City of Farmington

2030 Comprehensive
Sewer Plan

October 2008

Bonestroo

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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 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 Sewer Plan (CSP) which describes the current and future service needs required from MCES.

The City of Farmington was connected to the Metropolitan Council Environmental Services (MCES) trunk sanitary sewer system in 1977 when the Empire Wastewater Treatment Facility replaced the City of Farmington Wastewater Treatment Facility. The MCES provides wastewater treatment at Empire for the Lakeville, Apple Valley, Rosemount, Farmington, and Empire areas, and in the future will also provide treatment to Elko-New Market.

The City of Farmington's existing and proposed sanitary sewer system for the ultimate development of the City is shown on Map 1 at the back of this report. The City has eight major sewer districts, named Districts 1 through 8, which each define the limits of service for a separate trunk system. The existing trunk system, which covers areas D1, D3, D4, D5, D6, and D8, is shown in red lines. Two trunk lines (in blue) are proposed to serve areas D2 and D7 in the future. The trunk line to D2 in the far northwest portion of the City is currently not planned to be installed until after 2030. Additional proposed trunk lines are also shown on Map 1 in areas D4 and D6 as possible new trunk lines depending on the timing of Phase 2 of the Elko-New Market Interceptor.

Farmington's trunk sanitary sewer system discharges to two existing MCES interceptors that travel through the City, which are shown in green on Map 1. Interceptor #7103-1 (Lakeville-Farmington Interceptor) enters Farmington from Lakeville to the west, and districts D2, D3, D4, D5, and D6 discharge to this interceptor. Interceptor #7409 (Apple Valley Interceptor) enters Farmington from Lakeville to the north, and also carries sewer flow from Apple Valley and Rosemount. Districts D1, D7, and D8 discharge to this interceptor.

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 sewersheds 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.

The Metropolitan Council identified Farmington as a community with at least one Infiltration and Inflow (I/I) exceedence event recorded between June 1, 2004 and June 30, 2006, and assessed a surcharge to begin in 2007 and last for five years, until 2011. The City has since drafted an I/I Reduction Plan which proposes improvements over a period of five years to reduce I/I which will cost more than the surcharge. If this plan is approved by the Metropolitan Council, the City will receive credit for the entire surcharge. The I/I Reduction Plan consists of six components:

1. Resume monitoring wastewater flow in the City system
2. A sump pump cross connection inspection and removal program
3. A program to investigate known or suspected areas of foundation drains, leaking cleanouts, and leaking services
4. A manhole inspection and repair program
5. An ongoing sewer cleaning, televising, and repair program
6. Stringent requirements for new sanitary sewer and home construction

The Comprehensive Sanitary Sewer Plan presented herein is intended to serve as an inventory of City of Farmington's existing sanitary sewer trunk facilities and as a guide for expanding the trunk sewer system to service future development in the City. Based on the information analyzed in this study and presented in this report, the following outcomes are desired:

1. That the Metropolitan Council use the City's population and flow projections in determining the appropriate capacity for its own facilities.
2. That the City Council adopt the sanitary sewer layout, as presented in the Trunk Sewer System Map, as the development guide for sanitary sewer construction within the study area.
3. That the system design flows and criteria in Appendices C and D be used for sizing all future sanitary sewer trunk facilities, but that flow projections of Section 2 be used when representing the impact of Farmington's system on the Metropolitan Disposal System and the Empire WWTF.

1. Background

1.1 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 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 Sewer Plan (CSP) which describes the current and future service needs required from MCES.

In March, 2005 the Metropolitan Council adopted a revised Water Resources Management Policy Plan (WRMPP). The 2030 WRMPP includes the metropolitan wastewater system plan with which local comprehensive plans must conform. Farmington has chosen to demonstrate conformance through a separate Comprehensive Sewer Plan (CSP). The Farmington CSP updates previous sewer planning efforts and describes in detail the expansion of the City's sanitary sewer system to serve urban development.

The Farmington CSP projects increases in sanitary sewer flows that the Metropolitan Council can then use in its planning of the Metropolitan Disposal System or MDS, which is operated by the Metropolitan Council Environmental Services (MCES). MCES also uses the CSP to determine whether capacity upgrades will be needed at the Empire WWTF, to which Farmington discharges. This CSP update is necessary to reflect land use changes that have occurred since Farmington's previous comprehensive plan and trunk sewer lines that have been constructed since that time.

1.2 LOCATION AND HISTORY

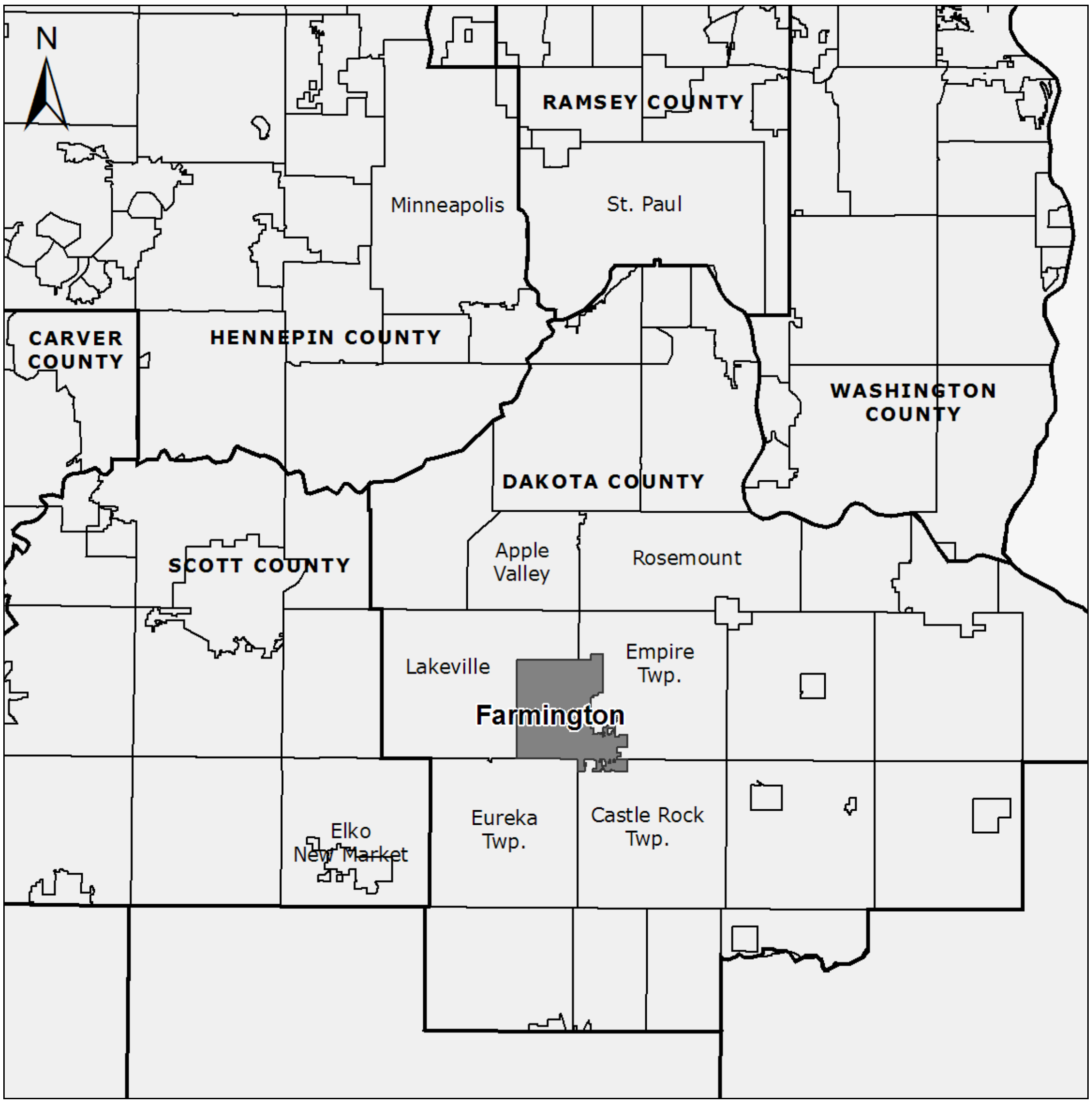
The City of Farmington is located in the central portion of Dakota County about 30 miles south of Minneapolis and St. Paul in Minnesota as shown on Figure 1.1. The City is bordered by Lakeville on the west and north, Empire Township on the east, Eureka Township to the southwest and Castle Rock Township to the southeast.

The topography within the City varies from nearly flat to fairly steep slopes. The Vermillion River passes from the southwest to the northeast through the City. Land surface elevations vary from a low of 890 to a high of 1,020 feet above sea level. This is a fairly flat area with sandy soils that have high groundwater influenced by the river levels. The study area includes parts of the adjacent townships that may be served by the City.

The City of Farmington principally serves as a convenient goods and service center for the surrounding farming area. It is expected that its close proximity to the Twin Cities will draw more commuters to the area and encourage the continued growth of the City.

The City of Farmington was connected to the Metropolitan Council Environmental Services (MCES) trunk sanitary sewer system in 1977 when the Empire Wastewater Treatment Facility replaced the City of Farmington Wastewater Treatment Facility. The MCES provides wastewater treatment at Empire for the Lakeville, Apple Valley, Rosemount, Farmington, and Empire areas, and in the future will also provide treatment to Elko-New Market.

FIGURE 1.1 – LOCATION MAP



1.3 EXISTING SANITARY SEWER SYSTEM

This study is concerned with Farmington's trunk sanitary sewer system which includes all lines 10 inches in diameter and larger, other main lines, and other facilities (such as lift stations) which are a vital part of the sewer trunk system. Since the sewer trunk design determines the ultimate service area for the system, it is essential that an overall trunk plan be available as a guide for future development. Such a plan should be flexible enough to absorb some changes in planning and development patterns. Periodic review with updating which shows the relationship of construction of facilities to future planning and which reevaluates costs is required.

The City of Farmington's existing and proposed sanitary sewer system for the ultimate development of the City is shown on Map 1 at the back of this report. The City has eight major sewer districts, named Districts 1 through 8, which each define the limits of service for a separate trunk system. The existing trunk system, which covers areas D1, D3, D4, D5, D6, and D8, is shown in red lines. Two trunk lines (in blue) are proposed to serve areas D2 and D7 in the future. The trunk line to D2 in the far northwest portion of the City is currently not planned to be installed until after 2030. Additional proposed trunk lines are also shown on Map 1 in areas D4 and D6 as possible new trunk lines depending on the timing of Phase 2 of the Elko-New Market Interceptor.

Farmington's trunk sanitary sewer system discharges to two existing MCES interceptors that travel through the City, which are shown in green on Map 1. Interceptor #7103-1 (Lakeville-Farmington Interceptor) enters Farmington from Lakeville to the west, and districts D2, D3, D4, D5, and D6 discharge to this interceptor. Interceptor #7409 (Apple Valley Interceptor) enters Farmington from Lakeville to the north, and also carries sewer flow from Apple Valley and Rosemount. Districts D1, D7, and D8 discharge to this interceptor.

The Apple Valley Interceptor joins the Lakeville-Farmington Interceptor just north of downtown Farmington in Empire, and the Lakeville-Farmington Interceptor then discharges to the Empire WWTF. According to the Metropolitan Council, the Lakeville-Farmington Interceptor currently has an available capacity of 5.5 MGD to provide for Farmington's long term needs. The Apple Valley Interceptor has an available capacity of 1.7 MGD for the long-term needs of the City.

Sewer line 402 to 410 down Flagstaff Avenue is currently under construction and will ultimately carry 1.6 MGD average flow from Lakeville, as well as flow from Farmington. Because of its inter-jurisdictional nature, this sewer line will become part of the MCES interceptor system. For the purposes of this report, this line will be referred to as the Flagstaff Interceptor.

2. Forecasts

Table 2.1 presents the Metropolitan Council's projections of population, households, and employees for the City of Farmington from the Metropolitan Council Water Resources Management Policy Plan. The Metropolitan Council assumes that Farmington's entire population will be sewered.

TABLE 2.1 – THE METROPOLITAN COUNCIL CITY-WIDE PROJECTIONS

Year	Sewered Population	Sewered Households	Sewered Employment
2010	20,500	7,500	6,600
2015[1]	23,800	9,000	7,500
2020	27,100	10,500	8,400
2025[1]	29,550	11,500	9,150
2030	32,000	12,500	9,900

[1]Values Interpolated

The City of Farmington's projections are similar to the Metropolitan Council's and are shown in Table 2.2.

TABLE 2.2 – CITY OF FARMINGTON PROJECTIONS

Year	Sewered Population	Sewered Households	Sewered Employment
2007	18,589	6991	6,030
2010	20,500	7585	6,600
2015	24,920	8575	7,425
2020	27,510	10,500	8,250
2025	30,110	11,500	9,075
2030	32,700	12,500	9,900

The facilities described in this report are designed to serve the City under conditions of ultimate development, which will occur after the year 2030. It is estimated that the ultimate population of Farmington will be 65,000. Actual growth rates will affect only the timing of trunk sewer construction and not the actual design of the system. Therefore, the discrepancy between the City's population projections and the Metropolitan Council's population projections does not impact the City's ultimate system and is insignificant as far as this report is concerned.

Table 2.3 presents projected sewer flows for the City of Farmington. The current (2007) average flow for the City of Farmington was estimated to be 1.29 MGD using the Metropolitan Council mid 2005-present flow metering at the City's limits, within the City, and at the Empire Treatment Plant, as well as land use calculations for the portion of Empire draining into the interceptor between Farmington city limits and the Empire WWTP. However this value may underestimate the actual average flow because of the large number of Farmington trunk discharges into the interceptors, and the difficulty of metering them all. For this reason, the Metropolitan Council's projections in the Metropolitan Council Water Resources Management Policy Plan have been adopted exactly. It is assumed that the Metropolitan Council projections pertain to Farmington only and do not include flows entering the interceptors from outside City limits. Flows for 2015 and 2025 have been linearly interpolated.

TABLE 2.3 – WASTEWATER FLOW PROJECTIONS

Year	Farmington Projected Average Flow (MGD)[1]
2010	1.92
2015	2.17[2]
2020	2.42
2025	2.61[2]
2030	2.79

[1]The Metropolitan Council's Water Resources Management Policy Plan (May 2005)

[2]Values interpolated

This CSP must accomplish two things:

4. Provide the Metropolitan Council with sufficient detailed information so that it can make reasonable plans for upgrades to its interceptors and Empire WWTF.
5. Provide a trunk system that allows the City a certain measure of reserve capacity in the event that a high sewage generating use does appear within its borders.

Section 2 forecasts when combined with the sewer map and modeling information contained in the appendices gives the Metropolitan Council the information they need to plan and maintain the metropolitan system. The subsequent sections of the CSP discuss sizing and planning the City's own trunk system and the spreadsheet sewer flow models in the appendices support this purpose.

The flow projections presented in the appendices originate from the land use statistics of Appendix A which are based directly on the City's ultimate land use plan (included in Appendix A). Certain reductions in land use area are made to account for wetlands, steep slopes, floodplains, right-of-way, etc. and a net developable acreage for each land use category is created. The net acreage is multiplied by standard unit flow rates to obtain an average flow for each sewershed. Appendix B provides these average flows and totals them for all the districts within the Farmington CSP. The Appendix B total average flow is 7.4 MGD. This exceeds the Table 2.3 projected average flow for 2030 by a factor of 3.2 to 1. One reason for this is that Farmington's ultimate build out will not occur by 2030. The ultimate buildout will account for the full development of 11,000 acres shown as the 2030 area on Map 1. The City's 2030 land use on the other hand, also shown in Appendix A, shows that of the 11,000 acres assumed within the City's 2030 boundaries, almost 2,500 acres will remain agricultural for 2030, and almost 1,500 acres that are currently within the Castle Rock Township OAA area have not been designated.

The other reason the average flow shown in Appendix B is 3.2 times the 2030 flow shown in Table 2.3 is that the purpose of the sewer model shown in the appendix spreadsheets is to conservatively estimate demand at the municipal level so that no City trunk is undersized for its projected sewershed. The unit flow rates used in Appendix B 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 Farmington. To cover this possibility, Farmington continues to use the high design rates shown in Table 3.2 below.

3. Sanitary Sewer Design Criteria

3.1 LAND USE

The ultimate land use plan for the City of Farmington (see Appendix A) served as the basis for the development of the sanitary sewer flow projections and analysis of the trunk system. The Metropolitan Council requires phased flow projections through 2030, so the City's 2030 land use plan is also shown in Appendix A. This is the 2030 land plan included in the City of Farmington's 2030 Comprehensive Plan.

Using the ultimate land use plan, the area of each land use was determined for each sewershed. Several land uses were consolidated for this study because of similar sanitary flow rates. Table 3.1 shows the Comprehensive Plan land use and the corresponding land use for this study.

TABLE 3.1 – COMPREHENSIVE SEWER STUDY PLAN LAND USES

Comprehensive Plan Land Use	Sewer Plan Modeled Land Use
Low Density	Low Density Residential
Low Medium Density	Low Density Residential
Medium Density	Medium Density Residential
High Density	High Density Residential
Commercial	Commercial
Industrial	Industrial
Public/Semi-public	Public/Semi-public
Park/Open Space	Park/Open Space
Restricted Development	Low Density Residential
Mixed-Use (Commercial/Residential)	Commercial
ROW (Right-of-Way)	ROW

Detailed descriptions of the various land uses are found in the City of Farmington Comprehensive Plan. Areas of each land use by sewershed are presented in Appendix A. The acreage in Appendix A is gross acreage which is the City's total acreage including the undevelopable areas. Undevelopable acres include floodplain, waterbodies, and streets right-of-way. Floodplain was removed from the gross acreage using the City of Farmington's Floodplain Overlay district, and waterbodies were removed using data from the City's Surface Water Management Plan. The sewer modeling is based on the remaining developable acreage.

A portion of Eureka Township is not included in the City's 2030 or ultimate land use plans, but is shown on Map 1 as serviced by the existing interceptor. It was necessary to evaluate the existing sanitary sewer system based on potential for the increased development. Based on City projections, net development in this portion of Eureka (D4-16 through D4-19) would develop in the following densities:

- Low Density Residential – 3.0 units per acre over 50% of the net developable acreage.
- Medium Density Residential – 7.15 units per acre over 45% of the net developable acreage.
- High Density Residential – 14.5 units per acre over 5% of the net developable acreage.

3.2 ESTIMATED AVERAGE WASTEWATER FLOWS

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. The flows due to I/I are accounted for in the analysis and design of the trunk sewer system.

The anticipated average wastewater flows from the various sewersheds were determined by applying unit flow rates to each of the land use categories. The "system design" unit flow rates are presented in Table 3.2. The average wastewater flows for each sewershed are presented in Appendix B.

For most land uses unit rates/acre were used to generate average flow projections. The exception is existing low density residential, in which lots were counted and average flows were projected on a rate/unit basis. The units per acre assumptions for low, medium, and high density residential were based in part on information from the City Planning staff regarding recent past numbers of units per acre that have developed within the City. The population densities are in accordance with our experience in Farmington as well as other communities in the Twin Cities area. The estimated flows are in accordance with standard engineering practice and are generally considered conservative.

TABLE 3.2 – SYSTEM DESIGN WASTEWATER UNIT FLOW RATES

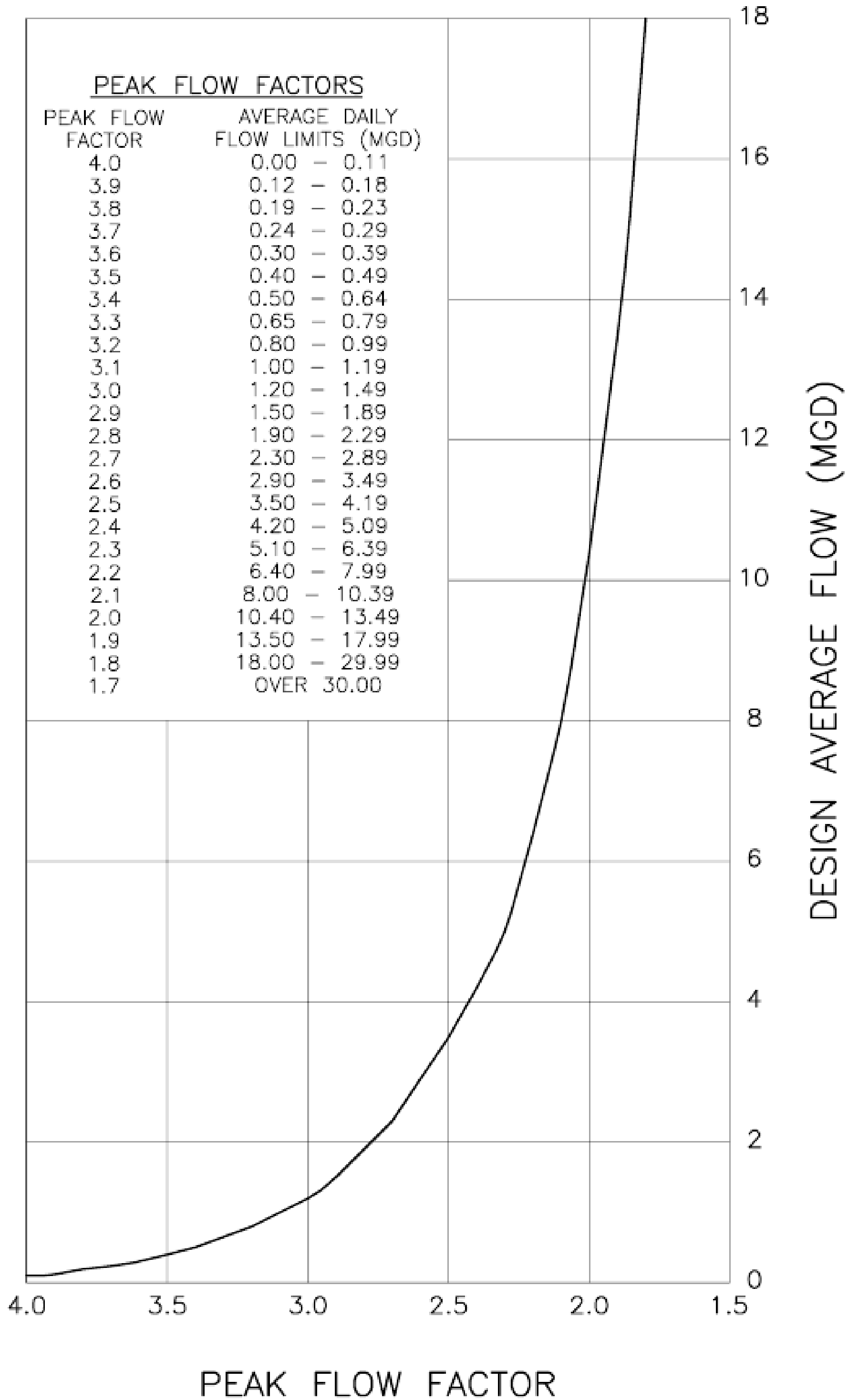
Land Use Type	Persons/Unit	Units/Acre	Gal/Acre/Day
Low Density Residential	2.8	3.1	780
Medium Density Residential	2.5	7.9	1,580
High Density Residential	2	12.8	1,790
Industrial	---	---	1,200
Commercial	---	---	1,200
Public/Semi-public	---	---	800

3.3 PEAK FLOW FACTORS

The sanitary sewer system must be capable of handling the anticipated peak wastewater flow rate including any I/I. The design peak flow rate can be expressed as a variable ratio to the average flow rate. Curves used to describe this ratio, called the Peak Flow Factor (PFF), indicate a decreasing ratio of peak flow to average flow with increasing average flow.

The PFF values applied in this study are shown in Figure 3.1 as a curve and in tabular form. These values are generally conservative and widely used throughout the state for municipal planning. They include a standard allowance for I/I, which is typical of new sanitary sewer construction as well as properly operating existing sewers. The design flows for each sewershed are presented in Appendix C.

FIGURE 3.1 – PEAK FLOW FACTORS



4. Sanitary Sewer Trunk System

4.1 GENERAL

The trunk sewer system layout for the City of Farmington is presented on Map 1. This map shows the main sanitary sewersheds, existing and proposed trunk sanitary sewers, existing and proposed Metropolitan Council Interceptors and existing and proposed lift stations and forcemains.

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 sewersheds 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 sewershed 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 sewersheds.

The proposed alignments shown on Map 1 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 sewershed contains at least one collection point where the sewershed's sewage is defined to enter the pipe network. Upstream of that collection point, a lateral network of 8" gravity lines can serve unserviced areas. Lift stations and force mains will be required to service certain areas.

4.2 INTERCOMMUNITY FLOWS

Currently no other City sends sewage flow across the Farmington city limits except through MCES Interceptors. Lakeville will send 1.6 MGD average flow through the Flagstaff Interceptor, but because of its interjusidictional nature, this line will be managed under the MCES interceptor system. All flow leaving the City of Farmington is via interceptor to the Empire WWTF.

4.3 INDIVIDUAL SEWAGE TREATMENT SYSTEMS (ISTS)

There are currently 85 ISTS included in the City's tracking and notification database. Most are located on agricultural or large lot properties in the west and south portions of the City.

The City of Farmington is committed to the proper design, location, installation, and ongoing maintenance of ISTS. Title 7, Chapter 3 of the Farmington City Code requires that all new systems be installed according to Minnesota Pollution Control Agency (MPCA) rule 7080 permit requirements and Dakota County Environmental Management Department Ordinance 113. Groundwater conditions, soil borings, distance to surface water, percolation tests, and design and type of selected ISTS are further factors included in the developer's site evaluation. An owner must have a City permit before using an ISTS.

The City of Farmington currently abides by the Minnesota Pollution Control Agency's Chapter 7080.0175 for maintenance reviews of the ISTS systems. The City will soon comply with the MPCA's new reporting and maintenance code under Chapter 7080.2430 and 7080.2450 respectively.

The complete ISTS ordinance is included in Appendix F.

4.4 PUBLICLY OWNED SEWAGE TREATMENT SYSTEMS

There are no publicly owned on-site treatment systems.

4.5 SYSTEM DESIGN AND RECOMMENDATIONS

The City of Farmington is divided into eight sewer districts, each defining the limits of service. These districts are further subdivided into smaller sewersheds that were used to develop design flows and then determine cumulative design flows in the various pipe segments. The major sanitary sewer districts and their corresponding prefix abbreviations are given in Table 4.2.

TABLE 4.2 – SANITARY SEWER DISTRICTS

Sewer District	Abbreviation
North Central - District 1	D1
Northwest - District 2	D2
West Central - District 3	D3
Southwest - District 4	D4
East Central - District 5	D5
Southeast - District 6	D6
Northeast - District 7	D7
East Central - District 8	D8

A summary of characteristics and special issues within each district is provided below.

4.5.1 North Central - District 1

District 1 serves the north central portion of Farmington up to the border with Lakeville. This district is served by the Apple Valley Interceptor operated by the MCES. District 1 is almost completely built out. The ultimate land use within the City of Farmington is tabulated below. A detailed breakdown is provided in Appendix A.

Table 4.3 – District 1 Land Uses

Land Use	Acres
Low Density Residential	629
Medium Density Residential	47
High Density Residential	2
Industrial	0
Commercial	7
Public/Semi-public	45
Park/Open-space	191
Floodplain	103
Right-of-Way	220
Water	81
Total	**1,326**

The trunk sewer in this district is completely installed. The majority of this trunk was installed in 1975 and flowed north, where it was intended to reach the Apple Valley wastewater treatment facility. The old portion of the trunk line now travels north from Node 101 out of the City into Lakeville, where it connects with the Apple Valley Interceptor at Node 107. Another portion of the trunk line, which was installed in 1996, travels east from Node 101 to Node 118. This newer trunk line picks up the trunk line from Node 113 to Node 116, a portion of which was once directed north. The Fair Hills lift station at Node 305 once flowed into the north trunk as well, but was abandoned in 1998. These improvements eliminated a capacity problem that once existed in the trunk line heading north. No capacity issues for this district are shown in Appendix D.

4.5.2 Northwest – District 2

District 2 is located in the northwest corner of Farmington. The district will be served by the District 3 trunk sewer and the Lakeville-Farmington Interceptor. This district is completely undeveloped, and the majority of this district will remain agriculture until after 2030. The ultimate land use within the City of Farmington is tabulated below. A detailed breakdown is provided in Appendix A.

TABLE 4.4 – DISTRICT 2 LAND USES

Land Use	Acres
Low Density Residential	833
Medium Density Residential	8
High Density Residential	0
Industrial	0
Commercial	0
Public/Semi-public	0
Park/Open-space	0
Floodplain	132
Right-of-Way	15
Water	0
Total	**988**

No portion of the District 2 trunk pipe has been constructed. Construction of the trunk pipe in District 3 is completed to Node 207, therefore allowing for expansion of development in this district with only limited construction of trunk sewer.

Although a significant portion of Lakeville naturally drains to this district, it has been routed into District 4 rather than District 2. During the design phase of the Middle Creek Trunk Sewer (from Node 207 to 419) Lakeville declined to participate in the costs of the line. As a result, the sewer line was not sized to accommodate future sewage flows from Lakeville. This is a major change from the 1996 CSP and also affects District 3.

4.5.3 WEST CENTRAL – DISTRICT 3

District 3 is located in the west central portion of Farmington. This district is served by the Middle Creek trunk line, which discharges to the Lakeville-Farmington Interceptor. The district is partially developed, and the majority of development within the district will likely not occur until after 2030. The ultimate land use within the City of Farmington is tabulated below. A detailed breakdown is provided in Appendix A.

TABLE 4.5 – DISTRICT 3 LAND USES

Land Use	Acres
Low Density Residential	565
Medium Density Residential	303
High Density Residential	0
Industrial	282
Commercial	131
Public/Semi-public	19
Park/Open-space	184
Floodplain	237
Right-of-Way	205
Water	45
Total	**1,971**

The trunk service for this district was completed in 1988, as noted above. A portion of this district has been redirected from the 1996 CSP west into the Flagstaff trunk line in District 4 (Nodes 402-410). A large section of District 1 was redirected into District 3 when the Fair Hills lift station was taken offline and the trunk line from Node 305 to 308 was completed. Appendix D shows several minor capacity issues in District 3, but these are the result of the conservative nature of the unit flow rates in the model. No surcharging issues have been observed in District 3's trunk sewer, so no improvements are scheduled at this time.

4.5.4 SOUTHWEST – DISTRICT 4

District 4 is located in the southwestern portion of the City along the border with Lakeville. The majority of the trunk sewer in this district is the existing Lakeville-Farmington Interceptor and the soon to be completed Flagstaff Interceptor. This district is primarily agriculture, and the majority of development within the district will likely not occur until after 2030. The ultimate land use within the City of Farmington is tabulated below. This land use table does not include the area in Eureka shown serviced by sewer line 420 to 414.
A detailed breakdown is provided in Appendix A.

TABLE 4.6 – DISTRICT 4 LAND USES

Land Use	Acres
Low Density Residential	196
Medium Density Residential	256
High Density Residential	221
Industrial	152
Commercial	391
Public/Semi-public	129
Park/Open-space	173
Floodplain	300
Right-of-Way	91
Water	11
Total	1,919

A proposed trunk line is shown from Node 420 in Eureka Township to Node 414. The necessity of this sewer line will be determined by timing of development in this portion of Eureka and the installation of the Phase 2 Elko-New Market Interceptor. If the interceptor is constructed before development occurs, this area will be served by the Elko-New Market Interceptor and this trunk line will be unnecessary. The Lakeville-Farmington interceptor has capacity to handle this additional flow if necessary. No capacity issues are shown for the District 4 trunk line in Appendix D.

4.5.5 EAST CENTRAL - DISTRICT 5

District 5 is located in the center of Farmington, along Akin Road and the Middle Schools. The trunk sewer system for District 5 is completely constructed. This district is served by the Lakeville-Farmington interceptor. District 5 is almost fully developed. The majority of landuse in the district is large lot residential properties and the two middle schools. The ultimate land use within the City of Farmington is tabulated below.
A detailed breakdown is provided in Appendix A.

TABLE 4.7 – DISTRICT 5 LAND USES

Land Use	Acres
Low Density Residential	124
Medium Density Residential	0
High Density Residential	0
Industrial	0
Commercial	0
Public/Semi-public	88
Park/Open-space	141
Floodplain	16
Right-of-Way	43
Water	45
Total	456

No capacity issues are shown for the District 5 trunk line in Appendix D.

4.5.6 SOUTHEAST - DISTRICT 6

District 6 is located in the southeast portion of the City and includes the oldest part of town, commercial downtown area and OAA areas in Empire and Castle Rock Townships south to 230th Street and east to Biscayne Avenue. The OAA areas are shown on the 2030 Land Use map in Appendix A. This is the largest district with 2,766 acres. This district is currently served by two trunks that both connect to the Lakeville-Farmington interceptor. The area on the south and east edges of the district have yet to develop and only a portion is expected to develop by 2030. The ultimate land use within the City of Farmington is tabulated below. A detailed breakdown is provided in Appendix A.

TABLE 4.8 – DISTRICT 6 LAND USES

Land Use	Acres
Low Density Residential	805
Medium Density Residential	243
High Density Residential	37
Industrial	16
Commercial	243
Public/Semi-public	436
Park/Open-space	186
Floodplain	401
Right-of-Way	331
Water	69
Total	**2,766**

The sewers that serve downtown are old and have deteriorated joints. For the past several years the City has undertaken a sewer replacement program when downtown streets are reconstructed that has reduced I/I.

Four lift stations are in use in District 6, all non-trunk. Two of these lift stations are proposed to be eliminated: Dakota Electric and Hunter. The Hunter lift station at Node 609 currently pumps flows north to Node 602. This lift station will be replaced with a gravity sewer south to 610. The Dakota Electric lift station at Node 423 currently pumps flow north into the lateral sewer, which then gets carried to the West View Lift Station, and on to Node 601. The Dakota Electric lift station would be replaced with a gravity sewer west to Node 424. If the proposed sewer from Node 420 to Node 414 in District 4 is never constructed, this gravity line may be routed to the Elko-New Market Interceptor. Because the sewer model is based on ultimate conditions, both area D6-8 (served by the Hunter Lift Station), and area D6-1 (served by the Dakota Electric lift station) are shown in the model routed to their ultimate discharge point.

A proposed trunk line is shown extending down the east side of the district along Biscayne Avenue.
The existing trunk from Node 611 to Node 619 does not have capacity to handle the ultimate flows from D6-17 through D6-21. The system does have capacity to take the peak flows from D6-18 and D6-20, which

the model shows have an average flow of approximately 0.23 MGD, and a peak flow of 0.87 MGD. If these areas develop before the rest of the districts along Biscayne Avenue, the entirety of these districts will be routed into the existing system. If development pressure occurs along the entire length of Biscayne Avenue at once, the new trunk line will need to be constructed. If one of the other sewersheds develops first, that sewershed can be routed into the existing trunk sewer as long as the total additional flow into the existing sewer does not exceed 0.23 MGD. Because of the likelihood of D6-18 and D6-20 being routed into the existing sewer, these flows are included in Appendices C and D twice, both to account for the flows in the existing trunk, and to size the new trunk along Biscayne Avenue.

The south branch of the Vermillion River intersects sewersheds D6-15, D6-16, and D6-17, limiting development in these regions. D6-15 is not slated for redevelopment and is currently planted in prairie seed by the county. Therefore no flow was assumed from this district.

No capacity issues are shown for the District 6 trunk line in Appendix D with the construction of the Biscayne Avenue trunk line.

4.5.7 NORTHEAST - DISTRICT 7

District 7 is located in the northeastern portion of the City, on the east side of the railroad tracks. This district is completely undeveloped but will be developed by a single owner over the next fifteen years. The proposed land use is low and medium density housing, with a mixed-use commercial/residential corridor at the intersection of Hwy. 3 and 195th Street. The ultimate land use within the City of Farmington is tabulated below. A detailed breakdown is provided in Appendix A.

TABLE 4.9 – DISTRICT 7 LAND USES

Land Use	Acres
Low Density Residential	461
Medium Density Residential	139
High Density Residential	0
Industrial	0
Commercial	17
Public/Semi-public	58
Park/Open-space	23
Floodplain	43
Right-of-Way	35
Water	8
Total	**783**

The proposed trunk sewer system will cross under the railroad tracks at Node 707. A lift station is needed at Node 701 to serve the low area in D7-1. The design for this trunk line is currently in the preliminary approval stage, and the trunk and lift station will be funded completely by the developer.

4.5.8 EAST CENTRAL - DISTRICT 8

District 8 is located in the central part of the City, along North Creek to the east. This district is served by a trunk line that runs west to east and connects into the Apple Valley Interceptor. This is the smallest sewershed, and the district is partially developed. There remains undeveloped property in the south portion of the district that's development is dependent on market forces. The ultimate land use within the City of Farmington is tabulated below. A detailed breakdown is provided in Appendix A.

TABLE 4.10 – DISTRICT 8 LAND USES

Land Use	Acres
Low Density Residential	215
Medium Density Residential	0
High Density Residential	0
Industrial	0
Commercial	0
Public/Semi-public	0
Park/Open-space	92
Floodplain	27
Right-of-Way	46
Water	51
Total	430

The trunk system serving District 8 was designed and constructed within the past few years and has sufficient capacity to serve the existing development and future development. When future development occurs an additional 10" trunk line will be extended south from Node 802 to serve this area.

5. Infiltration and Inflow

In February of 2006, the Metropolitan Council instituted its Inflow/Infiltration Surcharge Program. 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 use its system. Communities that exceed this threshold are required to eliminate this excess flow within a reasonable timeframe or pay a surcharge fee.

The Metropolitan Council identified Farmington as a community with at least one Infiltration and Inflow (I/I) exceedence event recorded between June 1, 2004 and June 30, 2006, and assessed a surcharge to begin in 2007 and last for five years, until 2011. The City has since drafted an I/I Reduction Plan which proposes improvements over a period of five years to reduce I/I which will cost more than the surcharge. If this plan is approved by the Metropolitan Council, the City will receive credit for the entire surcharge. The I/I Reduction Plan consists of six components:

1. Resume monitoring wastewater flow in the City system
2. A sump pump cross connection inspection and removal program
3. A program to investigate known or suspected areas of foundation drains, leaking cleanouts, and leaking services
4. A manhole inspection and repair program
5. An ongoing sewer cleaning, televising, and repair program
6. Stringent requirements for new sanitary sewer and home construction

Appendix G contains a copy of the City's I/I Reduction Plan, which gives details on each component, as well as a summary of improvement costs through 2011.

In 2013 the Metropolitan Council will institute a wastewater demand charge program for those communities that have not met their inflow and infiltration goal(s). With the implementation of the I/I Reduction Plan, Farmington should meet its goals. Farmington has had only one exceedence event since June 1, 2004: October 4, 2005, when the Twin Cities area received an almost 100-yr rainfall event, with 6" of rain in some areas. Additionally, Farmington's current dry weather flow is approximately 66 gallons of wastewater per capita per day (gcd). A typical annual flow is 85 gcd (75 gcd dry weather flow plus 10 gcd I/I), showing that Farmington has significantly less I/I than average. Recent metering also does not show much variability around these values indicating limited infiltration and inflow even in the spring. Farmington has also been systematically replacing older sanitary sewer within the downtown area since 1991, which has already significantly reduced I/I. Finally, the City requires new homes be constructed two feet above the highest groundwater level recorded, which is often three to six feet below the surface. This reduces infiltration in new development sewer systems, which is harder to avoid in older parts of town where basements may be constructed in the groundwater table.

6. Cost Estimates and Financing

6.1 COST ESTIMATES

Cost estimates have been prepared for the proposed trunk facilities outlined in this report. Two trunk lines shown on Map 1 as proposed are not included in the cost estimates. Both of these trunk lines are shown in the spreadsheet as "Design", which means they are already in the design or construction phase. One area is the new Farmington Flagstaff Interceptor project, which is currently under construction. The costs for this project have already been determined and were split by the City, Lakeville, and the Metropolitan Council. The other trunk line is the District 7 trunk line. This line is already in preliminary design with the development of District 7, and this trunk line will be paid for entirely by the developer of the property in District 7, so no area charge need be assessed by the City.

The total estimated cost of all other proposed trunk facilities shown on Map 1 is $6,747,000. Trunk facilities include lift stations, force mains, and all gravity lines greater than or equal to 10" in diameter. A breakdown of the cost estimates for proposed trunk sewer is presented in Table 6.1 and in detail in Appendix E. For the City of Farmington, no new lift stations or force mains are proposed other than in District 7, which as described above is in the design phase, so the table includes only gravity lines. The cost estimates include construction, design, legal, administration, and planning contingency costs. Land and easement acquisition costs are not included. The planning contingency costs account for unexpected costs. Examples include route changes by the developer or difficulties in construction such as unexpected bedrock or the requirement of excessive dewatering.

TABLE 6.1 – TRUNK SEWER COST ESTIMATES

From Point	To Point	Trunk Line Size (inches)	Proposed Pipe Length (feet)	Depth (ft)	Unit Cost ($)	Total Segment Cost ($)
201	202	12	2,600	28	$187	$486,000
202	203	12	2,110	22	$187	$393,000
203	204	12	1,730	23	$187	$324,000
204	207	12	2,880	17	$119	$344,000
205	206	10	2,030	13	$103	$209,000
206	207	10	153	9	$96	$15,000
301	302	10	1,350	10	$103	$140,000
304	308	18	2,540	8	$155	$394,000
420	421	10	1,900	20	$103	$197,000
421	424	18	2,830	25	$227	$642,000
422	424	10	2,020	15	$103	$209,000
423	424	12	1,290	13	$119	$154.000
424	414	21	2,670	25	$279	$744,000
609	610	10	1,010	15	$103	$104,000
621	622	10	2,380	29	$156	$372,000
622	623	15	2,740	17	$142	$390,000
623	624	21	7,230	19	$187	$1,350,000
624	625	21	762	24	$279	$212,000
801	802	10	715	9	$96	$69,000
					Total Cost	$6,747,000

6.2 FINANCING

The City of Farmington finances new trunk sanitary sewer with area and connection charges. The existing area and connection charges should be revised according to the cost estimates provided in this report to provide adequate funding for anticipated expansion. These charges should be reviewed and adjusted annually, according to the ENR construction cost index.

7. Summary and Outcomes

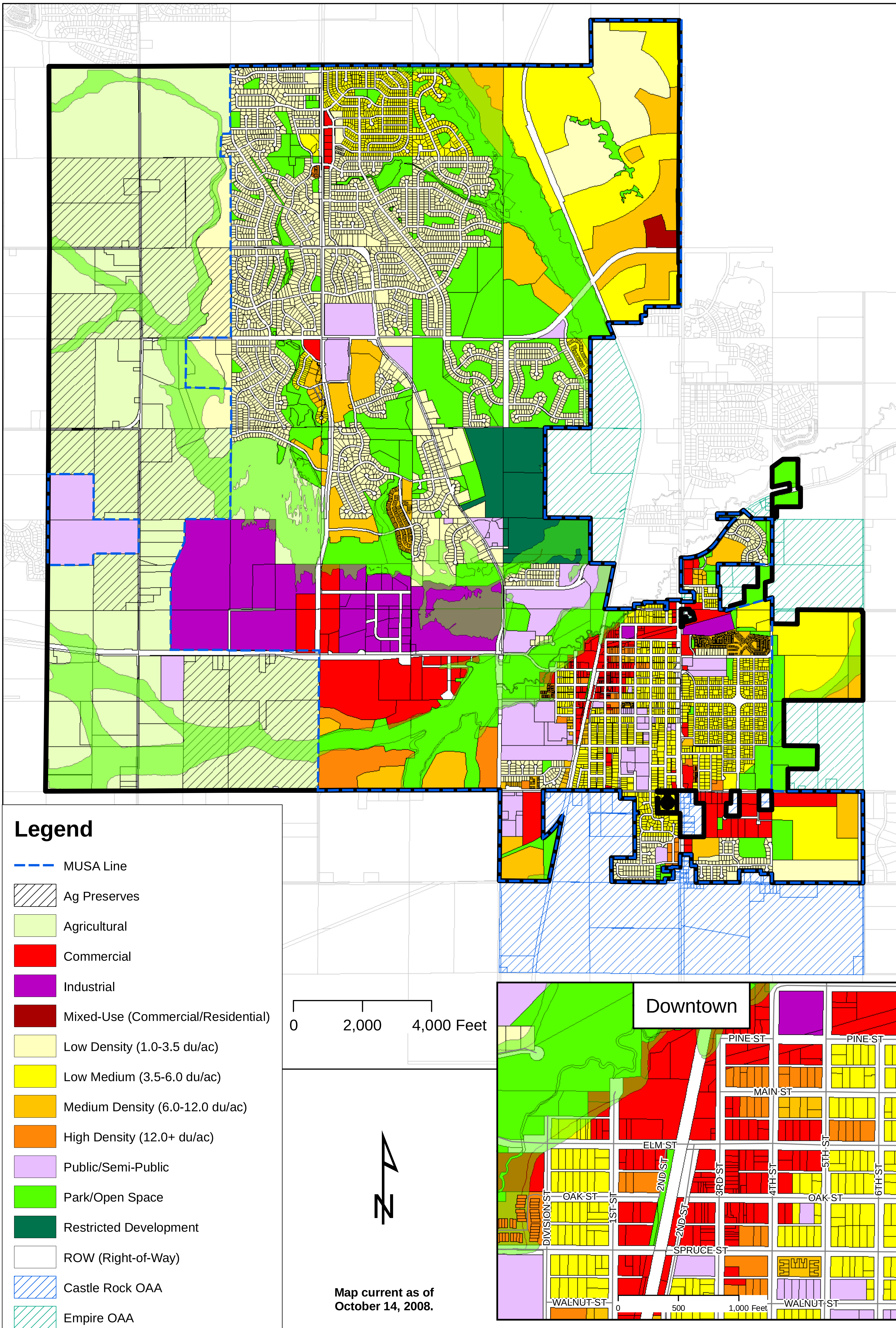
The Comprehensive Sanitary Sewer Plan presented herein is intended to serve as an inventory of City of Farmington's existing sanitary sewer trunk facilities and as a guide for expanding the trunk sewer system to service future development in the City. Based on the information analyzed in this study and presented in this report, the following outcomes are desired:

1. That the Metropolitan Council use the City's population and flow projections in determining the appropriate capacity for its own facilities.
2. That the City Council adopt the sanitary sewer layout, as presented in the Trunk Sewer System Map, as the development guide for sanitary sewer construction within the study area.
3. That the system design flows and criteria in Appendices C and D be used for sizing all future sanitary sewer trunk facilities, but that flow projections of Section 2 be used when representing the impact of Farmington's system on the Metropolitan Disposal System and the Empire WWTF.

Appendix A
Land Use Maps and Areas for the Ultimate System

2030 Comprehensive Plan

(2008 Update)

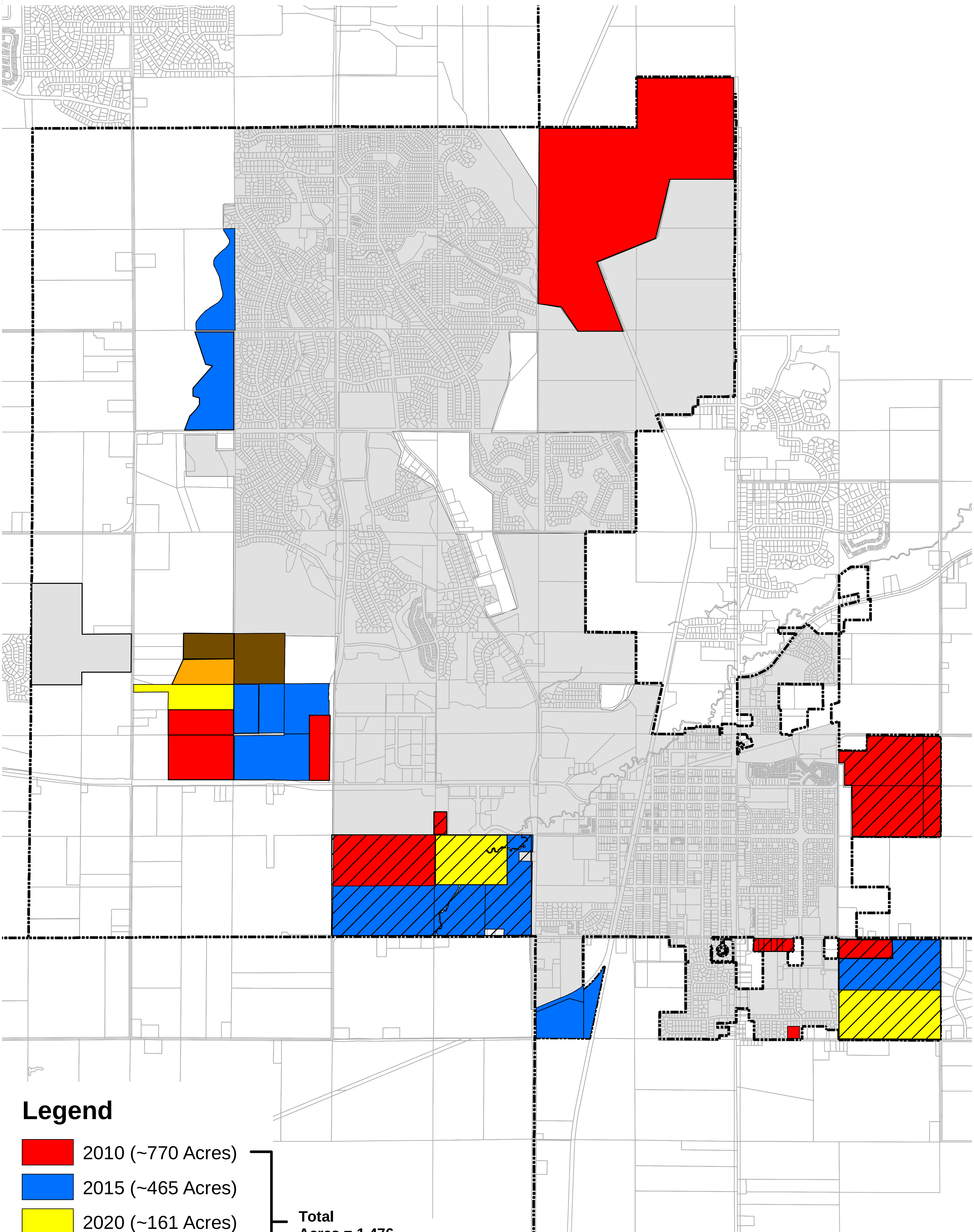


Prepared for the Farmington Community Development Department by the Dakota County Office of GIS.

Project #11663

Map 4.6

2008 MUSA STAGING MAP



Legend

- 2010 (~770 Acres)
- 2015 (~465 Acres)
- 2020 (~161 Acres)
- 2025 (~20 Acres)
- 2030 (~60 Acres)
- City Boundary
- Existing MUSA

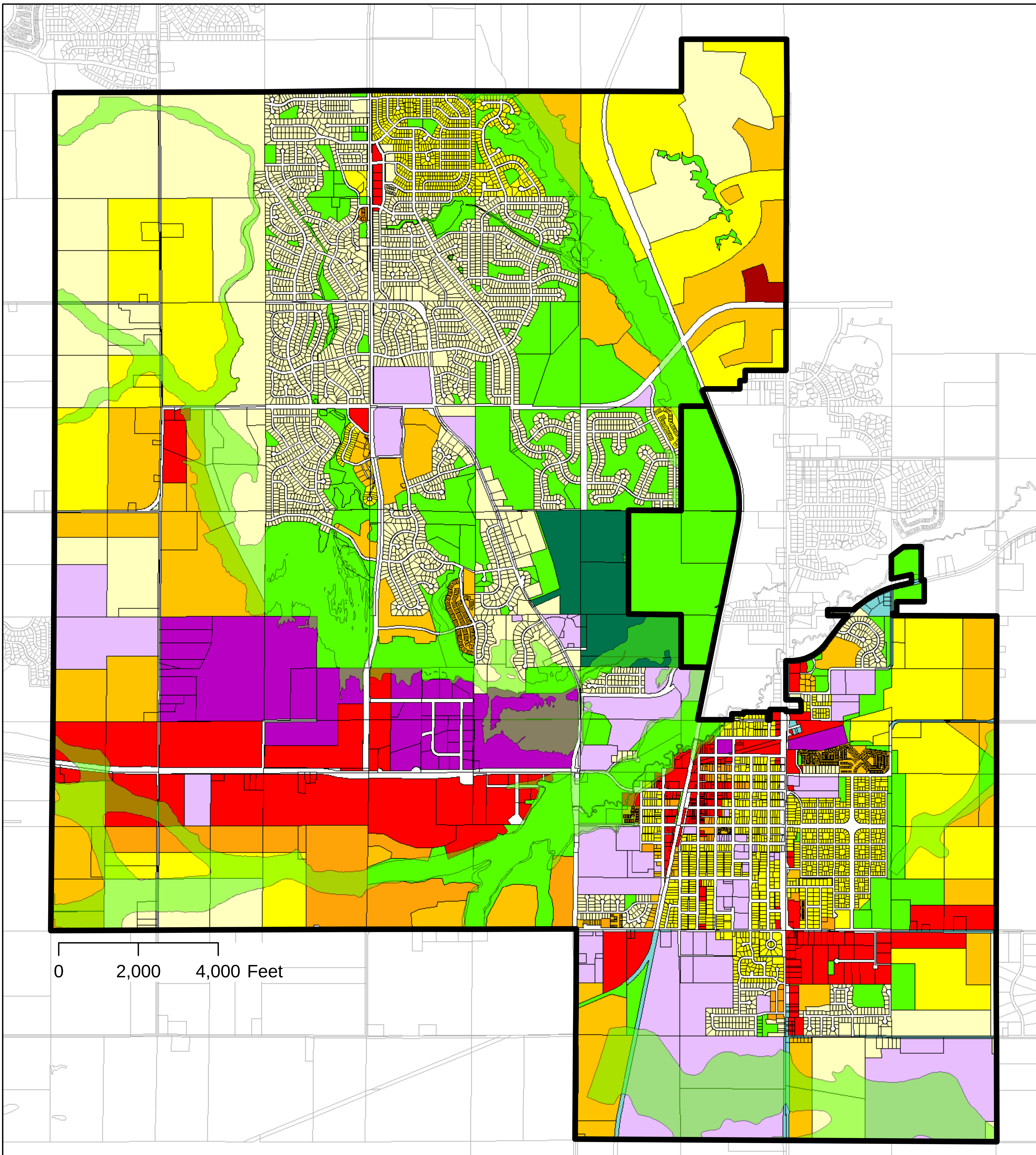
Total Acres = 1,476

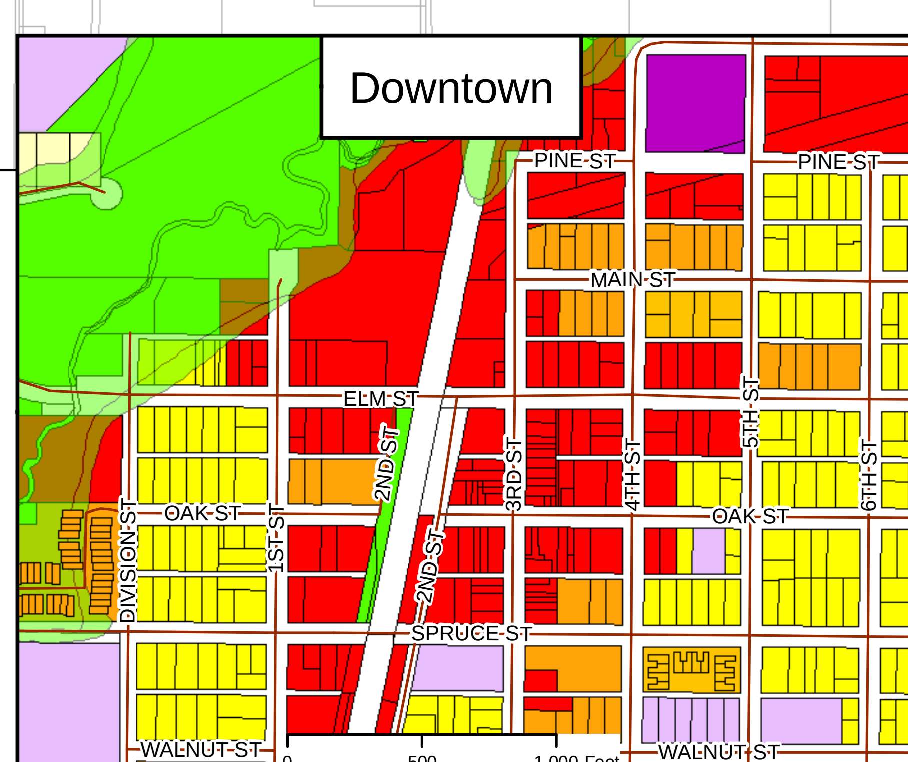
These properties have received MUSA approval from the Farmington City Council but still require approval from the Metropolitan Council upon submission of a development plan for the property.

N

I:\GIS User Group\Projects\2008 MUSA Staging Map

Ultimate Land Use





Legend

- Low Density
- Low Medium
- Medium Density
- High Density
- Commercial
- Industrial
- Public/Semi-Public
- Park/Open Space
- Mixed-Use (Commercial/Residential)
- Restricted Development
- ROW (Right-of-Way)
- Floodplain Overlay

Map current as of October 15, 2008.

Prepared for the Farmington Engineering Department by the Dakota County Office of GIS.

Project #11828

APPENDIX A - AREAS FOR THE ULTIMATE SYSTEM

Area Desig.	Low Density Residential		Medium Density Residential	High Density Residential	Industrial	Commercial	Public/ Semi-Public	Park/ Open Space	Floodplain	ROW	Water	TOTAL
	Units	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)
DISTRICT 1												
1-1	14	3.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.9	0.1	4.3
1-2	15	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.1	4.6
1-3	333	99.1	0.0	1.7	0.0	7.4	0.0	15.0	0.0	43.0	5.1	171.3
1-4	312	53.6	0.0	0.0	0.0	0.0	0.0	3.5	0.0	20.4	3.2	80.7
1-5	202	60.0	0.0	0.0	0.0	0.0	0.0	12.3	0.0	22.0	0.2	94.4
1-6	408	77.2	0.0	0.0	0.0	0.0	0.0	6.7	0.0	30.7	4.5	119.2
1-7	102	30.2	0.0	0.0	0.0	0.0	0.0	20.3	9.8	9.9	14.7	84.9
1-8	195	48.8	18.7	0.0	0.0	0.0	0.0	9.6	27.7	6.2	8.9	119.9
1-9	215	54.0	0.0	0.0	0.0	0.0	0.0	13.7	0.2	15.9	7.1	90.9
1-10	33	11.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	0.0	17.6
1-11	139	45.7	0.0	0.0	0.0	0.0	30.1	0.4	0.0	17.6	0.6	94.3
1-12	114	36.7	0.0	0.0	0.0	0.0	0.0	2.8	0.0	11.4	0.3	51.1
1-13	265	69.6	0.1	0.0	0.0	0.0	0.1	76.6	0.0	23.0	27.8	197.1
1-14	70	17.1	0.1	0.0	0.0	0.0	0.0	9.7	0.1	5.6	8.8	41.4
1-15	20	5.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	1.3	0.0	7.9
1-16	0	13.4	28.3	0.0	0.0	0.0	15.2	18.3	65.6	5.5	0.0	146.2
Subtotal	**2437**	**628.6**	**47.3**	**1.7**	**0.0**	**7.4**	**45.4**	**190.6**	**103.4**	**220.3**	**81.2**	**1325.8**
DISTRICT 2												
2-1	664	180.8	0.0	0.0	0.0	0.0	0.0	0.0	20.9	2.3	0.0	203.9
2-2	431	85.0	0.0	0.0	0.0	0.0	0.0	0.0	11.3	1.1	0.0	97.4
2-3	0	49.3	0.0	0.0	0.0	0.0	0.0	0.1	6.3	0.0	0.0	55.6
2-4	460	142.8	0.0	0.0	0.0	0.0	0.0	0.0	6.2	2.2	0.0	151.2
2-5	402	192.7	0.0	0.0	0.0	0.0	0.0	0.0	24.0	6.9	0.0	223.5
2-6	403	105.4	7.9	0.0	0.0	0.0	0.0	0.0	40.0	1.6	0.0	154.9
2-7	150	77.4	0.0	0.0	0.0	0.0	0.0	0.0	23.4	1.0	0.0	101.8
Subtotal	**2510**	**833.3**	**7.9**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**	**132.0**	**15.0**	**0.0**	**988.3**

APPENDIX A - AREAS FOR THE ULTIMATE SYSTEM

Area Desig.	Low Density Residential		Medium Density Residential	High Density Residential	Industrial	Commercial	Public/ Semi-Public	Park/ Open Space	Floodplain	ROW	Water	TOTAL
	Units	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)
DISTRICT 3												
3-1	229	44.5	56.5	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	105.2
3-2	258	81.1	42.9	0.0	0.0	23.8	0.0	0.0	38.6	6.3	2.0	194.8
3-3	42	14.9	52.9	0.0	0.0	0.0	0.0	0.0	27.9	1.2	0.0	96.9
3-4	0	0.0	32.6	0.0	190.7	3.7	0.0	3.0	12.9	2.0	0.0	244.9
3-5	650	204.1	0.0	0.0	0.0	0.0	0.0	24.1	0.0	69.9	7.4	305.5
3-6	137	38.7	0.0	0.0	0.0	0.0	0.0	4.4	0.0	13.0	4.3	60.5
3-7	44	9.0	10.4	0.0	0.0	4.9	0.0	19.8	0.0	10.3	1.4	55.8
3-8	163	45.2	0.0	0.0	0.0	0.0	0.0	11.3	53.6	11.6	1.2	122.8
3-9	0	0.0	9.2	0.0	0.0	0.0	0.0	20.3	0.4	5.5	4.4	39.8
3-10	0	0.0	0.0	0.0	61.0	98.2	0.0	1.6	13.2	21.8	0.0	195.7
3-11	112	38.3	42.0	0.0	0.0	0.0	19.0	12.4	0.0	22.0	3.9	137.6
3-12	102	34.5	17.2	0.0	0.0	0.0	0.0	2.4	0.0	14.8	2.8	71.7
3-13	0	0.0	0.0	0.0	12.5	0.0	0.0	16.4	65.8	3.6	0.0	98.4
3-14	101	41.2	39.2	0.0	0.0	0.0	0.0	67.1	0.0	17.9	17.4	182.8
3-15	52	13.3	0.0	0.0	18.0	0.0	0.0	1.9	24.4	0.8	0.6	59.0
Subtotal	**1890**	**564.9**	**302.9**	**0.0**	**282.2**	**130.6**	**19.0**	**184.4**	**236.8**	**205.0**	**45.4**	**1971.1**
DISTRICT 4												
4-1	64	27.0	33.5	0.0	0.0	0.0	0.1	0.0	0.0	3.3	0.0	63.8
4-2	183	57.3	3.8	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	62.8
4-3	0	0.0	9.8	0.0	0.0	0.0	109.2	0.0	0.0	1.0	0.0	119.9
4-4	0	0.0	78.9	0.0	15.8	75.5	0.0	0.0	13.4	7.2	0.0	190.9
4-5	0	2.3	1.8	13.6	0.0	49.4	6.4	0.0	45.6	11.0	0.0	130.1
4-6	53	18.9	53.0	4.0	0.0	0.3	0.0	0.0	78.9	0.8	0.0	155.9
4-7	279	86.2	0.0	46.4	0.0	30.9	13.3	0.0	88.8	1.4	0.0	267.0
4-8	1	3.9	5.2	96.1	0.0	5.1	0.0	9.2	22.4	2.3	0.0	144.3
4-9	0	0.0	0.0	15.3	0.0	41.0	0.0	18.0	0.1	0.0	0.0	74.4
4-10	0	0.0	45.2	45.4	0.0	9.2	0.0	105.4	1.4	6.4	0.0	213.0
4-11	0	0.0	0.0	0.0	1.3	66.4	0.0	0.0	0.0	7.6	0.0	75.3
4-12	0	0.0	0.0	0.0	34.8	17.5	0.0	7.9	7.6	3.2	4.5	75.5
4-13	0	0.0	0.0	0.0	22.3	0.0	0.0	7.9	0.9	4.3	2.0	37.4
4-14	0	0.0	0.0	0.0	41.7	56.8	0.0	0.0	0.0	17.0	0.0	115.5
4-15	0	0.0	0.0	0.0	35.7	38.7	0.0	25.0	36.0	21.3	4.4	161.1
4-17	0	0.0	24.5	0.0	0.0	0.0	0.0	0.0	4.5	2.7	0.0	31.6
Subtotal	**580**	**195.6**	**255.7**	**220.9**	**151.7**	**390.8**	**129.0**	**173.4**	**299.5**	**91.2**	**10.9**	**1918.5**

APPENDIX A - AREAS FOR THE ULTIMATE SYSTEM

Area Desig.	Low Density Residential		Medium Density Residential	High Density Residential	Industrial	Commercial	Public/ Semi-Public	Park/ Open Space	Floodplain	ROW	Water	TOTAL
	Units	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)
DISTRICT 5												
5-1	47	18.6	0.0	0.0	0.0	0.0	7.8	44.4	0.0	5.2	33.9	109.9
5-2	38	18.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0	21.8
5-3	20	11.0	0.0	0.0	0.0	0.0	0.0	5.5	0.0	3.7	0.2	20.4
5-4	203	72.6	0.0	0.0	0.0	0.0	8.3	26.9	15.7	15.8	9.5	148.7
5-5	5	3.2	0.0	0.0	0.0	0.0	72.0	63.9	0.0	15.0	1.2	155.2
Subtotal	**313**	**123.6**	**0.0**	**0.0**	**0.0**	**0.0**	**88.1**	**140.7**	**15.7**	**43.2**	**44.6**	**456.0**
DISTRICT 6												
6-1	0	0.0	46.2	0.0	0.0	31.5	15.3	15.3	25.9	11.4	3.1	148.7
6-2	120	32.6	9.9	8.1	0.0	23.2	71.0	28.7	0.0	39.8	1.6	214.9
6-3	307	76.4	3.7	4.8	0.0	18.7	27.0	0.2	0.0	68.0	0.0	198.9
6-4	66	15.5	1.4	3.7	3.0	9.6	0.0	0.0	0.0	18.8	0.0	52.0
6-5	44	13.7	0.0	0.0	12.6	22.0	0.0	5.6	0.0	12.9	1.0	67.8
6-6	0	0.0	0.0	0.0	0.0	0.0	111.0	0.0	1.5	5.6	0.0	118.2
6-7	173	49.5	0.0	5.1	0.0	2.8	4.4	4.6	0.0	19.2	0.0	85.5
6-8	60	19.7	0.2	0.0	0.0	0.9	1.1	0.0	0.0	12.0	0.0	34.0
6-9	119	37.2	0.0	10.5	0.0	37.7	0.0	7.5	0.0	15.7	4.3	112.8
6-10	15	6.5	0.0	0.0	0.0	15.4	0.0	0.6	0.0	3.3	10.8	36.6
6-11	83	22.8	0.1	4.9	0.0	16.1	0.0	13.3	0.0	16.0	7.9	81.1
6-12	461	78.6	9.0	0.0	0.0	3.8	14.6	22.4	0.0	46.6	9.8	184.7
6-13	81	23.8	26.7	0.0	0.0	2.2	9.2	6.9	0.0	5.9	7.2	81.9
6-14	99	33.5	17.8	0.0	0.0	5.2	15.6	11.0	0.0	17.8	7.2	108.0
6-15	0	0.0	0.0	0.0	0.0	0.0	80.7	0.0	160.7	3.0	0.0	244.4
6-16	125	36.0	19.0	0.0	0.0	5.7	0.0	0.0	64.7	6.4	0.0	131.9
6-17	4	8.9	0.0	0.0	0.0	0.0	85.7	0.0	102.3	4.6	0.0	201.5
6-18	301	96.8	18.4	0.0	0.0	17.0	0.0	15.6	0.0	13.2	0.0	161.1
6-19	172	55.3	20.4	0.0	0.0	30.7	0.0	27.7	14.3	2.2	9.4	159.9
6-20	286	92.0	21.2	0.0	0.0	0.0	0.0	9.4	31.4	2.4	3.9	160.2
6-21	336	106.2	49.0	0.0	0.0	0.0	0.0	17.5	0.0	6.8	2.9	182.4
Subtotal	**2852**	**805.1**	**243.0**	**37.3**	**15.6**	**242.5**	**435.8**	**186.0**	**400.7**	**331.2**	**69.1**	**2766.3**

APPENDIX A - AREAS FOR THE ULTIMATE SYSTEM

Area Desig.	Low Density Residential		Medium Density Residential	High Density Residential	Industrial	Commercial	Public/ Semi-Public	Park/ Open Space	Floodplain	ROW	Water	TOTAL
	Units	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)
DISTRICT 7												
7-1	312	100.4	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	107.9
7-2	334	107.5	11.2	0.0	0.0	0.0	0.0	3.8	0.0	4.2	1.8	128.4
7-3	259	83.3	84.0	0.0	0.0	16.8	0.0	6.3	0.0	3.9	2.5	196.8
7-4	378	121.8	10.7	0.0	0.0	0.0	0.0	4.2	0.0	7.3	0.0	144.0
7-5	148	47.6	43.5	0.0	0.0	0.0	0.0	0.0	0.0	7.6	0.0	98.6
7-6	0	0.0	0.0	0.0	0.0	0.0	57.9	9.2	43.3	11.6	0.0	122.0
Subtotal	**1431**	**460.6**	**153.2**	**0.0**	**0.0**	**16.8**	**57.9**	**23.4**	**43.3**	**34.5**	**7.9**	**797.6**
DISTRICT 8												
8-1	334	107.5	0.0	0.0	0.0	0.0	0.0	54.2	26.7	1.1	0.0	189.6
8-2	149	40.4	0.0	0.0	0.0	0.0	0.0	12.6	0.0	14.2	20.9	88.0
8-3	285	66.8	0.0	0.0	0.0	0.0	0.0	24.7	0.0	30.4	30.5	152.4
Subtotal	**768**	**214.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**91.6**	**26.7**	**45.7**	**51.4**	**430.0**
Total	**12781**	**3826.3**	**1010.0**	**259.8**	**449.5**	**788.1**	**775.1**	**990.1**	**1258.1**	**986.2**	**310.5**	**10653.6**

Appendix B
Average Flows (MGD) for the Ultimate System

APPENDIX B - AVERAGE FLOWS (MGD) FOR THE ULTIMATE SYSTEM

Area Desig.	Low Density Residential (MGD)	Medium Density Residential (MGD)	High Density Residential (MGD)	Industrial (MGD)	Commercial (MGD)	Public/ Semi-Public (MGD)	TOTALS (MGD)
DISTRICT 1							
1-1	0.004	0.000	0.000	0.000	0.000	0.000	**0.004**
1-2	0.004	0.000	0.000	0.000	0.000	0.000	**0.004**
1-3	0.084	0.000	0.003	0.000	0.009	0.000	**0.096**
1-4	0.079	0.000	0.000	0.000	0.000	0.000	**0.079**
1-5	0.051	0.000	0.000	0.000	0.000	0.000	**0.051**
1-6	0.103	0.000	0.000	0.000	0.000	0.000	**0.103**
1-7	0.026	0.000	0.000	0.000	0.000	0.000	**0.026**
1-8	0.049	0.030	0.000	0.000	0.000	0.000	**0.079**
1-9	0.054	0.000	0.000	0.000	0.000	0.000	**0.054**
1-10	0.008	0.000	0.000	0.000	0.000	0.000	**0.008**
1-11	0.035	0.000	0.000	0.000	0.000	0.024	**0.059**
1-12	0.029	0.000	0.000	0.000	0.000	0.000	**0.029**
1-13	0.067	0.000	0.000	0.000	0.000	0.000	**0.067**
1-14	0.018	0.000	0.000	0.000	0.000	0.000	**0.018**
1-15	0.005	0.000	0.000	0.000	0.000	0.000	**0.005**
1-16	0.000	0.045	0.000	0.000	0.000	0.012	**0.057**
Subtotal	**0.614**	**0.075**	**0.003**	**0.000**	**0.009**	**0.036**	**0.737**
DISTRICT 2							
2-1	0.167	0.000	0.000	0.000	0.000	0.000	**0.167**
2-2	0.109	0.000	0.000	0.000	0.000	0.000	**0.109**
2-3	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
2-4	0.116	0.000	0.000	0.000	0.000	0.000	**0.116**
2-5	0.101	0.000	0.000	0.000	0.000	0.000	**0.101**
2-6	0.102	0.012	0.000	0.000	0.000	0.000	**0.114**
2-7	0.038	0.000	0.000	0.000	0.000	0.000	**0.038**
Subtotal	**0.633**	**0.012**	**0.000**	**0.000**	**0.000**	**0.000**	**0.645**
DISTRICT 3							
3-1	0.058	0.089	0.000	0.000	0.000	0.000	**0.147**
3-2	0.065	0.068	0.000	0.000	0.029	0.000	**0.161**
3-3	0.011	0.084	0.000	0.000	0.000	0.000	**0.094**
3-4	0.000	0.052	0.000	0.229	0.004	0.000	**0.285**
3-5	0.164	0.000	0.000	0.000	0.000	0.000	**0.164**
3-6	0.035	0.000	0.000	0.000	0.000	0.000	**0.035**
3-7	0.011	0.016	0.000	0.000	0.006	0.000	**0.033**
3-8	0.041	0.000	0.000	0.000	0.000	0.000	**0.041**
3-9	0.000	0.015	0.000	0.000	0.000	0.000	**0.015**
3-10	0.000	0.000	0.000	0.073	0.118	0.000	**0.191**
3-11	0.028	0.066	0.000	0.000	0.000	0.015	**0.110**
3-12	0.026	0.027	0.000	0.000	0.000	0.000	**0.053**
3-13	0.000	0.000	0.000	0.015	0.000	0.000	**0.015**
3-14	0.025	0.062	0.000	0.000	0.000	0.000	**0.087**
3-15	0.013	0.000	0.000	0.022	0.000	0.000	**0.035**
Subtotal	**0.476**	**0.479**	**0.000**	**0.339**	**0.157**	**0.015**	**1.465**

APPENDIX B - AVERAGE FLOWS (MGD) FOR THE ULTIMATE SYSTEM

Area Desig.	Low Density Residential (MGD)	Medium Density Residential (MGD)	High Density Residential (MGD)	Industrial (MGD)	Commercial (MGD)	Public/ Semi-Public (MGD)	TOTALS (MGD)
DISTRICT 4							
4-1	0.016	0.053	0.000	0.000	0.000	0.000	**0.069**
4-2	0.046	0.006	0.000	0.000	0.000	0.000	**0.052**
4-3	0.000	0.015	0.000	0.000	0.000	0.087	**0.103**
4-4	0.000	0.125	0.000	0.019	0.091	0.000	**0.234**
4-5	0.000	0.003	0.024	0.000	0.059	0.005	**0.092**
4-6	0.013	0.084	0.007	0.000	0.000	0.000	**0.105**
4-7	0.070	0.000	0.083	0.000	0.037	0.011	**0.201**
4-8	0.000	0.008	0.172	0.000	0.006	0.000	**0.187**
4-9	0.000	0.000	0.027	0.000	0.049	0.000	**0.077**
4-10	0.000	0.071	0.081	0.000	0.011	0.000	**0.164**
4-11	0.000	0.000	0.000	0.002	0.080	0.000	**0.081**
4-12	0.000	0.000	0.000	0.042	0.021	0.000	**0.063**
4-13	0.000	0.000	0.000	0.027	0.000	0.000	**0.027**
4-14	0.000	0.000	0.000	0.050	0.068	0.000	**0.118**
4-15	0.000	0.000	0.000	0.043	0.046	0.000	**0.089**
4-17	0.000	0.039	0.000	0.000	0.000	0.000	**0.039**
Subtotal	**0.336**	**0.749**	**0.439**	**0.182**	**0.469**	**0.103**	**2.279**
DISTRICT 5							
5-1	0.012	0.000	0.000	0.000	0.000	0.006	**0.018**
5-2	0.010	0.000	0.000	0.000	0.000	0.000	**0.010**
5-3	0.005	0.000	0.000	0.000	0.000	0.000	**0.005**
5-4	0.051	0.000	0.000	0.000	0.000	0.007	**0.058**
5-5	0.001	0.000	0.000	0.000	0.000	0.058	**0.059**
Subtotal	**0.079**	**0.000**	**0.000**	**0.000**	**0.000**	**0.071**	**0.149**
DISTRICT 6							
6-1	0.000	0.073	0.000	0.000	0.038	0.012	**0.123**
6-2	0.030	0.016	0.014	0.000	0.028	0.057	**0.145**
6-3	0.077	0.006	0.009	0.000	0.022	0.022	**0.136**
6-4	0.017	0.002	0.007	0.004	0.011	0.000	**0.041**
6-5	0.011	0.000	0.000	0.015	0.026	0.000	**0.053**
6-6	0.000	0.000	0.000	0.000	0.000	0.089	**0.089**
6-7	0.044	0.000	0.009	0.000	0.003	0.004	**0.060**
6-8	0.015	0.000	0.000	0.000	0.001	0.001	**0.017**
6-9	0.030	0.000	0.019	0.000	0.045	0.000	**0.094**
6-10	0.004	0.000	0.000	0.000	0.019	0.000	**0.022**
6-11	0.021	0.000	0.009	0.000	0.019	0.000	**0.049**
6-12	0.116	0.014	0.000	0.000	0.005	0.012	**0.147**
6-13	0.020	0.042	0.000	0.000	0.003	0.007	**0.073**
6-14	0.025	0.028	0.000	0.000	0.006	0.012	**0.072**
6-15	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
6-16	0.032	0.030	0.000	0.000	0.007	0.000	**0.068**
6-17	0.001	0.000	0.000	0.000	0.000	0.069	**0.070**
6-18	0.076	0.029	0.000	0.000	0.020	0.000	**0.125**
6-19	0.043	0.032	0.000	0.000	0.037	0.000	**0.112**
6-20	0.072	0.033	0.000	0.000	0.000	0.000	**0.106**
6-21	0.085	0.077	0.000	0.000	0.000	0.000	**0.162**
Subtotal	**0.740**	**0.422**	**0.067**	**0.019**	**0.291**	**0.284**	**1.822**

APPENDIX B - AVERAGE FLOWS (MGD) FOR THE ULTIMATE SYSTEM

Area Desig.	Low Density Residential (MGD)	Medium Density Residential (MGD)	High Density Residential (MGD)	Industrial (MGD)	Commercial (MGD)	Public/ Semi-Public (MGD)	TOTALS (MGD)
DISTRICT 7							
7-1	0.079	0.006	0.000	0.000	0.000	0.000	**0.085**
7-2	0.084	0.018	0.000	0.000	0.000	0.000	**0.102**
7-3	0.065	0.133	0.000	0.000	0.020	0.000	**0.218**
7-4	0.095	0.017	0.000	0.000	0.000	0.000	**0.112**
7-5	0.037	0.069	0.000	0.000	0.000	0.000	**0.106**
7-6	0.000	0.000	0.000	0.000	0.000	0.046	**0.046**
Subtotal	**0.361**	**0.242**	**0.000**	**0.000**	**0.020**	**0.046**	**0.669**
DISTRICT 8							
8-1	0.084	0.000	0.000	0.000	0.000	0.000	**0.084**
8-2	0.038	0.000	0.000	0.000	0.000	0.000	**0.038**
8-3	0.072	0.000	0.000	0.000	0.000	0.000	**0.072**
Subtotal	**0.194**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.194**
Total	**3.432**	**1.978**	**0.509**	**0.539**	**0.946**	**0.555**	**7.323**

Appendix C
Design Flows for the Ultimate System

APPENDIX C - DESIGN FLOWS (MGD) FOR THE ULTIMATE SYSTEM

From Point	To Point	Area Added	Average Flow Added (MGD)	Total Average Flow (MGD)	Peak Flow Factor (PFF)	DESIGN FLOW (MGD)
DISTRICT 1						
101	102	1/2 of 1-1	0.002	0.002	4.0	0.007
102	103	1-2	0.004	0.006	4.0	0.022
103	105	1-3	0.096	0.101	4.0	0.405
104	105	1-5	0.051	0.051	4.0	0.204
105	106	1-4	0.079	0.231	3.8	0.877
106	**107 (Interceptor)**	1-6	0.103	0.334	3.6	1.201
109	**110 (Interceptor)**	1-7	0.026	0.026	4.0	0.103
111	112	1-9	0.054	0.054	4.0	0.217
112	117	1-14	0.018	0.072	4.0	0.288
113	114	1-10	0.008	0.008	4.0	0.033
114	115	1-11	0.059	0.067	4.0	0.270
115	116	1-12	0.029	0.096	4.0	0.385
101	116	1/2 of 1-1	0.002	0.002	4.0	0.007
116	117	1-13	0.067	0.165	3.9	0.643
117	118 (Interceptor)	1-15	0.005	0.242	3.7	0.895
110 (Interceptor)	**118 (Interceptor)**	1-8	0.079	0.321	3.6	1.154
DISTRICT 2						
201	202	2-1	0.167	0.167	3.9	0.653
202	203	2-2	0.109	0.276	3.7	1.021
203	204	2-3	0.000	0.276	3.7	1.021
204	207	2-4	0.116	0.392	3.6	1.411
205	206	2-5	0.101	0.101	4.0	0.405
206	207	2-6	0.114	0.215	3.8	0.818
207	302	2-7	0.038	0.645	3.4	2.193
DISTRICT 3						
301	302	3-1	0.147	0.147	3.9	0.573
302	303	3-2	0.161	0.953	3.2	3.051
303	308	3-3	0.094	1.048	3.1	3.247
304	308	3-4	0.285	0.285	3.7	1.054
305	306	3-5	0.164	0.164	3.9	0.639
306	307	3-6	0.035	0.198	3.8	0.754
307	308	3-7	0.033	0.232	3.8	0.881
308	309	3-8	0.041	1.605	2.9	4.655
309	313	3-9	0.015	1.620	2.9	4.697
310	311	3-11	0.110	0.110	4.0	0.439
311	312			0.110	4.0	0.439
312	313			0.110	4.0	0.439
313	315	3-12	0.053	1.782	2.9	5.169
314	315	3-10	0.191	0.191	3.8	0.726
315	316	3-13	0.015	1.988	2.8	5.567
316	317	3-14	0.087	2.076	2.8	5.812
317	318	3-15	0.035	2.110	2.8	5.909
318	419 (Interceptor)			2.110	2.8	5.909

APPENDIX C - DESIGN FLOWS (MGD) FOR THE ULTIMATE SYSTEM

From Point	To Point	Area Added	Average Flow Added	Total Average Flow	Peak Flow Factor (PFF)	DESIGN FLOW
			(MGD)	(MGD)		(MGD)
DISTRICT 4						
403 (Interceptor)	**404 (Interceptor)**	4-1	0.069	0.069	4.0	0.276
404 (Interceptor)	**405 (Interceptor)**	4-2	0.052	0.052	4.0	0.208
405 (Interceptor)	**406 (Interceptor)**	4-3	0.103	0.103	4.0	0.411
407 (Interceptor)	**408 (Interceptor)**	4-4	0.234	0.234	3.8	0.890
408 (Interceptor)	**409 (Interceptor)**	4-5	0.092	0.092	4.0	0.366
410 (Interceptor)	**411 (Interceptor)**	4-6	0.105	0.105	4.0	0.419
411 (Interceptor)	**412 (Interceptor)**	4-7	0.201	0.201	3.8	0.764
412 (Interceptor)	**413 (Interceptor)**	4-8	0.187	0.187	3.9	0.729
413 (Interceptor)	**414 (Interceptor)**	4-9	0.077	0.817	3.2	2.614
420	421	4-16	0.115	0.115	4.0	0.461
421	424	4-17	0.271	0.386	3.6	1.391
422	424	4-18	0.118	0.118	4.0	0.473
423	424	6-1	0.123	0.123	3.9	0.480
424	**414 (Interceptor)**	4-19	0.112	0.740	3.3	2.443
415	418	4-11	0.081	0.081	4.0	0.325
416	417	4-12	0.063	0.063	4.0	0.251
417	418	4-13	0.027	0.090	4.0	0.358
418	419 (Interceptor)	4-14	0.118	0.289	3.7	1.069
414 (Interceptor)	**419 (Interceptor)**	4-10	0.164	2.563	2.7	6.920
DISTRICT 5						
501	502	5-1	0.018	0.018	4.0	0.072
502	503	5-2	0.010	0.028	4.0	0.111
503	504			0.028	4.0	0.111
504	505			0.028	4.0	0.111
505	506	5-3	0.005	0.033	4.0	0.131
506	507			0.033	4.0	0.131
507	508 (Interceptor)	5-4	0.058	0.091	4.0	0.362
419 (Interceptor)	**508 (Interceptor)**	4-15	0.089	0.180	3.9	0.701

APPENDIX C - DESIGN FLOWS (MGD) FOR THE ULTIMATE SYSTEM

From Point	To Point	Area Added	Average Flow Added (MGD)	Total Average Flow (MGD)	Peak Flow Factor (PFF)	DESIGN FLOW (MGD)
DISTRICT 6						
601	602	6-2	0.145	0.145	3.9	0.566
602	603	6-3	0.136	0.281	3.7	1.040
603	604			0.281	3.7	1.040
604	605 (Interceptor)	6-4	0.041	0.322	3.6	1.158
508 (Interceptor)	**605 (Interceptor)**	5-5	0.059	0.380	3.6	1.370
605 (Interceptor)	**606 (Interceptor)**	6-5	0.053	0.053	4.0	0.210
607	608	6-6	0.089	0.089	4.0	0.355
608	610	6-7	0.060	0.148	3.9	0.579
609	610	6-8	0.017	0.017	4.0	0.070
610	614			0.166	3.9	0.647
611	613	6-16	0.068	0.068	4.0	0.274
612	613	6-18	0.125	0.125	3.9	0.489
613	614	6-9	0.094	0.288	3.7	1.065
614	615	6-10	0.022	0.476	3.5	1.666
615	617	6-11	0.049	0.525	3.4	1.786
616	617	6-20	0.106	0.106	4.0	0.422
617	618	6-12	0.147	0.777	3.3	2.566
618	**619 (Interceptor)**	6-13	0.073	0.850	3.2	2.720
619 (Interceptor)	**620 (Interceptor)**	6-14	0.072	0.072	4.0	0.287
621	622	6-17	0.070	0.070	4.0	0.278
622	623	6-18	0.125	0.195	3.8	0.741
623	624	6-19, 6-20	0.218	0.413	3.5	1.445
624	**625 (Interceptor)**	6-21	0.221	0.634	3.4	2.154
DISTRICT 7						
701	702	7-1	0.085	0.085	4.0	0.339
702	703			0.085	4.0	0.339
703	705	7-2	0.102	0.187	3.9	0.727
704	705	7-3	0.218	0.218	3.8	0.829
705	706	7-4	0.112	0.517	3.4	1.758
706	707 (Interceptor)	7-5	0.106	0.623	3.4	2.118
118 (Interceptor)	**707 (Interceptor)**	1-16	0.057	0.680	3.3	2.243
DISTRICT 8						
801	802	8-1	0.084	0.084	4.0	0.337
802	803	8-2	0.038	0.122	3.9	0.475
803	804 (Interceptor)	8-3	0.072	0.194	3.8	0.735
707 (Interceptor)	**804 (Interceptor)**	7-6	0.046	0.240	3.8	0.911

Entries shown in bold are connections between the Farmington Sanitary Sewer System and Metropolitan Council's Interceptor System. We have not shown routing within the Interceptors, just flows into them.

Appendix D
Pipe Capacities for the Ultimate System

APPENDIX D - EXISTING/PROPOSED PIPE CAPACITIES FOR THE ULTIMATE SYSTEM

Node ID #		Design Flow	Exist./ Proposed	Size	Length	Rim	Upstream Elev.	Dowstrm Elev.	Slope	CAPACITY					Capacity/ Design Flow
From Point	To Point									Inlet Control		Outlet Control		Capacity	
		(MGD)		(in.)	(ft.)	(ft.)	(ft.)	(ft.)	(%)	(cfs)	(MGD)	(cfs)	(MGD)	(MGD)	
DISTRICT 1															
101	102	0.01	Exist.	12	670	915.88	909.98	909.00	0.15	3.65	2.36	1.36	0.88	0.88	124.75
102	103	0.02	Exist.	15	1584	916.36	909.00	906.26	0.17	6.38	4.12	2.69	1.74	1.74	78.26
103	105	0.41	Exist.	15	1637	915.70	906.26	904.52	0.11	6.38	4.12	2.11	1.36	1.36	3.36
104	105	0.20	Exist.	8	1075	920.50	908.43	904.52	0.36	1.33	0.86	0.73	0.47	0.47	2.31
105	106	0.88	Exist.	18	1309	914.65	904.52	903.14	0.11	10.07	6.51	3.41	2.20	2.20	2.51
106	107 (Interceptor)	1.20	Exist.	18	2344	917.19	903.55	900.04	0.15	10.07	6.51	4.06	2.63	2.63	2.19
109	110 (Interceptor)	0.10	Exist.	10	2325	921.16	898.61	891.18	0.32	2.32	1.50	1.24	0.80	0.80	7.78
111	112	0.22	Exist.	10	804	913.60	897.46	895.49	0.25	2.32	1.50	1.08	0.70	0.70	3.23
112	117	0.29	Exist.	12	1047	914.96	895.39	892.64	0.26	3.65	2.36	1.83	1.18	1.18	4.10
113	114	0.03	Exist.	12	1962	961.13	950.51	942.39	0.41	3.65	2.36	2.29	1.48	1.48	44.51
114	115	0.27	Exist.	12	1075	963.33	942.39	914.40	2.60	3.65	2.36	5.75	3.71	2.36	8.76
115	116	0.38	Exist.	12	2149	919.90	906.30	896.76	0.44	3.65	2.36	2.37	1.53	1.53	3.99
101	116	0.01	Exist.	12	2163	915.88	909.98	896.76	0.61	3.65	2.36	2.79	1.80	1.80	255.01
116	117	0.64	Exist.	12	1329	910.95	896.76	892.47	0.32	3.65	2.36	2.02	1.31	1.31	2.03
117	118 (Interceptor)	0.90	Exist.	12	1606	907.00	892.47	883.30	0.57	3.65	2.36	2.69	1.74	1.74	1.94
DISTRICT 2															
201	202	0.65	Prop.	12	2604	957.50	930.00	927.50	0.10	3.65	2.36	1.10	0.71	0.71	1.09
202	203	1.02	Prop.	12	2107	949.00	927.50	923.00	0.21	3.65	2.36	1.65	1.06	1.06	1.04
203	204	1.02	Prop.	12	1734	945.70	923.00	919.50	0.20	3.65	2.36	1.60	1.03	1.03	1.01
204	207	1.41	Prop.	12	2883	936.40	919.50	908.50	0.38	3.65	2.36	2.20	1.42	1.42	1.01
205	206	0.41	Prop.	10	2025	930.00	917.00	909.10	0.39	2.32	1.50	1.37	0.88	0.88	2.18
206	207	0.82	Prop.	10	153	918.50	909.10	908.50	0.39	2.32	1.50	1.37	0.89	0.89	1.08
207	302	2.19	Exist.	18	1200	924.00	908.50	904.90	0.30	10.07	6.51	5.75	3.72	3.72	1.69

APPENDIX D - EXISTING/PROPOSED PIPE CAPACITIES FOR THE ULTIMATE SYSTEM

Node ID #		Design Flow	Exist./ Proposed	Size	Length	Rim	Upstream Elev.	Dowstrm Elev.	Slope	CAPACITY					Capacity/ Design Flow
From Point	To Point									Inlet Control		Outlet Control		Capacity	
		(MGD)		(in.)	(ft.)	(ft.)	(ft.)	(ft.)	(%)	(cfs)	(MGD)	(cfs)	(MGD)	(MGD)	
DISTRICT 3															
301	302	0.57	Prop.	10	1350	927.50	917.50	904.90	0.93	2.32	1.50	2.12	1.37	1.37	2.39
302	303	3.05	Exist.	18	2317	916.04	904.90	901.56	0.14	10.07	6.51	3.99	2.58	2.58	0.84
303	308	3.25	Exist.	18	1795	920.17	901.56	898.92	0.15	10.07	6.51	4.03	2.60	2.60	0.80
304	308	1.05	Prop.	18	2543	910.00	902.00	898.78	0.13	10.07	6.51	3.74	2.41	2.41	2.29
305	306	0.64	Exist.	10	1367	938.62	926.74	918.21	0.62	2.32	1.50	1.73	1.12	1.12	1.75
306	307	0.75	Exist.	10	3356	932.40	918.21	909.37	0.26	2.32	1.50	1.12	0.73	0.73	0.96
307	308	0.88	Exist.	10	1893	935.78	909.37	898.78	0.56	2.32	1.50	1.64	1.06	1.06	1.20
308	309	4.65	Exist.	24	2009	916.74	898.78	896.51	0.11	20.67	13.35	7.60	4.91	4.91	1.06
309	313	4.70	Exist.	24	1126	913.69	896.51	895.72	0.07	20.67	13.35	5.99	3.87	3.87	0.82
310	311	0.44	Exist. FM	6	1347	918.70	911.70	939.43	FM	FM	FM	FM	FM	FM	FM
311	312	0.44	Exist.	8	1790	950.73	939.43	906.00	1.87	1.33	0.86	1.65	1.07	0.86	1.95
312	313	0.44	Exist.	10	1835	906.00	905.87	896.82	0.49	2.32	1.50	1.54	0.99	0.99	2.26
313	315	5.17	Exist.	24	349	908.46	895.72	895.35	0.11	20.67	13.35	7.37	4.76	4.76	0.92
314	315	0.73	Exist.	12	894	905.74	897.63	895.72	0.21	3.65	2.36	1.65	1.06	1.06	1.47
315	316	5.57	Exist.	24	2768	906.75	895.35	892.56	0.10	20.67	13.35	7.18	4.64	4.64	0.83
316	317	5.81	Exist.	24	3158	906.38	892.56	889.30	0.10	20.67	13.35	7.27	4.70	4.70	0.81
317	318	5.91	Exist.	24	1673	904.58	889.30	887.68	0.10	20.67	13.35	7.04	4.55	4.55	0.77
318	419 (Interceptor)	5.91	Exist.	24	151	905.40	887.68	887.50	0.12	20.67	13.35	7.81	5.05	5.05	0.85
DISTRICT 4															
420	421	0.46	Prop.	10	1904	920.00	900.50	895.20	0.28	2.32	1.50	1.16	0.75	0.75	1.62
421	424	1.39	Prop.	18	2829	919.00	894.00	890.70	0.12	10.07	6.51	3.59	2.32	2.32	1.67
422	424	0.47	Prop.	10	2021	912.00	896.70	890.70	0.30	2.32	1.50	1.19	0.77	0.77	1.63
423	424	0.48	Prop.	12	1291	913.50	901.00	890.70	0.80	3.65	2.36	3.18	2.06	2.06	4.28
424	414 (Interceptor)	2.44	Prop.	21	2670	916.00	890.70	887.90	0.10	14.81	9.56	5.13	3.31	3.31	1.36
415	418	0.32	Exist.	15	2430	917.30	897.26	892.60	0.19	6.38	4.12	2.83	1.83	1.83	5.63
416	417	0.25	Exist.	12	1396	907.87	900.69	897.64	0.22	3.65	2.36	1.67	1.08	1.08	4.28
417	418	0.36	Exist.	10	1360	910.88	897.80	893.32	0.33	2.32	1.50	1.26	0.81	0.81	2.27
418	419 (Interceptor)	1.07	Exist.	15	2565	913.40	892.60	886.35	0.24	6.38	4.12	3.19	2.06	2.06	1.93
DISTRICT 5															
501	502	0.07	Exist.	8	1500	944.47	935.21	921.99	0.88	1.33	0.86	1.13	0.73	0.73	10.11
502	503	0.11	Exist.	10	343	936.03	921.99	919.68	0.67	2.32	1.50	1.80	1.16	1.16	10.49
503	504	0.11	Exist.	10	10	927.39	919.68	919.60	0.80	2.32	1.50	1.96	1.27	1.27	11.43
504	505	0.11	Exist.	10	655	927.50	914.62	900.73	2.12	2.32	1.50	3.19	2.06	1.50	13.51
505	506	0.13	Exist.	10	2127	910.84	900.73	892.79	0.37	2.32	1.50	1.34	0.86	0.86	6.60
506	507	0.13	Exist.	12	2010	899.00	892.78	887.84	0.25	3.65	2.36	1.77	1.14	1.14	8.71
507	508 (Interceptor)	0.36	Exist.	12	2092	902.18	887.78	883.20	0.22	3.65	2.36	1.67	1.08	1.08	2.97

APPENDIX D - EXISTING/PROPOSED PIPE CAPACITIES FOR THE ULTIMATE SYSTEM

Node ID #		Design Flow	Exist./ Proposed	Size	Length	Rim	Upstream Elev.	Dowstrm Elev.	Slope	CAPACITY					Capacity/ Design Flow
From Point	To Point									Inlet Control		Outlet Control		Capacity	
		(MGD)		(in.)	(ft.)	(ft.)	(ft.)	(ft.)	(%)	(cfs)	(MGD)	(cfs)	(MGD)	(MGD)	
DISTRICT 6															
601	602	0.57	Exist.	10	1760	904.33	889.45	882.20	0.41	2.32	1.50	1.41	0.91	0.91	1.61
602	603	1.04	Exist.	18	73	902.02	881.54	881.44	2.36	10.07	6.51	16.12	10.42	6.51	6.26
603	604	1.04	Exist.	18	1130	902.12	881.44	879.82	0.51	10.07	6.51	7.53	4.87	4.87	4.68
604	605 (Interceptor)	1.16	Exist.	21	1100	899.76	879.82	875.63	0.38	14.81	9.56	9.78	6.32	6.32	5.46
607	608	0.36	Exist.	10	1765	909.70	891.89	877.02	0.84	2.32	1.50	2.01	1.30	1.30	3.66
608	610	0.58	Exist.	10	447	902.99	886.99	885.79	0.27	2.32	1.50	1.14	0.73	0.73	1.27
609	610	0.07	Prop.	10	1010	903.50	888.34	885.84	0.25	2.32	1.50	1.29	0.83	0.83	11.91
610	614	0.65	Exist.	15	1909	904.09	885.43	882.21	0.17	6.38	4.12	3.14	2.03	2.03	3.13
611	613	0.27	Exist.	10	2652	921.36	891.63	883.78	0.30	2.32	1.50	1.41	0.91	0.91	3.33
612	613	0.49	Exist.	10	1649	900.00	889.30	884.10	0.32	2.32	1.50	1.45	0.94	0.94	1.92
613	614	1.06	Exist.	10	368	889.92	883.78	882.35	0.39	2.32	1.50	1.61	1.04	1.04	0.98
614	615	1.67	Exist.	15	1712	889.65	882.20	879.50	0.16	6.38	4.12	3.03	1.96	1.96	1.18
615	617	1.79	Exist.	18	2925	889.75	879.40	875.65	0.13	10.07	6.51	4.45	2.87	2.87	1.61
616	617	0.42	Exist.	10	1296	892.23	879.29	875.75	0.27	2.32	1.50	1.15	0.74	0.74	1.75
617	618	2.57	Exist.	18	2073	897.22	875.65	872.32	0.16	10.07	6.51	4.98	3.21	3.21	1.25
618	619 (Interceptor)	2.72	Exist.	18	1421	896.77	873.32	871.26	0.14	10.07	6.51	4.73	3.05	3.05	1.12
621	622	0.28	Prop.	10	2376	923.00	894.00	876.46	0.74	2.32	1.50	2.22	1.44	1.44	5.16
622	623	0.74	Prop.	15	2743	893.20	876.46	873.17	0.12	6.38	4.12	2.64	1.71	1.71	2.31
623	624	1.44	Prop.	21	7232	892.00	873.17	864.41	0.12	14.81	9.56	6.52	4.21	4.21	2.91
624	625 (Interceptor)	2.15	Prop.	21	762	888.20	864.41	863.51	0.12	14.81	9.56	6.44	4.16	4.16	1.93
DISTRICT 7															
701	702	0.34	Design FM	6	797	958.00	940.00	959.00	FM	FM	FM	FM	FM	FM	FM
702	703	0.34	Design	8	4181	970.00	959.00	922.00	0.88	1.33	0.86	1.34	0.87	0.86	2.53
703	705	0.73	Design	12	5018	933.00	922.00	893.00	0.58	3.65	2.36	3.20	2.07	2.07	2.84
704	705	0.83	Design	10	1332	920.00	902.00	893.00	0.68	2.32	1.50	2.13	1.37	1.37	1.66
705	706	1.76	Design	15	920	911.10	893.00	890.70	0.25	6.38	4.12	3.82	2.47	2.47	1.40
706	707 (Interceptor)	2.12	Design	15	269	908.00	890.70	880.61	3.75	6.38	4.12	14.79	9.55	4.12	1.95
DISTRICT 8															
801	802	0.34	Prop.	10	715	899.5	890.2	887.83	0.33	2.32	1.50	1.49	0.96	0.96	2.86
802	803	0.47	Exist.	12	2481	907.9	888.11	881.8	0.25	3.65	2.36	2.12	1.37	1.37	2.89
803	804 (Interceptor)	0.74	Exist.	12	1561	906.24	881.69	878.02	0.24	3.65	2.36	2.04	1.32	1.32	1.79

Appendix E
Cost Estimates

APPENDIX E - COST ESTIMATES

From Point	To Point	Length (ft.)	Exist./ Proposed	Size (in.)	Depth (ft.)	Cost/Foot	Cost
DISTRICT 1							
101	102	670	Exist.	12	6	$112	$0
102	103	1584	Exist.	15	7	$135	$0
103	105	1637	Exist.	15	9	$135	$0
104	105	1075	Exist.	8	12	$92	$0
105	106	1309	Exist.	18	10	$162	$0
106	107 (Interceptor)	2344	Exist.	18	14	$162	$0
109	110 (Interceptor)	2325	Exist.	10	23	$156	$0
111	112	804	Exist.	10	16	$103	$0
112	117	1047	Exist.	12	20	$119	$0
113	114	1962	Exist.	12	11	$119	$0
114	115	1075	Exist.	12	21	$187	$0
115	116	2149	Exist.	12	14	$119	$0
101	116	2163	Exist.	12	6	$112	$0
116	117	1329	Exist.	12	14	$119	$0
117	118 (Interceptor)	1606	Exist.	12	15	$119	$0
						Subtotal	**$0**
DISTRICT 2							
201	202	2604	Prop.	12	28	$187	$486,036
202	203	2107	Prop.	12	22	$187	$393,271
203	204	1734	Prop.	12	23	$187	$323,651
204	207	2883	Prop.	12	17	$119	$343,563
205	206	2025	Prop.	10	13	$103	$209,335
206	207	153	Prop.	10	9	$96	$14,718
207	302	1200	Exist.	18	16	$162	$0
						Subtotal	**$1,770,574**
DISTRICT 3							
301	302	1350	Prop.	10	10	$103	$139,557
302	303	2317	Exist.	18	11	$162	$0
303	308	1795	Exist.	18	19	$162	$0
304	308	2543	Prop.	18	8	$155	$394,325
305	306	1367	Exist.	10	12	$103	$0
306	307	3356	Exist.	10	14	$103	$0
307	308	1893	Exist.	10	26	$156	$0
308	309	2009	Exist.	24	18	$212	$0
309	313	1126	Exist.	24	17	$212	$0
310	311	1347	Exist. FM	6	7	$53	$0
311	312	1790	Exist.	8	11	$92	$0
312	313	1835	Exist.	10	0	$96	$0
313	315	349	Exist.	24	13	$212	$0
314	315	894	Exist.	12	8	$112	$0
315	316	2768	Exist.	24	11	$212	$0
316	317	3158	Exist.	24	14	$212	$0
317	318	1673	Exist.	24	15	$212	$0
318	419 (Interceptor)	151	Exist.	24	18	$212	$0
						Subtotal	**$533,882**

APPENDIX E - COST ESTIMATES

From Point	To Point	Length (ft.)	Exist./ Proposed	Size (in.)	Depth (ft.)	Cost/Foot	Cost
DISTRICT 4							
420	421	1904	Prop.	10	20	$103	$196,827
421	424	2829	Prop.	18	25	$227	$641,762
422	424	2021	Prop.	10	15	$103	$208,921
423	424	1291	Prop.	12	13	$119	$153,847
424	414 (Interceptor)	2670	Prop.	21	25	$279	$743,699
415	418	2430	Exist.	15	20	$207	$0
416	417	1396	Exist.	12	7	$112	$0
417	418	1360	Exist.	10	13	$103	$0
418	419 (Interceptor)	2565	Exist.	15	21	$207	$0
						Subtotal	**$1,945,056**
DISTRICT 5							
501	502	1500	Exist.	8	9	$82	$0
502	503	343	Exist.	10	14	$103	$0
503	504	10	Exist.	10	8	$96	$0
504	505	655	Exist.	10	13	$103	$0
505	506	2127	Exist.	10	10	$103	$0
506	507	2010	Exist.	12	6	$112	$0
507	508 (Interceptor)	2092	Exist.	12	14	$119	$0
						Subtotal	**$0**
DISTRICT 6							
601	602	1760	Exist.	10	15	$103	$0
602	603	73	Exist.	18	20	$227	$0
603	604	1130	Exist.	18	21	$227	$0
604	605 (Interceptor)	1100	Exist.	21	20	$187	$0
607	608	1765	Exist.	10	18	$103	$0
608	610	447	Exist.	10	16	$103	$0
609	610	1010	Prop.	10	15	$103	$104,409
610	614	1909	Exist.	15	19	$142	$0
611	613	2652	Exist.	10	30	$156	$0
612	613	1649	Exist.	10	11	$103	$0
613	614	368	Exist.	10	6	$96	$0
614	615	1712	Exist.	15	7	$135	$0
615	617	2925	Exist.	18	10	$162	$0
616	617	1296	Exist.	10	13	$103	$0
617	618	2073	Exist.	18	22	$227	$0
618	619 (Interceptor)	1421	Exist.	18	23	$227	$0
621	622	2376	Prop.	10	29	$156	$371,841
622	623	2743	Prop.	15	17	$142	$389,893
623	624	7232	Prop.	21	19	$187	$1,349,851
624	625 (Interceptor)	762	Prop.	21	24	$279	$212,247
						Subtotal	**$2,428,240**

APPENDIX E - COST ESTIMATES

From Point	To Point	Length (ft.)	Exist./ Proposed	Size (in.)	Depth (ft.)	Cost/Foot	Cost
DISTRICT 7							
701	702	797	Design FM	6	18	$53	$0
702	703	4181	Design	8	11	$92	$0
703	705	5018	Design	12	11	$119	$0
704	705	1332	Design	10	18	$103	$0
705	706	920	Design	15	18	$142	$0
706	707 (Interceptor)	269	Design	15	17	$142	$0
						Subtotal	**$0**
DISTRICT 8							
801	802	715	Prop.	10	9	$96	$68,780
802	803	2481	Exist.	12	20	$119	$0
803	804 (Interceptor)	1561	Exist.	12	25	$187	$0
						Subtotal	**$68,780**
						Total	**$6,746,533**

Appendix F
ISTS Ordinance

CHAPTER 3
DESIGN, INSTALLATION AND MAINTENANCE OF ON-SITE INDIVIDUAL SEWAGE TREATMENT SYSTEMS (ISTS)

7-3-1: DEFINITIONS:

The following terms in this Chapter shall have the following meanings as set forth below:

ABANDONMENT: The permanent and proper termination or decommissioning of an individual sewage treatment system (hereinafter ISTS) or part thereof.

APPROVED TESTING METHODS: All those relevant sample collection, preservation, analytical and statistical reporting methods known to accurately and precisely represent physical, chemical, biological and radiological parameters of interest or concern in wastewater or water. Approved testing methods shall be regulatory or consensus standards and shall not be limited to standard methods for examination of water and wastewater (APHA, AWWA, WPCF) methods for chemical analysis of water and waste (EPA) and, where applicable, test methods for evaluating solid waste (SW-846, EPA).

BAFFLE: A device installed in a septic tank for proper operation of the tank and to provide maximum retention of solids, and includes vented sanitary tees and submerged pipes in addition to those devices that are normally called baffles.

COMMERCIAL AND INDUSTRIAL: Any use of a building or property other than a single-family, duplex or triplex residential dwelling unit.

CONTAMINANT: Any physical, chemical, biological, or radiological substance or material in water which tends to degrade the environment by contributing toxicity, constituting a hazard or otherwise impairing its usefulness.

CONTAMINATION: The presence of certain infectious or toxic agents or certain hazardous characteristics capable of causing disease or other harm.

DWELLING: Any building or portion thereof, which is designed or used exclusively for residential purposes but not including rooms in motels, hotels, nursing homes, boarding houses, or trailers, tents, cabins or trailer coaches.

FAILED INDIVIDUAL SEWAGE TREATMENT SYSTEM: A soil treatment system that is allowing sewage, sewage tank effluent, or seepage from the soil treatment system to be discharged to the ground surface, abandoned wells, or bodies of surface water, or into any rock or soil formation the structure of which is not conducive to purification of water by filtration, or into any well or other excavation in the ground. "Failed individual sewage treatment system" also means an individual sewage treatment system that uses cesspools, leaching pits, seepage pits, or systems with less than three feet (3') of unsaturated soil or sand between the distribution device and the limiting soil characteristics.

GROUND WATER: Subsurface water in the vadose (unsaturated) and phreatic (saturated) zones occurring naturally in soil and rock formations, whether or not capable of yielding such water to wells, and shall specifically mean that subsurface water present in the saturated zone defined by a perched, free or confined ground water surface.

HAZARDOUS MATERIALS: Any substance, which when discarded, meets the definition of hazardous waste in Minnesota Rules 7045.

HOLDING TANK: A watertight tank for storage of sewage until it can be transported to a point of approved treatment and disposal.

IMMINENT THREAT TO PUBLIC HEALTH OR SAFETY: Situations with the potential to immediately and adversely impact or threaten public health or safety. An imminent threat to public health or safety shall include all ground surface or surface water discharge of wastewater and any systems causing sewage backup into a dwelling or other establishment shall constitute an imminent threat to public health or safety.

INDIVIDUAL SEWAGE TREATMENT SYSTEM (hereinafter ISTS): A sewage treatment system or part thereof, serving a dwelling, or other establishment, or group thereof, which uses subsurface soil treatment and disposal, including approved holding tanks.

MOUND SYSTEM: A system where the soil treatment area is built above the ground to overcome limits imposed by proximity to water table or bedrock or by rapidly or slowly permeable soils.

OWNER: All persons having possession of, control over, or title to an ISTS.

POLLUTANT: A contaminant whose form concentration or other attribute in an environmental medium such as soil or water, exceeds established, acceptable criteria and standards prescribed by the Minnesota Pollution Control Agency and, therefore, may be capable of causing disease, injury or death in humans, animals or plants, contributing to the risk thereof, otherwise degrading the environment or creating a public nuisance.

PUBLIC NUISANCE OR PUBLIC HEALTH NUISANCE: Defined as in MSA chapter 145A, as amended, and restricted in this Chapter to those conditions in which wastes, wastewaters, sewage, septage, sludge and other releases or related activities contribute to the annoyance or endangerment of persons or the degradation of the environment and which require appropriate prevention, control or abatement to resolve.

PUMP OR PUMPED: The removal and sanitary disposal of septage from the septic tank. Removal of septage also includes complete removal of scum and sludge.

PUMPER OR CERTIFIED PUMPER: A person or company that has been licensed to pump septic systems.

RESERVE AREA: That portion of a property that is designated to be protected from all vehicular traffic, construction and other disturbances to the original, natural soils such that a future wastewater treatment system or device may be constructed meeting all Chapter requirements when the existing primary system or device malfunctions, becomes irreparable or when it fails to comply with this Chapter.

SECONDARY DISCHARGE: Those solids and liquids discharged intermittently which are not part of the business; commercial and/or industrial process, including, but not limited to, floor drains and overflow from containment areas.

SEPTAGE: Those solids and liquids removed during periodic maintenance of a septic or aerobic tank or those solids and liquids which are removed from a holding tank.

SEPTIC TANK: Any watertight, covered receptacle designed and constructed to receive the discharge of sewage from a building sewer, separate solids from liquid, digest organic matter, and store liquids through a period of detention, and allow the clarified liquids to discharge to a soil treatment system.

SEWAGE: Any water-carried domestic waste, exclusive of footing and roof drainage, from any industrial, agricultural, or commercial establishment, or any dwelling or any other structure. Domestic waste includes liquid waste produced by toilets, bathing, laundry, culinary operations and the floor drains associated with these sources and specifically excludes animal waste and commercial or industrial waste water.

SEWAGE TANK: A watertight tank used in the treatment of sewage and includes, but is not limited to, septic tanks and aerobic tanks.

SEWAGE TANK EFFLUENT: Liquid which flows from a septic or aerobic tank under normal operations.

SOIL TREATMENT AREA: Area of trench or bed bottom which is in direct contact with the drainfield rock of the soil treatment system. For mounds, it is the area to the edges of the required absorption width and extends five feet (5') beyond the ends of the rock layer.

SOIL TREATMENT SYSTEM: A system where sewage tank effluent is treated and disposed of below the ground surface by filtration and percolation through the soil, and includes those systems commonly known as seepage bed, trench, drain field, disposal field and mounds.

STANDARD SYSTEMS: An ISTS employing a building sewer, sewage tank, and the soil treatment system consisting of trenches, seepage beds or mounds which are constructed on original soil which has a percolation rate equal to or faster than one hundred twenty (120) minutes per inch.

WATER TABLE: The highest elevation in the soil where all voids are filled with water, as evidenced by the presence of water or soil mottling or other information. (Ord. 094-343, 12-19-1994; amd. Ord. 097-389, 2-18-1997)

7-3-2: ADMINISTRATION:

Standards for installation, maintenance and repair of ISTS are as established herein. Adoption of MPCA Rule 7080 and any subsequent amendments thereto, and Dakota County Environmental Management Department Ordinance 113 and any subsequent amendments thereto, in the most current editions are hereby adopted by reference and shall be part of this Chapter as if set forth herein. (Ord. 097-389, 2-18-1997)

7-3-3: HOLDING TANKS:

Holding tanks conforming to the requirements of this Code are limited to the following installations:

(A) Tanks with a capacity not exceeding two thousand (2,000) gallons may be used for collection of secondary discharge not suitable for on-site treatment.

(B) Replacement of failed ISTS on existing uses when no other means of treatment are possible. (Ord. 094-343, 12-19-1994)

7-3-4: DESIGN OF ISTS:

In addition to requirements contained within MPCA Rule 7080 and Dakota County Ordinance 113, as amended, all new, rebuilt or otherwise modified ISTS located in the City shall be designed by a person licensed as a site evaluator qualified to design such systems. Said person shall submit proof of certification to the City's Building Inspection Division at the time the ISTS design is submitted for approval. No building permit will be issued until the design is approved by the Building Inspection Division. (Ord. 097-389, 2-18-1997)

7-3-5: INSTALLATION OF INDIVIDUAL SEWAGE TREATMENT SYSTEMS:

The installation of an ISTS shall occur only at the location approved by the City's Inspection Division. Installation of the system at any other location shall require submission to and approval of revised design and location plans by the City's Building Inspection Division. The system shall only be installed by a person or company licensed as qualified to install such a system. Failed systems shall be abandoned at the time a new system is installed by pumping the tank, removing the top and bottom, and placing fill material in the tank up to existing grade. (Ord. 094-343, 12-19-1994)

7-3-6: TESTING FOR ISTS DESIGN:

Prior to approval of any preliminary or final plat, waiver of platting or permit issuance for any and all buildable and existing lots of record in unsewered areas, the landowner shall submit to the City Building Inspection Division the following:

(A) Two (2) separate ISTS site evaluations for both a primary and secondary reserve area sewage/soil treatment system;

(B) A minimum of four (4) soil borings;

(C) Two (2) percolation test results;

(D) A complete site analysis for both the primary and secondary ISTS soil treatment systems per MPCA 7080.0110. Said analysis must show existence of adequate land area for both sites and take into account seasonably saturated soils, soil types and conditions, topographic features, flooding potential and mandatory setback requirements as dictated by City ordinance and applicable State and Federal regulations.

Failure to provide any of the above required information shall be grounds for denial of building and ISTS permits. (Ord. 097-389, 2-18-1997)

7-3-7: PERMIT REQUIRED:

Subject to Section 7-3-9 of this Chapter, no ISTS shall be used unless the owner of the ISTS has received a permit from the City and the permit is in force and effect.

(A) Mandatory Pumping; Maintenance Permit: The owner of every single-family residential sewage tank, septic tank or holding tank shall apply for the tank maintenance permit from the City's Building Inspection Division. The permit shall be issued by the Building Inspection Division only if the following requirements are met:

1. The owner of the ISTS shows evidence to the Building Inspection Division in the form of a written certificate from the pumper that the septic or sewage tank has been pumped in accordance with subsection 7-3-7(C) of this Section, within twelve (12) months prior to permit application.

2. The owner of the ISTS shall show evidence to the Building Inspection Division in the form of a written certificate from the pumper on the average pumping frequency and volume of holding tank(s).

3. The owner of the ISTS or holding tanks pays the required permit fee as set forth from time to time by resolution of the City Council.

(B) Commercial And Industrial Operational Permit: The owner of every commercial and industrial ISTS shall apply for an individual sewage treatment system permit from the City's Building Inspection Division. The permit shall be issued by the Building Inspection Division only if the following requirements are met:

1. The owner of the ISTS shows evidence to the Building Inspection Division in the form of a written certificate from the pumper that the septic or sewage tank has been pumped in accordance with subsection 7-3-7(C) of this Section, within twelve (12) months prior to permit application.

2. The owner of the ISTS shall show evidence to the Building Inspection Division in the form of a written certificate from the pumper on the average pumping frequency and volume of holding tank(s).

3. Inspection shall be completed by the City Building Inspection Division to verify water use and suitable effluent quality for on-site treatment. For an increase in discharge rate due to a change of use or building addition, the owner will be responsible to complete an ISTS evaluation to determine capacity of existing system. A permit will not be issued unless the system is capable of handling discharge.

4. The owner of the ISTS pays the required permit fee as set forth from time to time by resolution of the City Council.

5. A new operational permit is required when a change of ownership, building use or building addition occurs. (Ord. 094-343, 12-19-1994)

(C) ISTS Maintenance: Upon successful completion of ISTS maintenance per MPCA 7080.0175 and Dakota County Ordinance 113, as amended, the licensed pumper/inspector shall submit a sewage system maintenance log sheet to the Dakota County Environmental Management Department within thirty (30) days with the appropriate County recording fee. The log sheet must be completed in its entirety and all information recorded must be verified in writing by the signature and date of the licensed pumper/inspector completing the maintenance. The log sheet must state the condition of and work done on the following:

1. The sewerage or septic tank(s) has/have been thoroughly pumped by a licensed pumper to remove all solids and scum in accordance with the requirements of Minnesota Rules chapter 7080.0175. Exception: Pumping is not required if a licensed pumper/inspector determines the accumulated sludge and scum layers do not exceed the levels required for pumping per Minnesota Rules chapter 7080.0175.

2. An ISTS evaluation is completed by the licensed pumper/inspector verifying that the baffles and tank (s) are in working order and in substantial compliance with Minnesota Rules chapter 7080 and if there is any evidence of ISTS surface discharge or failure. (Ord. 097-389, 2-18-1997)

(D) Duration: The duration of the permit shall be for three (3) years and shall be renewed by the owner again making application to the City for such permit. The permit shall be deemed revoked if the system becomes a failed ISTS. (Ord. 098-419, 12-21-1998)

(E) Relation To Zoning Code: Permits will not be issued if the building or property use is not in conformance with City zoning code. No building permits, variances or conditional use permits shall be issued unless a current maintenance permit has been issued.

(F) Timely Application: If an owner has not obtained the permit as required in subsections (A) through (E) of this Section by the date specified in the City letter of notification, the permit fee shall be doubled. (Ord. 094-343, 12-19-1994)

7-3-8: SYSTEMS CAUSING IMMINENT THREAT TO PUBLIC HEALTH AND SAFETY:

The owner of any ISTS determined or found to be causing or having the potential to cause an imminent threat to public health or safety shall immediately replace, modify or reconstruct the ISTS in conformance with MPCA Rule 7080. (Ord. 097-389, 2-18-1997)

7-3-9: SCHEDULE FOR INITIAL PERMITS:

The owners of ISTS shall obtain a maintenance or operational permit as required no later than July 1, 1995. (Ord. 094-343, 12-19-1994)

7-3-10: LIMITS ON COMMERCIAL AND INDUSTRIAL DISCHARGE:

No animal waste or commercial wastewater or industrial wastewater shall be discharged on the surface or into the subsurface unless the person allowing or causing the discharge first obtains a State disposal system permit from the Minnesota Pollution Control Agency. Such discharges must comply with the terms and requirements of the State disposal system permit in order to continue. An ISTS that is used for the discharge of animal waste, commercial or industrial wastewater prior to the effective date of this Chapter, may continue to be used for such purposes until such system becomes a failed ISTS or the MPCA orders discontinuance, whichever occurs first; then, in such case, the new installed system must comply with this Chapter. (Ord.

094-343, 12-19-1994)

7-3-11: FAILED ISTS:

The City shall inspect all existing ISTS systems within the City within one year of the effective date of this Chapter, and periodically thereafter, to determine compliance with this Section. The owner of a failed ISTS shall replace, modify or reconstruct the failed system within ten (10) months of the inspection, either in conformance with MPCA Rule 7080 and Dakota County Ordinance 113, as amended, or if allowed by the Building Official, in conformance with MPCA Rule 7080.0190. In the alternative, the owner shall permanently discontinue use of a failed system within ten (10) months of the inspection. Upon application by the owner, the City Council may allow the failed system to be used up to one year from Council approval of the application. The City shall not issue a building permit, variance or conditional use permit until the existing ISTS is determined to be in compliance with MPCA Rule 7080 and Dakota County Ordinance 113, as amended. (Ord. 098-419, 12-21-1998)

7-3-12: PENALTY:

Violation of this Chapter shall be a misdemeanor. Presentation to the City of any false or intentionally misleading statements, certificates or applications by the owner or by the certified pumpers, or certified designers or installers of ISTS shall also be a misdemeanor. A separate offense shall be deemed committed each day during or upon which a violation occurs or continues to occur. (Ord. 097-389, 2-18-1997)

7-3-13: INCONSISTENCY:

If any provision of this Chapter is inconsistent with MPCA Rule 7080 or Dakota County Ordinance 113, as amended, then that provision which is more demanding or provides a greater level of requirements or restrictions, or provides an earlier date of compliance shall prevail and be controlling. If any provision of this Chapter is inconsistent with any City code, then that provision which is more demanding or provides a greater level of requirements or restrictions, or provides an earlier date of compliance shall prevail and be controlling. (Ord. 097-389, 2-18-1997)

Appendix G
I/I Reduction Plan

Infiltration/Inflow Reduction Plan

City of Farmington, MN
August 2007

The City of Farmington Sanitary Sewer Infiltration/Inflow Reduction Plan consists of six components. The six components are:

1. Monitoring wastewater flow in the City system. The City will continue replacing existing flow meters in the sanitary sewer system at key locations, including replacement of non-functioning flow meters with a modern monitoring system that reduces ongoing maintenance requirements and data recovery. The flow monitoring systems will allow the City to compare City flow data with MCES flow data, and to track flow in areas suspected as having potential for Infiltration/inflow. Monitoring flow data will assist the City in finding problem locations and targeting them for repair.

2. A sump pump cross connection inspection and removal program. A major portion of this program will include public education. The sump-pump cross connection and removal plan will consist of a phased structure by structure inspection and verification program. Information regarding the sump pump inspection program, including the City Ordinance requiring the program, sample notice letters, sample details, and a map showing the phasing of the inspections is attached.

3. A program to investigate known or suspected areas of foundation drains, leaking cleanouts, and leaking services. This process will include televising sewer mains and some services in targeted areas where sources of infiltration/inflow are suspected. If necessary, secondary investigation techniques such as smoke testing or dye testing may be necessary as part of this component.

4. A manhole inspection and repair program. This component of the Plan consists of inspection of every sanitary sewer manhole in the City, identification of leaks and other problems, and completion of repairs. Manhole lids with holes in them will continue to be replaced with solid covers. Approximately 425 manholes will be inspected each year for four years to complete all manhole inspections.

5. An ongoing sewer cleaning, televising, and repair program. The City Public Works staff will continue to annually clean and televise sewers. As part of this process, sewers that are identified as needing repair will be addressed through spot repairs or as part of a future CIP, depending on the extent of the repairs needed.

6. Stringent requirements for new sanitary sewer and home construction. The final component of the City's I/I Reduction plan will be to eliminate I/I from new construction, through enforcement of current City ordinances. New sewer construction will continue to be pressure tested and televised before it is accepted by the City. In addition, new home construction is required to provide hard plumbing of sump pumps to the outside of the home.

Cost Estimate for Infiltration/Inflow Reduction Plan

Plan Year	Year	Amount Required	Amount Spent	
1	2006/2007	$56,000.00	$139,059.21	
2	2008	$56,000.00	$65,500.00	
3	2009	$56,000.00	$65,500.00	
4	2010	$56,000.00	$64,500.00	
5	2011	$56,000.00	$24,000.00	
			$358,559.21	**Total Expenditures**
		-	$280,000.00	Total MCES Assessment
			$78,559.21	

2006 (actual)

	$47,457.32	Sewer flow meter system (Purchase, installation, training)
	$17,757.36	Sewer flow meter system Engineering
	$2,806.97	Preparation of Draft I & I Reduction Plan (Engineering)
	$7,267.56	Manhole Lid Replacement Program - lid purchases
	$1,230.00	Manhole Lid Replacement Program - lid inventory
	$76,519.21	**2006 Expenditures**

2007 (projected)

	$21,540.00	Sewer Televising (60,000 LF * $0.359/LF)
	$10,000.00	Sewer Flow Meter System at Riverbend - estimate
	$17,500.00	Sanitary Sewer Slip Lining and Patching (at 50%)
	$8,500.00	Manhole Inspection (425 MHs * $20)
	$5,000.00	I & I Reduction Final Program Preparation - estimate
	$62,540.00	**2007 Expenditures**
+	**$76,519.21**	**2006 Expenditures**
	$139,059.21	**2006/2007 Expenditures**
-	$56,000.00	2007 Program Requirement
	$83,059.21	**2007 Credit Carryover**

2008 (projected)

	$24,000.00	Sewer Televising (60,000 LF * $0.40/LF)
	$32,000.00	Sump Pump Inspection Program (800 homes * $40/home)
	$8,500.00	Manhole Inspection (425 MHs * $20)
	$1,000.00	I & I Reduction Program Update - estimate
	$65,500.00	**2008 Expenditures**
+	**$83,059.21**	**2007 Credit Carryover**
-	$56,000.00	2008 Program Requirement
	$92,559.21	**2008 Credit Carryover**

2009 (projected)

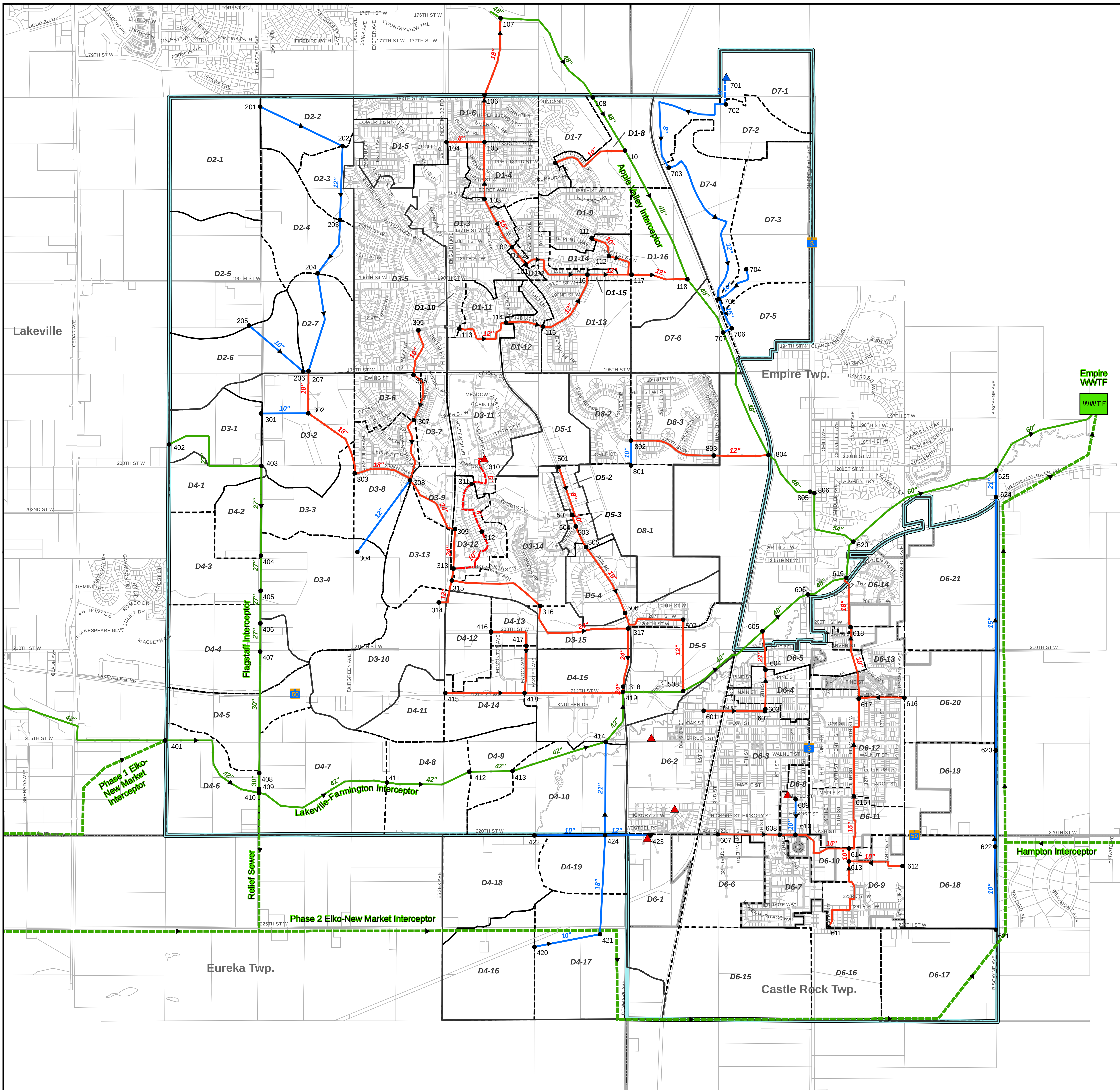
	$24,000.00	Sewer Televising (60,000 LF * $0.40/LF)
	$32,000.00	Sump Pump Inspection Program (800 homes * $40/home)
	$8,500.00	Manhole Inspection (425 MHs * $20)
	$1,000.00	I & I Reduction Program Update - estimate
	$65,500.00	**2009 Expenditures**
+	**$92,559.21**	**2008 Credit Carryover**
-	$56,000.00	2009 Program Requirement
	$102,059.21	**2009 Credit Carryover**

2010 (projected)

	$24,000.00	Sewer Televising (60,000 LF * $0.40/LF)
	$32,000.00	Sump Pump Inspection Program (800 homes * $40/home)
	$8,500.00	Manhole Inspection (425 MHs * $20)
	$64,500.00	**2010 Expenditures**
+	**$102,059.21**	**2009 Credit Carryover**
-	$56,000.00	2010 Program Requirement
	$110,559.21	**2010 Credit Carryover**

2011 (projected)

	$24,000.00	Sewer Televising (60,000 LF * $0.40/LF)
	$24,000.00	**2011 Expenditures**
+	**$110,559.21**	**2010 Credit Carryover**
-	$56,000.00	2011 Program Requirement
	$78,559.21	**2011 Credit Carryover/ Excess of $280,000 Assessment**



MCES INTERCEPTOR
- Existing Gravity Pipe
- Proposed Gravity Pipe

EXISTING TRUNK SANITARY SEWER
- Existing
- Existing Forcemain

PROPOSED SANITARY SEWER
- Trunk Sewer
- Forcemain

- Node
- Existing Lift Station
- Proposed Lift Station
- Flow Arrow
- D8-1 District Boundary
- Subdistrict Boundary
- 2030 City Boundary
- Existing Jurisdictional Boundaries

City of Farmington

Comprehensive Sewer Plan

TRUNK SANITARY SEWER

October 2008

Map 1

N W E S

Feet

2000 1000 0 2000

Bonestroo

CITY OF FARMINGTON A PROUD PAST • A PROMISING FUTURE

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