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2040 INFRASTRUCTURE MASTER PLAN WATFORD CITY, NORTH DAKOTA

Executive Summary



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EXECUTIVE SUMMARY

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Over the last decade, communities across western North Dakota have experienced rapid population growth, primarily due to increased oil and gas activity in the Bakken Formation. **Watford City** was one of the fastest growing communities in the State, growing from 1,800 people in 2010 to an estimated 7,000+ people today. Population growth presents many benefits and opportunities, including local economy stimulation and increased amenities in the community, but also comes with potential challenges such as strained municipal services and finances.

Watford City relies heavily on gross production tax (GPT) revenues, sales tax revenues, property tax revenues, and utility (water, sewer, garbage) fees to fund new infrastructure, infrastructure renewal and replacement, and infrastructure operations and maintenance. With the recent slowdown in western North Dakota and the world (due to the ongoing COVID-19 pandemic), City leaders and staff wanted to better position the community for the future and align funding sources with existing and proposed infrastructure needs to ensure a resilient infrastructure plan is in place.

The City made the decision to embark on a Master Planning journey in 2021 to develop the **Watford City 2040 Infrastructure Master Plan**. The Master Plan will help the City plan and strategically implement operations, maintenance, and infrastructure improvements over the next 20 years.



2040 INFRASTRUCTURE MASTER PLAN

INTRODUCTION

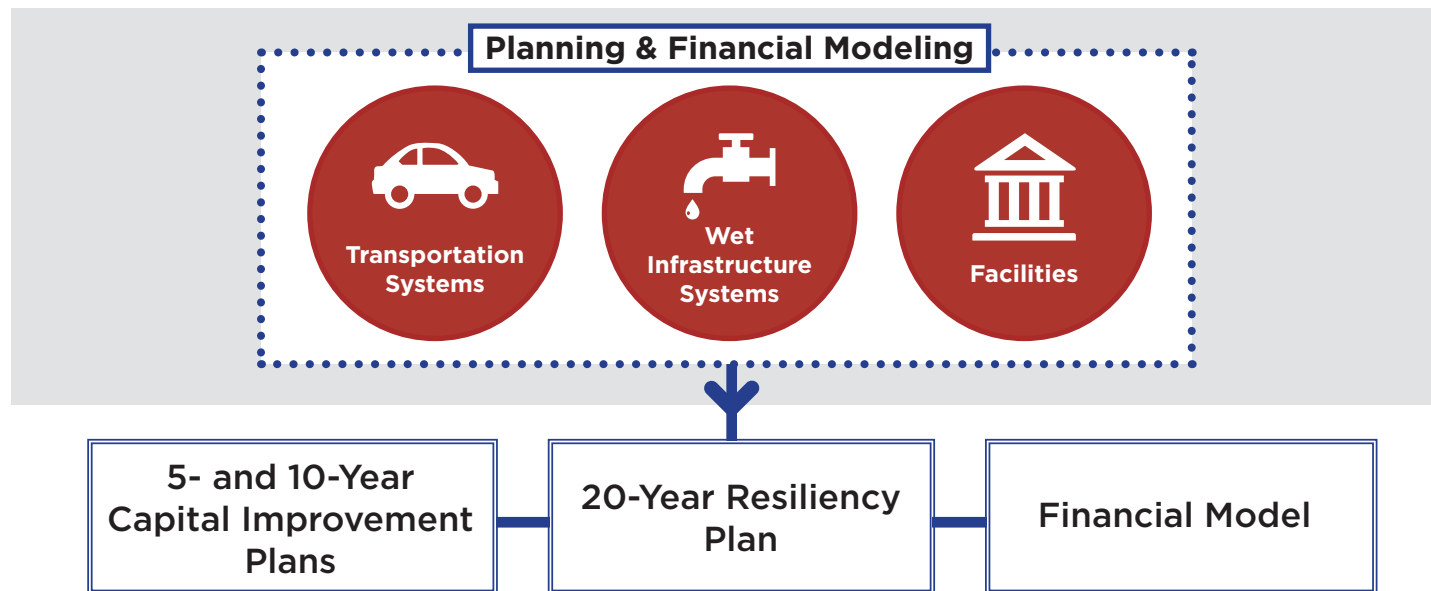
BACKGROUND

The purpose of the Watford City 2040 Infrastructure Master Plan (Master Plan) is to evaluate the City's existing and future infrastructure systems as well as the City's finances and financial processes to ensure the City is making appropriate infrastructure decisions over the next 20 years.

To accomplish this, the following infrastructure systems were evaluated:

- Transportation Systems (Roads, Sidewalks, and Paths)
- Wet Infrastructure Systems (Water, Wastewater, and Stormwater)
- Facilities (Multiple City-Owned Facilities)

As existing and future infrastructure needs were identified throughout the Master Planning process, a financial model was developed that aligned financial sources with infrastructure needs. Ultimately, the Master Plan resulted in three core deliverables (in addition to the Report), including a Capital Improvements Plan, a 20-Year Resiliency Plan, and a dynamic Financial Model.



At the beginning stages of the Project, the Project team developed a Project-specific Mission Statement and Project Goals to ensure the project stayed on course, fulfilled the goals, and ultimately lived up to the Master Plan Mission.

MASTER PLAN MISSION STATEMENT



The Watford City 2040 Infrastructure Master Plan is an overarching policy document which is intended to guide decision making related to the City infrastructure assets and financials to ensure decisions move the City towards the community's vision.

PROJECT GOALS



GOAL #1

Determine the existing condition of the City's wet infrastructure, transportation network, and facilities that are owned and/or maintained by the City so service may continue to be provided that meets or exceeds regulatory requirements and defined levels of service.



GOAL #2

Determine future infrastructure needs based on proposed development, population projections, and funding scenarios to understand how additional growth will affect the City's financials.



GOAL #3

Assess current service delivery, operational processes, and maintenance processes against the established levels of service. Determine if improvements to the processes are necessary to maintain levels of service and prolong the life of existing and future infrastructure.



GOAL #4

Prioritize wet infrastructure, transportation network, and facility projects and develop cost estimates for each project.



GOAL #5

Establish a budget stabilization fund to maintain the City's essential services and be resilient during varying economic conditions.



GOAL #6

Create an annual budget which incorporates current debt requirements, ongoing operations and maintenance (O&M) costs, capital improvement priorities, and future renewal costs associated with existing facilities.



GOAL #7

Develop an infrastructure master planning program and capital improvement prioritization process that is documented, repeatable, affordable, and implementable. The plan should be able to be incorporated into the staff's daily work and annual budgeting process.



EXISTING CONDITIONS ASSESSMENT

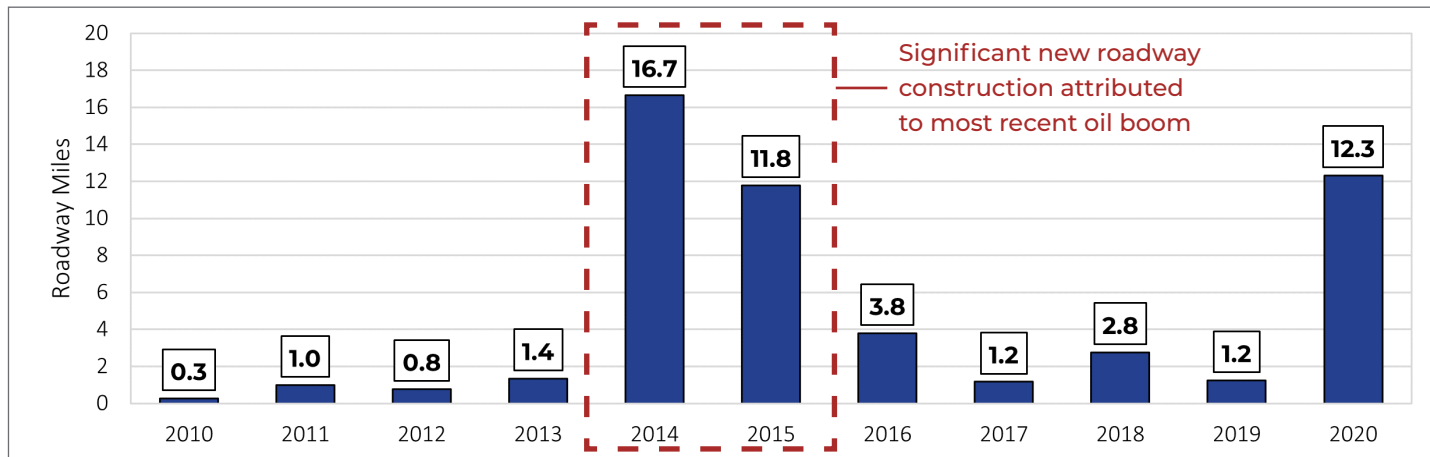
TRANSPORTATION SYSTEM

The Transportation System Assessment was comprised of the following components:

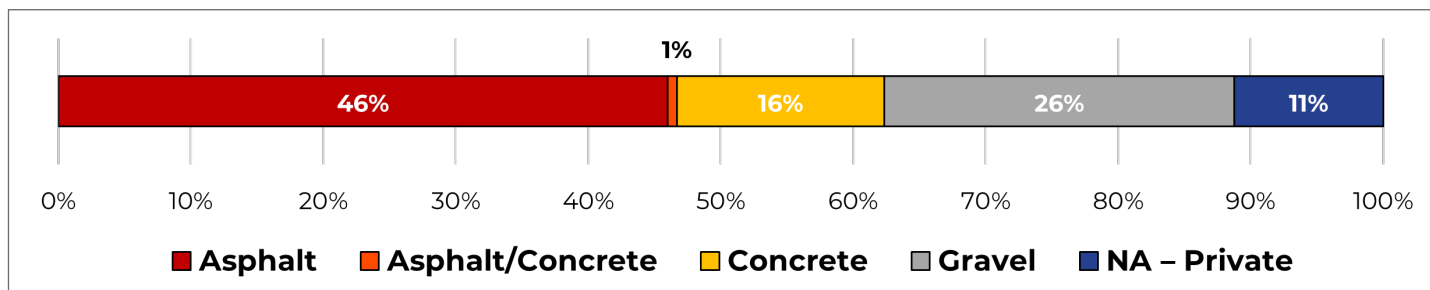


Some key graphics and figures from the **Transportation System Assessment** are shown below, along with a map showing the findings of the pavement condition analysis and key transportation system takeaways on the following page.

ANNUAL ROADWAY CONSTRUCTION MILEAGE (2010 – 2020)



EXISTING ROAD TYPES



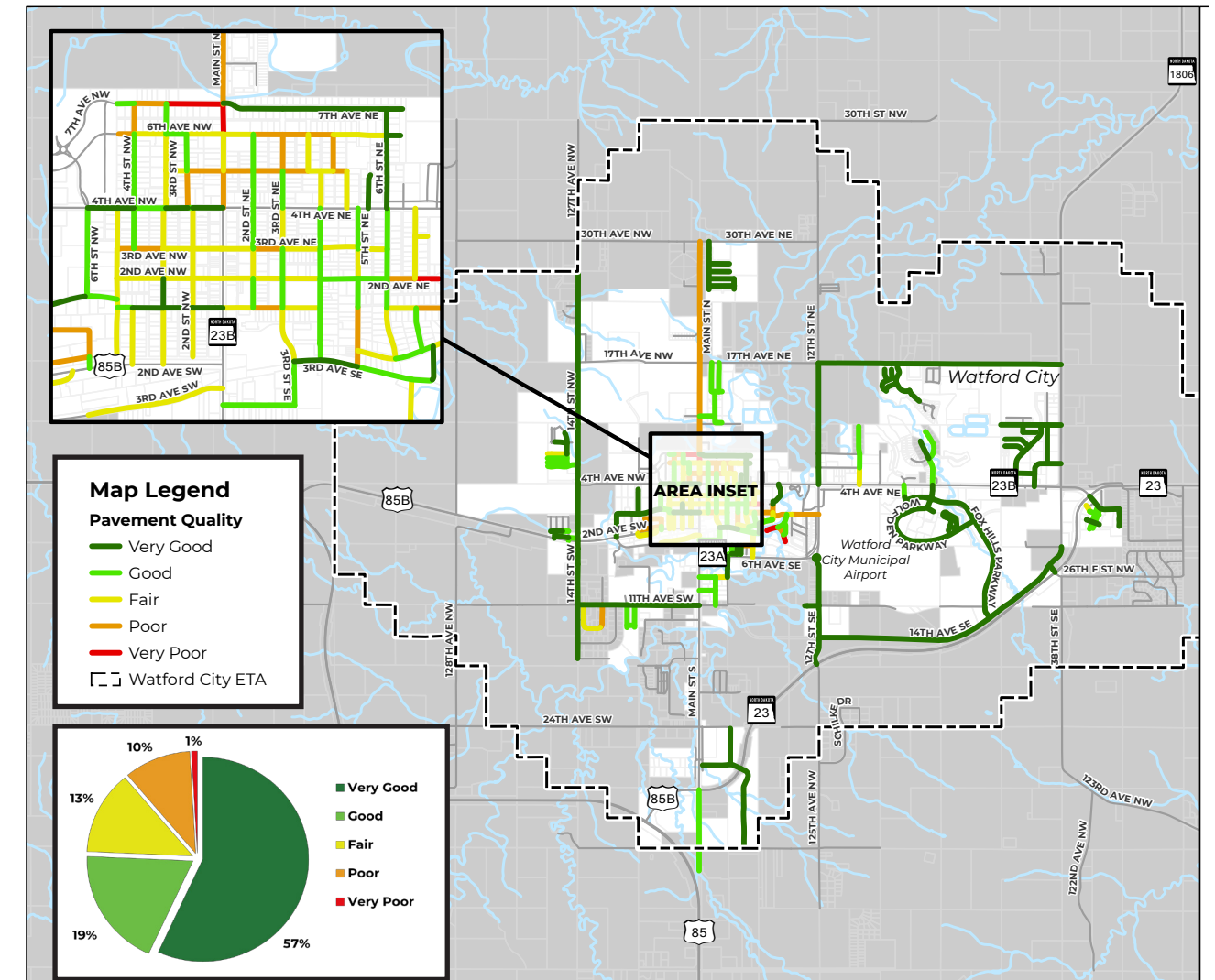
KEY PROJECT NOTE:

As part of the Master Plan, two transportation annual programs were recommended to help the City infill sidewalk gaps as well as repair and make more sidewalks ADA* compliant. They include:

- Sidewalk Gap Infill Annual Program
- Sidewalk Repair and ADA Annual Program

*Americans with Disabilities Act

MAP OF PAVEMENT QUALITY

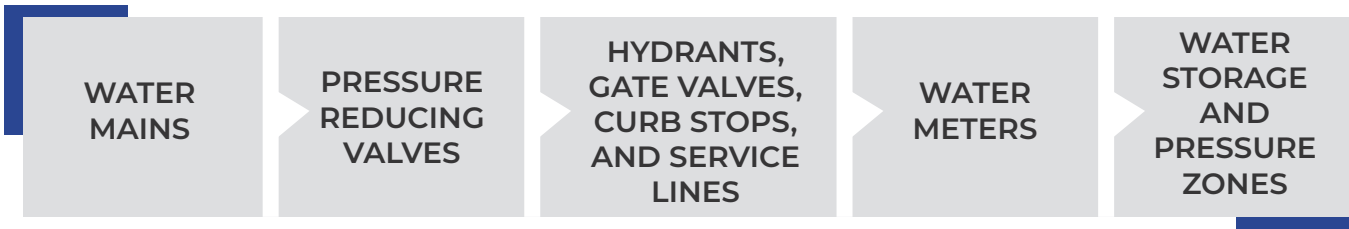


KEY TRANSPORTATION SYSTEM OBSERVATIONS AND TAKEAWAYS

- 76% of the City's pavement is in good or very good condition.
- The majority of the City's pavement that is in fair or worse condition is located in "Old Watford City."
- Pavement improvement capital projects are identified in the CIP as either corridor reconstruction projects, gravel to urban section conversion projects, or new roadway projects.
- Pavement improvement O&M projects are identified in the CIP as mill and overlay projects or a chip seal projects, which generally depends on the pavement condition.
- Functional roadway classifications, roadway capacities, system connectivity, access spacing, pedestrian systems, and safety were all reviewed as part of the project, and specific recommendations related to these components are outlined in the Master Plan.
- Because there has been significant growth of the transportation system over the past decade, there were no major roadway capacity concerns identified.
- Two sidewalk programs were identified and programmed into the CIP to address sidewalk gaps, sidewalk repairs and ADA compliance.
- In order to maintain a resilient transportation system beyond the 10-year CIP horizon, it's recommended for the City to continue with pavement preservation practices. This includes investing in prolonging the life of the City's roadways through asphalt chip seal, asphalt mill and overlay, and concrete joint seal projects.

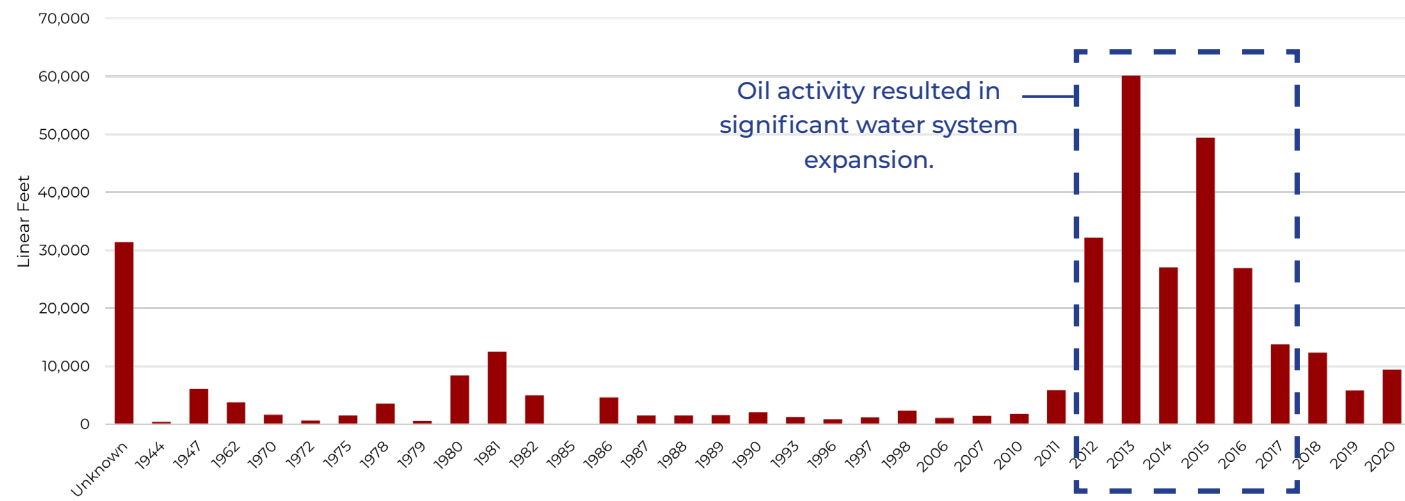
WATER SYSTEM

The Water System Assessment included the following components:

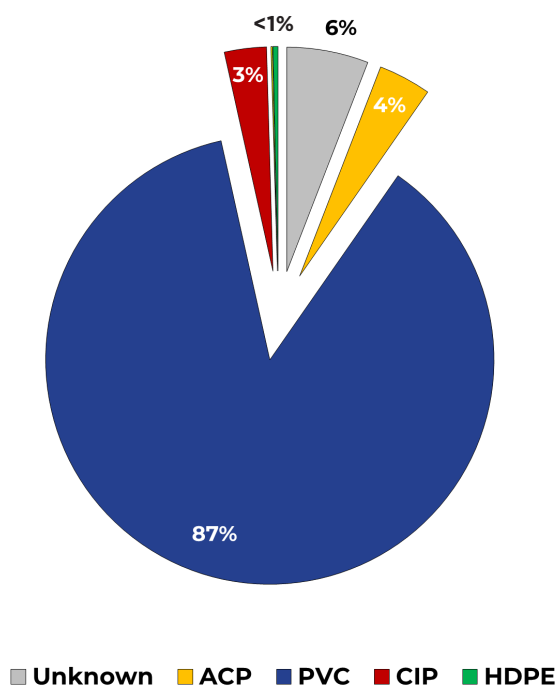


Some key graphics and figures from the **Water System Assessment** (specifically related to water mains) are shown below, along with a map showing the breakdown of water main material and key water system takeaways on the following page.

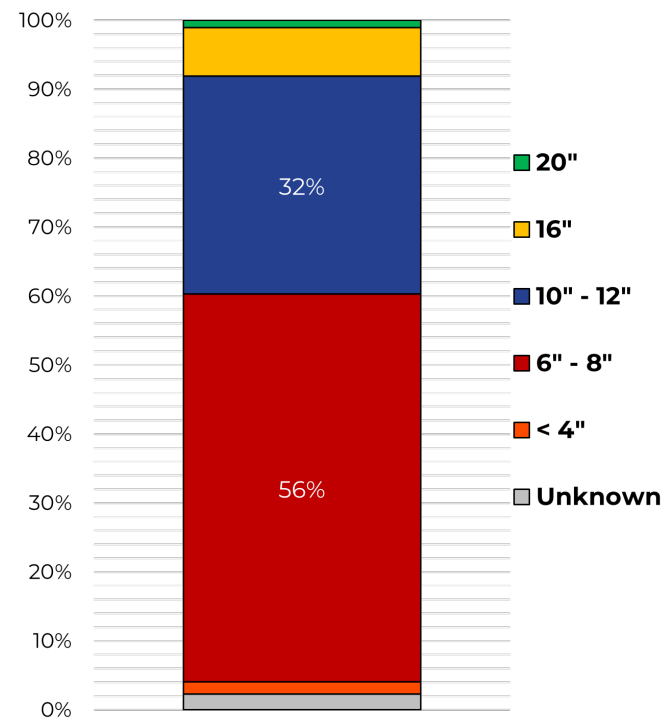
WATER MAIN INSTALLATION DATES



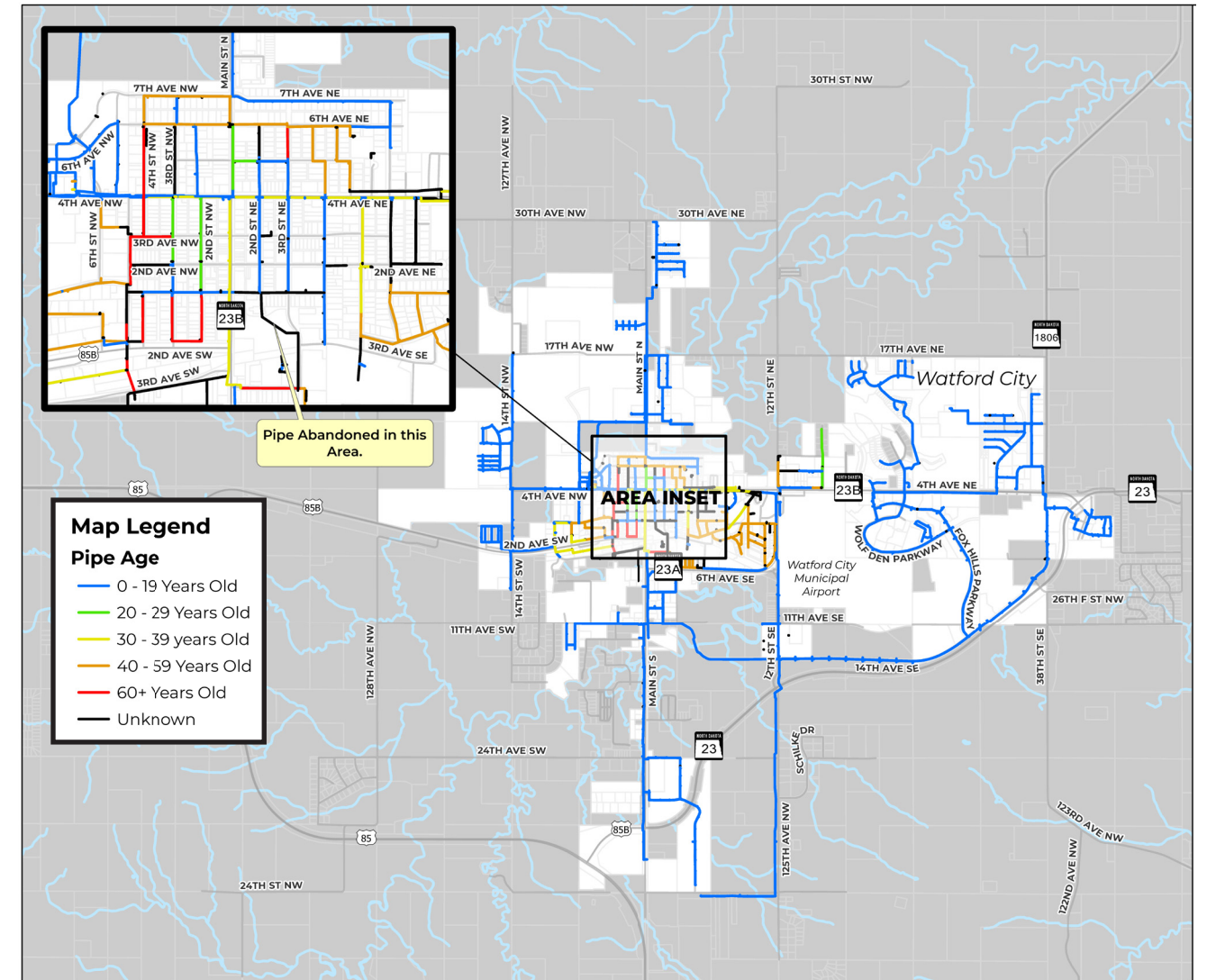
WATER MAIN MATERIAL



WATER MAIN SIZE



MAP OF WATER MAIN AGE



KEY WATER SYSTEM OBSERVATIONS AND TAKEAWAYS

- The City has an expansive water system consisting of the following infrastructure components:
 - 64.3 miles of water mains
 - 2 water towers (each 1MG)
 - 2 ground storage reservoirs (each 1MG)
 - 4 pressure zones
 - 12 pressure reducing valves (PRVs)
 - 582 fire hydrants
 - 1,804 gate valves
 - 2,255 curb stops (estimated)
- Approximately 73% (in terms of distance) of the water mains were installed within the last 20 years.
- Approximately 87% (in terms of distance) of the water mains are PVC pipe.
- Generally, the City's water system is generally a "young" system and appears to be in good overall condition. Certain components that are known to be in worse condition, such as older cast iron and asbestos cement pipes, have been targeted for replacement and programmed as projects in the CIP.
- Looking beyond the 10-year CIP horizon included in this Master Plan (from 2030 to 2080), it's estimated that Watford City will need to replace approximately 1,270 linear feet of water main per year (on average) to continue to maintain a healthy water system.

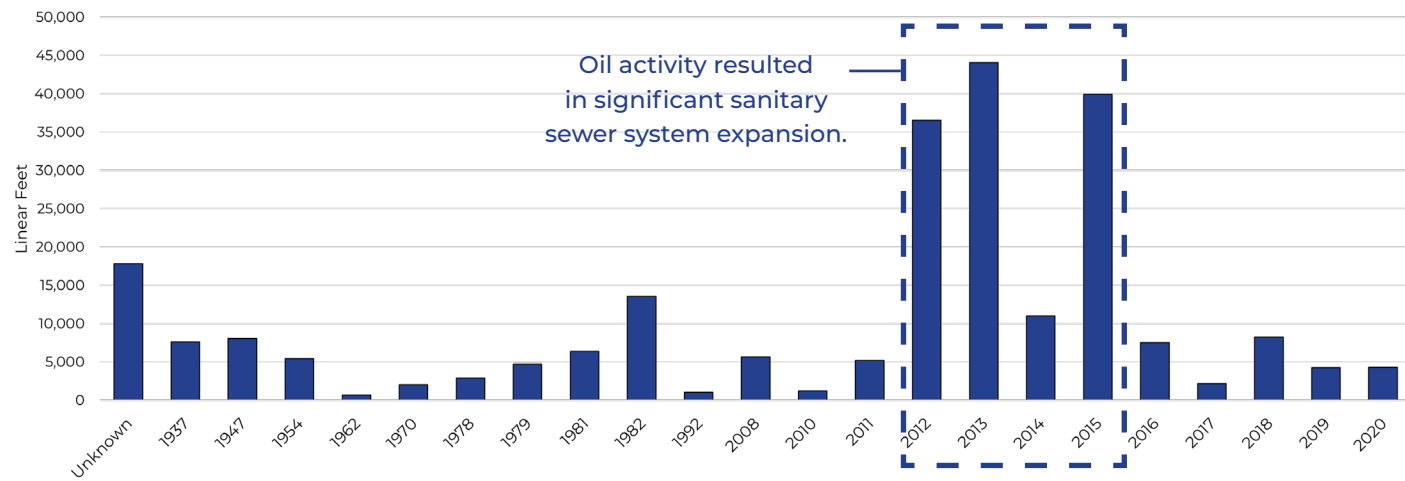
WASTEWATER SYSTEM

The Wastewater System Assessment included the following components:

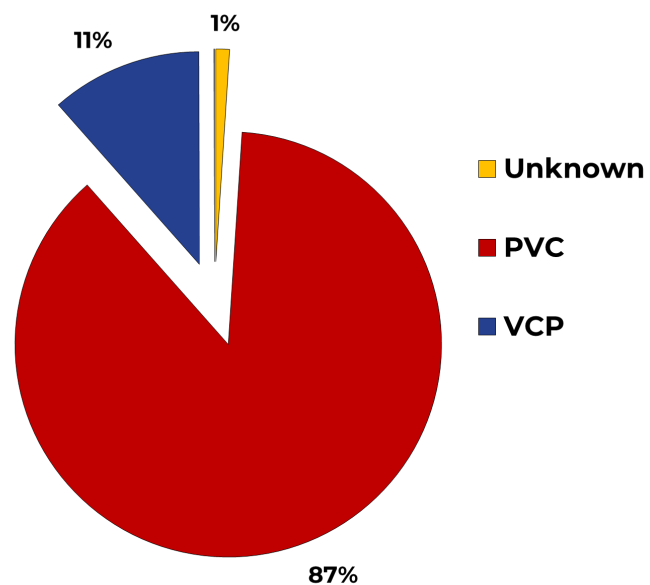


Some key graphics and figures from the Wastewater System Assessment (specifically related to sanitary sewers) are shown below, along with a map showing the breakdown of sanitary sewer material and key wastewater system takeaways on the following page.

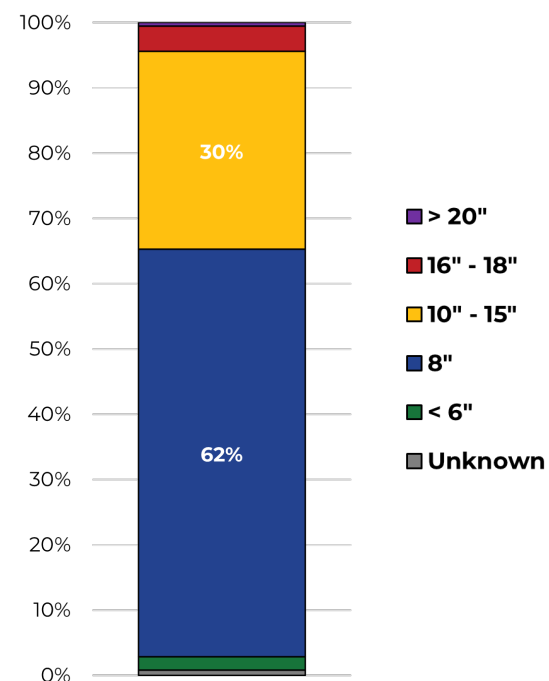
SANITARY SEWER INSTALLATION DATES



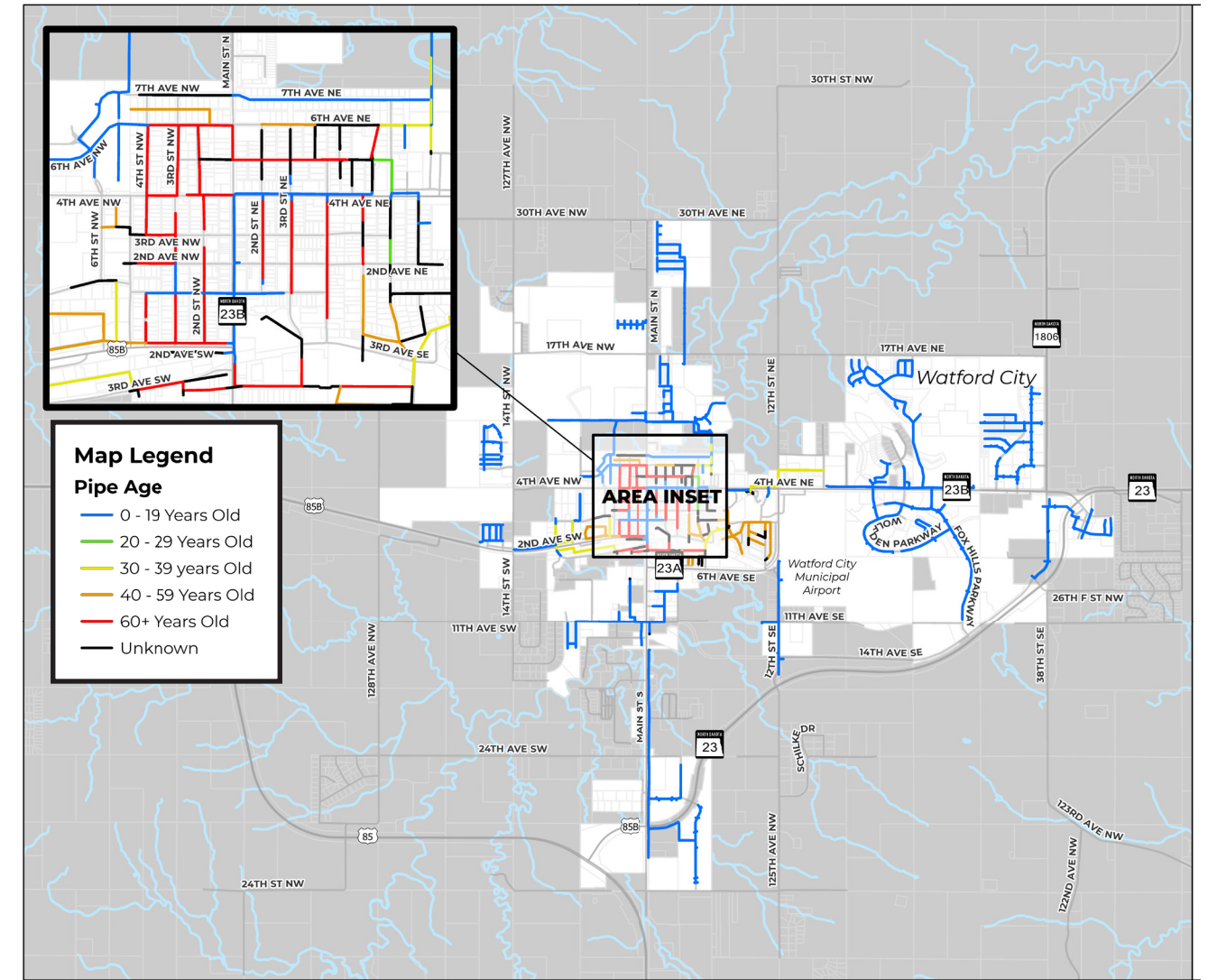
SANITARY SEWER MATERIAL



SANITARY SEWER SIZE



MAP OF SANITARY SEWER AGE



KEY WASTEWATER SYSTEM OBSERVATIONS AND TAKEAWAYS

- The City has a wastewater system consisting of the following infrastructure components:
 - 45.4 miles of gravity sewers
 - 20 sanitary sewer lift stations
 - 15.7 miles of force mains
 - 993 sanitary manholes
 - 1 Water Resource Recovery Facility (WRRF) with Reclaimed Effluent Irrigation Supply System
- Approximately 71% (in terms of distance) of the sanitary sewers were installed within the last 20 years.
- Approximately 87% (in terms of distance) of the sanitary sewers are PVC pipe.
- Similar to the water system, the City's wastewater system is a generally "young" system and appears to be in good overall condition. Certain components that are known to be in worse condition, such as older vitrified clay pipe and two lift stations (Lift Station 4BT and Lift Station CSI), have been targeted for replacement/improvement and programmed as projects in the CIP.
- Looking beyond the 10-year CIP horizon included in this Master Plan (from 2030 to 2080), it's estimated that Watford City will need to replace approximately 760 linear feet of sanitary sewer per year (on average) to continue to maintain a healthy wastewater system.

STORMWATER SYSTEM

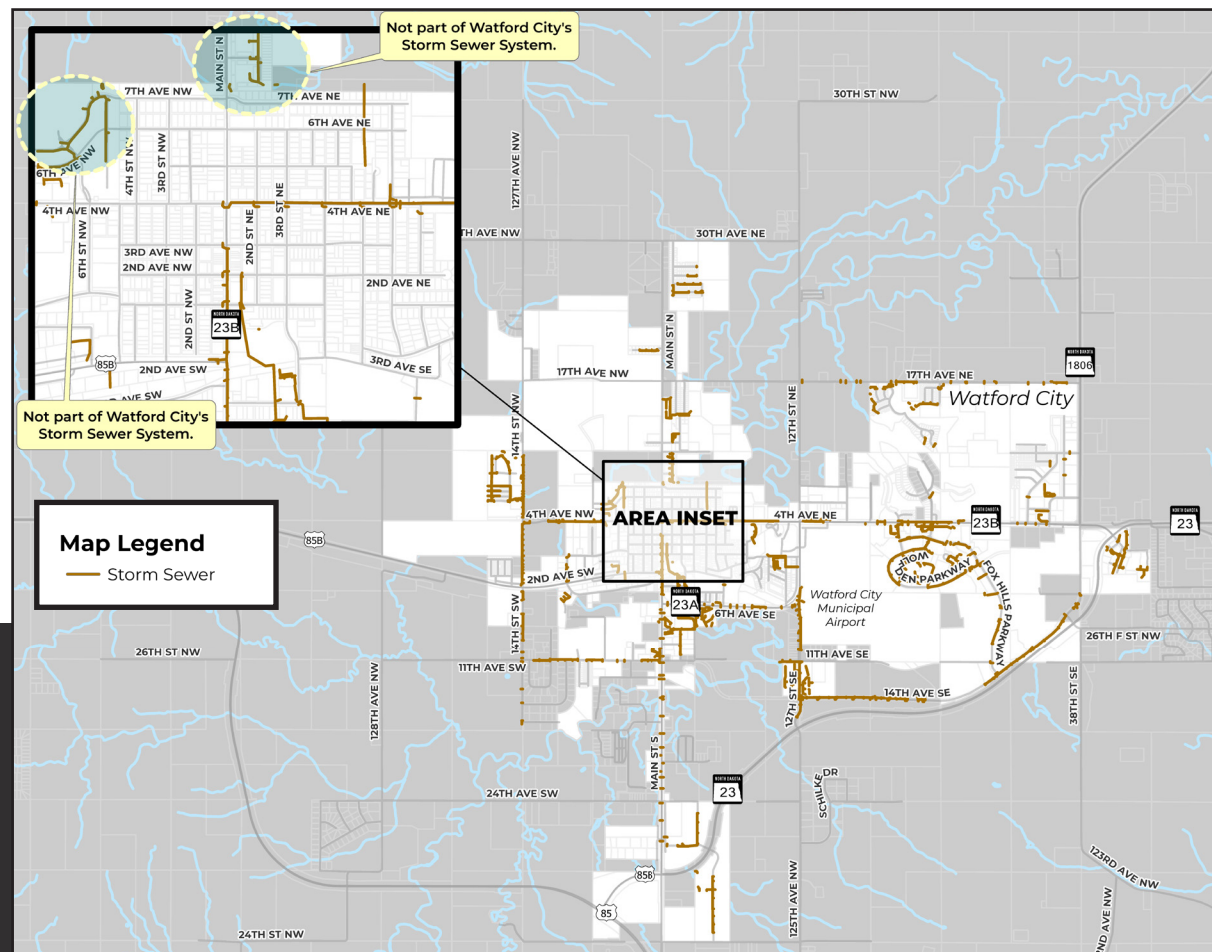
The City relies on significant relief and elevation changes to aid with stormwater drainage. Throughout much of the City, as precipitation and stormwater accumulates, the stormwater overland flows in streets or ditches to either storm sewer catch basins and into the stormwater collection system, or directly into a stormwater outfall prior to discharging to a receiving waterbody. It is typical for stormwater sewer systems to be primarily made up of reinforced concrete pipe (RCP). Watford City shares this makeup, where 96% of its stormwater sewer system is RCP. Stormwater sewer systems are more challenging to **desktop assess** compared to water main and sanitary sewer systems for several reasons, including:



- Internal pipe corrosion is typically a non-factor
- No customer service connections
- Pipe diameter isn't indicative of actual flow volumes being carried through the pipe
- RCP is extremely resilient and doesn't have similar aging characteristics like cast iron pipe (for water) or vitrified clay pipe (for sanitary sewer)

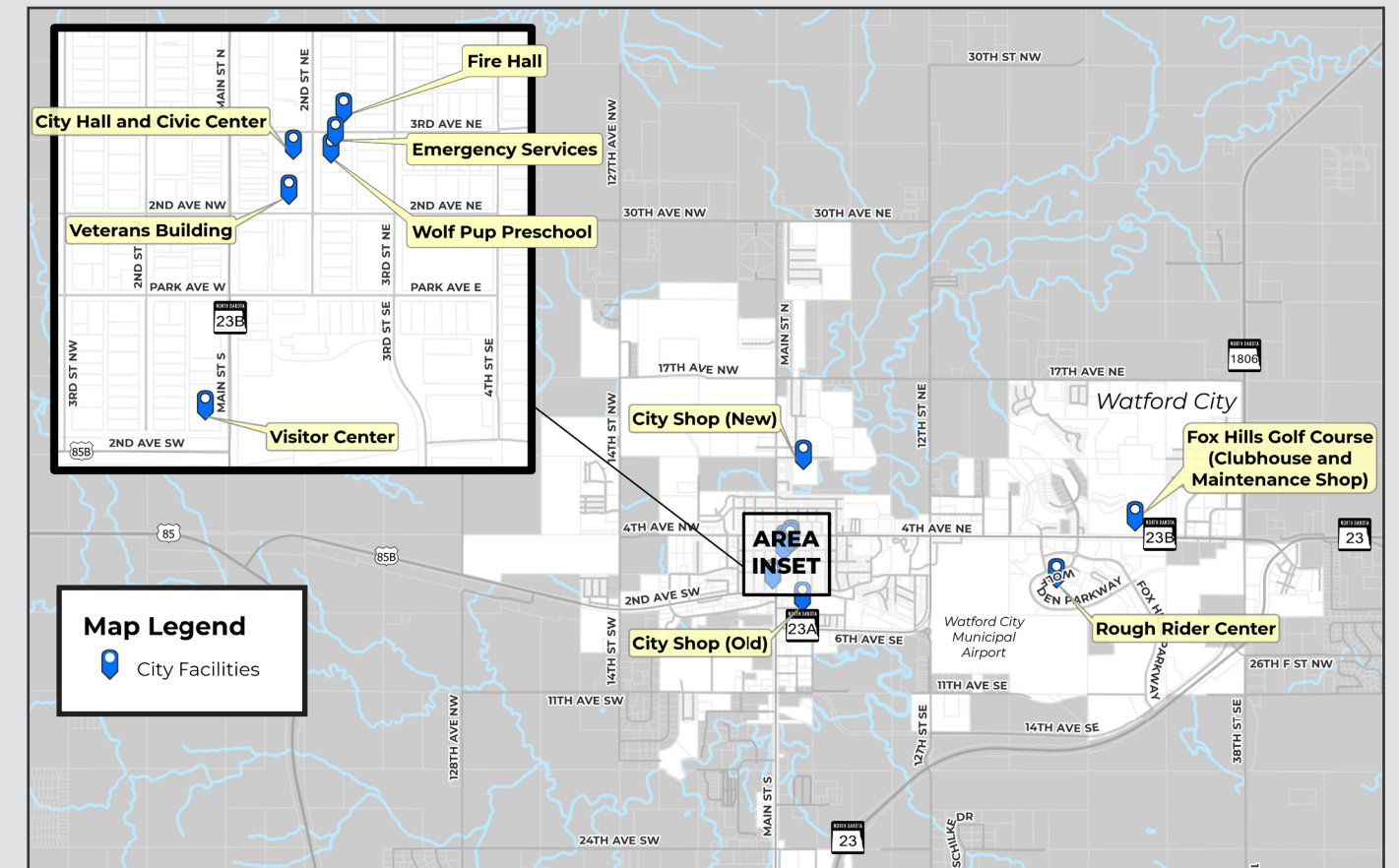
The most appropriate method for evaluating stormwater system adequacy is through stormwater system hydraulic modeling, which was not included in the scope of this project. For these reasons, the stormwater system was not thoroughly assessed as part of this Master Plan; rather, discussions were facilitated with City staff to identify areas throughout the City that experience stormwater system challenges and drainage issues, which are outlined in the Master Plan.

STORMWATER SYSTEM



FACILITIES

A facilities walkthrough was performed in 2021 where each facility component was assigned a grade for its respective condition as well as purpose/function. Facility components were evaluated ranging from architectural and structural (which also included site conditions), to mechanical, electrical, and plumbing categories. The 11 facilities are presented on the map below.



The following table provides a summary of the facility reviews and how each facility graded out.

Facility	Condition GPA	Function GPA	Cumulative GPA	Overall GPA
City Shops - Old	0.6	1.3	1.0	F
Fire Hall	1.8	2.6	2.2	C-
Visitor Center	2.9	3.1	3.0	B-
Fox Hills Clubhouse	2.8	3.3	3.1	B
Veterans Memorial Building	3.3	3.2	3.3	B+
City Hall and Civic Center	3.3	3.4	3.3	B+
Wolf Pup Preschool	3.3	3.6	3.4	A-
Rough Rider Center	3.9	3.7	3.8	A
Emergency Services	3.7	4.0	3.9	A+
City Shop (2017)	4.0	3.8	3.9	A+
Golf Course Maintenance Shop	TBD	TBD	TBD	TBD

Given the number of City-owned facilities, in addition to the existing and anticipated future O&M needs, it's highly recommended for the City to hire a Facilities Manager to spearhead Facility improvements.

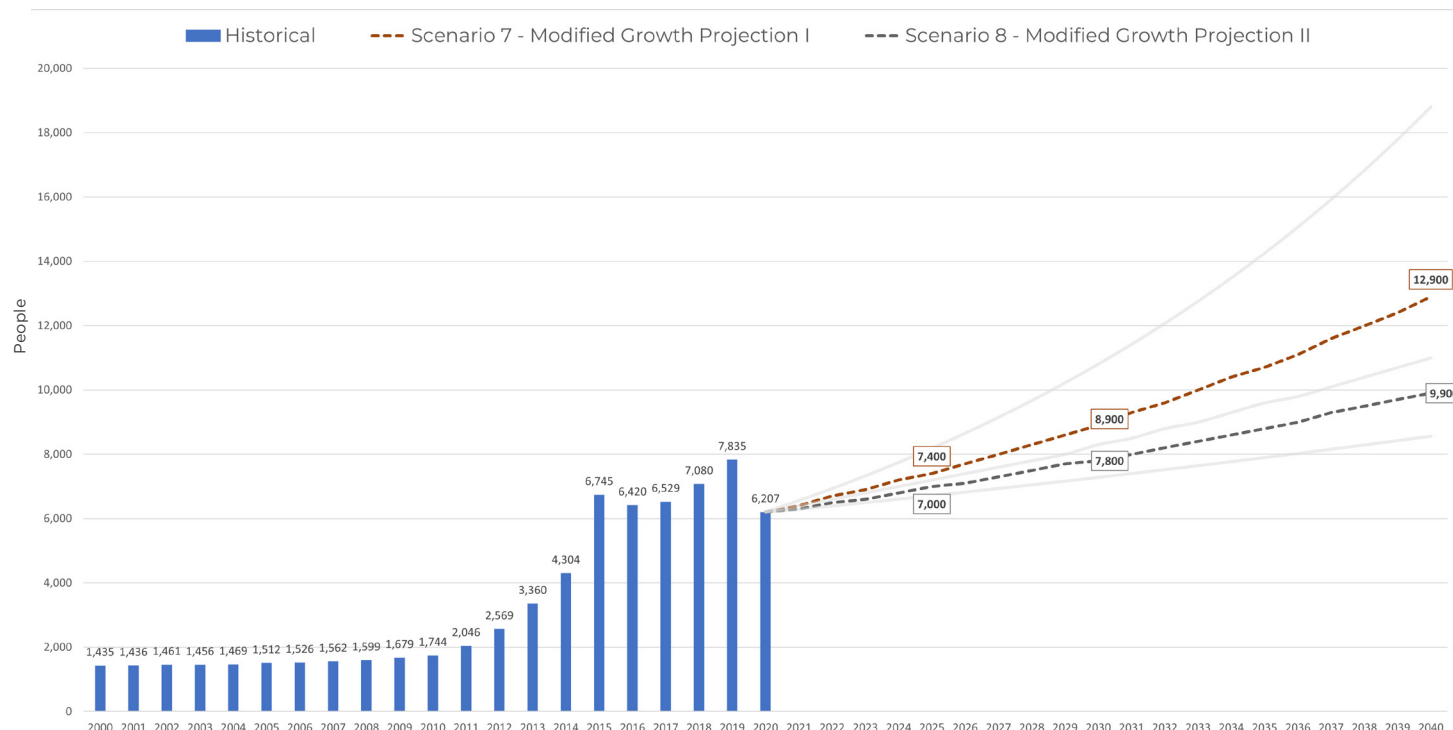
FUTURE CONDITIONS AND GROWTH

Over the years and through times of oil and economic booms and slowdowns, the population growth rate has experienced wide variations. For example, from 2000 to 2010, a time period where oil activity was very limited, the City experienced an average annual population growth rate of 2.0%. More recently during the Bakken oil boom that occurred throughout the mid-2010s, the City grew from 1,744 people in 2010 to 6,207 people in 2020, an average annual growth rate of 13.5%

Six previously developed population projections (from past planning and study efforts) were reviewed and evaluated. Because the six population projections provided a wide variety of outcomes, ranging from 8,600 people by 2040 on the low-end to 18,800 people by 2040 on the high-end (Scenario 2), two modified growth projection scenarios (defined as Scenario 7 and Scenario 8 below) were developed. Scenario 7 and Scenario 8 represent the 75th and 25th percentiles calculated from the projections of Scenarios 1 through Scenario 6.

Source	Watford City Enrollment	Energy Impact Study			Williston Basin Employment, Population, and Housing Forecasts			Modified Scenarios	
Scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	
Source Description	2021 Enrollment Analysis	Watford City Projected Growth Rate	McKenzie County Projected Growth Rate	Low Projection	Moderate Projection	High Projection	75 th Percentile	25 th Percentile	
Growth Rate	3.94%	5.70%	2.60%	1.40%	2.00%	2.80%	3.7%	2.4%	

WATFORD CITY HISTORICAL POPULATION + POPULATION PROJECTIONS



Trying to predict the future is uncertain. Given the quality of life in Watford City and its strong economic drivers such as tourism and the oil and gas industry, however, it's very realistic that the City could achieve any one of the population growth scenarios outlined on the previous page. **One thing can be said with strong degree of confidence – the City of Watford City will remain dynamic for the foreseeable future.**

Future population growth is most appropriately represented as a range of outcomes, which is depicted in the modified growth scenarios of Scenario 7 and Scenario 8. These scenarios project a future population range of 9,900 to 12,900 people by 2040.

WITH NEW GROWTH COMES NEW INFRASTRUCTURE DEMANDS

The most recent oil and gas boom throughout the mid-2010s resulted in the City building out many of its transportation, water, and wastewater infrastructure systems. This is good for growth, as much of the infrastructure required to serve new growth is already in place and has capacity to take on additional demands. However, new growth and development activity will still require additional infrastructure beyond what is currently installed. The forthcoming pages outline “future growth projects” to be considered as the City navigates an increasing population in and around the City. Each future growth project is associated with one of five overarching growth areas (Northwest, Northeast, Southeast, Southwest, and Infill), which is all encompassed within the City's ETA.

Previous planning efforts completed in 2017 and 2019 outlined various transportation, water, and wastewater projects driven by new growth. Those previously planned projects were reviewed carefully, omitted (if the project was completed or no longer relevant), and/or updated to reflect the current conditions of the City. Projects were also added to the respective lists of projects based on findings uncovered throughout this master planning process.

It should be noted that there is a strong chance that some of the projects provided on the following pages either



- (1) don't happen due to changing plans and/or changing City wants and needs, or
- (2) have strong outside participation or are funded (entirely or partially) by outside entities (private, County, State, etc.).

Furthermore, because these future growth projects ‘build out’ much of the City's major infrastructure in the entire ETA area, some of these projects may not be needed for decades depending on future growth demands.

It was determined most appropriate to refer to these future growth projects as ‘identified future growth infrastructure needs’ rather than ‘project recommendations’. As the City recognizes the need to pursue one of these projects (which could be driven by a want [i.e. amenity project], a specific need [i.e. growth and development], or by available funding resource), that project should be added into the prioritization process, and ultimately programmed into the City's CIP.

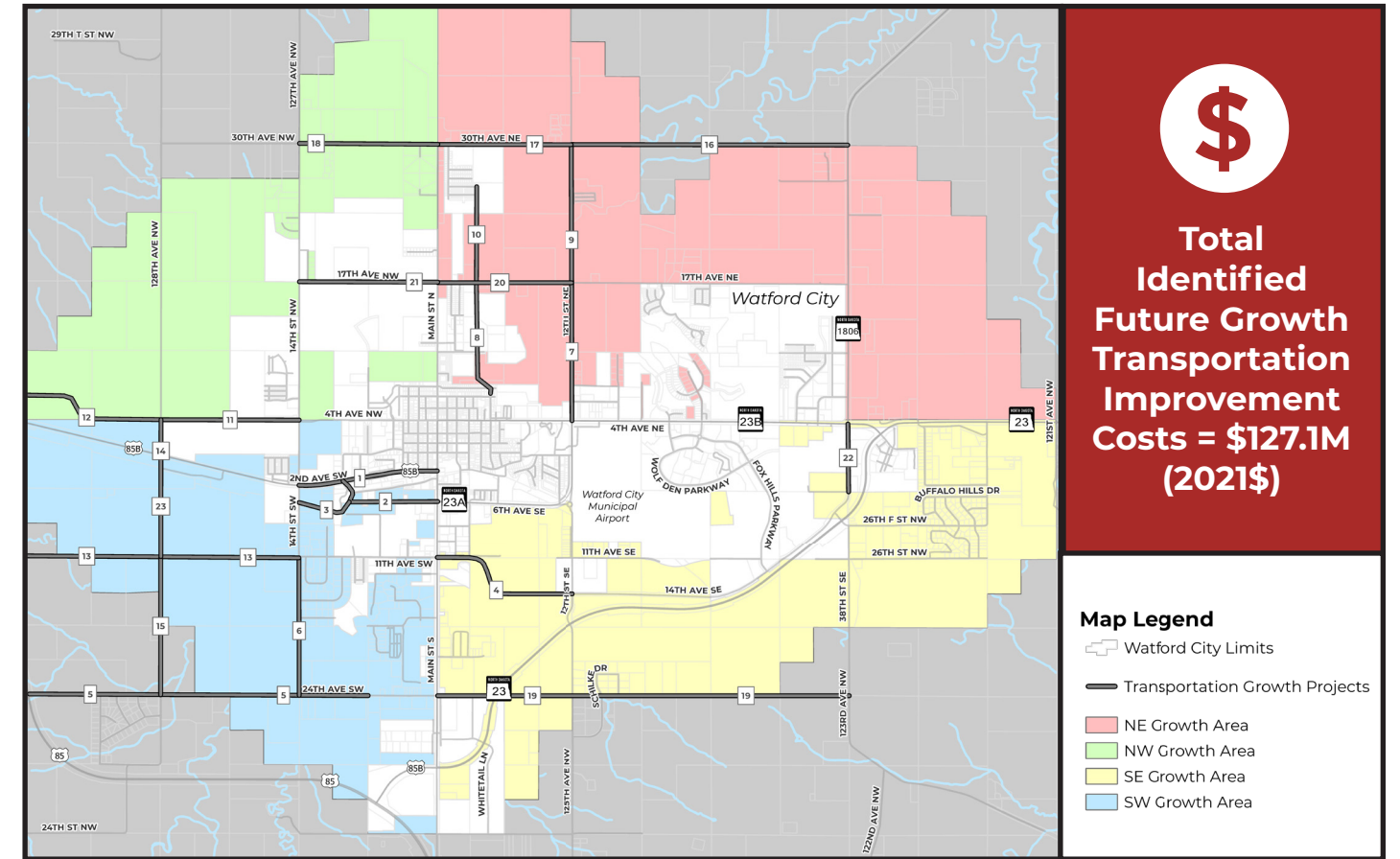
It's recommended for the City to implement these future projects as needed, and in a methodical manner that is feasible and economical. Additionally, it's strongly encouraged for the City to keep the CIP updated on an annual basis to ensure these Projects are carefully reviewed each year and prioritized and programmed accordingly.

TRANSPORTATION SYSTEM

IDENTIFIED FUTURE GROWTH-DRIVEN TRANSPORTATION SYSTEM PROJECTS

MAP ID ^(A)	PROJECT NAME	GROWTH AREA	TOTAL ESTIMATED PROJECT COSTS (2021\$)
1	2nd Avenue SW Shared Use Path (14th Street to Main Street)	Infill	\$624,000 ^(B)
2	ND 23 A (10th Street SW to Main Street)	Infill	\$4,209,000
3	ND 23 A (14th Street SW to 10th Street SW)	Southwest	\$2,094,000
4	11th Avenue S (Main Street to 12th Street SE)	Southeast	\$4,193,000
5	24th Avenue SW (US 85 to 7th Street W)	Southwest	\$15,224,000
6	14th Street SW (11th Avenue SW to 24th Avenue SW)	Southwest	\$3,688,000
7	12th Street NE (17th Avenue NE to ND 23 B)	Northeast	\$2,288,000
8	Extension of 6th Street NE (N of 6th Avenue NE to 17th Avenue NE)	Infill	\$3,907,000
9	12th Street NE (17th Avenue NE to 30th Avenue NE)	Northeast	\$9,344,000
10	6th Street NE (17th Avenue NE to 25th Avenue NE)	Northeast	\$3,188,000
11	4th Avenue NW (28th Street NW to 14th Street NW)	Infill	\$4,570,000
12	4th Avenue NW (40th Street NW to 28th Street NW)	Northwest	\$4,933,000
13	11th Avenue SW (US 85 to 14th Street SW)	Southwest	\$7,586,000
14	28th Street NW (4th Avenue NW to US 85)	Southwest	\$914,000
15	28th Street SW (11th Avenue SW to 24th Avenue SW)	Southwest	\$3,686,000
16	30th Avenue NE (CR 36 to ND 1806)	Northeast	\$12,401,000
17	30th Avenue NE (Main Street to CR 36)	Northeast	\$4,923,000
18	30th Avenue NE (CR 35 to Main Street)	Northwest	\$5,080,000
19	24th Avenue SE (Main Street to CR 37)	Southeast	\$18,518,000
20	17th Avenue NE (Main Street to 12th Street NE)	Northeast	\$7,465,000
21	17th Avenue NW (14th Street NW to Main Street)	Infill	\$3,711,000
22	CR 37 (ND 23 B to 5th Avenue SE)	Infill	\$1,821,000
23	28th Street SW (US 85 to 11th Avenue SW)	Southwest	\$2,752,000
Total Growth-Driven Transportation System Estimated Project Costs			\$127,119,000

A – Map ID does not correspond with project priority.
 B - City's cost share is estimated to be \$111,111.



Many of the future growth-driven transportation projects will include joint participation between the City and the State, County, or sometimes both. The total improvement costs represent the estimated total project costs in 2021 dollars, but will likely be cost-shared by multiple entities.

City staff work diligently to capture available funding opportunities as well as identify partnerships to lower overall project costs paid by the City. Watford City takes great pride in working jointly with the North Dakota Department of Transportation (NDDOT) and McKenzie County to implement successful transportation projects.



FAST FACT - DID YOU KNOW THAT WATFORD CITY MAINTAINS NEARLY 63 MILES OF ROADWAY?

Within the City's Extraterritorial Area (ETA), there are approximately 123 miles of roadway, which are owned by either the City, County, State, or Private/Other entities. Of the 123 miles, the City is responsible for maintaining about 63 miles of roadway. The City strives to follow best practice pavement preservation methods for maintaining the roadway systems, including mill & overlays, crack fills, chip seals, and seal coats on asphalt roads, and joint seals and concrete repairs on concrete roads.

Pavement preservation focuses on maximizing the condition and life of a network of pavements while minimizing the network's lifecycle cost. It may seem counter-intuitive, but when it comes to maintaining the City's transportation system, roads that should receive attention are the ones that are in good condition.

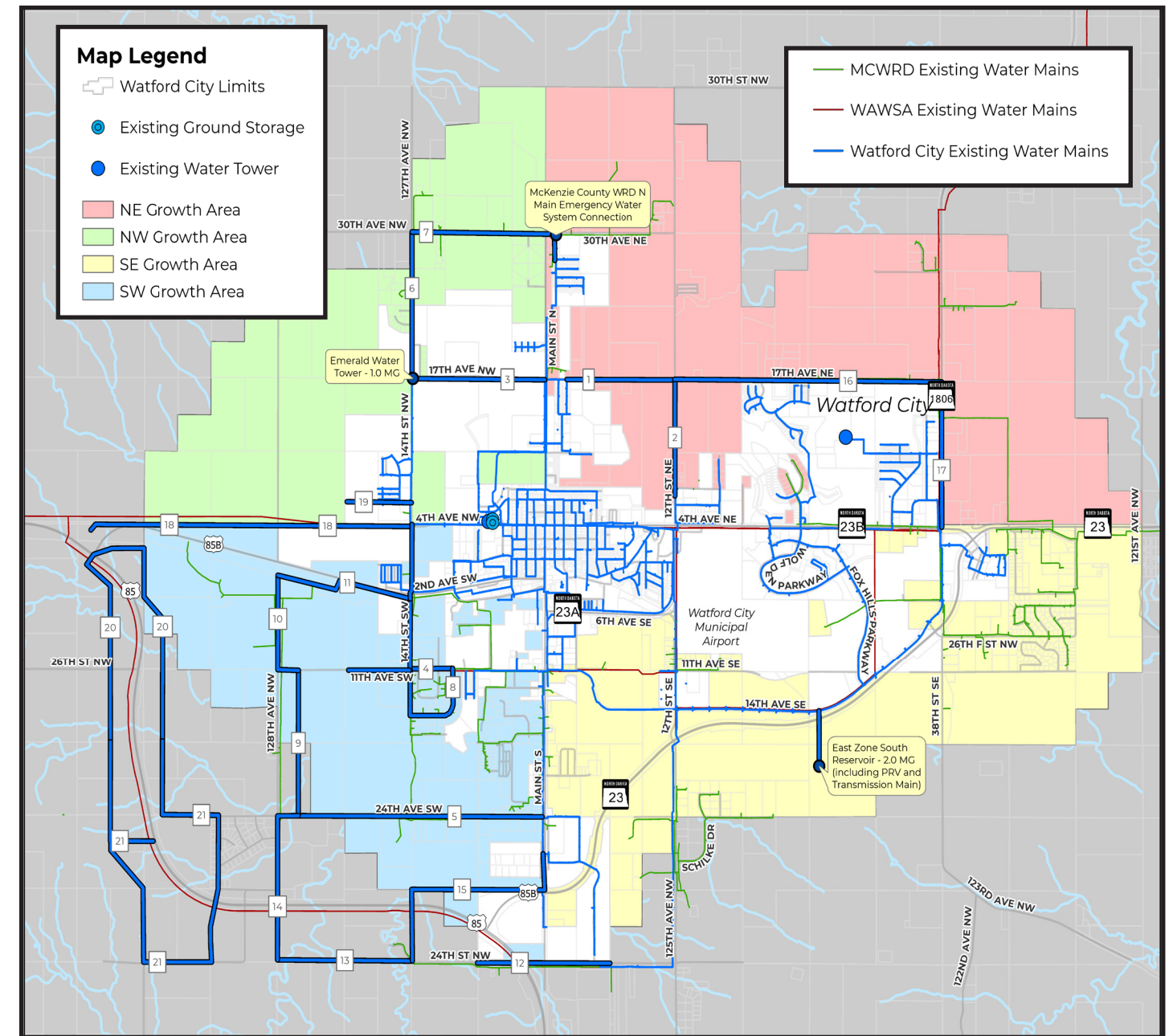
Without adequate maintenance, roads can deteriorate faster and ultimately result in more costly improvement projects. To stay proactive, multiple roadway sections will be improved under CIP programmed O&M mill and overlay or chip seal projects in order to keep the City's roadway network in good overall condition.

WATER SYSTEM

IDENTIFIED FUTURE GROWTH-DRIVEN WATER SYSTEM PROJECTS

MAP ID (A)	PROJECT NAME	GROWTH AREA	TOTAL ESTIMATED PROJECT COSTS (2021\$)
1	17th Avenue N (Between Pheasant Ridge and 12th Street NE)	Northeast	\$ 1,103,000
2	12th Street NE (Between 6th Avenue N and 17th Avenue N)	Northeast	\$1,065,000
3	17th Avenue N (Between Main Street and 14th Street W)	Infill	\$803,000
4	11th Avenue SW (Between 11th Street SW and 14th Street SW)	Southwest	\$769,000
5	24th Avenue SW (Between Main Street and 26th Street W)	Southwest	\$2,497,000
6	14th Street NW (Between 17th Avenue NW and 30th Avenue NW)	Northwest	\$1,344,000
7	30th Avenue NW (Between 14th Street NW and Main Street)	Northwest	\$1,091,000
8	11th Street SW (South of 11th Avenue SW to 15th Avenue SW and up 14th Street SW)	Southwest	\$550,000
9	26th Street SW (Between 11th Avenue SW and 24th Avenue SW)	Southwest	\$1,319,000
10	28th Street SW (Between US 85 and 11th Avenue SW)	Southwest	\$1,078,000
11	US 85 (Between 28th Street SW and 14th Street SW)	Southwest	\$1,331,000
12	37th Avenue S (Between 7th Street SW and 6th Street SE)	Southwest/Southeast	\$888,000
13	37th Avenue SW (Between 28th Street SW and 14th Street SW)	Southwest	\$888,000
14	28th Street SW (Between 24th Avenue SW and 37th Avenue SW)	Southwest	\$1,031,000
15	30th Avenue SW (Between 14th Street SW and Main Street; Including 14th Street SW south to 37th Avenue SW)	Southwest	\$1,530,000
16	17th Avenue NE (between 12th Street NE and 37th Street NE)	Northeast	\$ 1,792,000
17	ND 1806 (Between 17th Avenue NE and ND 23 B)	Northeast	\$1,048,000
18	4th Avenue N (Between US 85 Bypass and 14th Street W; Include PRV)	Northeast/Southeast	\$3,786,000
19	6th Avenue NW (West of 14th Street NW)	Infill	\$546,000
20	US 85 Bypass West Loop (North Half)	Southwest	\$1,864,000
21	US 85 Bypass West Loop (South Half)	Southwest	\$2,751,000
N/A	McKenzie County WRD N Main Emergency Water System Connection	Infill	\$85,000 ^(B)
N/A	Emerald Water Tower - 1.0 MG	Infill	\$4,713,000
N/A	East Zone South Reservoir - 2.0 MG (including PRV and Transmission Main)	Southeast	\$5,688,000
Total Growth-Driven Water System Estimated Project Costs			\$39,560,000

A – Map ID does not correspond with project priority.
 B - City's cost share is estimated to be \$21,111.



\$ Total Identified Future Growth Water Improvement Costs = \$39.5M (2021\$)



FAST FACT - DID YOU KNOW THAT THE CITY PURCHASES WATER FROM MCKENZIE COUNTY WATER RESOURCE DISTRICT (MCWRD), AND MCWRD PURCHASES WATER FROM WESTERN AREA WATER SUPPLY AUTHORITY (WAWSA)?

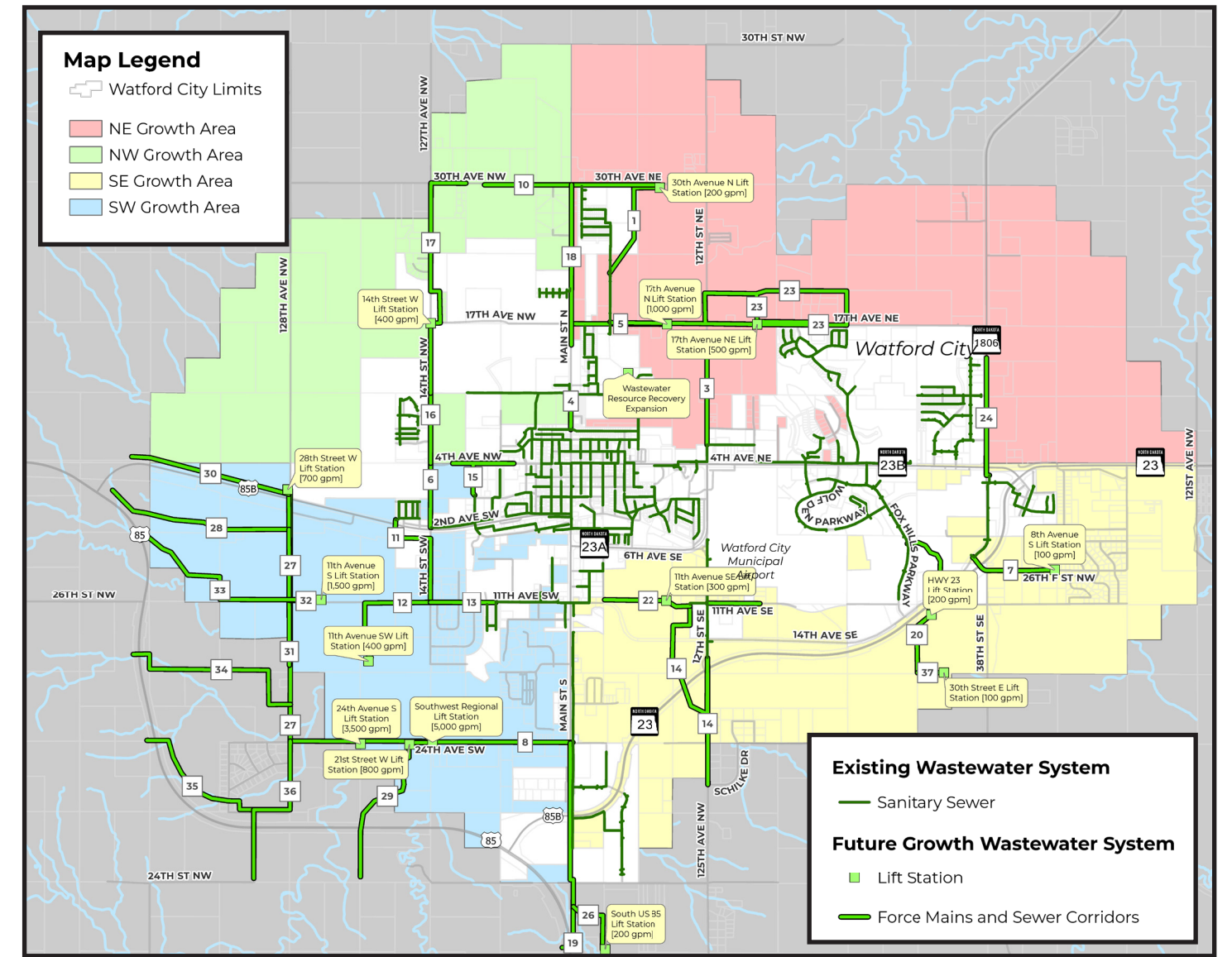
Prior to the formation of WAWSA, the City of Watford City supplied and treated groundwater from two groundwater wellfields to its customers and MCWRD. Today, MCWRD purchases water from WAWSA at a wholesale rate and the City of Watford City purchases wholesale water from MCWRD, so the City's groundwater wellfields are no longer used to provide domestic water to residents of Watford City. After the City receives water supply from MCWRD, the primary components of the water system under the City's ownership include water main pipes, pressure reducing valves, water towers, ground storage reservoirs, hydrants, and gate valves.

WASTEWATER SYSTEM

IDENTIFIED FUTURE GROWTH-DRIVEN WASTEWATER SYSTEM PROJECTS

MAP ID	PROJECT NAME	GROWTH AREA	TOTAL ESTIMATED PROJECT COSTS (2021\$)
1	30th Avenue N Lift Station [200 gpm], Forcemain, and Gravity Sewer (to South)	Northeast/Infill	\$806,000
2	11th Avenue S Gravity Sewer (East of 12th Street E)	Southeast/Infill	\$821,500
3	12th Street E Gravity Sewer (just South of 17th Avenue N to 6th Avenue N)	Northeast	\$294,500
4	Main Street Gravity Sewer (between 10th Avenue N to 7th Avenue N)	Infill	\$186,000
5	17th Avenue N Gravity Sewer (between Main Street and 12th Street E), including Lift Station [1,000 gpm] and Forcemain	Northeast	\$2,852,000
6	14th Street W Gravity Sewer (between 4th Avenue N and US 85)	Southwest/Infill	\$356,500
7	8th Avenue S Lift Station [100 gpm] and Forcemain	Southeast	\$341,000
8	24th Avenue S Gravity Sewer (between SWRLS and Main Street)	Southwest	\$1,410,500
9	Southwest Regional Lift Station [5,000 gpm] and Forcemain	Southwest	\$10,664,000
10	30th Avenue N Gravity Sewer (just East of 14th Street W to Lift Station)	Northwest/Northeast	\$1,209,000
11	14th Street W Gravity Sewer (between 11 Avenue S and North to US 85)	Southwest/Infill	\$682,000
12	11th Avenue S Gravity Sewer (west of 14th Street W and South to Lift Station [400 gpm] and Forcemain)	Southwest	\$3,007,000
13	11th Avenue S Gravity Sewer (between 7th Street W and 14th Street W)	Southwest/Infill	\$372,000
14	12th Street SE Gravity Sewer (between 28th Avenue S [north branch and northwest branch] to Existing Gravity Sewer Connections)	Southeast	\$2,340,500
15	4th Avenue N Gravity Sewer (between 7th Street W and 12th Street W)	Infill	\$899,000
16	14th Street W Gravity Sewer (between 4th Avenue N and 10th Avenue N)	Infill	\$372,000
17	14th Street W Gravity Sewer (Between 10th Avenue N and 30th Avenue N including Lift Station [400 gpm] and Forcemain)	Infill/Northwest	\$2,139,000
18	Main Street Gravity Sewer (between 15th Avenue N and 30th Avenue N)	Infill	\$868,000
19	South Main Street Gravity Sewer (43rd Avenue S to 24th Avenue S)	Infill	\$1,581,000
20	HWY 23 Lift Station [200 gpm], Forcemain, and Sewer at 32nd Street E	Infill/Southeast	\$945,500
21	Wastewater Treatment System Expansion (population to 15,000)	Infill	\$15,500,000
22	11th Avenue S Gravity Sewer (between 4th Street E and 12th Street E including Lift Station [300 gpm] and Forcemain)	Southeast	\$759,500
23	17th Avenue N Gravity Sewer (East of 12th Street E including Sewer to North, Lift Station [500 gpm], and Forcemain to the West)	Northeast	\$3,208,500
24	HWY 1806 Gravity Sewer (between 12th Avenue N and Lift Station 6B)	Northeast/Infill	\$682,000
25	24th Avenue S Gravity Sewer (between 28th Street W and SWRLS), including Lift Station [3,500 gpm] and Force Main	Southwest	\$4,913,500
26	South HWY 85 Lift Station [200 gpm] and Forcemain (43rd Avenue S to Main Street)	Southeast (out of ETA)	\$558,000
27	28th St W Lift Station [700 gpm], Forcemain, and Gravity Sewer (North End of 28th Street W and South to 24th Ave S)	Southwest	\$2,976,000
28	4th Avenue S (HWY 85 Bypass East to 28th Street and North to Lift Station)	Southwest	\$1,379,500

29	21st Street W Lift Station [800 gpm], Gravity Sewer, and Forcemain (between 37th Avenue S and 24th Avenue S)	Southwest	\$2,790,000
30	US 85 North Gravity Sewer (42 Street W to 28th Street W)	Southwest	\$1,116,000
31	28th Street W Gravity Sewer (between 17th Avenue S and 4th Avenue S)	Southwest	\$790,500
32	11th Avenue S Lift Station [1,500 gpm] and Forcemain (26th Street W and 28th Street W and South to 17th Avenue S)	Southwest	\$2,557,500
33	11th Avenue S Gravity Sewer (between US 85 Bypass and 28th Street W)	Southwest	\$1,984,000
34	17th Avenue S Gravity Sewer (between US 85 Bypass and 28th Street W)	Southwest (out of ETA)	\$1,302,000
35	South 85 Bypass Gravity Sewer (US 85 Bypass to 31st Street W)	Southwest (out of ETA)	\$914,500
36	31st Street W Gravity Sewer (including 30th Avenue S and North to the Corner of 28th Street W and 24th Avenue S)	Southwest (out of ETA)	\$1,550,000
37	30th Street E and 17th Avenue S Lift Station [100 gpm] and Forcemain	Southeast	\$589,000
Total Growth-Driven Wastewater System Estimated Project Costs			\$75,717,500



\$ Total Identified Future Growth Wastewater Improvement Costs = \$75.7M (2021\$)

FINANCIAL ANALYSIS AND MODEL DEVELOPMENT

A key component of developing a successful infrastructure Master Plan is to ensure tools and processes are in place that can be aligned with the capital improvements plan. A financial analysis was completed and a financial model was developed, which will be used to ensure planned capital and operational expenditures can be appropriately funded.

FINANCIAL ANALYSIS APPROACH

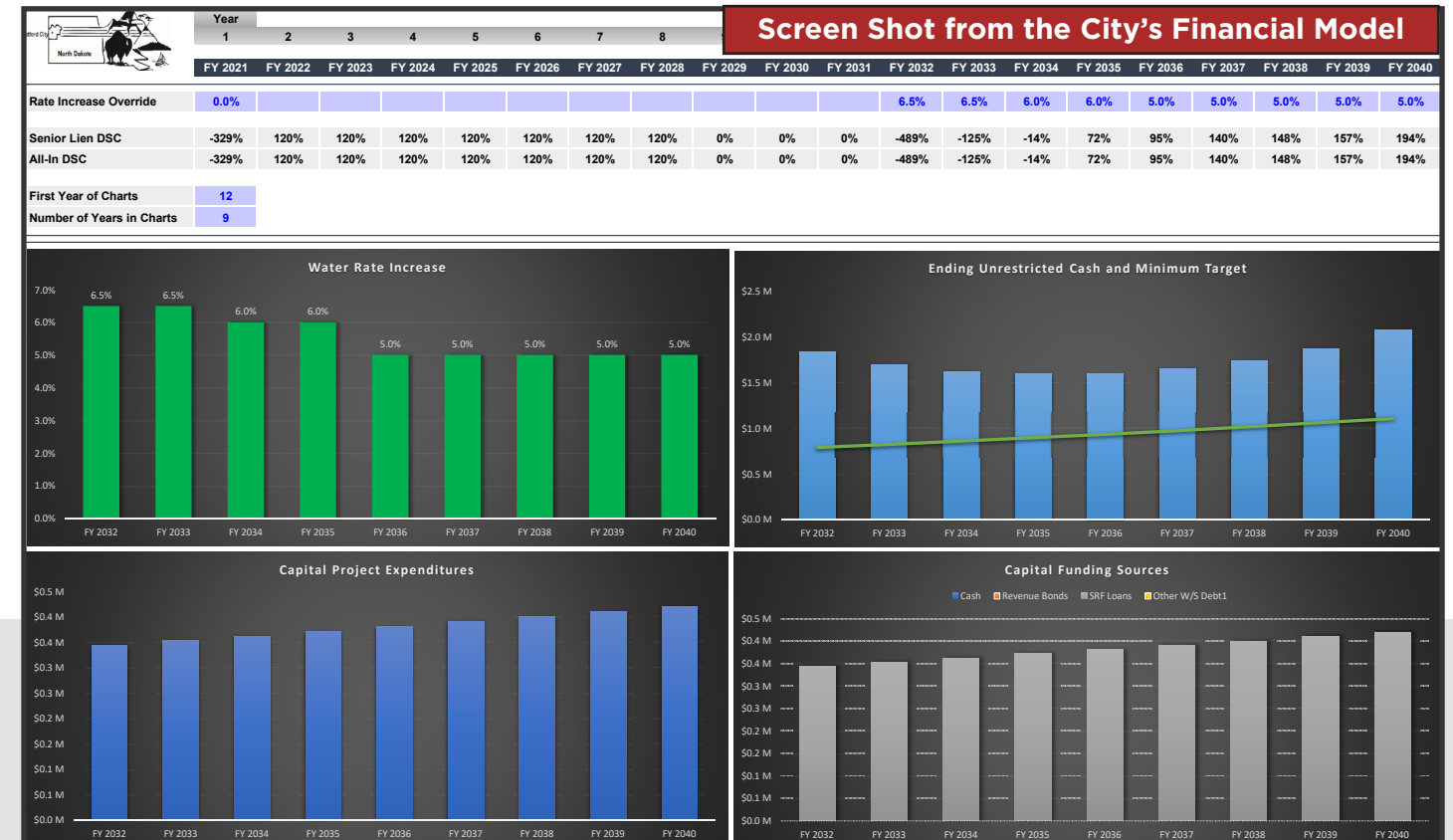
The following steps were taken to analyze the City's financial standing and financial ability to fund improvement projects:

- 01 Identify the beginning unrestricted cash available to pay for operating, debt, and capital related expenses within each fund included in the financial forecast.
- 02 Project the City's major revenues in each year of the forecast periods. Project all non-major revenues within each of the funds included in the forecast over each year of the forecast periods. Funds incorporated into the financial model include:
 - General Fund
 - Gross Production Tax (GPT) Fund
 - Roads and Streets Fund
 - Rough Rider Center Fund
 - Rough Rider Sales Tax Fund
 - Sales Tax Surplus Fund
 - Special Improvement Fund
 - Water Works Fund
 - Sewer Fund
 - Plus two additional 'unused funds' in the model for future model expansion
- 03 Add the projected revenues to the beginning cash balances within each fund to determine the total annual cash available to fund expenses.
- 04 Project operation expenses and existing debt service in each year of the forecast period within the included funds. Assume that transfers from the Gross Production Tax (GPT) Fund to other funds will continue to occur at the current level in future years, if appropriate.
- 05 Incorporate the capital projects identified as part of this Master Plan into the forecast. Fund each project according to the capital project funding guidelines.
- 06 Adjust the water and sewer rates to fund the water and sewer related Master Plan projects.
- 07 Identify the additional funds needed to fully fund the non-water and sewer related Master Plan projects.

CAPITAL FUNDING ASSUMPTIONS

Master Plan capital projects were funded with cash or debt based on the following guidelines:

- Programs for annually recurring operations and maintenance or repair and/or replacement work should be funded with cash from current revenues. Street repair and replacement work and other infrastructure projects should be funded with debt, when possible.
- If it is determined that excess cash reserves are available (excess cash is defined as cash above the minimum cash reserve target for the fund) over the forecast period, these monies will be used to fund capital project costs.
- When cash reserves are limited, or if cash funding projects would require a significant additional revenue need, projects should be debt funded.



OTHER POTENTIAL REVENUE SOURCE CONSIDERATIONS



Grants and Low Interest Loans

Grants and low interest loans are popular means for funding critical infrastructure improvements. There are many grants and loans that exist. The application and use requirements, as well as the funding structure, vary greatly from program to program.



Formation of New Utilities

Like water and sewer utilities, residents are charged a monthly rate (either flat, variable, or combination of both) for the services the City provides. Some potential new utilities that could be formed in Watford City to help fund infrastructure improvements include a Street Utility, Street Light Utility, and Stormwater Utility.



Special Improvement Districts

Special Improvement (also commonly referred to as special assessment) Districts are a popular method for funding infrastructure improvements in areas that benefit nearby property owners. Generally, infrastructure costs (or a portion of infrastructure costs) are levied against property owners who will benefit from the project.

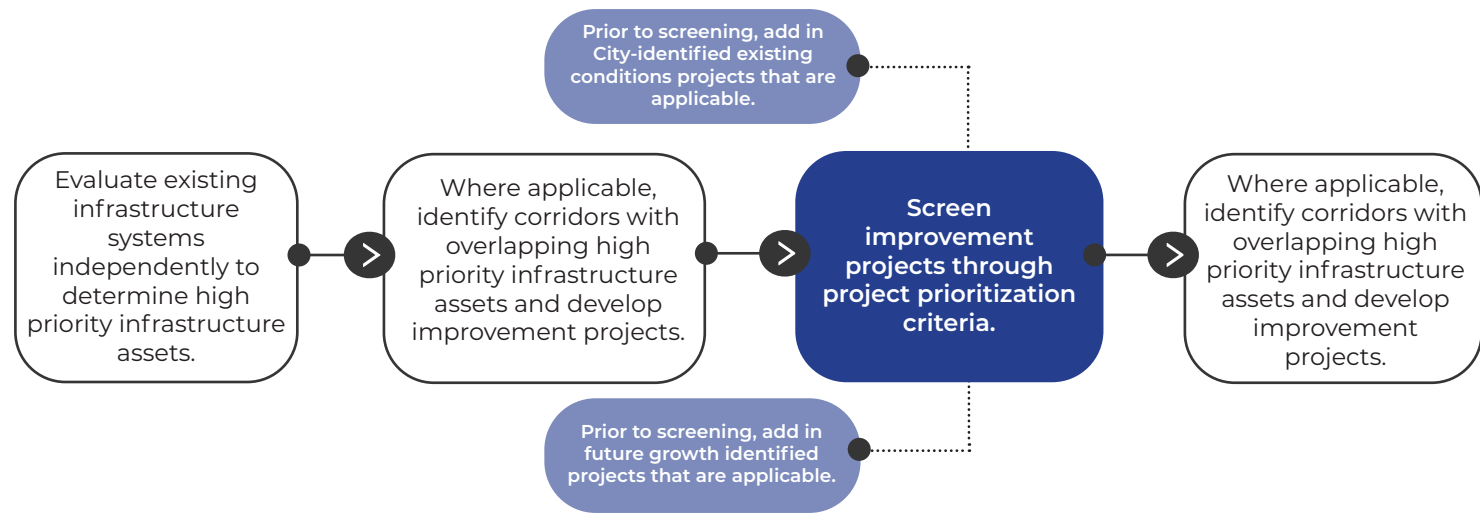


Property and Sales Tax Considerations

Property tax rates and sales tax rates were reviewed and compared to other large communities in North Dakota. It was found that Watford City has the lowest property tax rate and sales tax rate when compared to peer communities. Another method to unlock additional City revenues would be to pursue increases to property and/or sales taxes.

PROJECT PRIORITIZATION AND COST ESTIMATING

Project prioritization is a critical component of the Master Plan. The process allows the City to evaluate existing infrastructure in a relatively impartial manner, add in infrastructure projects that are identified as future growth needs, and ultimately defensibly prioritize the two categories following an objective process. The project prioritization process utilized for this Master Plan can be summarized as follows:



PROJECT PRIORITIZATION CRITERIA

Criterion	Description	Weight
Quality of Life	Degree to which the project will improve the quality of life of the City's residents.	15%
Health, Safety, and Regulatory Compliance	Degree to which the project will help minimize health risks, improve safety, and improve regulatory compliance capabilities.	25%
Infrastructure Condition	Degree to which the existing infrastructure condition is in need of improvement	25%
Infrastructure Overlap	Degree to which multiple infrastructure systems are captured within one project.	20%
Economic Development and Growth	Degree to which the project will support economic development initiatives and support smart growth	15%

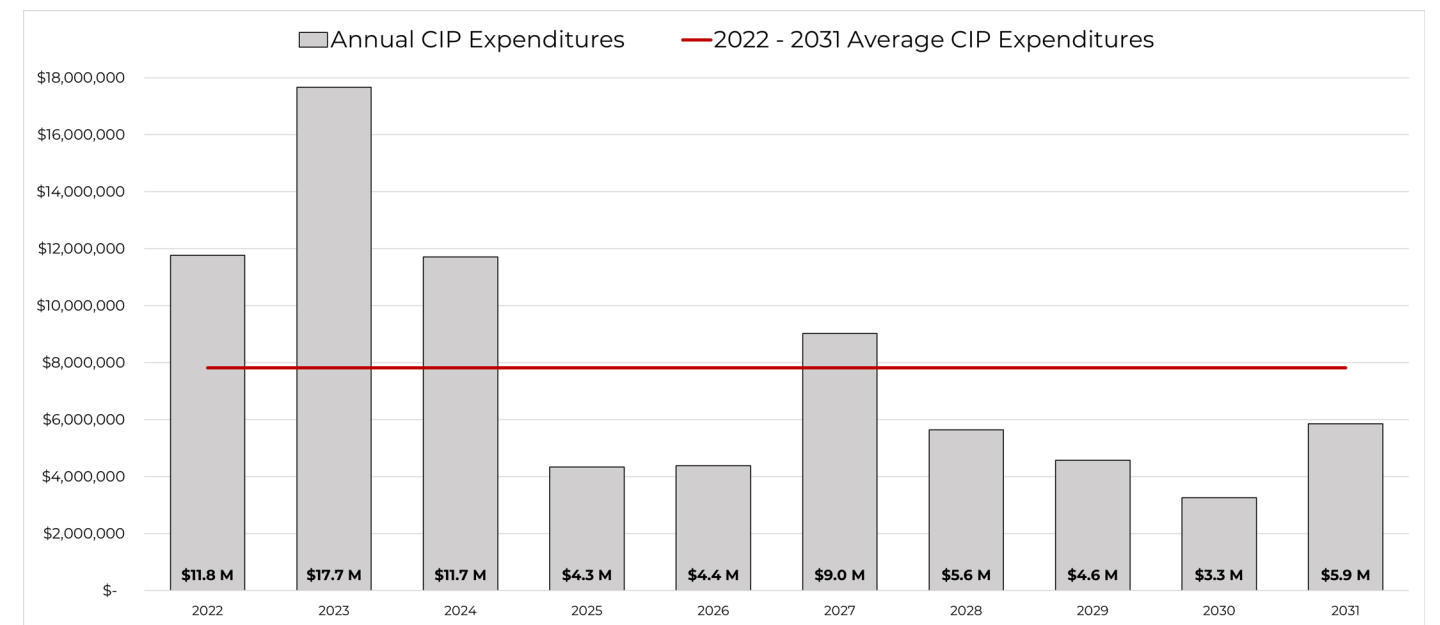
Once the projects were developed and screened through the project prioritization criteria shown above, each project received a priority score and associated priority rank. Additionally, because each project had a cost estimate, a 'bang-for-buck' analysis was performed to give higher priority to projects that provided the most value at the least cost to the City. The final 10-year CIP is outlined in the forthcoming pages.

CAPITAL IMPROVEMENTS PLAN

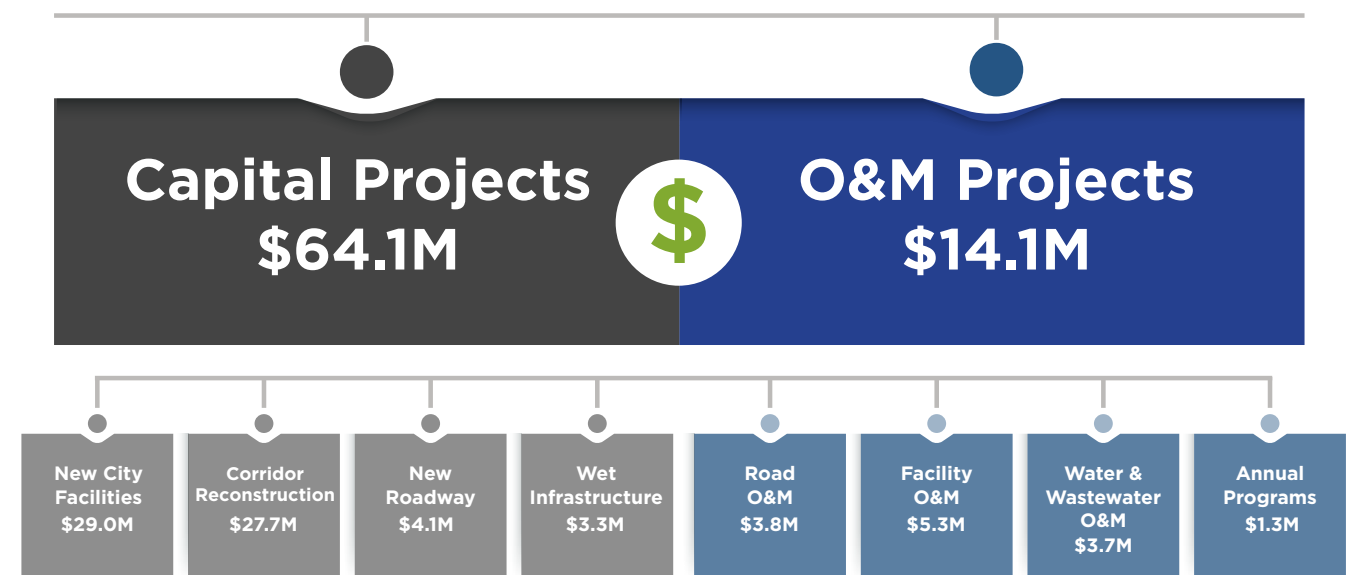
Watford City's Capital Improvements Plan (CIP) provides a 10-year outlook of project recommendations from 2022 to 2031 to improve Watford City's infrastructure systems. The CIP represents two equally split 5-year planning horizons. The near-term planning horizon includes recommended projects from 2022 through 2026, and the mid-term planning horizon includes recommended projects from 2027 through 2031.

CITY EXPENDITURES (PROGRAMMED IN CIP)

All CIP costs developed for this project are represented in 2021 dollars.



NEARLY \$78.2M IN PROGRAMMED IMPROVEMENTS



NEAR-TERM PLANNING HORIZON (2022 - 2026) | TABLE VIEW

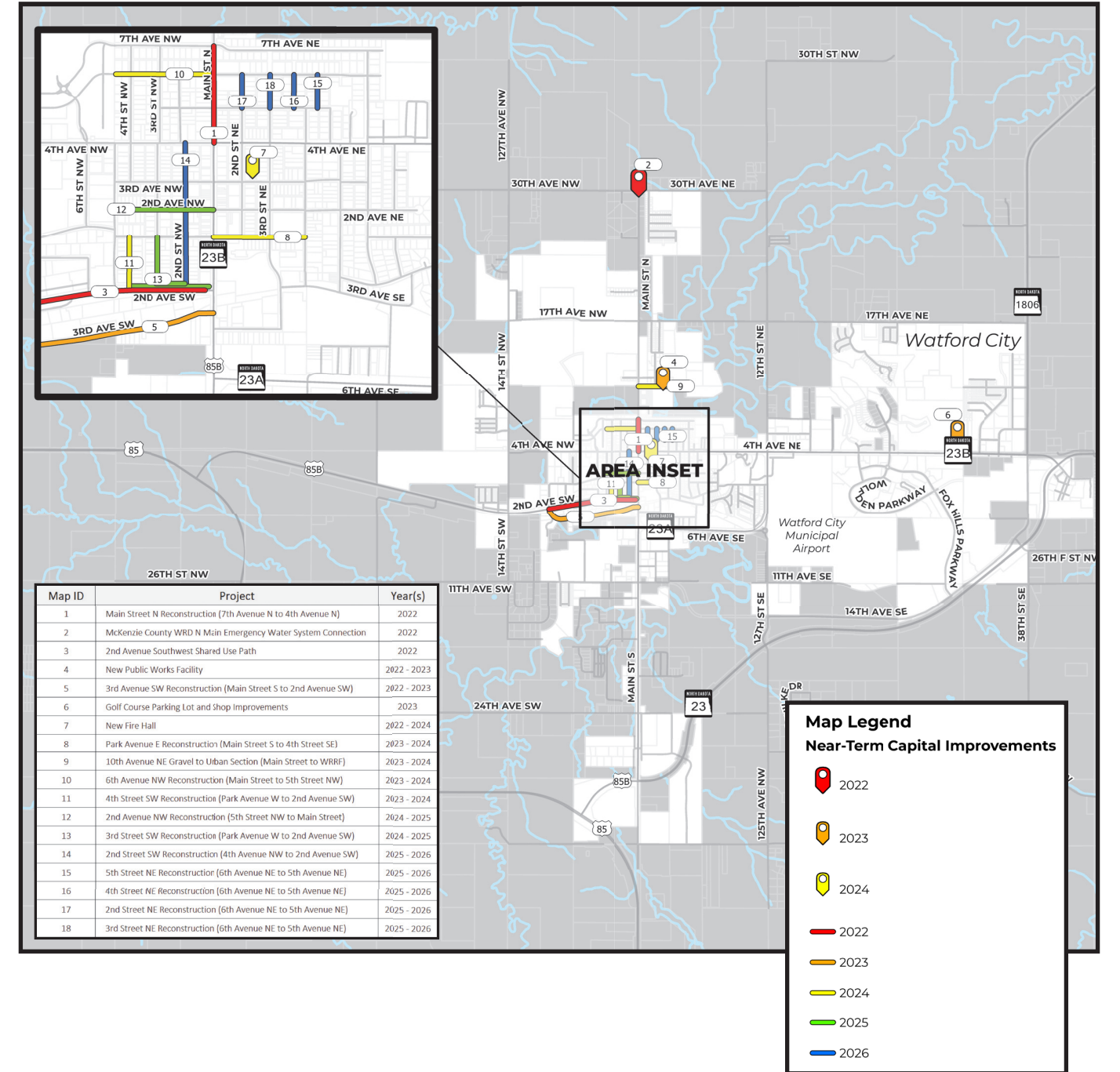
The CIP project recommendations for the near-term planning horizon (from years 2022 to 2026) are provided below.

CIP PROJECT RECOMMENDATIONS | 2022 - 2026

Project	Total Project Costs	Project Year(s)	Other(s) Cost Share (2021\$)	City Cost Share (2021\$)
Capital Projects				
Main Street N Reconstruction (7th Avenue N to 4th Avenue N)	\$1,490,000	2022	\$1,339,052	\$150,948
McKenzie County WRD N Main Emergency Water System Connection	\$85,000	2022	\$63,889	\$21,111
2nd Avenue Southwest Shared Use Path	\$624,000	2022	\$513,000	\$111,000
New Public Works Facility	\$17,500,000	2022 - 2023	\$ -	\$17,500,000
3rd Avenue SW Reconstruction (Main Street S to 2nd Avenue SW)	\$3,779,000	2022 - 2023	\$ -	\$3,779,000
Golf Course Parking Lot and Shop Improvements	\$1,300,000	2023	\$ -	\$1,300,000
New Fire Hall	\$9,750,000	2022 - 2024	\$ -	\$9,750,000
Park Avenue E Reconstruction (Main Street S to 4th Street SE)	\$1,227,000	2023 - 2024	\$ -	\$1,227,000
10th Avenue NE Gravel to Urban Section (Main Street to WRRF)	\$1,260,000	2023 - 2024	\$ -	\$1,260,000
6th Avenue NW Reconstruction (Main Street to 5th Street NW)	\$1,278,000	2023 - 2024	\$ -	\$1,046,000
4th Street SW Reconstruction (Park Avenue W to 2nd Avenue SW)	\$795,000	2023 - 2024	\$ -	\$795,000
2nd Avenue NW Reconstruction (5th Street NW to Main Street)	\$1,230,000	2024 - 2025	\$ -	\$1,230,000
3rd Street SW Reconstruction (Park Avenue W to 2nd Avenue SW)	\$1,243,000	2024 - 2025	\$ -	1,243,000
2nd Street SW Reconstruction (4th Avenue NW to 2nd Avenue SW)	\$1,990,000	2025 - 2026	\$ -	\$1,990,000
5th Street NE Reconstruction (6th Avenue NE to 5th Avenue NE)	\$514,000	2025 - 2026	\$ -	\$514,000
4th Street NE Reconstruction (6th Avenue NE to 5th Avenue NE)	\$514,000	2025 - 2026	\$ -	\$514,000
2nd Street NE Reconstruction (6th Avenue NE to 5th Avenue NE)	\$514,000	2025 - 2026	\$ -	\$514,000
3rd Street NE Reconstruction (6th Avenue NE to 5th Avenue NE)	\$518,000	2025 - 2026	\$ -	\$518,000
Operations and Maintenance Projects [Mill and Overlay]				
2024 Mill and Overlay Improvements	\$566,000	2023 - 2024	\$ -	\$566,000
Operations and Maintenance Projects [Chip Seal]				
2022 City Wide Chip Seal Improvements	\$1,247,000	2022	\$ -	\$1,247,000
2025 City Wide Chip Seal Improvements	\$887,000	2025	\$ -	\$887,000
Operations and Maintenance Projects [Watermain and Sanitary Sewer Rehabilitation]				
2025 Sanitary Sewer Rehabilitation	\$798,000	2025	\$ -	\$798,000
Operations and Maintenance Projects [Facilities]				
2023 City Facility Improvements	\$620,000	2023	\$ -	\$620,000
Operations and Maintenance Projects [WRRF]				
WRRF Improvements - Phase I (Bypass Pumping Upgrades and Electrical Distribution Repairs)	\$300,000	2022	\$ -	\$300,000
WRRF Improvements - Phase II (PTB Improvements)	\$200,000	2022	\$ -	\$200,000
WRRF Improvements - Phase III (Sludge Removal)	\$150,000	2026	\$ -	\$150,000

Project	Total Project Costs	Project Year(s)	Other(s) Cost Share (2021\$)	City Cost Share (2021\$)
Annual Improvement Programs				
Manhole Lining Annual Program ¹	\$20,000	Annual	\$ -	\$20,000
Sidewalk Gap Infill Annual Program ²	\$35,000	Annual	\$ -	\$35,000
Sidewalk Repair and ADA Annual Program ³	\$75,000	Annual	\$ -	\$75,000

- 1 - \$20,000 per year (\$200,000 total over the 10-year CIP planning horizon)
- 2 - \$35,000 per year (\$350,000 total over the 10-year CIP planning horizon)
- 3 - \$75,000 per year (\$750,000 total over the 10-year CIP planning horizon)



MID-TERM PLANNING HORIZON (2027 - 2031) | TABLE VIEW

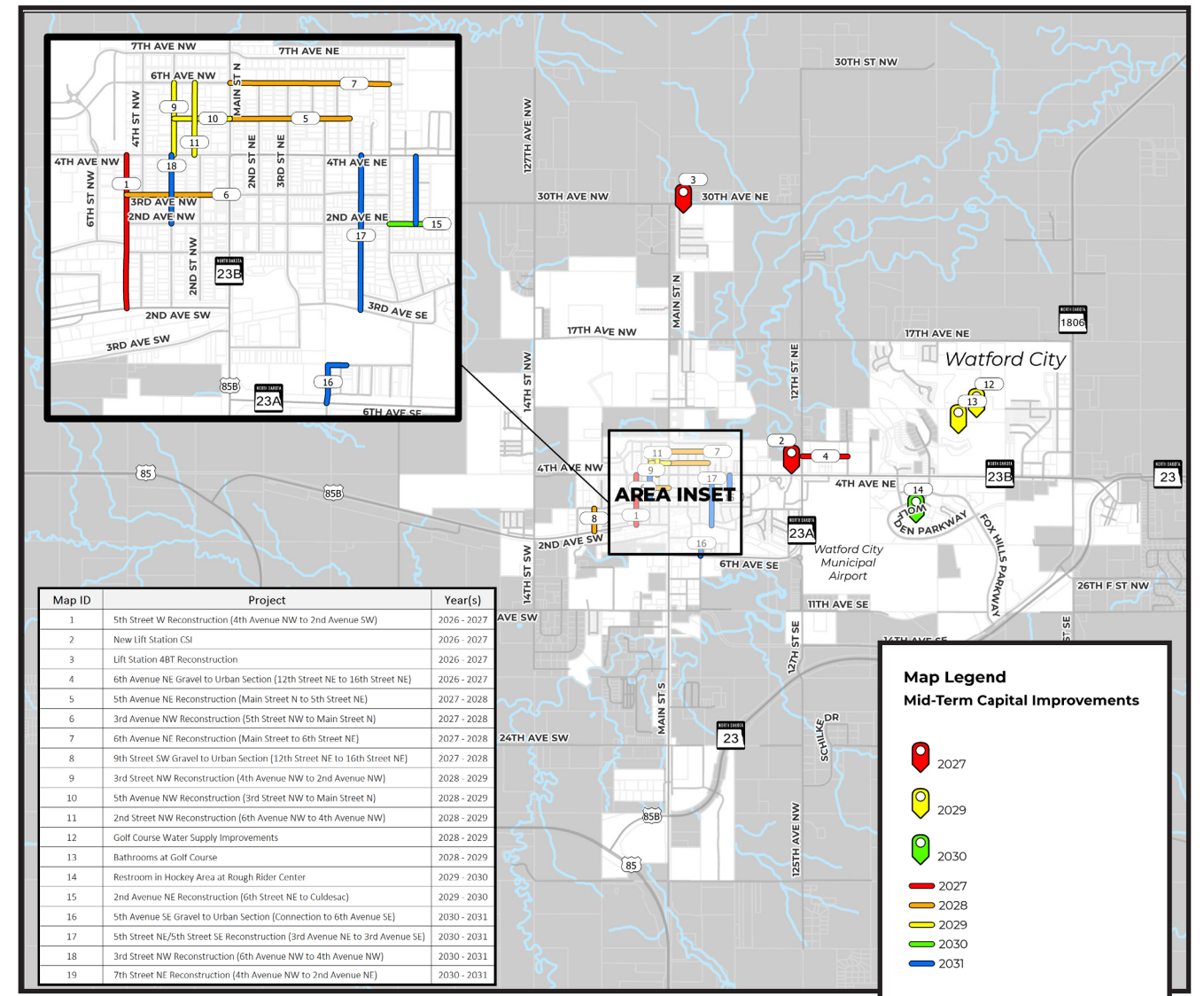
The CIP project recommendations for the mid-term planning horizon (from years 2027 to 2031) are presented below.

CIP PROJECT RECOMMENDATIONS | 2027 - 2031

Project	Total Project Costs	Project Year(s)	Other(s) Cost Share (2021\$)	City Cost Share (2021\$)
Capital Projects				
5th Street W Reconstruction (4th Avenue NW to 2nd Avenue SW)	\$2,511,000	2026 - 2027	\$ -	\$2,511,000
New Lift Station CSI	\$1,040,000	2026 - 2027	\$ -	\$1,040,000
Lift Station 4BT Reconstruction	\$1,219,000	2026 - 2027	\$ -	\$1,219,000
6th Avenue NE Gravel to Urban Section (12th Street NE to 16th Street NE)	\$1,262,000	2026 - 2027	\$ -	\$1,262,000
5th Avenue NE Reconstruction (Main Street N to 5th Street NE)	\$1,216,000	2027 - 2028	\$ -	\$1,216,000
3rd Avenue NW Reconstruction (5th Street NW to Main Street N)	\$1,230,000	2027 - 2028	\$ -	\$1,230,000
6th Avenue NE Reconstruction (Main Street to 6th Street NE)	\$2,029,000	2027 - 2028	\$ -	\$2,029,000
9th Street SW Gravel to Urban Section (12th Street NE to 16th Street NE)	\$638,000	2027 - 2028	\$ -	\$638,000
3rd Street NW Reconstruction (4th Avenue NW to 2nd Avenue NW)	\$1,125,000	2028 - 2029	\$ -	\$1,125,000
5th Avenue NW Reconstruction (3rd Street NW to Main Street N)	\$661,000	2028 - 2029	\$ -	\$661,000
2nd Street NW Reconstruction (6th Avenue NW to 4th Avenue NW)	\$917,000	2028 - 2029	\$ -	\$917,000
Golf Course Water Supply Improvements	\$975,000	2028 - 2029	\$ -	\$975,000
Bathrooms at Golf Course	\$163,000	2028 - 2029	\$ -	\$163,000
Restroom in Hockey Area at Rough Rider Center	\$325,000	2029 - 2030	\$ -	\$325,000
2nd Avenue NE Reconstruction (6th Street NE to Culdadesac)	\$597,000	2029 - 2030	\$ -	\$597,000
5th Avenue SE Gravel to Urban Section (Connection to 6th Avenue SE)	\$850,000	2030 - 2031	\$ -	\$850,000
5th Street NE/5th Street SE Reconstruction (3rd Avenue NE to 3rd Avenue SE)	\$1,793,000	2030 - 2031	\$ -	\$1,793,000
3rd Street NW Reconstruction (6th Avenue NW to 4th Avenue NW)	\$925,000	2030 - 2031	\$ -	\$925,000
7th Street NE Reconstruction (4th Avenue NW to 2nd Avenue NE)	\$958,000	2030 - 2031	\$ -	\$958,000
Operations and Maintenance Projects [Mill and Overlay]				
2028 Mill and Overlay Improvements	\$452,000	2027 - 2028	\$ -	\$452,000
Operations and Maintenance Projects [Chip Seal]				
2029 City Wide Chip Seal Improvements	\$689,000	2029	\$ -	\$689,000

Project	Total Project Costs	Project Year(s)	Other(s) Cost Share (2021\$)	City Cost Share (2021\$)
Operations and Maintenance Projects [Watermain and Sanitary Sewer Rehabilitation]				
2030 Watermain and Sanitary Sewer Rehabilitation	\$2,096,000	2030	\$ -	\$2,096,000
Operations and Maintenance Projects [Facilities]				
2027 City Facility Improvements	\$2,191,000	2027	\$ -	\$2,191,000
2031 City Facility Improvements	\$1,327,000	2031	\$ -	\$1,327,000
Operations and Maintenance Projects [WRRF]				
WRRF Improvements - Phase III (Cell Maintenance)	\$150,000	2027	\$ -	\$150,000
Annual Improvement Programs				
Manhole Lining Annual Program ¹	\$20,000	Annual	\$ -	\$20,000
Sidewalk Gap Infill Annual Program ²	\$35,000	Annual	\$ -	\$35,000
Sidewalk Repair and ADA Annual Program ³	\$75,000	Annual	\$ -	\$75,000

1 - \$20,000 per year (\$200,000 total over the 10-year CIP planning horizon)
 2 - \$35,000 per year (\$350,000 total over the 10-year CIP planning horizon)
 3 - \$75,000 per year (\$750,000 total over the 10-year CIP planning horizon)



RESILIENCY PLAN

Another component of this Master Plan included looking beyond the 10-year capital improvements timeline to identify methods, concepts, and processes for the City to employ in order to remain resilient. Infrastructure resiliency is defined as the ability of a community to prevent, withstand, adapt to, and recover from infrastructure disruptions.

UTILIZING LEVELS OF SERVICE TO OPERATE AND MAINTAIN RESILIENT INFRASTRUCTURE SYSTEMS

Levels of service were developed based on City input for this Master Plan. Levels of service can be defined as characteristics or attributes of a service that describe its required level of performance. These characteristics typically describe how much, to what degree, and how frequently about the service. A few examples of levels of service and their respective key performance indicators (means for measuring service performance) that were developed as part of this Master Plan include:

- Number of Sewer Main Failures per Year: Less than 2
- Number of Complaints per Year Related to Missed Garbage Can Pick Ups: Less than 50
- Number of Traffic Accidents (Vehicle Collisions; Non-Fatal): Less than 15

Understanding the City's required "sustainable" levels of service can help establish the guiding principles for maintaining a resilient network of infrastructure systems. Levels of service allow the City to monitor how services are being delivered, and whether or not those services are being delivered exceptionally or those services need attention. By having levels of service in place, the City can better communicate to stakeholders and citizens the plan for continuing the delivery of exceptional city-provided services. Levels of Service were developed for the following City departments/categories:

- Financial
- Water
- Wastewater
- Stormwater
- Solid Waste
- Transportation
- Fleet
- Police Department
- Fire Department
- Facilities



GENERAL INFRASTRUCTURE RESILIENCY RECOMMENDATIONS

Cybersecurity, Technology, and Data

Implement processes and systems to minimize the possibility of cyber attacks.

Be receptive to utilizing new technology to leverage existing data to make better decisions in both managerial and operational settings.

Natural Disasters

Implement redundant infrastructure systems to ensure that natural disasters such as droughts or tornadoes do not cause major service disruptions, safety hazards, or increase potential loss of life.

Condition Assessment and Monitoring

Implement condition assessment and monitoring programs for critical infrastructure systems.

Performance Assessment and Monitoring

Implement performance assessment and monitoring programs for critical infrastructure systems.

Asset Management and Proactive Maintenance

Utilize the findings and information from this Master Plan to start developing an asset management program.

Continue to invest in existing infrastructure, even if it is in good condition. Generally, large-dollar improvement projects can either be delayed or mitigated by investing in proactive maintenance practices. The goal should be to maximize the useful life of functioning assets that are sufficiently meeting levels of service targets.

USING THE MASTER PLAN

The steps below outline the recommended process for utilizing the Master Plan and CIP planning process on an annual basis. For this process to work effectively, it's imperative for Watford City to maintain up-to-date GIS files. As projects are completed, infrastructure is decommissioned, or new information or data becomes available, the GIS files should be updated prior to conducting the steps below. Additionally, it is critically important to keep the financial model current with accurate financial data.

1

At fiscal year end, update the levels of service tracking spreadsheet to ensure target levels of service are being achieved.

- If a target level of service isn't being achieved, either reconsider the target, or make investments to help the City achieve the target.
- If a target level is being achieved, continue to function as usual or consider scaling back investments in that system.

2

Prior to budgeting for forthcoming years:

- Re-run the individual infrastructure system assessments. Ensure that assets calculated as high priority are captured within a project in the CIP spreadsheet. If a high priority asset is not included within a project, create a project.
- Once all the projects (both existing infrastructure as well as applicable growth projects) are loaded in the CIP spreadsheet, conduct the project prioritization.
- After the project prioritization, review projects that are programmed into the CIP to ensure they are still applicable. Shift projects from year-to-year accordingly.
- After programming projects into the CIP, conduct a final review with applicable committees and City Council for approval. In unison with this step, the CIP projects should be extracted from the CIP and input into the financial model.
- Ensure the financial model is up to date with revenue and expense projections for the upcoming year. Review current rates and determine if rate increases are needed to fund the projected expenses.
- Once the CIP and financial model are in sync, and the financial model reveals that the City can sufficiently fund the upcoming projects, finalize the CIP for the upcoming year.

3

Repeat this process on an annual basis.

Although significant effort was put into development of this Master Plan, it's recommended for the City to strive for continuous improvement. As more data becomes available and the City evolves over time, the process should be refined, as needed, to ensure that the City is utilizing all sources of information to make informed and defensible decisions regarding investments in the City's infrastructure systems.



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