CHAPTER 12: SANITARY SEWER SYSTEM

Chapter 12 includes the following information:

1. System Overview
2. On-Site Sewage Treatment
3. Inter-Community Services
4. Future Demand Forecast
5. Infiltration and Inflow (I/I)
6. Utility Capital Improvement Plan
7. Goals and Strategies

1. SYSTEM OVERVIEW

The entire City of Roseville is within the Metropolitan Urban Service Area (MUSA). Therefore, sanitary sewer interceptor and treatment is provided to the City via the Metropolitan Council Environmental Services (MCES) system. Within the city, the system is under the jurisdiction of the City's sanitary sewer utility. Historically, the sanitary sewer utility has been managed to be self-supporting, with future infrastructure replacement needs financed with revenues generated from the fees paid by users.

The Roseville sanitary sewer system consists of approximately 145 miles of sanitary sewer, 3,156 manholes, and 12 lift stations. The public sanitary sewer provides service to 14,623 households and businesses. The Citywide Sanitary Sewer map (MAP 12-1) shows the locations of these facilities and direction of flow. The City also has a number of residential connections with adjacent communities. TABLE 12-1 below summarizes these connections.

TABLE 12-1 RESIDENTIAL CONNECTIONS WITH ADJACENT COMMUNITIES

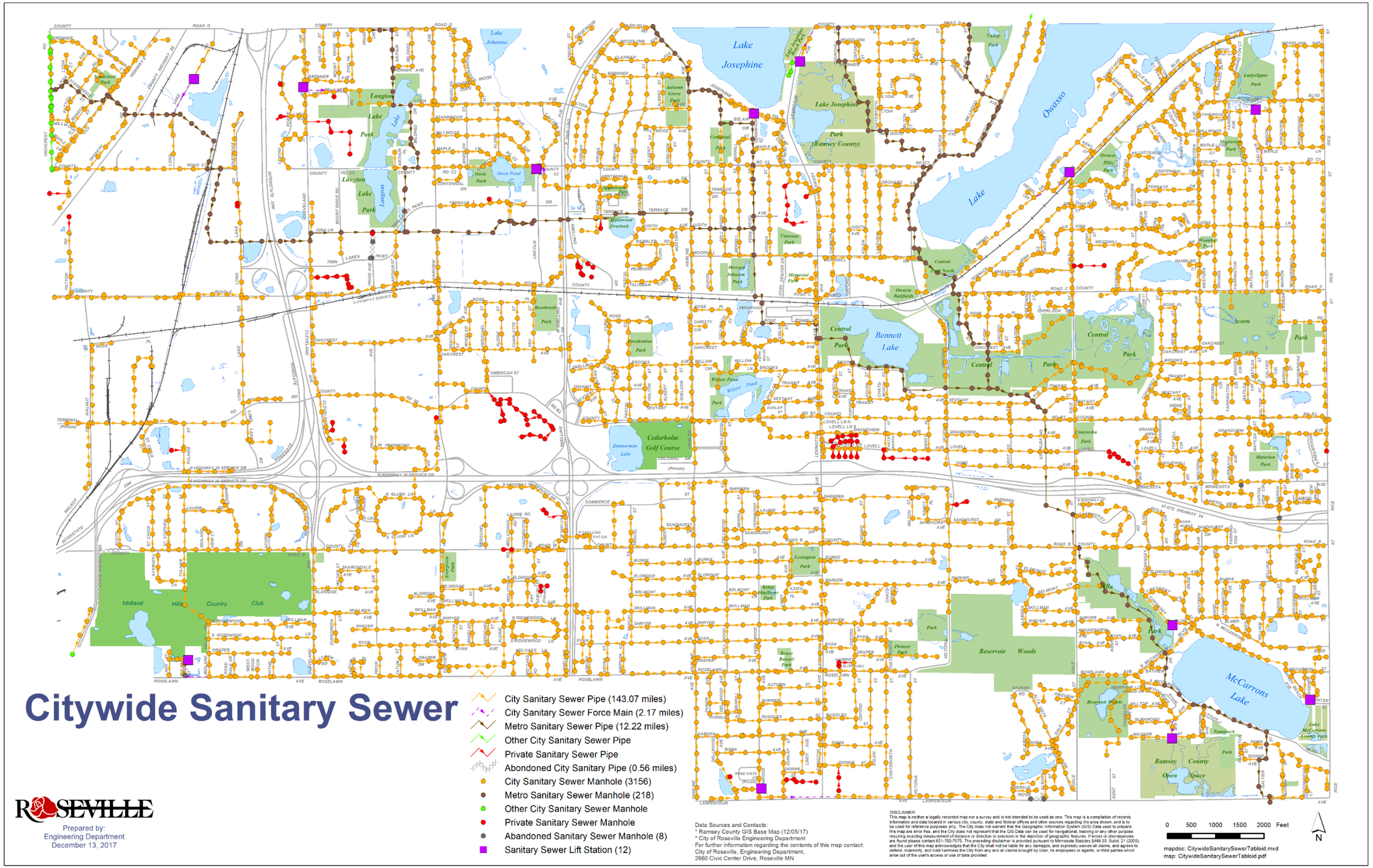
City	Sewer flow TO Roseville	Sewer flow FROM Roseville
Arden Hills		48 houses (County Road D)
St. Anthony	2 houses	
St. Paul	9 houses, 17-unit apartment building	
Shoreview		11 units (County Road D/ Lake Owasso)
Totals	28 dwelling units	59 dwelling units

Trunk sewers and the 12 lift stations collect wastewater and deliver it to the MCES interceptor sewers. The MCES interceptors serving the City of Roseville include RV-430, RV-431, RV-432, and RV-433. For interceptor locations and service areas see MAP 12-1. All of the interceptors flow south and eastward where they connect to RV-430, which delivers the waste to the Pigs Eye Wastewater Treatment Plant in St. Paul. Operated by the MCES, this plant accepted an estimated 1.2 billion gallons of wastewater from Roseville in 2017. See MAP 12-2 for the Sanitary Service Areas map.

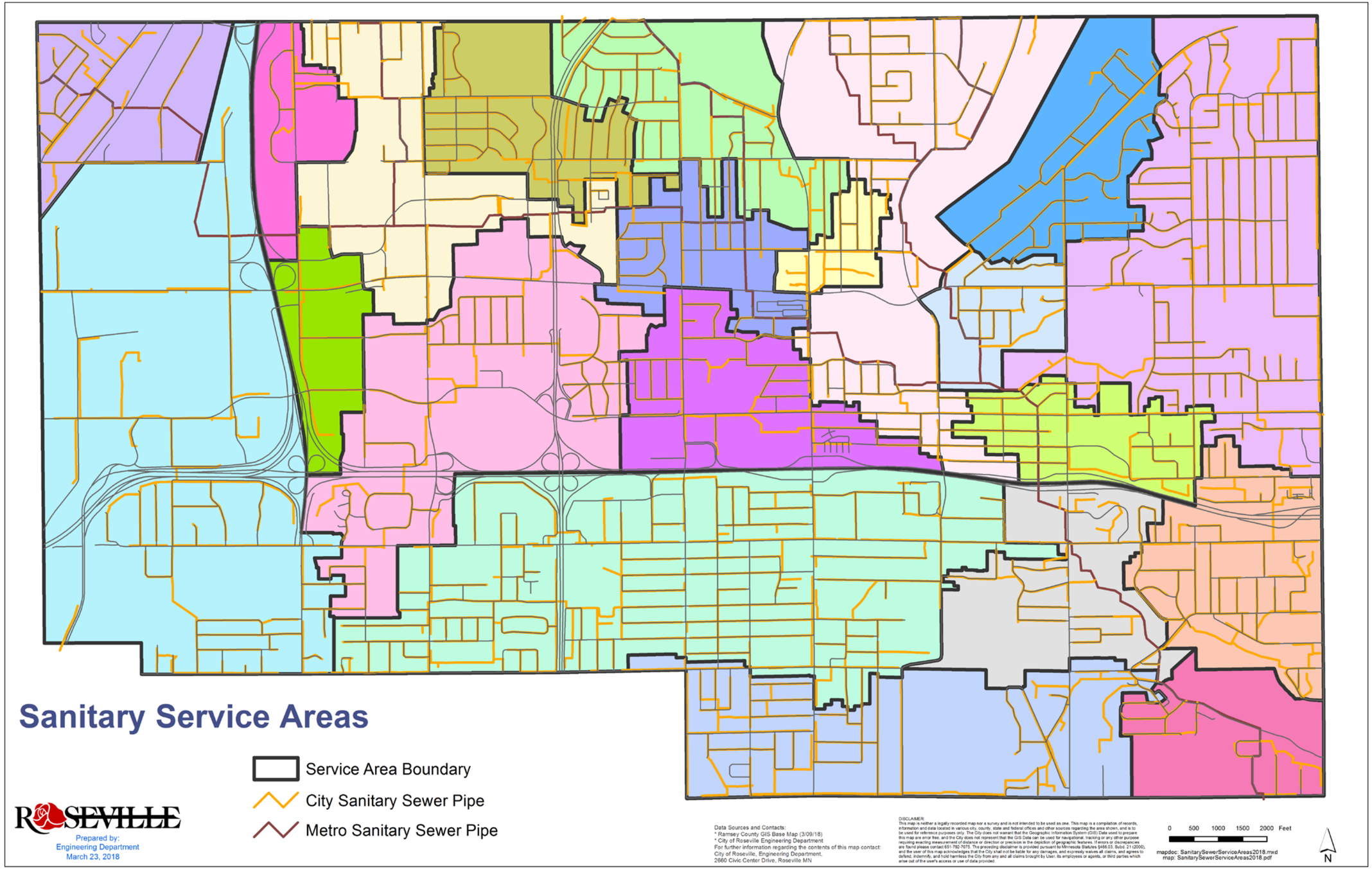
MCES owns and maintains the interceptor sewers. Public sanitary sewer trunk lines are in place and serve all 10,674 parcels in Roseville.

The City's sanitary sewer lines and lift stations collect sewage from individual parcels or properties and route the sewage to the MCES sewer interceptors. The City's system design and condition is reviewed and updated continuously to ensure adequacy. The 12 sanitary sewer lift stations are electronically monitored 24 hours a day.

MAP 12-1 CITYWIDE SANITARY SEWER



MAP 12-2 SANITARY SERVICE AREAS



2. On-Site Sewage Treatment

On-site septic systems are regulated by City code. The code requires that existing structures with on-site septic systems shall connect to the municipal sanitary sewer system within one year of sewer service being made available. Current records indicate all existing structures in the City of Roseville are connected to the sanitary sewer system.

3. Inter-Community Services

The City of Roseville provides utility service to properties in adjacent communities. As shown in Table 12-1, sewage from 59 dwelling units flows from Roseville to adjoining communities, and 28 dwelling units in adjacent communities send sewage into the Roseville system. Neighboring communities have not requested additional sanitary sewer extensions, and the City is not aware of any potential new requests.

4. Future Demand Forecast

Municipal sewer service is available to all properties within the City. Redevelopment and/or reuse of existing sites is the largest challenge for the City in the future. Developers are responsible for extending trunk or lateral mains to provide for sewer connections in development or redevelopment projects.

Presently over 98 percent of the properties within the city have been developed. The City of Roseville's 2040 population, household, and employment forecasts and projected annual sewer flow are shown in Table 12-2, and Table 12-3 details how the projected annual flow would be distributed among the MCES Interceptor lines.

Table 12-2 Projected Sewer Flow by Decade

Projected Sewer Flow			
Year	**2020**	**2030**	**2040**
Sewered Population	33,800	34,000	34,500
Sewered Households	15,300	15,700	16,100
Sewered Employment	37,300	38,300	39,300
Average Annual Waste-water Flow (MGD)	4.87	4.9	4.97
Allowable Peak Hourly Flow (MGD)	13.6	13.74	13.87

TABLE 12-3 PROJECTED SEWER FLOW BY MCES INTERCEPTOR

Projected Sewer Flow						
	2020		2030		2040	
Interceptor	Avg. Annual Wastewater Flow (MGD)	Peak Hourly Flow (MGD) (1)	Avg. Annual Wastewater Flow (MGD)	Peak Hourly Flow (MGD) (1)	Avg. Annual Wastewater Flow (MGD)	Peak Hourly Flow (MGD) (1)
1-RV-430 (2)	5.61	12.9	6.15	14.15	6.24	14.35
1-RV-431	0.33	1.17	0.33	1.20	0.33	1.20
1-RV-432	0.22	0.84	0.22	0.84	0.22	0.84
1-RV-433A	0.10	0.41	0.10	0.41	0.10	0.41
1-RV-433	0.19	0.72	0.19	0.72	0.19	0.72

Notes:
(1) Calculated using MCES peak flow factors
(2) Projections for 1-RV-430 include flows from 1-RV-431, 432, 433A, and 433.

5. INFILTRATION AND INFLOW (I/I)

The MCES Water Resources Management Plan includes policies for reducing inflow and infiltration (I/I). The MCES has projected significant growth in the metropolitan area by 2030. This increase, along with current levels of I/I in the system, would require significant, costly increases to expand the existing MCES treatment facilities to meet the future wastewater flows. The City is working to identify areas of the sanitary sewer system that are contributing to the City's I/I problem and to take the necessary measures to reduce and/or eliminate the surcharge. The following outlines the City's objectives, policies, strategies, and implementation plan to achieve reduction in I/I.

Problem: The City of Roseville sees an increase in the sanitary sewer flow rate for the community during large or prolonged rain events. This increase in flow rate has been attributed to I/I.

Objective: The objective of the program is to identify and reduce the amount of I/I entering into the City's sanitary sewer system.

Approach: Over the last ten years, the City has completed localized flow investigations and lined over 44 miles of sanitary sewer mains. By the end of 2017, the City will has completed a detailed citywide investigation study of I/I flow. This study will be used to review the reduction in flow of the last ten years, provide critical areas for short- and long-term capital investment, and give direction to the City's I/I efforts on the private sanitary sewer system within the city.

In 2007, the City began to study its I/I problem in response to the MCES imposed surcharge. In 2017, the City completed a citywide study and developed and implemented an I/I Reduction Plan, which includes an analysis of costs for remediation. The following steps explain how the City identified the extent, source, and significance of I/I throughout the City's sanitary sewer system.

1. Initial review: This was completed through the compilation of MCES flow data, City maps, City investigation records, lift station data, connection data, citywide flow studies, and building type information.

2. Analysis: The data was reviewed with respect to other system information to develop a plan for additional investigation efforts. The data allowed staff to eliminate areas where monitoring demonstrated there was not an I/I issue, and focus efforts on areas with I/I peaks.

3. Collection of additional flow data: The areas with I/I peaks were outfitted with temporary flow meters to allow staff to review "flow response" and the correlation to rainfall events. Lift station pumping records were also analyzed.

Identification of potential source(s): Once the analysis was complete, various types of I/I within the system could be identified. The source of I/I affects which actions the City will implement to reduce the excessive I/I.

I/I Implementation Plan

Once the potential sources of I/I are identified, the City will take the following actions to eliminate and prevent excessive I/I.

1. Additional investigation: Conduct additional investigation to pinpoint I/I sources. Methods used:
    a. Physical survey of manholes to identify deficient adjusting rings, manhole barrel joints, or wall leakage, and pipe penetration joint leakage.
    b. Internal televising of sewer mains to view and videotape the condition of the existing underground pipe. This will identify structural pipe problems including open and leaking joints, collapsed pipes, poor-quality service connections, and broken pipes, in addition to I/I defects such as leaking joints and leaking or running service connections.
    c. Sump pump inspections at individual properties for sump pumps that may be connected to the sanitary sewer. If the pump is illegally connected, the property owner must correct the situation and have the property re-inspected periodically to ensure that it remains disconnected.

d. Foundation drain (or leaking service line) inspection of individual properties to identify directly connected foundation drains and leaking service lines. Since this method is on private property and connections are typically underground, it is a difficult and potentially expensive task that is left as a last choice in the investigation list.

2. Rehabilitation of defects: Serious defects that are identified during the course of the investigation will be rehabilitated to eliminate I/I sources. Since the majority of the defects that are identified will be smaller, they will be compiled and evaluated before developing a rehabilitation project. This list of defects will be regularly reviewed and prioritized to provide the most benefit. A database of defects and projected rehabilitation methods will be maintained to prepare a priority listing of rehabilitation required to correct the problems. Rehabilitation methods include:

   a. Seal manholes: Raise cover to grade and seal cover or replace with non-vented cover, grout manhole barrel joints, install cast-in-place manhole liner, or replace deteriorated manhole as needed.

   b. Fix pipe defects: Test and seal joints, install cured-in-place pipe liner (CIPP), slip lining with new carrier pipe, or perform pipe bursting to replace pipe "in place".

   c. Eliminate private property sources: Re-route sump pumps to discharge onto ground or street surfaces, provide alternative outlets for sump pump discharge water.

   d. Foundation drain disconnection: Disconnect direct connections to the sanitary sewer and re-route the flow from the drain tile to a new sump pump installed to lift water from the foundation level and discharge it onto the ground surface away from the foundation.

   e. Repair of leaking service lines: Either replace or install slip lining to correct the leakage.

3. Annual Report: An annual report will be prepared to summarize efforts and costs during the course of the preceding year. It will include a review of flow data, comparison of changes from previous years, MCES allowable flow rates, and recommend work for the following year.

6. Utility Capital Improvement Plan

The Capital Improvement Plan (CIP) is one tool that is used to plan for rehabilitation and/or replacement of facilities as appropriate. The CIP has been developed to identify needs to ensure proper, continuous operation of the water

and sanitary sewer utilities. Since the physical infrastructure of Roseville is aging, the City recognizes the need to track and evaluate the condition of the City's infrastructure.

The CIP was developed to support the intent of the *Imagine Roseville 2025* goals to replace infrastructure, when appropriate, to minimize potential for failure of these systems.

Asset Management

The City's Capital Improvement Plan is primarily determined by the City's Asset Management Program. This program is designed to provide a basis for creating and documenting the condition rating of all publicly owned assets within the city. Ratings for each asset vary based upon the type of asset, but the determination of each rating is obtained through the following ways:

1. Visual inspections
2. Televised or camera inspections
3. Surveys
4. Full needs assessments and studies
5. History of issues or failures
6. Age of the asset
7. Type of material

This information is compiled and the Asset Management database is updated annually. This information is used while the Capital Improvement Plan is being developed, allows the City to be more strategic in its asset replacement, and also track the improvements over time.

Sanitary Sewer

The City's Sanitary Sewer Utility provides for the operation, maintenance, and replacement of sanitary sewer infrastructure. The division also ensures compliance with many regulatory requirements in the operation and maintenance of this system.

The Sanitary Sewer Utility's long-range goals include:

- Provide for uninterrupted operation of the sanitary sewer system to ensure the health and welfare of Roseville residents and businesses.
- Meet the regulatory goals of MCES and other regulatory agencies related to I/I reduction and other regulation.
- Provide excellent customer service in the utility area.
- Plan and implement a long-term infrastructure replacement plan.

To support these goals, the existing complement of vehicles and equipment must be replaced when they reach the end of their useful life. Infrastructure will be evaluated for appropriate rehabilitation or replacement schedules.

Other regulatory agencies have an impact on operational needs due to required compliance at the local level. A long-term funding plan is necessary to meet the infrastructure replacement needs. The City will see minimal growth that would affect this system. Capital needs are to support replacement of existing infrastructure and support existing operational equipment.

7. GOALS AND STRATEGIES

The City of Roseville provides a variety of public facilities and services. Utility services are essential to the health, safety, and welfare of its citizens. Sanitary sewer is absolutely necessary for the efficient functioning of the City and the preservation and protection of the City's sanitary sewer system is vital to the community's health and residents' quality of life. To accomplish this, the City of Roseville has identified the following goal and strategies:

Goal – Provide efficient and high-quality public facilities, services, and infrastructure.

Strategies:

- Provide reliable and high-quality sanitary sewer facilities.
- Work to provide efficient and cost-effective services through ongoing evaluation and intergovernmental coordination.
- Maintain an up-to-date emergency preparedness plan.
- Work to reduce inflow and infiltration into the City's sanitary sewer system.
- Prepare long-term plans to identify, prioritize, and determine the costs to maintain and/or replace City sanitary sewer facilities.
- Utilize the Capital Improvement Plan and annual budgeting process for prioritizing major public expenditures.