or 2A-8)	2019-2020
Extension of Waterford Trunk Sewer Main	2A	Development of Siegle, Song River, or Adjacent Parcels (Sub-District 2A-4 and/or 2A-7)	2019-2030
Extension of Oakpointe Trunk Sewer Main	2A	Development of Peitz and Fabel Parcels (Sub-District 2A-6)	2019-2030

Pheasant Ridge Lift Station Forcemain Upgrade	2B	Development of Burandt Property (Sub-District 2B-2)	2020- 2030
Construction of Southeast Area Trunk Sewer Main	3D	Development of Falk & Dircks Properties (Sub- District 3D-4 and/or 3D-5)	2020- 2030
Construction of Island View Road Lift Station	3E	Development of Golf Course Area (Sub-District 3E-3 and/or 3E-4)	2020- 2030
Construction of Airport Road Lift Station, Forcemain, & Trunk Sewer Main	4A	Development of County & Kirsch Parcels (Sub- District 4A-1, 4A-2, and/or 4A-3)	2020- 2030

## LOCAL SURFACE WATER MANAGEMENT PLAN

### Overview and Background

The Metropolitan Land Planning Act requires that each community include a local water management plan as part of their comprehensive plan. The City of Waconia has developed a Surface Water Management Plan to meet this requirement and to be used as a guide to assist with future decision making for water resources related matters. This plan will be submitted to the Carver County Water Management Organization for review in conjunction with the overall Comprehensive Plan Update submittal. The complete Surface Water Management Plan is located in Appendix 6-C.

### Physical Environment and Land Use

The City of Waconia borders Lake Waconia, the second largest lake in the 7-county metro area. Burandt Lake is located completely within current city limits as well. The growth area of Waconia includes Reitz Lake to the east of the existing City. In addition to these lakes, many wetlands and ponds are included within the city and growth area. The topography of Waconia and the growth area is undulating, with many high points and low points. Runoff from the northern part of the City drains to Lake Waconia which outlets to Burandt Lake. Burandt Lake outlets to an unnamed ditch (unofficially named Bent Creek). The western and southern portions of the City drain into Bent Creek. The southeastern area of the City drains to Reitz Lake. All of these areas drain into Carver Creek. The area around Waconia is predominantly undeveloped with an agricultural land use. The City can expand in all directions and is only limited by the current wetlands. The current city limits of Waconia are completely located within the boundary of the Carver County Water Management Organization (CCWMO). The CCWMO is managed by the Department of Planning and Water Management of Carver County. The growth area of Waconia is nearly all included within the boundary of the CCWMO as well. The very northeastern portion of the growth area, planned to be developed post-2030 is in the Six Mile Creek Watershed which falls within the jurisdiction of the Minnehaha Creek Watershed District (MCWD). The watershed boundaries and the topographical features in and around Lake Waconia are shown in Appendix 6-C on Figures 10.1 through 10.4.

### Existing and Potential Water Resource-Related Problems

The older “grid” portion of Waconia contains storm sewer that is undersized and in poor condition. This older section of town also contains very few measures for stormwater treatment. The City will be

addressing these areas by improving the conveyance system and adding treatment as street reconstruction projects are completed. Also, these projects will need to include stormwater Best Management Practices (BMP's) to begin managing pollutant loading for impaired waters within city boundaries per State requirements. The City's impaired waters are shown in Appendix 6-C on Figure 8.

The stormwater system constructed as part of housing developments since the early 1990's have an adequate stormwater conveyance system and treatments ponds. These facilities must be maintained and the ponds must be cleaned.

### **Local Implementation Plan/Program**

The City has actively pursued improving the water resources in the community. The City has completed several street reconstruction projects. As part of these projects, several Best Management Practices (BMP's) have been installed including rain gardens, treatment structures, and tree boxes. Additionally, the City has cleaned and improved six stormwater ponds as stand-alone projects and has initiated the construction of multiple stormwater reuse systems within the City.

Currently, runoff from approximately 300 acres of urban area is collected and reused for irrigation in order to improve water quality and lessen the need to rely on potable water. Refer to Figure 9 in Appendix 6-C for stormwater runoff treatment areas. One reuse system serves Bayview Elementary school and the surrounding ballfields. Another system serves the newly developed Highway 5 commercial area. Properties in the Highway 5 commercial area are purchasing the reuse water from the City for their irrigation systems. This approach is not only lessening the impact on the City's drinking water supply, but it is also allowing businesses to meet their stormwater management requirements with a smaller required design footprint. The newest system serves a City owned 40-acre community park using an existing development pond. Finally, the City completed an improvement project to Fountain Park in 2015 which received an award from the American Council of Engineering Companies. This project included hard surface reduction, pond expansion, disposal of level three contaminants, an outlet control structure, the addition of an iron enhanced sand filter, sump manholes with baffles, bioretention basins, permeable pavement, a tree box, and an education component.

The City's ongoing street reconstruction program will include BMP's to further improve water quality. The City also has several stormwater pond cleaning projects and wetland restoration projects planned to further improve and maintain the overall stormwater conveyance and treatment system.

The City has also implemented an enhanced street sweeping program to maximize efficiency of solids and nutrient removals. The timing and frequency of street sweeping has been analyzed for various streets to account for tree canopy cover, land use, proximity to receiving waters, and other best management practices present. With this analysis, sweeping routes have been defined that maximize removals while minimizing City expense.

Additional information on local stormwater management can be found in Appendix 6-C. This information includes planned future projects, land and water resources inventory, goals and policies, water related agreements, educational opportunities, etc.

## **WATER SUPPLY PLAN**

### **Overview and Background**

The purpose of this element of the Comprehensive Plan is to update the City's comprehensive water plan taking into account current population and land use projections. The updated plan will provide a guide plan for the extension of municipal water through new developments to ensure that all portions of the planning area can ultimately be serviced.

The preparation of a Water Supply Plan fulfills a city's statutory obligation under Minnesota Statute M.S.103G.291. This Water Supply Plan is mandated by the Metropolitan Council and by the Minnesota Department of Natural Resources (DNR). Waconia submitted its Water Supply Plan in September 2017 and the plan was approved by the DNR in March 2018. A copy of the City of Waconia's current water supply plan is included in Appendix 6-D.

### **Existing Water Supply System**

The City of Waconia currently owns and operates two water treatment facilities, six production facilities (wells), three elevated storage facilities, and an extensive distribution system to provide municipal water service to its residents and businesses. The City's distribution system includes piping varying in size from 4-inch to 16-inch. Please see Figure 6-4 for the existing municipal water supply system.

Water Treatment Plant 3 began operation in 1994 and was expanded / upgraded in 2008. This facility is located in the east central area of the City along Tenth Street. The facility provides iron and manganese removal through aeration, detention, and filtration, and has a capacity of 4,080,000 gpd (3,400 gpm) based on operating 20 hours per day. The facility also includes 900,000 gallons of underground storage in two clear wells. Water Treatment Plant 2 is located at the intersection of Maple Street and Main Street in the old part of the City. This facility is currently used as a backup treatment plant and has a capacity of 300 to 340 gpm.

Wells 2 and 3 are located near Water Treatment Plant 2. These wells are available for emergency use only and are capable of producing approximately 400 gpm and 430 gpm respectively. Wells 5 and 6 are Mount Simon wells and they supply Water Treatment Plant 3. They are capable of producing 400 gpm and 1,500 gpm respectively. Wells 7 and 8 are drift wells and they also supply Water Treatment Plant 3. They are capable of producing 1,000 gpm and 800 gpm respectively. Wells 7 and 8 were put into service to reduce the demand from the existing Mount Simon wells during off-peak periods.

The total existing production capacity of the four main wells in the City is approximately 3,700 gpm. When including the two emergency wells, the total production capacity of the City is approximately 4,530 gpm.

Tower 2 is located in the northwesterly area of the City and has a storage capacity of 250,000 gallons. Tower 3 is located next to Water Treatment Plant 3, and has a storage capacity of 2,000,000 gallons. Tower 1 is in-place but is has been disconnected from the system and is off-line. Both active towers have the same overflow elevation, thus the entire city is a single zone system. The total existing elevated storage capacity currently being used in the City is 2,250,000 gallons. The total storage capacity

including the 900,000 gallons of underground storage located at Water Treatment Plant 3 is 3,150,000 gallons.

**Future Improvements**

The City’s water system was evaluated based on the growth projections. The current system is insufficient to meet the demands of the projected growth. The production component of the water system will need to be increased to accommodate the anticipated growth. The City’s current firm capacity (largest well being out of service) is 3,030 gpm. This production rate can accommodate about 330 new units being added to the system. If increasing the well run times to 20 hours per day, this rate can accommodate approximately 900 new units being added to the system. Therefore, a new well will need to be added to the system by approximately the year 2024. To produce enough water for the projected 2040 population, the City’s firm capacity will need to exceed 5,000 gpm, or approximately a 2,000 gpm increase. Therefore, three new wells are planned to be needed over the planning period with a capacity ranging from 500 gpm to 1,000 gpm. The first well is needed in approximately the year 2020. The timing for the remaining two wells will be dependent on a combination of the actual growth rate along with the capacity achieved with the first new well.

The treatment component of the water system will also need to be increased to accommodate the anticipated growth. The current facility can accommodate approximately 200 new units being added to the system. By modifying operations and run times and by the utilization of peak use wells, this number is estimated to be able to also be increased to approximately 900 new units. Therefore, a new water treatment facility will be needed by approximately the year 2024 as well. The existing treatment facility has already been upgraded and expanded. Increasing the capacity of this facility further is not economically feasible. The new facility will need to be have a capacity of approximately 2,200 gpm to accommodate the anticipated growth of the City through 2040.

The storage capacity of the water system will not need to be increased to accommodate the anticipated growth of the City. When calculating technical parameters and storage parameters for the existing storage, the City is able to accommodate an additional 4,000 units which approximately matches the 2040 growth projections. However, the City is planning the construction of another tower to better serve the eastern growth area of the City and to allow for the ease of operations and adequate fire flows during planned rehabilitations of the existing towers. The 2040 Water System Plan is shown on Figure 6-5.

**System Improvements for Planning Area**

The schedule for the majority of the water system improvements is dependent on the timing and location of individual development proposals. Table 6-10 summarizes the approximate schedule for major water system improvements.

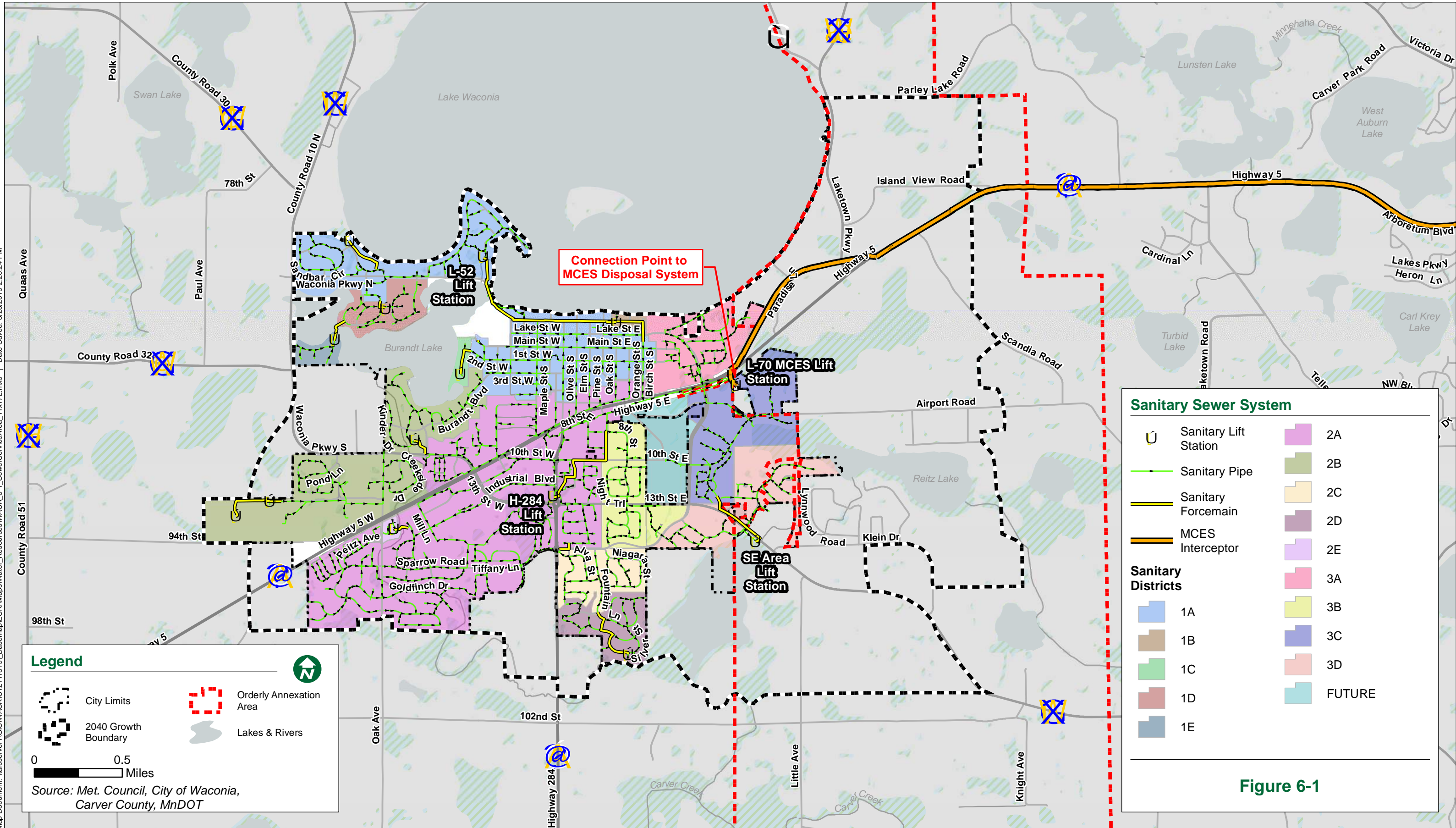
**Table 6-10  
Improvement Schedule**

Improvement	Triggering Event	Timing
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Water Resources Analysis and Plan

Trunk Watermain Improvements	Development & New Highway Construction Projects	Ongoing
Main Line and Service Replacements	Adjacent Street Reconstruction Projects	Ongoing
Existing Water Treatment Facilities Upgrades and Media Replacements	As Needed	Ongoing
Well No. 9	Construction of 900 New Units	2020-2024
Water Treatment Facility No. 4	Construction of 900 New Units	2020-2024
Well No. 10	Additional Development & Construction of Well No. 9	2022-2026
Well No. 11	Additional Development & Construction of Well No. 10	2024-2028
Tower No. 4	Additional Development & Construction of Additional Treatment and Production Facilities	2024-2034





Connection Point to MCES Disposal System

### Sanitary Sewer System

- Sanitary Lift Station
- Sanitary Pipe
- Sanitary Forcemain
- MCES Interceptor

	2A
	2B
	2C
	2D
	2E
	3A
	3B
	3C
	3D
	FUTURE

### Legend

- City Limits
- 2040 Growth Boundary
- Orderly Annexation Area
- Lakes & Rivers

0 0.5 Miles

Source: Met. Council, City of Waconia, Carver County, MnDOT

Figure 6-1

Map Document: \\arcserver\GIS\WACAC\12111519\_Basemap\ESRI\Map\Water\_Resources\WACA\_6-1\_SewerServiceArea\_11x17L.mxd | Date Saved: 3/26/2019 2:20:24 PM