Chapter 1
EXECUTIVE SUMMARY

The City of Watertown owns and operates a 5.2 million gallon per day (mgd) advanced wastewater treatment plant (WWTP) that serves all property within the City limits and discharges treated effluent to the Rock River. The WWTP's previous Facility Plan was completed in 2000, and a new wastewater treatment plant was constructed in 2004. The City is currently meeting its permitted discharge standards; however, plant loadings have begun to exceed design values outlined in the previous Facility Plan. The City authorized this Facility Plan to evaluate wastewater treatment alternatives for the planning area over a 20-year period (2027 through 2047) for the following reasons:

1. Influent loadings to the WWTP are exceeding the plant's rated capacity.
2. Existing treatment plant components are becoming obsolete due to age and condition.
3. The existing plant has reached the end of its 20-year design life.
4. To provide a plan for adequate capacity for future growth over the next 20 years.

The population of the City of Watertown was 24,357 in 2022 and is projected to grow to 27,492 by the year 2047. Waste load projections were developed based on the population growth and waste loads from major industrial dischargers. Figure 1-1 through Figure 1-5 present the existing and projected flows and pollutant loadings at the WWTP. These figures show that the existing plant is currently at 90-110% of rated plant capacity for BOD, TSS and TKN loading and will increase to 110-130% of its design capacity by the year 2047.

The WWTP has consistently met current effluent limits in its discharge permit. This excellent treatment performance is due to the diligence and hard work of the plant's operating staff. However, as the existing facilities and equipment age, it will be difficult to meet increasingly stringent discharge limits in the future.

An analysis of infiltration and inflow (I/I) indicated that the Watertown WWTP is experiencing excessive inflow. The City is drafting a new ordinance to require disconnection of drain tiles, and the WWTP will continue its current regime for handling and repairing I/I sources.

FIGURE 1-1
Annual Average Plant Flows

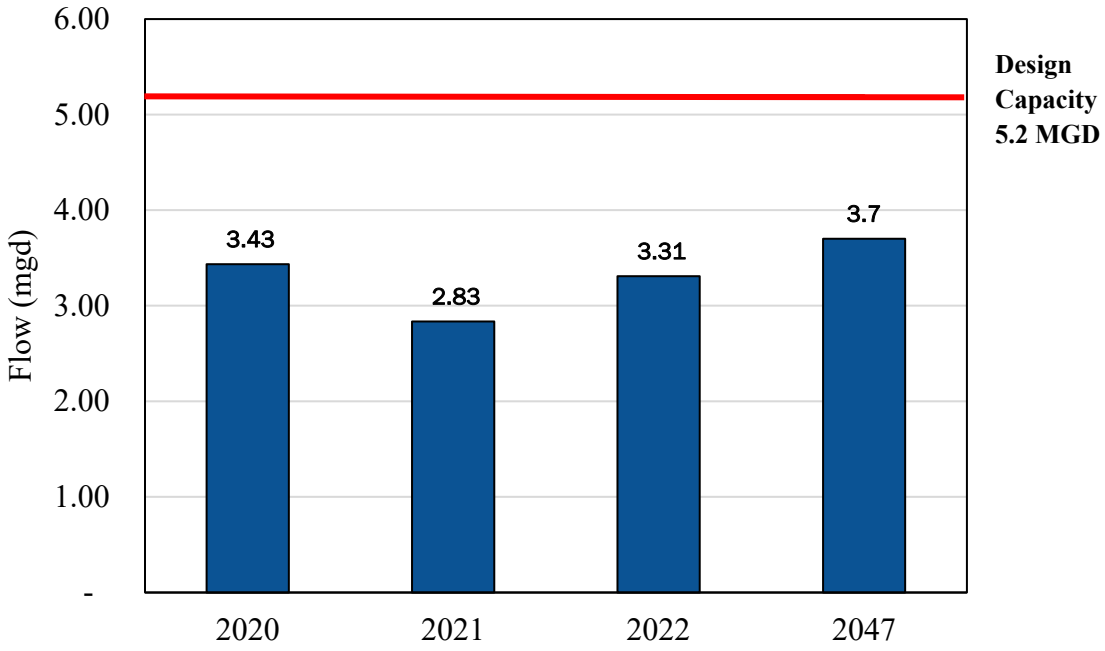


FIGURE 1-2
Annual Average BOD Loading

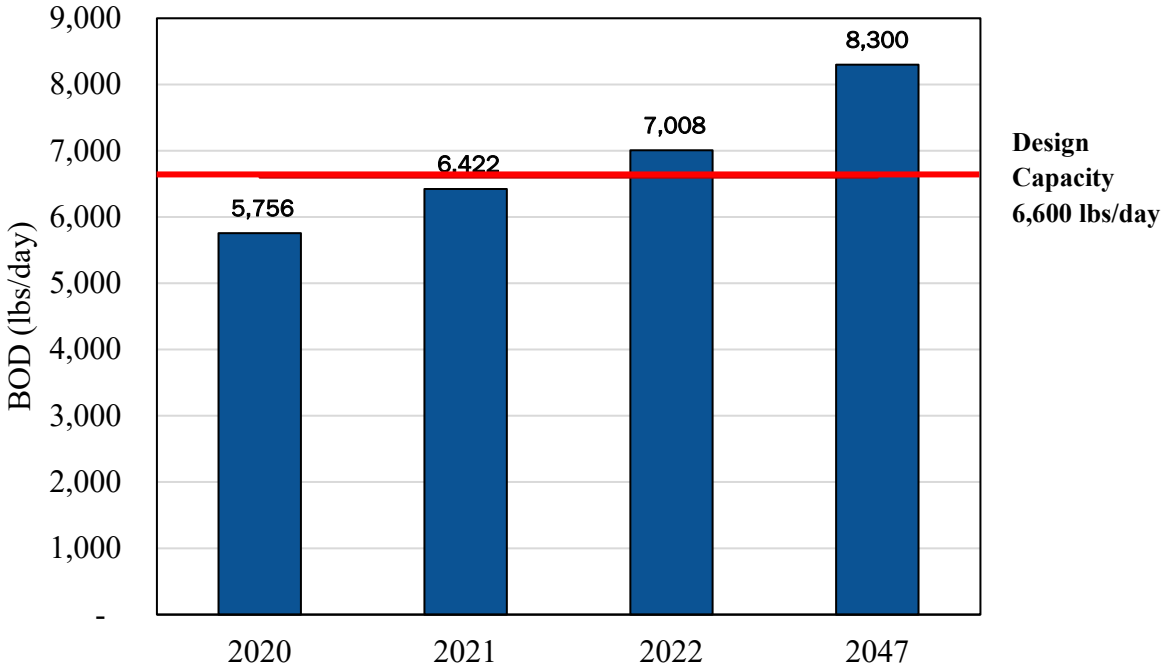


FIGURE 1-3
Annual Average TSS Loading

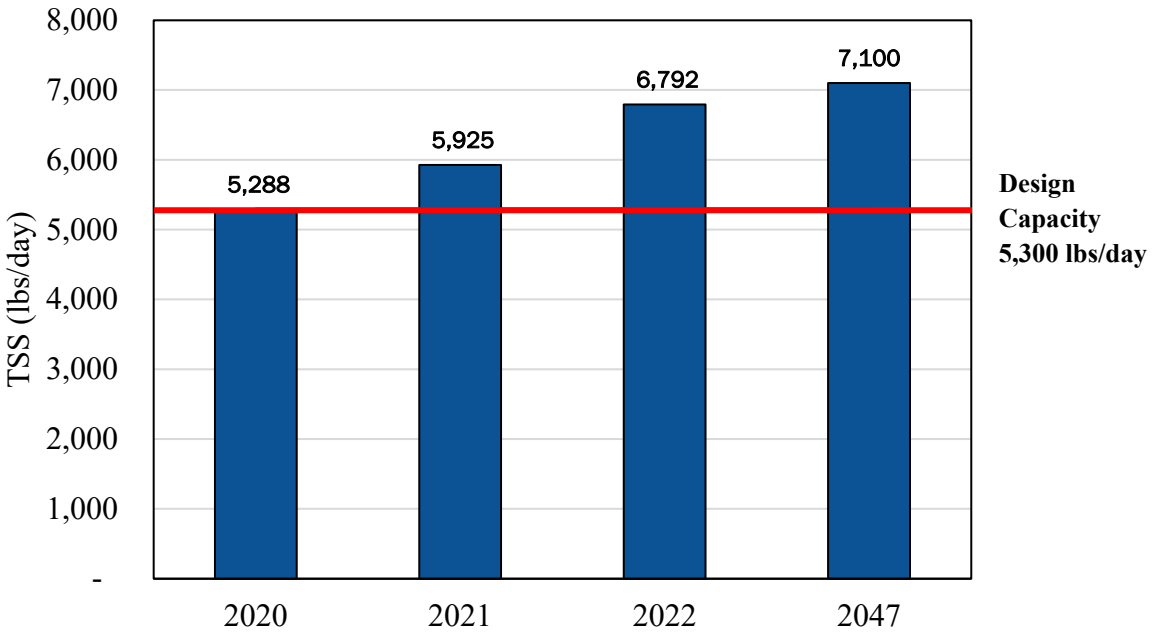


FIGURE 1-4
Annual Average TKN Loading

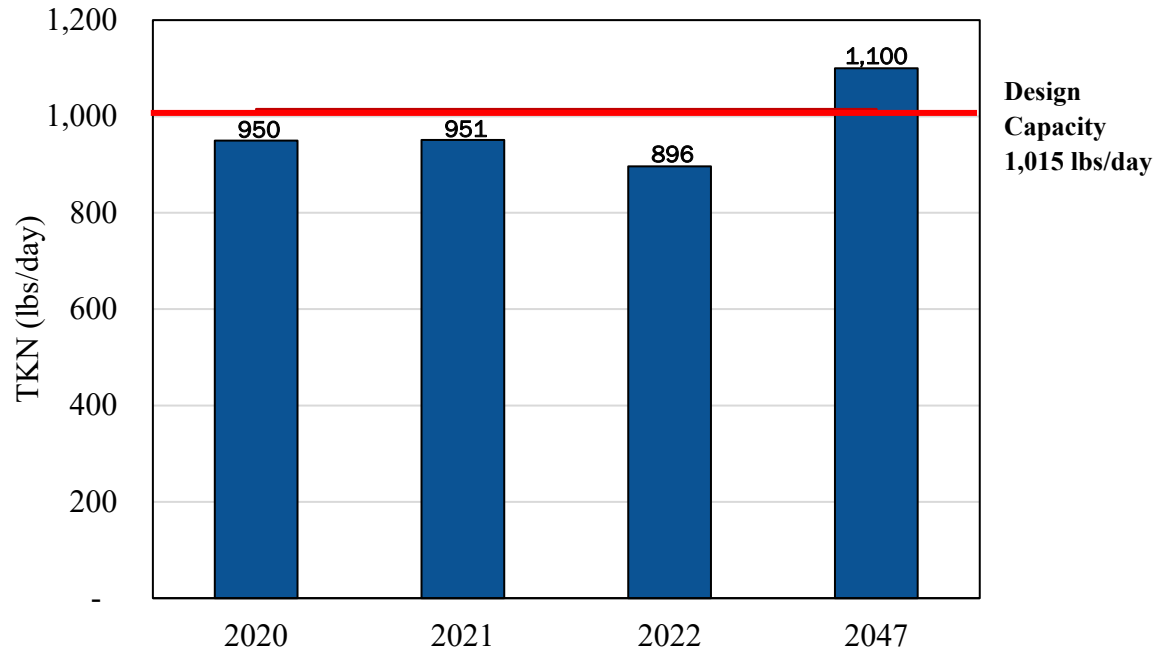
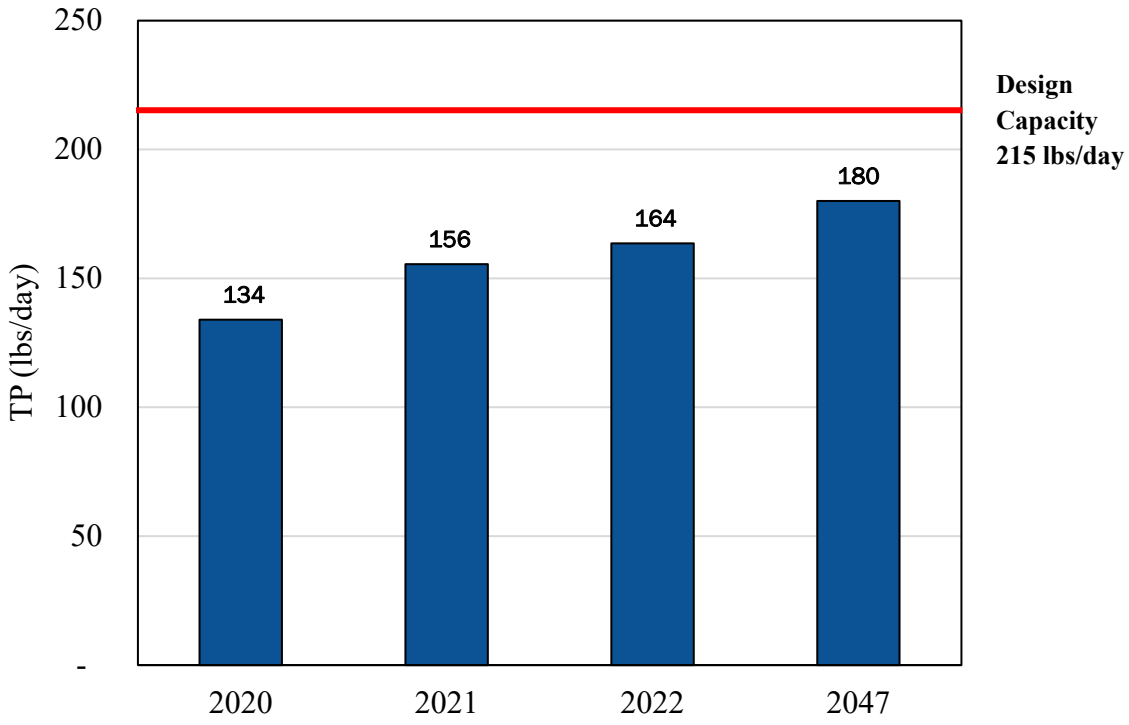


FIGURE 1-5
Annual Average TP Loading



Annual average design flows and loadings for the year 2047 were calculated by estimating residential and industrial flows and loadings. Design year flows were determined to remain less than the rated capacity of the WWTP. Therefore, the existing design flows will be used for capacity analysis and equipment sizing. Current peaking factors were used to calculate design maximum month, peak week, and peak day loadings. Results are summarized in Table 1-1.

Table 1-1
Influent Flows and Loadings, Design Year 2047

	Flow (mgd)	BOD (lb/d)	TSS (lb/d)	NH3-N (lb/d)	TKN (lb/d)	TP (lb/d)
Annual Average	5.2	8,300	7,100	750	1,100	180
Maximum Month	8.8	13,900	15,000	1,000	1,400	400
Peak Week	10.4	16,300	19,500	1,300	1,900	550
Peak Day	24	29,100	44,500	2,000	2,800	710
Peak Hour	27	-	-	-	-	-

Evaluations of selected facilities at the Watertown WWTP were performed, focusing on the areas identified at the Facility Plan Kickoff meeting and subsequent update meetings. The capacities of the facilities were compared to the current wasteloads and projected design year 2047 waste loads. Deficiencies and shortfalls were discussed, and alternatives for upgrading the existing facilities were identified and evaluated via present worth economic analyses.

A majority of the recommended plan includes replacing in kind the aging equipment that has reached the end of its 20-year design life. Upgrades to select treatment process will be completed to allow the Watertown WWTP to handle the projected flows and loadings for the design year 2047. The plan is outlined in a phased approach, with required upgrades being separated into near-term (0-2 years), mid-term (3-5 years), or long-term (5-10 years) improvements. These improvements are described below and summarized in Table 1-2 through Table 1-4. The phase timelines and specific unit process improvements can be modified by the City based on facility needs and equipment condition.

Mid-term improvements will be made to the Raw Sewage Pump Station with provisions to operate a sixth raw sewage pump using a portable standby generator. The primary influent force mains will be equipped with electrically actuated valves for remote flushing of grit buildup in either pipe. Long-term improvements include the replacement of the raw sewage pumps in kind.

The Preliminary Treatment facilities will be upgraded in the near term with replacement fine screens, grit removal and grit washing equipment rated for the same hydraulic capacity as the existing systems.

Near-term Primary Treatment improvements include replacement of the primary sludge and scum pumps. Mid-term improvements include the addition of primary sludge line cleanouts to control vivianite buildup in the pipelines, and replacement of the mixers. The primary scum well will also be modified to reroute the subnatant to the headworks of the WWTP to avoid the buildup of fats, oils, and grease downstream of the Primary Clarifiers. Long-term improvements include replacing the primary clarifier mechanisms and drives.

The Secondary Treatment facilities will continue utilizing the existing activated sludge system, but the aging blowers and fine bubble diffusers will be upgraded in the mid-term to accommodate the increase in waste loads at the plant and maintain compliance with effluent limits. The Secondary Splitter Structure will be upgraded with isolation gate valves to allow the two treatment trains to operate in parallel, and the aging chemical feed system will be replaced. Chemical phosphorus removal will continue to be the primary system used to meet effluent total phosphorus limits throughout the planning period. Long-term improvements include replacing the secondary sludge pumps, mixers, and final clarifier mechanisms and drives.

The ultraviolet disinfection system will be replaced in the near term to match the disinfection capacity with the 27 mgd hydraulic capacity of the existing system. A structural analysis of the cascade aerator and effluent outfall will be completed as part of the mid-term improvements to ensure the structures remain in good condition throughout the planning period.

Mid- and long-term improvements to the Biosolids Handling facilities will include replacing the aging boiler, centrifuges, sludge grinders, polymer system, and sludge discharge conveyors. The anaerobic digesters date from the 1970s, so a structural assessment of the digesters and digester covers will be completed to ensure they will remain in good condition through the planning period. Other improvements include replacing the anaerobic digester mixers, waste gas burner and ancillary gas safety equipment.

Several miscellaneous upgrades will be made throughout the wastewater treatment facilities, including the near-term replacement of the transformer near the Raw Sewage Pump Station, standby power generator and automatic transfer switch, instrumentation and control systems, fire alarm, gas monitoring system, and HVAC systems. The site's storm water pumps will be replaced in kind within the planning period.

TABLE 1-2
Summary of Near-Term Plant Improvements

Unit Process	No.	Size/Capacity
Preliminary Treatment		
Fine Screens	2	13.5 mgd, each
Grit Removal System Upgrades	1	18-ft Dia, 20-ft depth
Primary Treatment		
Primary Sludge and Scum Pumps	4	54 gpm, each
Disinfection		
UV Disinfection System	1	27 mgd
Biosolids Treatment		
Polymer System	2	94 lb/hr, each
Miscellaneous Improvements		
Transformers/Electrical Service Upgrade	1	N/A
SCADA Improvements	1	N/A
Gas Monitoring System Replacement	1	N/A
Fire Alarm System Replacement	1	N/A

TABLE 1-3
Summary of Mid-Term Plant Improvements

Unit Process	No.	Size/Capacity
Raw Sewage Pumping		
Auxiliary Generator Upgrades	1	N/A
Primary Treatment		
Scum Well Upgrades	1	N/A
Scum Well Pump	1	250 gpm
Scum Well Mixer	1	N/A
Secondary Treatment		
Secondary Splitter Upgrades	1	N/A
Aeration Basin Concrete Rehabilitation	1	N/A
Aeration Blowers*	3	3,000 scfm, each
Fine Bubble Diffusers*	1	N/A
Chemical Feed Pumps	3	5-30 gpm, each
Chemical Storage Tank	1	10,000 gal
Biosolids Treatment		
Primary Sludge Line Cleanout Improvements	1	N/A
Anaerobic Digester Structural Assessment	1	N/A
Centrifuges	2	1,500 lb/hr, each
Sludge Grinders	2	170 gpm, each
Sludge Discharge Conveyor	1	N/A
Miscellaneous Improvements		
Cascade Aeration Assessment	1	N/A
Effluent Outfall Assessment	1	N/A
Generator/ATS	1	N/A
HVAC System Improvements*	1	N/A

TABLE 1-4
Summary of Long-Term Plant Improvements

Unit Process	No.	Size/Capacity
Raw Sewage Pumping		
Raw Sewage Pumps	5	4,700 gpm, each
Primary Treatment		
Primary Clarifier Mechanisms/Drives	2	85-ft Dia, 12-ft SWD
Secondary Treatment		
Anoxic Mixers	3	1,500 gpm, each
Mixed Liquor Recycle Pumps	3	2,600 gpm, each
Return Sludge Pumps	3	2,300 gpm, each
Waste Sludge Pumps	2	380 gpm, each
Final Scum Pump	1	150 gpm, each
Final Clarifier Mechanisms/Drives	2	90-ft Dia, 16-ft SWD
Biosolids Treatment		
Anaerobic Digester Mixers	5	9,000 gpm, each
Dual Fueled Boiler	1	3,400 MBh
Waste Gas Burner	1	7,900 scf/hr
Miscellaneous Improvements		
Storm Water Pumps	2	1,670 gpm, each

The estimated capital costs and debt service for the three projects are shown in Table 1-5, with the debt service estimated using the September 2024 Clean Water Fund (CWF) interest rate of 2.365%.

Table 1-5
Debt Service Estimate

Project	Project Cost	Loan Amount	Annual Principal and Interest Payment
Near-Term Improvements	$9,098,000	$8,188,000	$519,000
Mid-Term Improvements	$10,261,000	$9,235,000	$585,000
Long-Term Improvements	$14,063,000	$12,657,000	$802,000

It is estimated that the current utility rates are sufficient for the additional revenue requirements for the proposed Near-Term project. The final cost allocation and user charge rates will be determined from a user charge study after final project costs, CWFP impacts, and method of financing are determined

The steps and anticipated schedule for implementing the recommended plant are outlined below:

- Conduct Public Hearing ..... December 2024
- Submit Facility Plan to DNR ..... December 2024
- DNR Approval of Facility Plan ..... March 2025
- Near-Term Improvements
  - Begin Design ..... January 2025
  - Submit Plans and Specifications to the DNR ..... September 2025
  - Bidding ..... November 2025
  - DNR Approval of Plans and Specifications ..... December 2025
  - Submit Clean Water Fund Application ..... December 2025
  - Award of Contract ..... January 2026
  - Begin Construction ..... March 2026
  - Final Completion/Startup of Facilities ..... May 2027
- Mid-Term Improvements ..... January 2028
- Long-Term Improvements ..... January 2030