

# 2023

## CORPORATE ASSET MANAGEMENT PLAN

Wastewater Collection System

## INTRODUCTION

This report outlines the state of Saskatoon's wastewater collection system (also referred to as sanitary sewer system) by providing information on asset inventory, replacement value condition, lifecycle programs, and expenditure levels.

The source of information is from the City of Saskatoon's (City) Geographical Information System (GIS), asset management database, past contract values and operation and maintenance records. Records up to December 31, 2022 have been used for this report.

*The City's  
wastewater  
collection  
infrastructure  
has a replacement  
value of over  
**\$4 billion.***

## CURRENT INVENTORY

The Wastewater Collection System network consists of: Collection Mains, Trunk Mains, Force Mains, Manholes, and Service Connections.

**Table 1 - Inventory and Valuation**

| Asset               | Type       | Inventory | Replacement Value* (\$M) |
|---------------------|------------|-----------|--------------------------|
| Sanitary Mains      | Collection | 957 km    | \$ 2,427                 |
|                     | Trunk      | 131 km    | \$ 741                   |
|                     | Forcemains | 52 km     | \$ 112                   |
| Manholes            | Collection | 11,046 ea | \$ 157                   |
|                     | Trunk      | 1,256 ea  | \$ 18                    |
| Service Connections |            | 70,944 ea | \$ 600                   |
| <b>Total</b>        |            |           | <b>\$ 4,055</b>          |

*\*Replacement values have been updated to take into account contract costs up to and including 2022 contracts. Values may have decreased or increased from previous reports due to normal variations in costs.*

*Sanitary collection inventory managed by the Public Private Partnership are not included above.*



Sewer Lateral Liner Preparation

## ASSET PERFORMANCE

This section outlines how the condition and performance of assets is determined.

### Wastewater Mains

The physical condition of gravity collector and trunk sewer mains is assessed using CCTV inspection. CCTV inspection refers to a remote camera used to record defects along the length of the pipe. Defects are assessed and graded and a final condition grade on a five-point scale from “A” to “F” is determined.

Physical condition of wastewater assets vary by each asset type and the defect used to develop the condition rating. The physical condition grades are assigned on a five-point scale from “A” to “F”. The grading system developed is shown in the table below

**Table 2 – Wastewater Condition Grade Definitions**

| Grade | Implication                        | Action                                                                                                                                                                            |
|-------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| “A”   | No structural problems evident     | Ongoing monitoring and maintenance only.                                                                                                                                          |
| “B”   | Some structural deficiencies noted | Ongoing monitoring and maintenance only.                                                                                                                                          |
| “C”   | Sewer main showing deterioration   | Some rehabilitation may be recommended for highly critical mains. Less critical mains should be flagged for increased monitoring.                                                 |
| “D”   | Physical condition is near failure | Rehabilitation likely necessary in 5 to 10 years and should be taken into account for long-term budgeting.                                                                        |
| “F”   | Physical condition has failed      | Rehabilitation or replacement is recommended. Mains should be prioritized for annual rehabilitation programs based on defect severity, main criticality, and budget availability. |

Forty-six percent (46%) of the collector system and 51% of the trunk system have condition ratings.

**Table 3 – Physical Condition of Collector Mains**

| Condition                    | Length (km) | % of Inspected | % of Total |
|------------------------------|-------------|----------------|------------|
| A                            | 356         | 81%            | 37%        |
| B                            | 1           | 0.3%           | 0%         |
| C                            | 54          | 12%            | 6%         |
| D                            | 7           | 1%             | 1%         |
| F                            | 19          | 4%             | 2%         |
| <b>Total Inspected (A-F)</b> | <b>437</b>  | <i>N/A</i>     | <b>46%</b> |
| Unknown                      | 522         | <i>N/A</i>     | 54%        |
| <b>Total</b>                 | <b>959</b>  | <i>N/A</i>     |            |

**Table 4 – Physical Condition of Trunk Mains**

| Condition                    | Length (km)  | % of Inspected | % of Total |
|------------------------------|--------------|----------------|------------|
| A                            | 53.0         | 80%            | 41%        |
| B                            | 0.5          | 1%             | 0%         |
| C                            | 8.1          | 12%            | 6%         |
| D                            | 0.5          | 1%             | 0%         |
| F                            | 4.2          | 6%             | 3%         |
| <b>Total Inspected (A-F)</b> | <b>66.3</b>  | <i>N/A</i>     | <b>50%</b> |
| Unknown                      | 64.4         | <i>N/A</i>     | 49%        |
| <b>Total</b>                 | <b>130.7</b> | <i>N/A</i>     |            |

## LIFECYCLE PROGRAMS

The wastewater collection system is managed through asset preservation and operation and maintenance programs. The established levels of service for these programs are to provide free-flowing sewage drainage from all properties for the protection of community health and property, provide sufficient flow for residential and commercial use, protect the environment, and provide fiscal responsibility.



*Sewer Main Liner Final Install*

## ASSET RENEWAL/REPLACEMENT PLAN

### Sanitary Collector Mains

Collector mains are inspected regularly and are rehabilitated proactively before they reach a condition where service is interrupted or costly repairs are required. Currently, approximately 46% of the collection system has a physical condition rating; however, funding levels for the preservation program are determined by projecting the condition rating of the entire system using the known condition data. Sewer mains are rehabilitated using Cured-in-Place Pipe (CIPP) lining. This method is more cost effective than traditional open excavation replacement methods. The CIPP method requires no excavation. A liner is inserted through existing manholes and a new pipe is created within the existing deteriorated pipe. There are currently 31.5 kilometres of sanitary main collection with a known physical condition of “Poor” or “Very Poor”. Based on this planned expenditure service level, there is no funding gap present.

### Sanitary Trunk Mains

Trunk mains receive approximately \$0.8 million annually for preservation programs. Large diameter sanitary mains require specialized equipment and expertise to evaluate, and rehabilitation projects can be very costly. The focus of the trunk main program has been inspection and condition evaluation with the long-term objective of establishing a recommended annual preservation funding level.

An inspection and condition assessment project of approximately 20 kilometres of trunk main was completed in 2020. The condition assessment recommended multiple lining and cleaning projects, which are currently being prioritized.

Currently identified projects are adequately funded by past contributions to the sanitary trunk preservation capital project budget. Future inspection and monitoring of sanitary trunk performance may identify future work that will require one-time funding requests.

### Service Connections

Connections are replaced as they fail, prior to road resurfacing, or at the request of the homeowner. Homeowners can request the replacement of a connection made of non-approved materials (clay-tile or fiber). These are addressed on a first-come, first-serve basis and approximately 20 are replaced per year. Fiber sewer connections are replaced prior to some types of road resurfacing or reconstruction treatments. The current service level and budget of \$1.98 million per year will allow for the replacement of approximately 20 homeowner-requested connections, 65 replacements on road programs, and 90 emergency replacements.

## **OPERATIONS AND MAINTENANCE PROGRAMS**

The operations and maintenance programs ensure the sanitary system is inspected, operated, and maintained within the requirements of the permit to Operate a Sewage Works as issued by the Water Security Agency.

### **CCTV Inspection Program**

The CCTV Inspection Program includes regular inspections to support the roadways rehabilitation programs (to verify sewer condition and undertake repairs or rehabilitation before planned roadwork) as well as regular planned inspections for sewer condition rating. The goal of CCTV inspection is to reduce uncertainty regarding the condition of infrastructure and to identify any issues or necessary repairs before they escalate and become more costly, which could potentially impact service levels.

The CCTV sewer main inspection program is currently being reviewed and revised to increase performance targets. Initiatives to increase production using existing operating and capital funding include purchasing improved equipment, increasing standby operator capacity, and night shift work where applicable.

### **Operations**

Operations programs include the provision of emergency response services to ensure that blockages (on sanitary sewer mains, sanitary service connections, or in manholes) are either cleaned and removed or bypassed in a timely manner, protecting both residents and property.

### **Cleaning**

Sanitary sewer mains are regularly cleaned as a preventative measure to ensure they are operating at capacity and are maintained in a free-flowing condition. Fats, oils, and grease introduced by residents and businesses are a major cause of blockages, as well as tree roots and non-flushable hygiene products. Currently, all sanitary sewer mains are cleaned every seven years on average. Some “hot-spot” locations, which are prone to blockages, are flushed on a six-month, or one-, two-, or three-year cycle.

### **Service Connections**

Emergency sanitary sewer service connection maintenance is provided to residents to ensure free-flowing sewage drainage from all properties within the City. The service is provided to the owner and/or occupant of any residential building connected to the sanitary sewer collection system and are provided on a first-come, first-served basis subject to route scheduling. Although the City strives to respond to blockages within eight business hours of reporting, this is not always possible, especially in periods of peak demand - even with contractor support.

### **Sewer Repairs**

When sewer mains are blocked by a pipe collapse or failure, the pipe repairs are undertaken while a bypass is in place. Sanitary sewer manholes and their components are replaced as they fail.

## SERVICE EXPENDITURE LEVELS

The Administration evaluates the condition of the City’s assets in order to develop an annual program to maintain the assets at a minimum lifecycle cost. Where feasible, condition assessments are conducted and used to establish the condition and develop annual capital improvement plans.

The level of service for each type of asset is defined differently, but as the level of service increase for the asset so does the cost of maintaining the asset.

In order to compare all assets equally, five levels of expenditure are identified below.

“A” represents the highest level of expenditure and “F” represents no expenditure.

**Table 5 – Levels of Expenditure**

| Expenditure Level | Asset Condition                     | Description                                                                                                     |
|-------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>“A”</b>        | Getting Better Quickly              | Sufficient expenditures to keep asset in top condition and to increase asset condition/value quickly over time. |
| <b>“B”</b>        | Getting Better                      | Sufficient expenditures to keep asset in top condition and to increase asset condition/value slowly over time.  |
| <b>“C”</b>        | Maintain Asset in Current Condition | Sufficient expenditures to keep asset in constant condition over time.                                          |
| <b>“D”</b>        | Getting Worse                       | Insufficient expenditures to maintain asset condition. Over time asset condition will deteriorate.              |
| <b>“F”</b>        | Getting Worse Quickly               | No expenditures. Asset condition/value decreased rapidly.                                                       |

Using the above criteria and physical condition desired, the Administration has identified the following expenditure service levels for certain assets within the wastewater collection system.

**Table 6 – Asset Performance and Funding**

| Asset Program                              | Current Performance                                | Desired Performance | Approved Expenditure Level | Required Annual Funding | Existing Annual Funding | Annual Funding Gap |
|--------------------------------------------|----------------------------------------------------|---------------------|----------------------------|-------------------------|-------------------------|--------------------|
|                                            | <i>Known Condition of 46% of Collection System</i> |                     |                            |                         |                         |                    |
| <b>Sanitary Mains - Collection</b>         | 81% Very Good                                      | Fair                | <b>B</b>                   | \$ 3.6M                 | \$ 3.6M                 | \$ 0.0M            |
|                                            | 13% Fair                                           |                     |                            |                         |                         |                    |
|                                            | 1% Poor                                            |                     |                            |                         |                         |                    |
|                                            | 4% Very Poor                                       |                     |                            |                         |                         |                    |
| <b>Sanitary Mains - Trunks</b>             | <i>Known Condition of 47% of Trunk System</i>      |                     |                            |                         |                         |                    |
|                                            | 80% Very Good                                      | Good                | <b>C</b>                   | \$ 0.8M                 | \$ 0.8M                 | \$ 0.0M            |
|                                            | 1% Good                                            |                     |                            |                         |                         |                    |
|                                            | 12% Fair                                           |                     |                            |                         |                         |                    |
|                                            | 1% Poor                                            |                     |                            |                         |                         |                    |
|                                            | 6% Very Poor                                       |                     |                            |                         |                         |                    |
|                                            |                                                    |                     |                            |                         |                         |                    |
| <b>Service Connections</b>                 | 93% Very Good                                      | Good                | <b>B</b>                   | \$ 2.1M                 | \$ 2.1M                 | \$ 0.0M            |
|                                            | 7% Very Poor                                       |                     |                            |                         |                         |                    |
| <b>Sanitary Operations and Maintenance</b> | Good                                               | Good                | <b>C</b>                   | \$ 10.0M                | \$ 8.9M                 | \$ 1.1M            |



### Funding Gap

Currently, the wastewater collection system has \$6.5 million allocated for capital preservation programs and \$8.9 million for operations and maintenance. The current funding level aims to maintain the collection network and improve its condition by gradually addressing the backlog of locations with a “Poor” and “Very Poor” condition rating.

The Wastewater Operations and Maintenance Program has identified a funding gap of \$1.1 million. This shortfall is primarily due to an increase in contracted operations work and high-cost emergency repairs required to meet service level timelines during periods of maintenance demands. Future reports to City Council will present potential options for adjusting the utility rate, including reducing service levels or increasing funding to maintain the current service standards.

The capital programs for collection and trunk wastewater main preservation and service connection replacements have no funding gaps based on approved expenditure levels. The current capital program focuses on rehabilitation using Cured-in-Place Pipe (CIPP) lining, which requires no excavation. The program typically has multi-year tenders and the contract pricing has not experienced substantial price escalation as seen in other work throughout the City. However, the long-term forecast of the program is highly dependent on maintaining annual growth and inflation based on construction costs. Failure to properly maintain inflation and growth may result in a decline in the network condition.

*Sewer Pipe  
Condition  
Assessment  
Very Poor*



## **THE WAY FORWARD**

The SAP Enterprise Asset Management (EAM) system was implemented in spring 2022. The implementation has been successful, with the initial focus being on the citizen-facing aspects of water and sewer Asset Operations and Maintenance, specifically complaint and defect resolution. Our teams are dedicated to continuously improving processes and programs within the water collection system. The following are the key areas of focus:

- Water and Sewer Operations will continue developing data capturing mechanisms within SAP to enhance the value and availability of operations and maintenance data for rehabilitation and replacement planning. The City will also explore opportunities to eliminate redundant reporting and tracking systems related to data capture and maintenance.
- Develop new performance level targets, monitor and evaluate annually to increase the production of CCTV inspection program using existing funding.

## **INFRASTRUCTURE RESILIENCE AND CLIMATE CHANGE ADAPTATION STRATEGY**

Sanitary sewers are susceptible to higher flows during heavy rain events. Even though they are not directly connected to the storm water collection system, it has been shown that high water tables combined with high rainfall events can lead to inflow and infiltration to sanitary sewers and cause sanitary backups. To counter inflow and infiltration events, it is important to ensure that sewers are clear and operating at full capacity; thereby better able to handle increased flows. Regular maintenance and cleaning of sanitary sewers ensures they are operating at full capacity. In addition, rehabilitation and replacement of deteriorated sewers, connections, and manholes will decrease infiltration rates into the wastewater collection system.



*Sewer Pipe  
Maintenance*

*We strive to maintain and fund  
our key infrastructure assets to  
minimize total lifecycle costs.*

