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Section 5 WWCTS Evaluations and Recommended Improvements

This section summarizes unit processes and equipment improvements required at City of Eustis's two WWTFs for capacity expansion needed to accommodate future wastewater flows and loadings for the 20-year planning horizon.

5.1 Overview

Wright-Pierce performed a planning level evaluation of the WWTFs and determined the general improvements necessary at each WWTF to serve their systems through the 20-year planning period. For this purpose, the rated capacity of each unit process and equipment was estimated using the permit limit. The year in which the rated capacity of each unit process and equipment would be reached was estimated. Based on the capacity shortfall, the unit process and equipment capacity expansion needs were identified. Subsequently, budgetary cost opinions were developed.

5.2 Bates Avenue WWTF

The unit processes and equipment improvement needs for capacity expansion were evaluated using the recently developed existing unit process capacity for the ongoing Bates Avenue WWTF expansion to 3.2 MGD AADF (permitted for 2.99 MGD AADF; refer to Table 2-10 of *Preliminary Design Report, Bates Avenue WWTF Expansion Project* dated January 2023). The expansion project would provide the following annual average influent capacity despite the 2.99 MGD AADF permit limit:

- AADF = 3.2 MGD
- Biological Oxygen Demand (BOD₅) Load = 7,205 lb/day
- Total Suspended Solids (TSS) Load = 6,979 lb/day
- Total Kjeldahl Nitrogen (TKN) Load = 1,454 lb/day

Wright-Pierce first estimated the rated capacity of each unit process and equipment using the 2.99 MGD AADF permit limit. Then, using the wastewater flow projection discussed in Table 3-5 and Figure 3-2, Wright-Pierce estimated the year in which the rated capacity of each unit process and equipment would be reached. Based on the capacity shortfall, the unit process and equipment capacity expansion needs were identified. Finally, budgetary cost opinions of the expansion needs were developed using the data from the ongoing Bates Avenue WWTF expansion project as well as other similar WWTF improvement projects that WP is conducting.

It should be noted that the 2042 flow projection to the Bates Avenue WWTF of 4.79 MGD AADF is higher than the flow projection shown in the January 2023 Preliminary Design Report (3.2 MGD AADF) due to the inclusion of additional planned developments in the projections that were not included in the initial planning documents. As with any future projections, growth should be assessed annually in relationship to flows and loads to the plants to determine whether adjustments need to be made to planned upgrades.

Table 5-1 shows a summary of the unit process capacities and their rated capacities expressed in MGD AADF for the Bates Avenue WWTF, the year that the rated capacities are reached, necessary improvements for capacity expansion, and the associated budgetary cost opinions. Depending on whether the anticipated growth occurs, the City may need to consider conducting the "paper rerate" of the Bates Avenue WWTF from 2.99 MGD to 3.2 MGD

sometime around the 2027 to 2028 timeframe. While the solids handling systems (Sludge Holding Tanks and Belt Filter Presses) show a capacity of 2.99 MGD, there are operational modifications that could be implemented to extend the time in which an upgrade would be needed (ex. operating the dewatering system more frequently to keep from building solids in the Sludge Holding Tanks).

5.3 Eastern WWTF

As shown in Table 3-6 and Figure 3-3, the wastewater flow projection for the Eastern WWTF is expected to remain substantially below the permitted design capacity of 1.3 MGD AADF for the next 20 years, with marginal increases. The anticipated AADF in 2042 is only expected to be 0.34 MGD AADF. Therefore, no unit process or equipment improvements are required for capacity expansion for the next 20 years at the Eastern WWTF. This evaluation did not include equipment replacement required over the next 20 years due to age or wear and tear.

Table 5-1 Bates Avenue WWTF Unit Process and Equipment Improvement Needs for Capacity Expansion

Unit Process/Equipment		Unit Process Capacity Following 2023 Expansion Project					Unit Process Capacity Requirement for 2.99 MGD AADF*		Unit Process Rated Capacity Following 2023 Expansion Project (MGD AADF)	Timing of Capacity Limitation (Year)	Necessary Improvements for Capacity Expansion	Planning Level Cost Opinions	
		No.	Unit Capacity		Process Capacity*								
Master Pumping Station		4	1,875	gpm	5,625	gpm	5,191	gpm	3.24	2029	New pumps with higher capacity, VFDs, controls and electrical upgrade to achieve 4.79 MGD AADF (12.0 MGD PHF).	\$1.5M	
Mechanical Screen		1	10	MGD	10	MGD	7.5	MGD	4.00	2032		Headwork structure improvements with hydraulic modifications to accommodate 4.79 MGD AADF (12.0 MGD PHF).	\$2M
Grit Removal		1	10	MGD	10	MGD	7.5	MGD	4.00				
Train A	Process Basin Volume	1	0.66	MG	0.66	MG	0.44	MG	4.50	2036	0.54 MG BNR Train D (MLE Process) with Fine bubble diffusers Submersible mixers IR pumps	\$7M	
	Fine Bubble Diffusers	1,800	4.5	scfm	8,100	scfm	2,805	scfm	4.50				
	IR Pumps	2	1,600	gpm	3,200	gpm	1,710	gpm	4.50				
Train B	Process Basin Volume	1	0.54	MG	0.54	MG	0.36	MG	4.50				
	Fine Bubble Diffusers	700	4.5	scfm	3,150	scfm	2,007	scfm	4.50				
	IR Pumps	2	1,000	gpm	2,000	gpm	1,221	gpm	4.50				
Train C	Process Basin Volume	1	0.54	MG	0.54	MG	0.36	MG	4.50				
	Fine Bubble Diffusers	700	4.5	scfm	3,150	scfm	2,007	scfm	4.50				
	IR Pumps	2	2,222	gpm	2,222	gpm	1,221	gpm	4.50				
Blowers		2	1,800	scfm	5,400	scfm	4,812	scfm	3.36	2029	Additional 1,800 scfm blower for 4.79 MGD (operating Trains A, B, C and D)	\$0.5M	
		3	1,200	scfm									
Secondary Clarifiers	Clarifier No. 1	1	1,963	sf	7,615	sf	4,200	sf	5.42	Beyond 2042	None	None	
	Clarifier Nos 2, 3, and 4	3	2,826	sf									
RAS Pumps		4	850	gpm	2,550	gpm	2,076	gpm	3.67	2031	New RAS pumps with higher capacity	\$0.75M	
Disc Filters		4	320	sf	960	sf	779	sf	3.69	2031	Two additional new disc filters (six discs each)	\$2M	
Chlorine Contact Tanks		2	43,150	gal	43,150	gal	38,932	gal	3.31	2029	One additional chlorine contact train of equal size to the two existing trains	\$1M	
Effluent Pumps		5	1,400	gpm	5,600	gpm	5,191	gpm	3.23	2029	Add the sixth pump in the open space already established	\$0.75M	
Sludge Holding Tanks		2	0.1	MG	0.2	MG	0.2	MG	2.99	2028	One, new 0.2 MG sludge holding tank and aeration system	\$2M	
Belt Filter Presses		1	3,600	lb/day	6,250	lb/day	6,250	lb/day	2.99	2028	New, higher capacity dewatering equipment, cake conveyor, polymer feed system	\$2M	
		1	2,650	lb/day									

*Total unit process capacities were estimated based on EPA Class 1 Reliability.

Table 3-6 Projected Flows – Eastern WWCTS

Year	Existing Flow (MGD)	Fill-in Flow (MGD)	Planned Development Flow (MGD)	Total Flow (MGD)
2027	0.16	0.02	0.12	0.30
2032	0.16	0.04	0.12	0.32
2037	0.16	0.06	0.12	0.34
2042	0.16	0.06	0.12	0.34

Figure 3-2 and Figure 3-3 present projected flows for planning year 2027 through 2042 along with the historical flows for the Bates and Eastern WWCTSs, respectively.

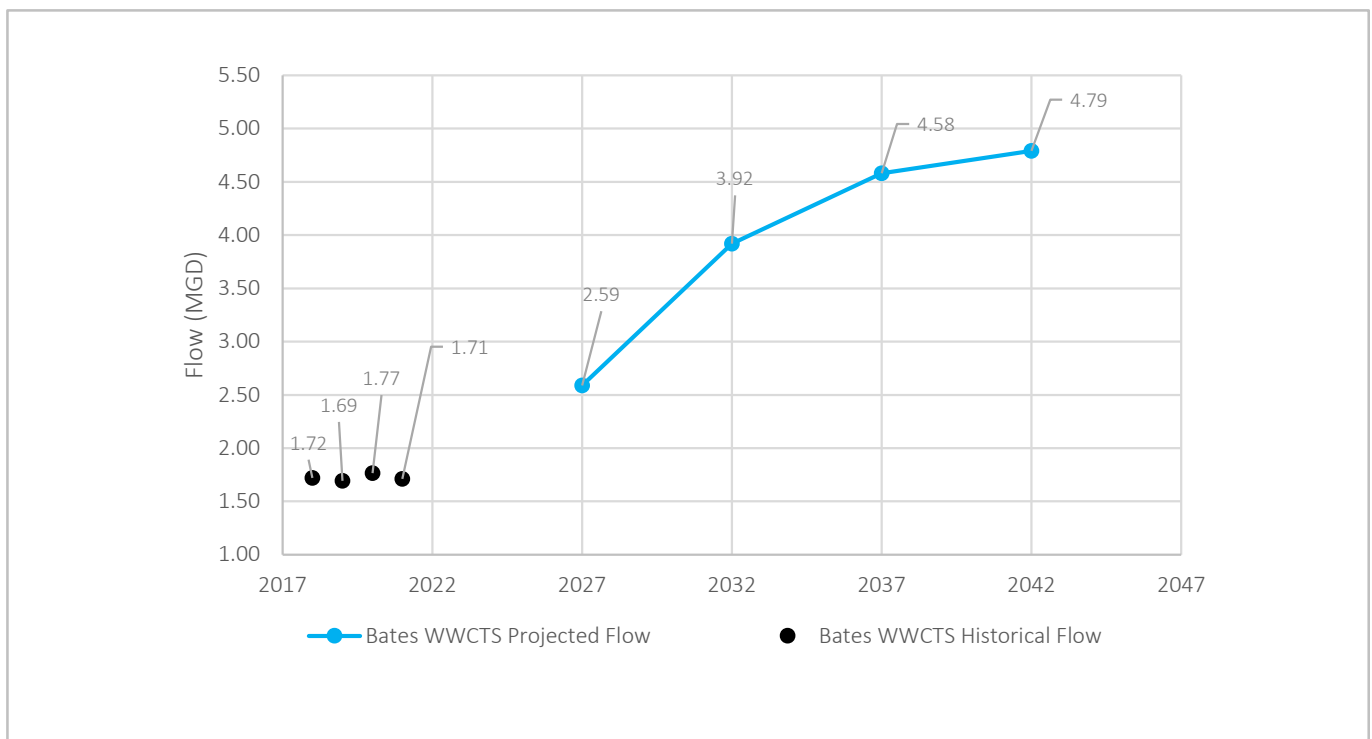
Figure 3-2 Wastewater Flow Projection and Historical Flow - Bates WWCTS

Figure 3-3 Wastewater Flow Projection and Historical Flow - Eastern WWCTS