CITY OF DAYTON
2040 COMPREHENSIVE PLAN
Chapter 9: Wastewater

Introduction

The Metropolitan Land Planning Act (amended 1995) requires local governments to prepare comprehensive plans and submit them to the Metropolitan Council to determine their consistency with the metropolitan system plans. The local Comprehensive Plan is to include a sanitary sewer element covering the collection and disposal of wastewater generated by the community. Similarly, the Metropolitan Sewer Act requires local governments to submit a Comprehensive Sanitary Sewer Plan (CSSP) which describes the current and future service needs required from Metropolitan Council Environmental Services (MCES).

In May 2015, the Metropolitan Council adopted the 2040 Water Resources Policy Plan (WRPP). The 2040 WRPP includes the metropolitan wastewater system plan with which local comprehensive plans must conform. The method Dayton has chosen to demonstrate its conformance is through a separate Comprehensive Sanitary Sewer Plan (CSSP). The Dayton CSSP updates previous sewer planning efforts and describes in detail the expansion of the City's sanitary sewer system to serve urban development.

The City last updated its CSSP in 2008 and described the expansion of the City's trunk system (in particular within the southwest portion) and the demands this expansion places on the Metropolitan Disposal System (MDS) operated by MCES. MCES also uses the CSSP to determine whether capacity upgrades will be needed at the Metropolitan Wastewater Treatment Plant (WWTP). This update is necessary to reflect land use changes that have occurred since the 2008 CSSP was prepared and to reflect land use changes in this Comprehensive Plan for the 2040 period.

Household and Employment Forecasts

The population of Dayton totaled nearly 5,000 in 2010 and is projected to increase to approximately 10,400 by 2040, including both sewered and unsewered areas; these data are based on the 2010 Census and the Land Use Chapter of the Dayton Comprehensive Plan. Table 1.1 displays Dayton's forecasts for growth through 2040 as determined by the Metropolitan Council.

Table 9.1 - Community Forecasts

Forecast Year	Population	Households	Employment
2010	4,617	1,619	921
2018	6,072	2,158	1,230
2020	5,900	2,200	2,000
2030	7,900	3,200	2,490
2040	10,400	4,400	3,000

The expected ultimate population and density of Dayton at full build-out (including redevelopment of existing residential areas to their guided densities) is shown in Table 1.2 – Ultimate Population Per Units Per Acre Calculation.

Table 9.2- Ultimate Population Per Units Per Acre Calculation

LAND USE	NET DEVELOPABLE ACRES	UNITS/ACRE	UNITS	POPULATION
Agricultural Preserve	124	2.00	249	597
Low Density Residential*	5,894	2.00	11,787	28,289
Medium Density Residential	508	5.00	2,540	6,097
High Density Residential	232	12.00	2,779	6,669
Mixed Use	263	12.00	3,160	7,584
Total	7,021		20,515	49,235
** Includes redevelopment of existing residential areas to their guided densities*				

Table 9.3 – Sewered Population Projections shows Dayton's households and employment forecasts based on the 2040 Staging Plan and Future Land Use.

Table 9.3 – Sewered Household and Employment Forecasts

	2010	2020	2030	2040
Population - Unsewered	2,706	2,310	820	1,060
Population – Sewered to CAB (M306)	911	1,390	3,280	4,500
Population – Sewered to Elm Creek (M305)	0	1,200	2,800	3,840
Population – Sewered to Otsego	700	700	700	700
Population – Sewered to Champlin (M230)	300	300	300	300
Population Total	**4,617**	**5,900**	**7,900**	**10,400**
Households - Unsewered	961	860	320	440
Households – Sewered to CAB (M306)	258	510	1,340	1,920
Households – Sewered to Elm Creek (M305)	0	430	1,140	1,640
Households – Sewered to Otsego	300	300	300	300
Households – Sewered to Champlin (M230)	100	100	100	100
Households Total	**1,619**	**2,200**	**3,200**	**4,400**
Employment - Unsewered	724	600	400	450
Employment – Sewered to CAB (M306)	39	200	290	350
Employment – Sewered to Elm Creek (M305)	158	1,200	1,800	2,200
Employment – Sewered to Otsego	0	0	0	0
Employment – Sewered to Champlin (M230)	0	0	0	0

Employment Total	**921**	**2,000**	**2,490**	**3,000**

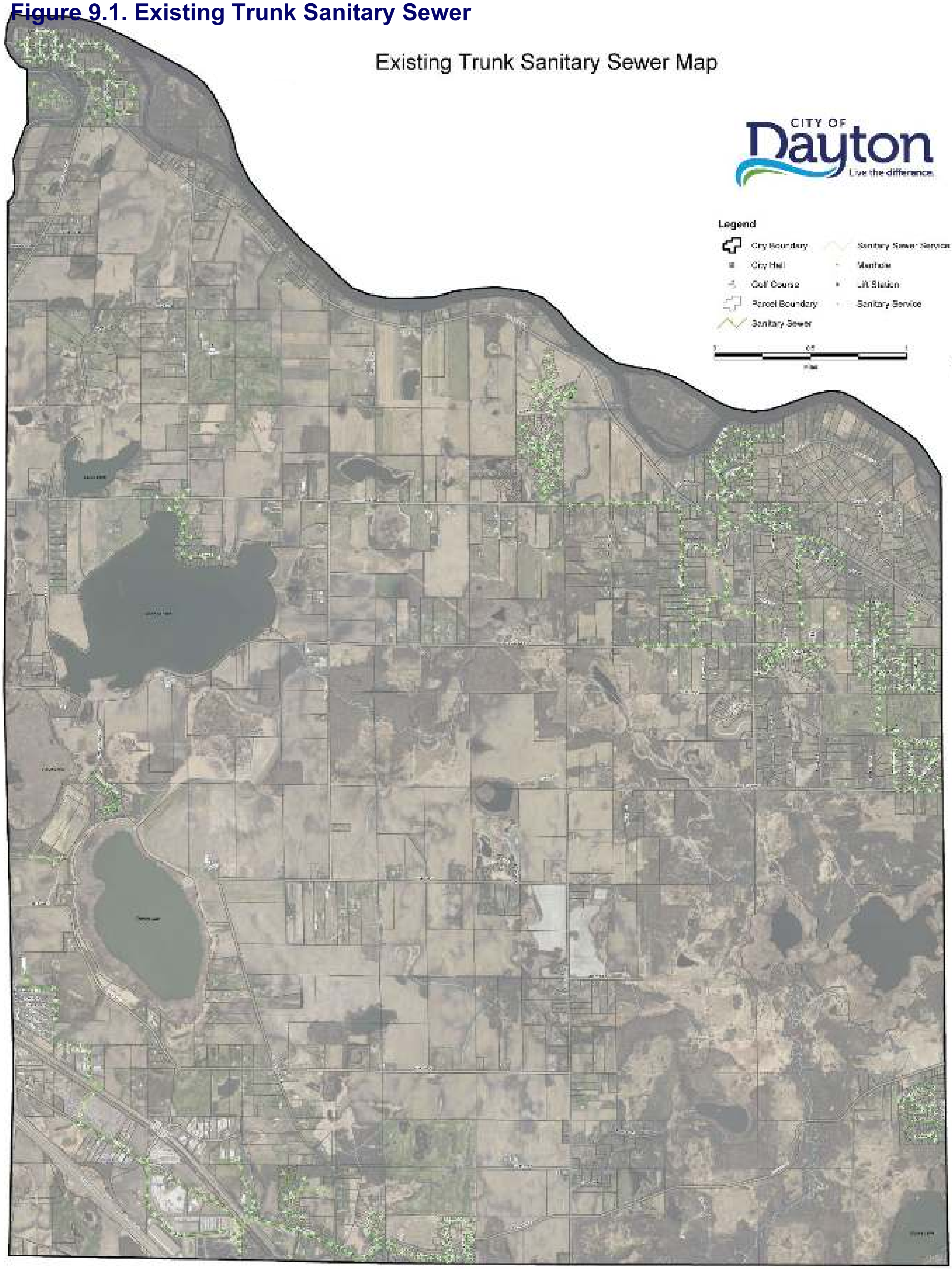
Existing Sanitary Sewer Trunk System

The trunk sewer system layout for the City of Dayton is presented on the Figure 9.1 – Existing Trunk Sanitary Sewer map. This map shows the main sanitary sewer districts, existing and proposed trunk sanitary sewers, and existing and proposed lift stations and force mains. There are no public wastewater treatment plants located within the City of Dayton. One private community subsurface sewage treatment system is located within the City; the private septic serves 11 homes in the Stonehearth Ridge residential development.

Dayton's sewer system connects to the Metropolitan Council interceptor at two locations. The north sewer district flows into meter station located upstream of the Dayton/Champlin extension of the Champlin/Anoka/Brooklyn Park (CAB) Interceptor. The meter is located off French Lake Road near the Dayton/Champlin border. The west sewer district flows through the Dayton/Hassan Township extension of the Elm Creek Interceptor. A meter is located off Holly Lane approximately 50 feet south of the Dayton/Maple Grove border. Ultimately sewage flowing in the Elm Creek Interceptor arrives at the Metropolitan WWTP in St Paul.

In addition to the connections to the Metropolitan Council interceptors, Dayton's sewer system also has intercommunity connections with Otsego and Champlin. The northwest sewer district flows into a lift station that pumps wastewater to the Otsego WWTP. The southeast sewer district flows by gravity to the Champlin sanitary sewer system. Dayton has not entered into any new intercommunity service agreements since December 31, 2008. Please see Appendix Item F regarding relevant Joint Powers Agreements.

Figure 9.1. Existing Trunk Sanitary Sewer



Sanitary Sewer Capacity and Design Flows

Design Criteria

The future land use plan for the City of Dayton served as the basis for the development of the sanitary sewer flow projections and analysis of the trunk system. Using the future land use plan, the area of each land use was determined for each sewer subdistrict. Existing land uses used in this plan include rural; low density, low/ medium density, medium density, and high density residential; commercial/industrial; mixed use; and recreational/public. Two types of rural land use are proposed – agricultural preserve and rural estate. For the purposes of generating sewer flows, these are grouped into the urban reserve category. Several types of commercial and industrial land use are proposed, including business park, neighborhood commercial, commercial, and industrial. For the purposes of generating sewer flows, these are grouped into commercial/industrial.

Municipal wastewater is made up of a mixture of domestic sewage, commercial and industrial wastes, groundwater infiltration, and surface water inflows. With proper design and construction, groundwater infiltration and surface water inflows, often called infiltration/inflow (I/I), can be minimized. Flows from I/I are accounted for in the analysis and design of the trunk sewer system by incorporating an allowance for an average of 10 gallons per capita per day.

The anticipated average wastewater flows from the various subdistricts were determined by applying unit flow rates to each of the land use categories. The "system design" unit flow rates are presented in Table 9.4 – System Design Wastewater Unit Flow Rates.

Table 9.4 – System Design Wastewater Unit Flowrates

LAND USE TYPE	GALLONS/UNIT/DAY	UNITS/AC	GALLONS/AC/DAY
Agricultural Preserve	216	2.00	432
Low Density Residential/Master Planned Development	216	2.00	432
Medium Density Residential	192	5.00	960
High Density Residential	168	12.00	2,016
Commercial/Industrial	--	--	800
Mixed Use	200	12.0	2,400
Recreational/Public	--	--	250

For all land uses unit rates per acre were used to generate average flow projections. The units per acre assumptions for low, medium, and high density residential, mixed use, commercial and urban reserve were based in part on information from the City planning staff regarding projected number of units for each land use.

Dayton's "system design" flow projections originate from the land use statistics based directly on the land use plan. Certain reductions in land use area are made to account for wetlands, right-of-ways, etc., and a net developable acreage for each land use category is thus created. The net acreage is multiplied by standard unit flow rates to obtain an average flow for each sewershed.

The unit flow rates used to generate average flows in part represent the “old economy” where commercial and industrial land use meant manufacturing and thus the potential for high sewage flows. In the “new economy” commercial and industrial land use means retail, offices, and warehousing which generate very little sewage compared to the old industrial facilities. Nonetheless, typical land use categories allow for a wide range of uses and the chance remains that localized heavy users of sanitary sewer capacity might locate in Dayton. To cover this possibility, Dayton continues to use the high design rates shown in Table 1.3 – System Design Wastewater Unit Flow Rates.

Modeling

The modeling of the sanitary sewer system was based on a variety of parameters, such as: land use, population density, standard wastewater generation rates, topography, and future land use plans. Based on the topography of the undeveloped areas, the sewer subdistricts were created and the most cost-effective locations for future trunk line facilities were determined. The location of smaller sewer laterals and service lines are dependent upon future land development plats and cannot be accurately located from a study of this type.

Both the existing and proposed pipe systems were evaluated and broken up into design segments. Each end of a design segment has a node assigned to it. The nodes were designated for the following reasons:

1. Flow from a subdistrict entering the pipe network.
2. Significant grade change has occurred.
3. Change in pipe size.
4. Two or more trunks connect.
5. Manmade elements (roads, railroads, etc.) affecting location and installation costs for the trunk system or lateral service of the sub districts.

The proposed alignments shown on the Figure 9.2 – Ultimate Trunk Sanitary Sewer map generally follow the natural drainage of the land to minimize the use of lift stations and consequently provide the City with the most economical ultimate design sanitary sewer system. Minor adjustments in the routing and size of the trunk facilities will take place as determined by the specific land use and development conditions at the time of final design. Any such adjustments are expected to deviate minimally from this plan.

Each sub district contains at least one collection point where the subdistrict’s sewage is defined to enter the pipe network. Upstream of that collection point, a lateral network of 8-inch gravity lines can serve unserviced areas.

The capacity and design flows for existing and ultimate system trunk sewers are presented in Tables 9.5, 9.6, 9.7, 9.8, 9.9, and 9.10.

Table 9.5. – Ultimate System Pipe Design (North District)

From Point	To Point	Design Flow (MGD)	Exist./ Prop.	Pipe Size (in)	Pipe Material	Length (ft)	Avg Slope (%)	CAPACITY					Capac./ Design Flow
								Inlet Control		Outlet Control		Capacity (MGD)	
								(cfs)	(MGD)	(cfs)	(MGD)		
25	24	0.397	Prop.	6	PVC	2,300	N/A	Assumed a pumping rate of 5 fps				0.63	1.60
24	19	0.397	Prop.	10	PVC	2,000	0.280	1.7	1.10	1.2	0.75	0.75	1.89
23	19	0.278	Prop.	10	PVC	5,300	0.280	1.7	1.10	1.2	0.75	0.75	2.70
22	21	0.337	Prop.	8	PVC	4,400	0.400	1.4	0.90	0.8	0.49	0.49	1.47
21	20	0.597	Prop.	10	PVC	3,200	0.400	1.7	1.10	1.4	0.90	0.90	1.50
20	19	1.242	Prop.	15	PVC	1,650	0.160	4.1	2.65	2.6	1.67	1.67	1.35
19	15	1.747	Prop FM	12	PVC	7,550	N/A	Assumed a pumping rate of 5 fps				2.54	1.45
15	14	1.938	Prop.	21	PVC	2,700	0.100	9.1	5.88	5.0	3.24	3.24	1.67
14	13	2.366	Prop.	21	PVC	6,500	0.100	9.1	5.88	5.0	3.24	3.24	1.37
18	17	0.219	Prop.	8	PVC	1,500	0.400	1.4	0.90	0.8	0.49	0.49	2.26
17	16	0.483	Prop.	10	PVC	2,650	0.280	1.7	1.10	1.2	0.75	0.75	1.55
16	13	0.809	Prop.	12	PVC	5,500	0.220	2.2	1.42	1.7	1.08	1.08	1.34
13	12	3.134	Exist.	24	PVC	1,200	0.080	13.0	8.40	6.4	4.14	4.14	1.32
12	9	3.284	Exist.	24	PVC	2,800	0.080	13.0	8.40	6.4	4.14	4.14	1.26
11	10	0.235	Prop FM	6	PVC	2,250	N/A	Assumed a pumping rate of 5 fps				0.63	2.70
10	9	0.450	Exist.	10	PVC	3,300	0.280	1.7	1.10	1.2	0.75	0.75	1.67
9	7	3.632	Exist.	27	PVC	1,900	0.070	17.7	11.43	8.2	5.30	5.30	1.46
8	7	0.189	Exist.	8	PVC	3,200	0.400	1.4	0.90	0.8	0.49	0.49	2.62
7	6	3.909	Exist.	27	PVC	3,500	0.070	17.7	11.43	8.2	5.30	5.30	1.36
5	6	0.339	Exist. & Prop.	10	PVC	4,500	0.280	1.7	1.10	1.2	0.75	0.75	2.22
6	3	4.163	Exist.	27	PVC	1,800	0.070	17.7	11.43	8.2	5.30	5.30	1.27
4	3	0.256	Prop FM	6	PVC	1,800	N/A	Assumed a pumping rate of 5 fps				0.63	2.48
4	3	0.256	Exist.	8	PVC	3,600	0.400	1.4	0.90	0.8	0.49	0.49	1.94
3	2	4.443	Exist.	30	PVC	2,700	0.058	23.3	15.05	9.9	6.39	6.39	1.44
2	1	4.644	Exist.	30	PVC	2,700	0.058	23.3	15.05	9.9	6.39	6.39	1.38
1	C.A.B	4.644	Exist.	30	PVC	50	0.058	23.3	15.05	9.9	6.39	6.39	1.38

Table 9.6. – Ultimate System Pipe Design (West District)

From Point	To Point	Design Flow (MGD)	Exist./ Prop.	Pipe Size (in)	Pipe Material	Length (ft)	Avg Slope (%)	CAPACITY					Capac./ Design Flow
								Inlet Control		Outlet Control		Capacity (MGD)	
								(cfs)	(MGD)	(cfs)	(MGD)		
19	18	0.397	Prop.	12	PVC	1,100	0.220	2.2	1.42	1.7	1.08	1.08	2.72
18	18A	0.051	Prop.	8	PVC	1,100	0.400	1.4	0.90	0.8	0.49	0.49	9.79
17	16	0.151	Prop.	8	PVC	3,200	0.400	1.4	0.90	0.8	0.49	0.49	3.27

16	15	0.273	Exist FM	5	HDPE	3,700	N/A	Upgrade Existing Pumps, 2@150 GPM				0.43	1.59
15	18A	0.738	Prop.	12	PVC	2,600	0.220	2.2	1.42	1.7	1.08	1.08	1.46
18A	14	0.768	Prop.	15	PVC	1,100	0.150	4.1	2.65	2.5	1.62	1.62	2.11
14	13	0.768	Prop FM	8	PVC	4,700	N/A	Assumed a pumping rate of 5 fps				1.13	1.47
13	9	1.007	Prop.	18	PVC	4,900	0.120	6.2	4.01	3.6	2.36	2.36	2.34
9	8	1.214	Prop.	18	PVC	5,500	0.120	6.2	4.01	3.6	2.36	2.36	1.94
8	7	1.478	Prop FM	12	PVC	1,650	N/A	Assumed a pumping rate of 5 fps				2.54	1.72
7	2	2.113	Exist.	24	PVC	6,300	0.080	13.0	8.40	6.4	4.14	4.14	1.96
2	1	2.364	Exist.	24	PVC	3,300	0.080	13.0	8.40	6.4	4.14	4.14	1.75
37	36	0.247	Prop.	8	PVC	2,350	0.400	1.4	0.90	0.8	0.49	0.49	2.00
36	34	0.708	Prop.	12	PVC	2,550	0.220	2.2	1.42	1.7	1.08	1.08	1.53
35	34	0.328	Prop.	10	PVC	2,550	0.280	1.7	1.10	1.2	0.75	0.75	2.29
34	31	1.259	Prop.	18	PVC	6,450	0.120	6.2	4.01	3.6	2.36	2.36	1.87
33	32	0.967	Prop.	12	PVC	2,600	0.280	2.2	1.42	1.9	1.22	1.22	1.26
32	31	0.967	Prop.	12	PVC	2,200	0.280	2.2	1.42	1.9	1.22	1.22	1.26
31	28	2.078	Prop.	18	PVC	1,050	0.120	6.2	4.01	3.6	2.36	2.36	1.13
28	27	2.518	Prop.	21	PVC	1,500	0.120	9.1	5.88	5.5	3.55	3.55	1.41
30	29	0.302	Prop.	8	PVC	1,600	0.400	1.4	0.90	0.8	0.49	0.49	1.64
29	27	0.302	Prop.	8	PVC	1,250	0.400	1.4	0.90	0.8	0.49	0.49	1.64
27	24	2.683	Prop FM	15	PVC	4,300	N/A	Assumed a pumping rate of 5 fps				3.45	1.29
26	25	0.519	Prop.	10	PVC	1,550	0.400	1.7	1.10	1.4	0.90	0.90	1.73
25	24	0.519	Prop FM	6	PVC	2,950	N/A	Assumed a pumping rate of 5 fps				0.63	1.22
24	20	3.302	Exist. & Prop.	21	PVC	4,900	0.120	9.1	5.88	5.5	3.55	3.55	1.08
10	12	0.333	Prop.	8	PVC	3,050	0.400	1.4	0.90	0.8	0.49	0.49	1.49
11	12	0.275	Prop.	8	PVC	6,500	0.400	1.4	0.90	0.8	0.49	0.49	1.80
12	22	1.075	Prop FM	8	PVC	6,300	N/A	Assumed a pumping rate of 5 fps				1.13	1.05
22	21	2.483	Prop.	18	PVC	3,250	0.170	6.2	4.01	4.3	2.80	2.80	1.13
23	21	0.416	Prop.	10	PVC	850	0.280	1.7	1.10	1.2	0.75	0.75	1.81
21	20	2.914	Prop.	21	PVC	3,350	0.120	9.1	5.88	5.5	3.55	3.55	1.22
20	1A	5.653	Exist.	30	PVC	4,200	0.100	23.3	15.05	13.0	8.40	8.40	1.49
5	4	0.685	Prop FM	8	PVC	1,950	N/A	Assumed a pumping rate of 5 fps				1.13	1.64
4	6	0.685	Prop.	12	PVC	1,950	0.220	2.2	1.42	1.7	1.08	1.08	1.58
6	3	0.339	Prop.	10	PVC	1,100	0.220	1.7	1.10	1.0	0.67	0.67	1.96
3	1A	0.964	Prop.	12	PVC	2,850	0.220	2.2	1.42	1.7	1.08	1.08	1.12
3A	1A	0.170	Exist.	8	PVC	1,960	0.400	1.4	0.90	0.8	0.49	0.49	2.92
1A	1	6.269	Exist.	30	PVC	400	0.080	23.3	15.05	11.6	7.51	7.51	1.20
1	E.C.I.	7.899	Exist.	36	PVC	1,000	0.060	36.5	23.58	16.4	10.58	10.58	1.34

Table 9.7. – Ultimate System Pipe Design (Southeast, Northwest, and Southwest Districts)

From Point	To Point	Design Flow (MGD)	Exist./ Prop.	Pipe Size (in)	Pipe Material	Length (ft)	Avg Slope (%)	CAPACITY					Capac./ Design Flow
								Inlet Control		Outlet Control		Capacity (MGD)	
								(cfs)	(MGD)	(cfs)	(MGD)		
Southeast District (SE)													
1	2	0.144	Prop FM	4	PVC	550	N/A	Assumed a pumping rate of 5 fps				0.28	1.95
2	C1	0.144	Exist.	8	PVC	---	0.400	1.4	0.90	0.8	0.49	0.49	3.43
3	C2	0.005	Prop FM	4	PVC	1,100	N/A	Assumed a pumping rate of 5 fps				0.28	53.84
Northwest District (NW)													
2	1	0.170	Exist FM	4	HDPE	---	N/A	2 Pumps @ 86 GPM = 172 GPM = 0.25 MGD				0.25	1.45
2	1	0.170	Exist.	8	PVC	---	0.400	1.4	0.90	0.8	0.49	0.49	2.90
1	OTF	0.623	Exist FM	6	PVC	---	N/A	2 Pumps @ 200 GPM = 400 GPM = 0.58 MGD				0.58	0.92
Southwest District (SW)													
1	E.C.I.	0.380	Prop.	8	PVC	2,600	0.400	1.4	0.90	0.8	0.49	0.49	1.30

Table 9.8. – Projected Utilized Pipe Capacity at 2040 (North District)

From Point	To Point	2040 Peak Flow (MGD)	Exist./ Prop.	Pipe Size (in)	Pipe Material	Length (ft)	Avg Slope (%)	CAPACITY					Percent of Pipe Capacity Utilized
								Inlet Control		Outlet Control		Capacity (MGD)	
								(cfs)	(MGD)	(cfs)	(MGD)		
25	24	-	Prop.	6	PVC	2,300	N/A	Assumed a pumping rate of 5 fps				0.63	0%
24	19	-	Prop.	10	PVC	2,000	0.280	1.7	1.10	1.2	0.75	0.75	0%
23	19	0.278	Prop.	10	PVC	5,300	0.280	1.7	1.10	1.2	0.75	0.75	37%
22	21	-	Prop.	8	PVC	4,400	0.400	1.4	0.90	0.8	0.49	0.49	0%
21	20	-	Prop.	10	PVC	3,200	0.400	1.7	1.10	1.4	0.90	0.90	0%
20	19	-	Prop.	15	PVC	1,650	0.160	4.1	2.65	2.6	1.67	1.67	0%
19	15	0.278	Prop FM	12	PVC	7,550	N/A	Assumed a pumping rate of 5 fps				2.54	11%
15	14	0.490	Prop.	21	PVC	2,700	0.100	9.1	5.88	5.0	3.24	3.24	15%
14	13	1.009	Prop.	21	PVC	6,500	0.100	9.1	5.88	5.0	3.24	3.24	31%
18	17	-	Prop.	8	PVC	1,500	0.400	1.4	0.90	0.8	0.49	0.49	0%
17	16	0.277	Prop.	10	PVC	2,650	0.280	1.7	1.10	1.2	0.75	0.75	37%
16	13	0.617	Prop.	12	PVC	5,500	0.220	2.2	1.42	1.7	1.08	1.08	57%
13	12	1.741	Exist.	24	PVC	1,200	0.080	13.0	8.40	6.4	4.14	4.14	42%
12	9	1.905	Exist.	24	PVC	2,800	0.080	13.0	8.40	6.4	4.14	4.14	46%
11	10	-	Prop FM	6	PVC	2,250	N/A	Assumed a pumping rate of 5 fps				0.63	0%
10	9	0.215	Exist.	10	PVC	3,300	0.280	1.7	1.10	1.2	0.75	0.75	29%
9	7	2.087	Exist.	27	PVC	1,900	0.070	17.7	11.43	8.2	5.30	5.30	39%

8	7	0.189	Exist.	8	PVC	3,200	0.400	1.4	0.90	0.8	0.49	0.49	38%
7	6	2.182	Exist.	27	PVC	3,500	0.070	17.7	11.43	8.2	5.30	5.30	41%
5	6	-	Exist. & Prop.	10	PVC	4,500	0.280	1.7	1.10	1.2	0.75	0.75	0%
6	3	2.182	Exist.	27	PVC	1,800	0.070	17.7	11.43	8.2	5.30	5.30	41%
4	3	-	Prop FM	6	PVC	1,800	N/A	Assumed a pumping rate of 5 fps				0.63	0%
4	3	-	Prop.	8	PVC	3,600	0.400	1.4	0.90	0.8	0.49	0.49	0%
3	2	2.448	Exist.	30	PVC	2,700	0.058	23.3	15.05	9.9	6.39	6.39	38%
2	1	2.595	Exist.	30	PVC	2,700	0.058	23.3	15.05	9.9	6.39	6.39	41%
1	C.A.B	2.595	Exist.	30	PVC	50	0.058	23.3	15.05	9.9	6.39	6.39	41%

Table 9.9. – Projected Utilized Pipe Capacity at 2040 (West District)

From Point	To Point	2040 Peak Flow (MGD)	Exist./ Prop.	Pipe Size (in)	Pipe Material	Length (ft)	Avg Slope (%)	CAPACITY					Percent of Pipe Capacity Utilized
								Inlet Control		Outlet Control		Capacity (MGD)	
								(cfs)	(MGD)	(cfs)	(MGD)		
19	18	0.397	Prop.	12	PVC	1,100	0.220	2.2	1.42	1.7	1.08	1.08	0%
18	18A	0.051	Prop.	8	PVC	1,100	0.400	1.4	0.90	0.8	0.49	0.49	0%
17	16	0.151	Prop.	8	PVC	3,200	0.400	1.4	0.90	0.8	0.49	0.49	0%
16	15	0.273	Exist FM	5	HDPE	3,700	N/A	Upgrade Existing Pumps, 2@150 GPM				0.43	28%
15	18A	0.738	Prop.	12	PVC	2,600	0.220	2.2	1.42	1.7	1.08	1.08	11%
18A	14	0.768	Prop.	15	PVC	1,100	0.150	4.1	2.65	2.5	1.62	1.62	7%
14	13	0.768	Prop FM	8	PVC	4,700	N/A	Assumed a pumping rate of 5 fps				1.13	11%
13	9	1.007	Prop.	18	PVC	4,900	0.120	6.2	4.01	3.6	2.36	2.36	5%
9	8	1.214	Prop.	18	PVC	5,500	0.120	6.2	4.01	3.6	2.36	2.36	16%
8	7	1.478	Prop FM	12	PVC	1,650	N/A	Assumed a pumping rate of 5 fps				2.54	28%
7	2	2.113	Exist.	24	PVC	6,300	0.080	13.0	8.40	6.4	4.14	4.14	33%
2	1	2.364	Exist.	24	PVC	3,300	0.080	13.0	8.40	6.4	4.14	4.14	40%
37	36	0.247	Prop.	8	PVC	2,350	0.400	1.4	0.90	0.8	0.49	0.49	0%
36	34	0.708	Prop.	12	PVC	2,550	0.220	2.2	1.42	1.7	1.08	1.08	0%
35	34	0.328	Prop.	10	PVC	2,550	0.280	1.7	1.10	1.2	0.75	0.75	0%
34	31	1.259	Prop.	18	PVC	6,450	0.120	6.2	4.01	3.6	2.36	2.36	0%
33	32	0.967	Prop.	12	PVC	2,600	0.280	2.2	1.42	1.9	1.22	1.22	0%
32	31	0.967	Prop.	12	PVC	2,200	0.280	2.2	1.42	1.9	1.22	1.22	0%
31	28	2.078	Prop.	18	PVC	1,050	0.120	6.2	4.01	3.6	2.36	2.36	0%
28	27	2.518	Prop.	21	PVC	1,500	0.120	9.1	5.88	5.5	3.55	3.55	17%
30	29	0.302	Prop.	8	PVC	1,600	0.400	1.4	0.90	0.8	0.49	0.49	0%
29	27	0.302	Prop.	8	PVC	1,250	0.400	1.4	0.90	0.8	0.49	0.49	0%

27	24	2.683	Prop FM	15	PVC	4,300	N/A	Assumed a pumping rate of 5 fps				3.45	17%
26	25	0.519	Prop.	10	PVC	1,550	0.400	1.7	1.10	1.4	0.90	0.90	0%
25	24	0.519	Prop FM	6	PVC	2,950	N/A	Assumed a pumping rate of 5 fps				0.63	0%
24	20	3.302	Exist. & Prop.	21	PVC	4,900	0.120	9.1	5.88	5.5	3.55	3.55	26%
10	12	0.333	Prop.	8	PVC	3,050	0.400	1.4	0.90	0.8	0.49	0.49	67%
11	12	0.275	Prop.	8	PVC	6,500	0.400	1.4	0.90	0.8	0.49	0.49	56%
12	22	1.075	Prop FM	8	PVC	6,300	N/A	Assumed a pumping rate of 5 fps				1.13	95%
22	21	2.483	Prop.	18	PVC	3,250	0.170	6.2	4.01	4.3	2.80	2.80	37%
23	21	0.416	Prop.	10	PVC	850	0.280	1.7	1.10	1.2	0.75	0.75	55%
21	20	2.914	Prop.	21	PVC	3,350	0.120	9.1	5.88	5.5	3.55	3.55	43%
20	1A	5.653	Exist.	30	PVC	4,200	0.100	23.3	15.05	13.0	8.40	8.40	29%
5	4	0.685	Prop FM	8	PVC	1,950	N/A	Assumed a pumping rate of 5 fps				1.13	61%
4	6	0.685	Prop.	12	PVC	1,950	0.220	2.2	1.42	1.7	1.08	1.08	63%
6	3	0.339	Prop.	10	PVC	1,100	0.220	1.7	1.10	1.0	0.67	0.67	51%
3	1A	0.964	Prop.	12	PVC	2,850	0.220	2.2	1.42	1.7	1.08	1.08	89%
3A	1A	0.170	Exist.	8	PVC	1,960	0.400	1.4	0.90	0.8	0.49	0.49	34%
1A	1	6.269	Exist.	30	PVC	400	0.080	23.3	15.05	11.6	7.51	7.51	42%
1	E.C.I.	7.899	Exist.	36	PVC	1,000	0.060	36.5	23.58	16.4	10.58	10.58	41%

Table 9.10. – Projected Utilized Pipe Capacity at 2040 (Southeast, Northwest, and Southwest Districts)

From Point	To Point	2040 Peak Flow (MGD)	Exist./ Prop.	Pipe Size (in)	Pipe Material	Length (ft)	Avg Slope (%)	CAPACITY					Percent of Pipe Capacity Utilized
								Inlet Control		Outlet Control		Capacity (MGD)	
								(cfs)	(MGD)	(cfs)	(MGD)		
Southeast District (SE)													
1	2	0.144	Prop FM	4	PVC	550	N/A	Assumed a pumping rate of 5 fps				0.28	51%
2	C1	0.144	Exist.	8	PVC	---	0.400	1.4	0.90	0.8	0.49	0.49	29%
3	C2	0.005	Prop FM	4	PVC	1,100	N/A	Assumed a pumping rate of 5 fps				0.28	2%
Northwest District (NW)													
2	1	0.170	Exist FM	4	HDPE	---	N/A	2 Pumps @ 86 GPM = 172 GPM = 0.25 MGD				0.25	69%
2	1	0.170	Exist.	8	PVC	---	0.400	1.4	0.90	0.8	0.49	0.49	34%
1	OTF	0.623	Exist FM	6	PVC	---	N/A	2 Pumps @ 200 GPM = 400 GPM = 0.58 MGD				0.58	108%
Southwest District (SW)													
1	E.C.I.	0.380	Prop.	8	PVC	2,600	0.400	1.4	0.90	0.8	0.49	0.49	77%

Figure 9.2 Ultimate Sewer Map

Infiltration and Inflow

General

The Metropolitan Council instituted an Inflow and Infiltration (I/I) Surcharge Program (IISP) in 2006. The fundamental policy statement summarizing this program is that the Metropolitan Council "will not provide additional capacity within its interceptor system to serve excessive inflow and infiltration." The Council establishes inflow and infiltration thresholds for each of the communities that connect to its system. Communities that exceed the thresholds are required to eliminate the excess flow within a reasonable timeframe or pay a surcharge fee.

Sources and Extent of I/I

Potential sources of I/I in Dayton's sewer system could include:

- Non-compliant residential sump pump connections to the sanitary sewer
- Leaky pipes and structures under groundwater or flooded conditions
- Service line leaks
- Inflow from floor drains of flooded structures

No pre-1970 services exist. The first city collection system was constructed in 2000. The City currently has approximately 338 pre-1970s homes (approximately 181 using SSTS) and 2,822 post-1970s homes (approximately 625 using SSTS) making up the housing stock. Other than the recent investigations noted below (in the implementation section), no other private services have been evaluated for I/I susceptibility and repair. All municipal sewer lines were constructed post 2000s. Approximately 7 SSTS are older than 1970, none of the systems are older than 1967 according to available data. Approximately 500 of the private SSTS are newer than 1970. Service lines are typically replaced when a new SSTS is installed, or when a home is connected to municipal sewer. Unfortunately, the City has knowledge of nearly 300 SSTS that we have no data on date of install. That being said, the City has no knowledge of I/I issues in areas where existing SSTS are utilized.

The EPA Guide for Estimating Infiltration and Inflow (June 2014) was used to estimate the proportion of I/I contribution in the City's wastewater system. Monthly flow data were obtained from Metropolitan Council Environmental Services for each connection point to MCES. The West system connects to the Dayton-Hassan Elm Creek Interceptor, while the North system connects to the Dayton-Champlain Interceptor.

Due to the rapidly developing nature of Dayton (and thus incrementally increasing sewer flows), 2016 to 2021 monthly data were used. For this six-year period, monthly average flows were calculated from March to November of each year (representative of a wet portion of the year) and December to February of each year (representative of a dry portion of the year).

For the West collection system, it was determined that the wet monthly average flow (March-November) was 3.76 MG, and that the dry monthly average flow (December-February) was 3.31 MG. Thus, on average, I/I contributed roughly 0.45 MG monthly (roughly 14% of base flows). The yearly peak I/I flow, expressed as a percentage of that year's base flow, was observed in March 2019. The peak monthly flow that year was 5.58 MG, which was roughly 59% above base flow for that year.

For the North collection system, it was determined that the wet monthly average flow (March-November) was 4.10 MG, and that the dry monthly average flow (December-February) was 4.04 MG. Thus, on average, I/I contributed roughly 0.06 MG monthly (roughly 1% of base flows). The yearly peak I/I flow, expressed as a percentage of that year's base flow, was observed in March 2019. The peak monthly flow that year was 5.10 MG, which was roughly 16% above base flow for that year.

Goals, Policies, and Strategies to Address I/I

The City's primary goals regarding I/I are to:

- Preserve capacity in the local and regional system
- Minimize I/I in the system
- Prevent excessive I/I, backups, and overflows

The City has adopted wastewater ordinances that address limiting I/I through current accepted engineering practices; prohibiting the connection of foundation drains, sump pumps, and roof leaders to the sanitary sewer system; and requiring disconnection of existing foundation drains, sump pumps, and roof leaders. These prohibitions are described in the City Code of Ordinances, Chapter 51, Sections 51.01-51.06 (found in the Appendix). The City will continue to utilize Chapter 51 as needed to solve for any new instances of I/I. Chapter 51 does not permit any cross connection of roof, ground water, drain tiles, pools, SSTS etc. to the municipal wastewater system unless otherwise provided by any exceptions outlined in Chapter 51.

The City also uses modern materials and standards in new construction to prevent I/I. The City's ongoing strategy includes a recently completed study that identifies I/I sources within the West collection system, and to develop an action plan to remove I/I where feasible.

I/I Implementation Plan

Indication of the presence of I/I has been identified, by monitoring of Met Council Lift Station M305 (West); note that there has not been previous indication of measurable I/I from at Station M306 (Northeast).

An I/I study was recently completed by the City to explore unusual amounts of discharge into the West collection system. Based on the study, which involved flow meters deployed throughout the West collection system over approximately a 3 month period in 2020, we have been able to determine that the issues are stemming from an older, private system, servicing a mobile home park, which was recently converted to the municipal system in the southwest part of the City located north of County Road 81, west of Troy Lane, East of Brockton Lane, and South of 124th Ave. We are currently working with property owners to solve existing I/I issues and will condition approvals for redevelopment on solving for I/I issues. Expenditure related to I/I has been limited to system inspections/evaluations by staff (not currently tracked). The recently completed I/I study was conducted at a cost of $30,000. Our wastewater/sanitary sewer charges (connection, area, and usage rates) per the City Fee Schedule will be utilized to fund not only the study and future studies, but also the mitigation recommended by the studies. It is expected that an amount similar to this may be realized on an annual basis in continued efforts to identify, and resolve, sources of I/I in Dayton's collection system.

Through continued system inspections of the municipal collection system, the City will continue to identify and address inflow and infiltration (I/I) sources as part of its ongoing annual maintenance program

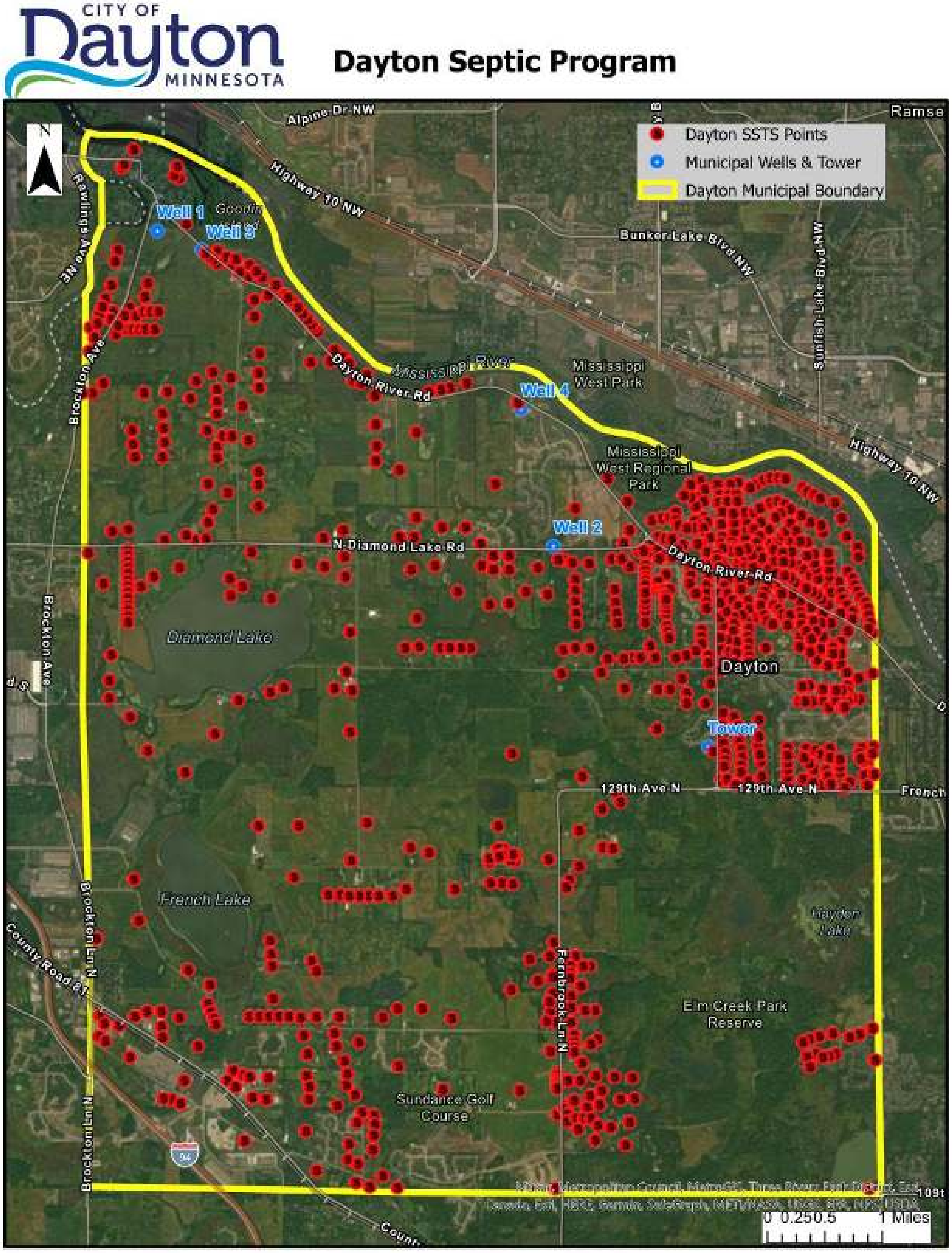
Community and Subsurface Treatment Systems

The City of Dayton has an existing ordinance (Chapter 51, Sections 20-30) regulating the installation of on-site wastewater disposal systems. Under this ordinance, the design of the system is reviewed in accordance with the guidelines of Minnesota Pollution Control Agency Standards described in MN Rules Chapters 7080-7083, and a permit is required before the system can be installed.

The City of Dayton is currently developing a septic and sewer plan to track and quantify the number of existing on-site wastewater disposal facilities located within the City and a database of private systems is available upon request. It is anticipated that the number of on-site systems will be reduced as municipal sanitary sewer service is extended throughout the districts. New Community Subsurface Sewer systems will most likely require a Planned Unit Development process.

The policy of the City of Dayton is to allow existing on-site wastewater disposal facilities to be maintained within each of the sanitary sewer districts until the community desires service and service is brought into an area. New on-site wastewater disposal facilities will be allowed by the City provided the properties agree to hook up to the City sewer system when available. See figure 9.3 below illustrating locations of septic systems.

Figure 9.3 Existing Septic Locations



Existing Septic Systems in Dayton

The City has approximately 885 individual septic systems in operation. One private community subsurface sewage treatment system is located within the City, which serves a residential development of approximately 10 homes located on 126th Ave N. This number is in decline as municipal sewer is brought near to developable land. However, there will likely continue to be septic systems in the following zoning districts until sewer is made available:

- A-1, A-2, and S-A, the City's Agricultural Districts (Agriculture, Special Homestead, and Agricultural Preserve). These districts require new lots to meet the 1 per 40 density. However, legal non-conforming agricultural lots are in existing and range drastically in size.
- R-2, and R-E Districts. R-2 is a larger lot residential district required 90,000 square feet minimum lot sizes, while R-E is the Rural Estate District requiring 5 Acre lot minimums.

Regarding Land Use, areas designated as Rural Estate or Existing Unsewered will most likely continue to have private septic systems until such a time as there are Land Use change in response to development needs.

Any existing or new septic system will be regulated by relevant state statutes and the City's SSTS Ordinance for type of system and require review and approval by the Building Official. Please Chapter 51 of Dayton City Code (Appendix Item D).