

**TOWN OF JACKSON
WATER AND SEWER
SYSTEMS EVALUATION REPORT
EXECUTIVE SUMMARY**



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1 Executive Summary

1.1 Introduction

The Town of Jackson (TOJ) is a resort community located in western Wyoming. The year-round population of the TOJ is approximately 10,000 residents. The TOJ is within Teton County, which has a year-round population of approximately 20,000 residents. In addition to the year-round population, the TOJ sees about four million visitors per year.

The TOJ provides water and sewer service to the residents and businesses within the town incorporated limits. In addition to providing services within the town limits, the TOJ also provides water to a limited number of Teton County residents and treats wastewater for several outlying sewer districts in Teton County. There are additionally a few privately owned systems that the TOJ allows to connect to the water and sewer systems. All water and sewer users within the service area boundaries that are not within the TOJ incorporated limits are considered out-of-town users for this report.

The TOJ is responsible for operating, maintaining, and if needed, expanding the existing TOJ facilities. These responsibilities include supply, treatment, conveyance, and transmission of both water and sewer systems.

1.2 Project Description

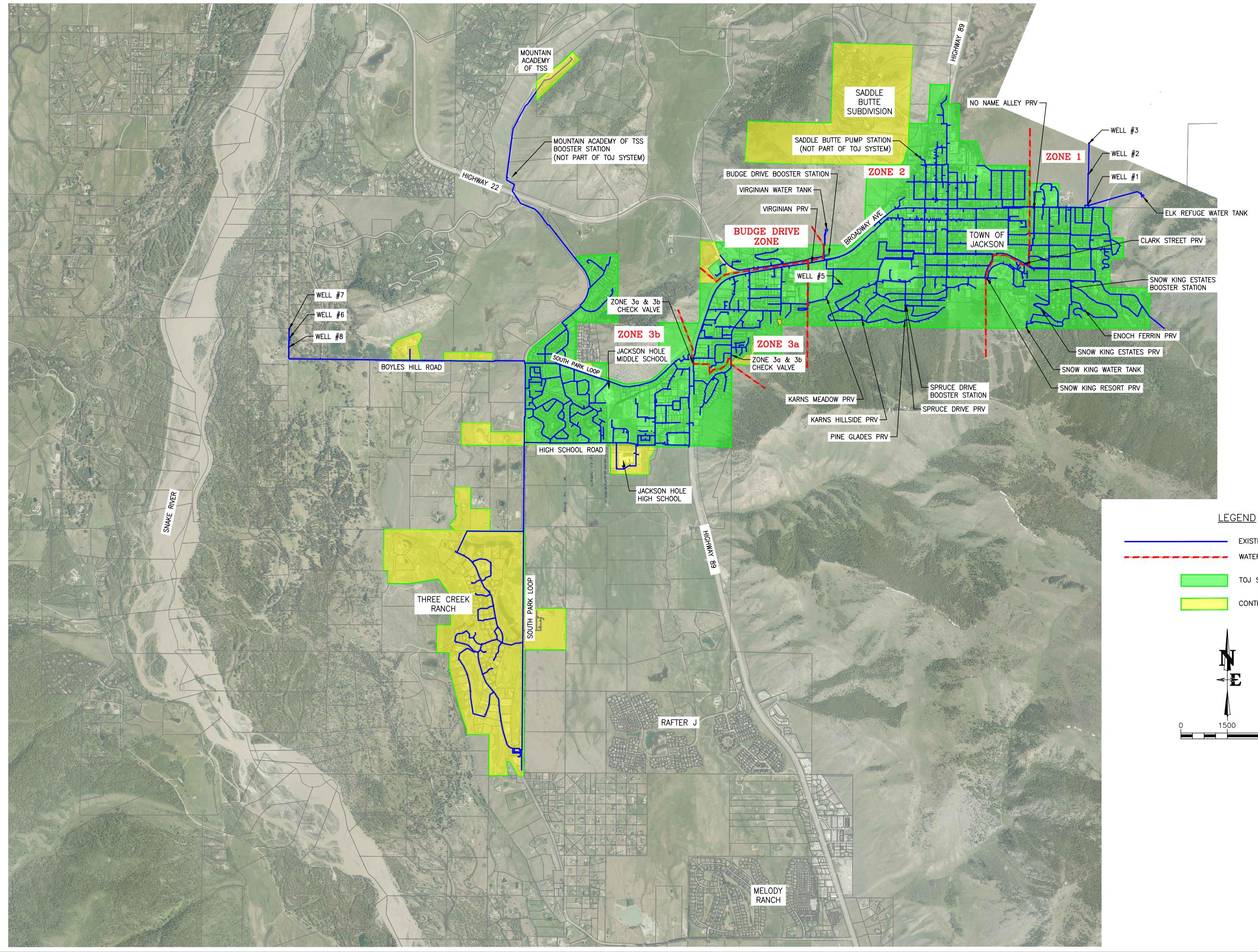
This 2020 Water and Sewer Capacity Study for the TOJ is Part 2 of a comprehensive study commissioned by the TOJ. Part 1 is a Water and Sewer Rate Study being performed by Raftelis Financial Consultants, Inc out of Denver, Colorado.

This study reviewed the existing water and sewer system capacities and formed a list of recommendations for improvements to the existing systems. The study also performed a review of the future buildout flow capacities of the water and sewer systems. Nelson Engineering (NE) contracted with OPS Strategies to perform projections on future buildout water and sewer demands. These growth projections allowed NE to review the system's capacity to accommodate obligated growth.

The existing water and sewer infrastructure was analyzed to determine modifications or improvements which are needed to address existing systems capacity and future buildout capacity. Recommendations from this study were included with the TOJ's Ten Year Water and Sewer CIP plans to provide a comprehensive water and sewer masterplan to address current and future uses.

2 Existing Water System Capacity Analysis

The extents of the existing water system are shown on Figure 1. The TOJ provides water to private and commercial customers within the TOJ limits and also to a few residents and businesses in Teton County (out-of-town users). There are approximately 4900 water customers within the TOJ and 95 out-of-town customers. The TOJ water system consists of seven supply wells, three storage tanks, three booster stations, and associated water mains.



DRAWING NO. **FIGURE 1** **JOB NO.** 18-336-01 **JOB TITLE** TOWN OF JACKSON WATER & SEWER CAPACITY STUDY **DRAWING TITLE** TOWN OF JACKSON WATER SYSTEM

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APPROVED	MB	

2.1 Contract Service Area

Figure 1 indicates the existing contract service areas of the TOJ Water System. The out-of-town customers are the Teton Science School, Three Creek Subdivision, Jackson Hole Classical Academy, and Saddle Butte Subdivision. Figure 1 also indicates the locations of the supply wells, storage tanks, pressure reducing valves, water pressure zones, and booster stations. The TOJ service area is separated into three pressure zones, with Zone 3 being separated into 2 subzones (3A and 3B) with check valves. The pressure zones are also indicated on Figure 1.

2.2 Existing Water Use

Water demand in the TOJ system varies seasonally, daily, and hourly. Irrigation and tourist impacts increase the demand significantly in the summer months. To determine water usage, meter data was gathered from the TOJ Finance Department. Meter data from January 2016 through December 2019 was collected for each customer. The meter data was associated with a parcel and parcel number. Water usage based on specific properties allowed NE to determine water use based on land use. Determining an accurate water demand for various locations and users within the system allowed NE to analyze the system components to determine if capacity is adequate when looking at current water demand.

To evaluate the amount of water sold to in TOJ and out-of-town users, along with the water use, Tables 2.5.2.1 and 2.5.2.2 were included in the report.

Table 2.5.2.1 Outside TOJ Water Use

	Total Water Sold August 2019	Town of Jackson	Teton Science School	Saddle Butte	3 Creek
Gallons Sold	159,036,140	145,814,711	310,000	1,476,000	11,435,429
% of Total	-	91.69%	0.19%	0.93%	7.19%

Table 2.5.2.2 Water Use

	Total Water Sold August 2019	Hotels	Hotels with Restaurants	Restaurants	Commercial	Irrigation	Residential
Gallons Sold	159,036,140	12,932,000	3,945,000	5,212,000	5,967,000	21,728,140	109,252,000
% of Total		8%	2%	3%	4%	14%	69%

As can be seen from the tables, the majority of the use is residential within the TOJ.

2.3 Evaluation of Existing Water System

Evaluation of the water system included a site visit with the Manager of the TOJ Water Division, discussions with personnel, review of existing conditions, updating the existing water model, and performing model run scenarios.

Based on the review of the existing water system, performing hydraulic analysis of the system, and discussion with operators and the TOJ Public Works department, several upgrades to the water system were recommended in the report. Several of these have been previously identified and marked for future funding in the TOJ's 10-year Water CIP plan. Other additional recommendations were identified from this capacity study. The report contains a list of the recommendations, the most pressing issues identified with the water system was the need for storage and additional supply in Zone 3B of the water system. At this time, during high irrigation months, Wells #6 and #8 are unable to maintain level of service within Zone 3B and Well #7 cannot operate at the same time due to drawdown issues in the well. This zone is on the west side of town, where a new storage tank is recommended along with an additional future supply well, Well #9.

3 Existing Sewer System

The extents of the existing sewer system are shown on Figure 3. The TOJ provides sewer service to TOJ residents and several out-of-town residents. There are approximately 4900 sewer customers within the TOJ and 1400 out-of-town customers. The TOJ sewer system consists of seven sewer lift stations, associated gravity sewer mains and force mains, and one sewer treatment plant.

3.1 Contract Service Area

Figure 3 indicates the existing contract service area of the TOJ Sewer System. The out-of-town customers include, Three Creek Subdivision, Wilson Sewer District, Teton Science School, Rafter J Subdivision, Melody Ranch Subdivision, Spring Creek Ranch, Gros Ventre Utility Company, Jackson Hole Airport, Adams Canyon, South Park Service Center Subdivision, Valley View Subdivision, Munger Mountain School, Jackson Hole Classical Academy, and some private residences.

3.2 Existing Sewer Flows

Much like the water meter flows, wastewater influent flows were gathered from October 2016 through October 2019. Over that period the highest flows occur in June/July and then slowly drops until September when there is a steeper drop through November. Additionally, there is a sharp increase through January followed by reduced flow from March thru May. With the exception of the high flows occurring in June, the flows pretty much directly correlate to tourist activity in the Town and County. High visitor numbers occur in late June through the middle of September, then tourist activity drops until the holiday season, with a slight increase during ski season through March. Visitor numbers again drop off until the end of May.

To compare the total flows attributed to TOJ customers versus flows from out-of-town customers, data acquired from the TOJ was analyzed for 2019. The TOJ has categorized flows from contributing sewer districts based on billings. The flows to the plant which were quantified separately were Wilson Sewer District, Gros Ventre Utility, Munger School, Airport, Spring Creek, Melody Ranch, Three Creek, and Rafter J. The smaller individual out-of-town users were included with the TOJ flow since this percentage is fairly small when comparing the total flow. The data indicated that during June, July, and August of 2019 the percentage of total flow experienced at the WWTP attributed to non-TOJ users was between 18%-20%.

A more in-depth review of the of the total contribution for the out-of-town users was prepared for the three maximum months of influent treated at the WWTP. Table 3.5.1.2 from the report shows the percentages of the total monthly flow attributed to each out-of-town customer for those three maximum months, with all units displayed in million gallons per month.

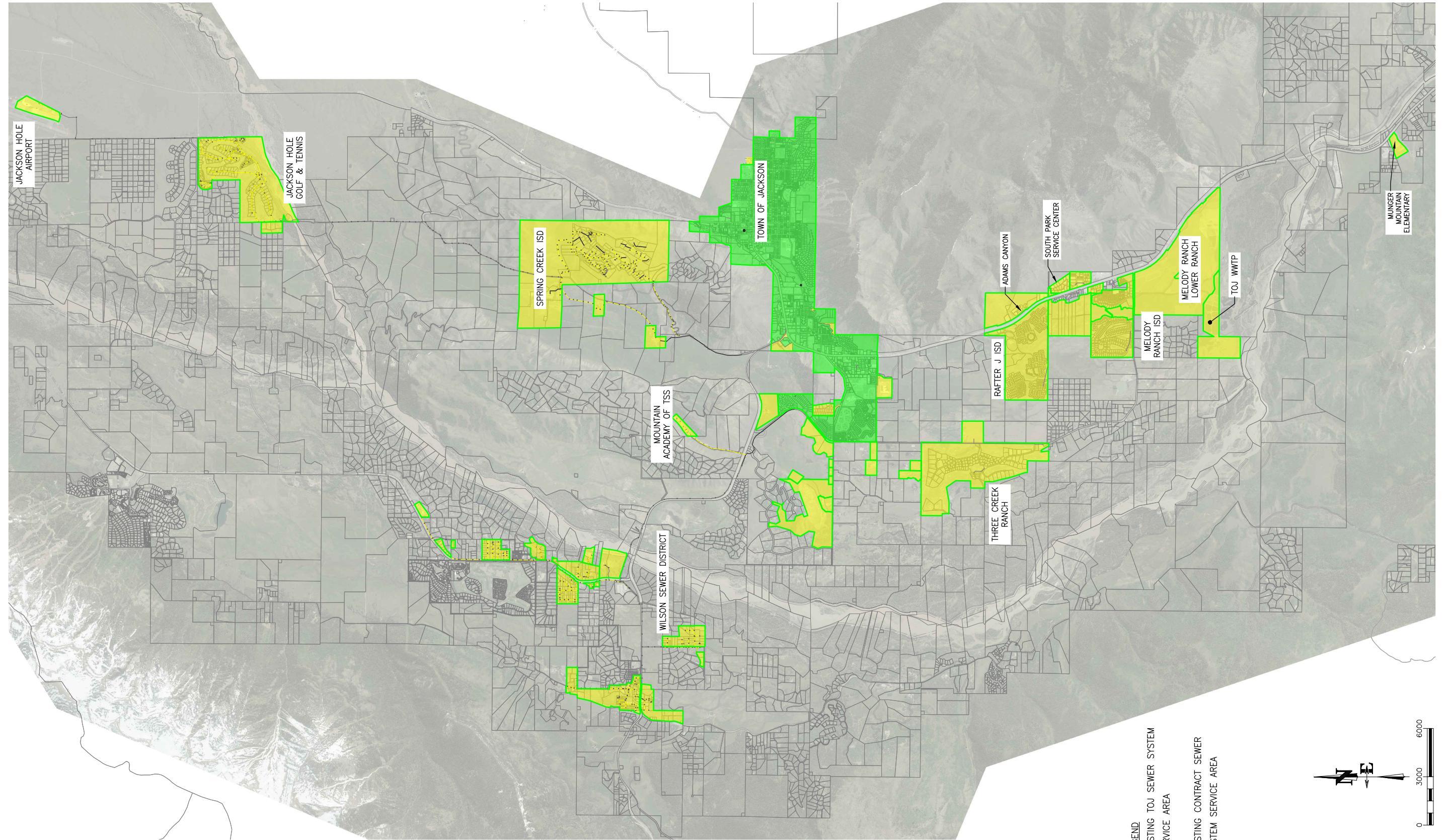


FIGURE 3
JOB NO
19-336-01

DRAWING NO
TOWN OF JACKSON WATER & SEWER
COMPREHENSIVE CAPACITY STUDY
JACKSON, WYOMING

**NELSON
ENGINEERING**
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Table 3.5.1.2 Contribution to Monthly Influent Flow from Outlying Customers

Date	WWTP Influent Flow (MG)	Non TOJ Sewer Customer														Total Outlying Customer			
		Wilson Sewer District		Gros Ventre Utility		Munger School		Airport		Spring Creek		Melody Ranch		3 Creek		Rafter J			
		Flow (MG)	% Total Flow	Flow (MG)	% Total Flow	Flow (MG)	% Total Flow	Flow (MG)	% Total Flow	Flow (MG)	% Total Flow	Flow (MG)	% Total Flow	Flow (MG)	% Total Flow	Flow (MG)	% Total Flow		
June 2017	85.8	3.45	4.47%	2.39	3.09%	0	0%	.48	0.62%	5.50	7.12%	2.32	3.00%	.79	1.02%	4.95	6.41%	19.8	23.15%
July 2017	77.3	2.32	4.02%	3.02	5.22%	0	0%	.58	1.01%	2.95	5.11%	2.32	4.01%	.70	1.20%	5.09	8.80%	17.0	21.95%
June 2018	77.2	2.99	3.87%	1.60	2.07%	0	0%	.51	0.66%	6.29	8.14%	2.03	2.63%	.50	0.64%	4.62	5.98%	18.5	23.99%

3.3 Evaluation of Existing Sewer System

Evaluation of the sewer system included a site visit with TOJ Sewer Department personnel, discussions with personnel, review of existing conditions, updating the existing sewer model, and performing model run scenarios. The evaluation also included a site visit of the treatment plant and discussions with the operators. Also included was a design review of the existing WWTP.

Based on the review of the existing sewer system, several upgrades were recommended in the report. Much like the water system, several of these have been previously identified and marked for future funding in the TOJ's 10-year sewer CIP plan. Additional recommendations were identified from this capacity study and included in the improvements list.

The evaluation of the Jackson WWTP reviewed the current operating configuration of the lagoon system to confirm treatment capacity still conforms to the design capacity. The review performed by Vista Engineering noted that the treatment capacity will still meet the design capacity of a monthly average of 5.0 million gallons per day (MGD). Also noted in the discussion is that by working with Wyoming DEQ and modifying the existing discharge permit, increasing the summer treatment capacity to 6.5 MGD is very feasible with some minor modifications.

Through review of wastewater influent flows from October 2016 to October 2019, Table 3.5.1.1 was included in the report which notes three of the peak monthly flows over that time. Review of the table it can be noted that the influent into the plant at the current maximum average daily flow over the month is about 57% of the plant capacity.

Table 3.5.1.1 Wastewater Influent Peak Monthly Flows Last 3 Years

Date	Flow (Million Gallons)	Average Daily Flow (MGPD)
June 2017	85.8	2.86
July 2017	77.3	2.49
June 2018	77.2	2.57

4 Future Capacity Analysis

The future capacity analysis allows the TOJ to plan future needs in both the water and sewer systems as the buildout potential of the TOJ and Teton County continues to be realized. This analysis included working with the TOJ and Teton County (TC) Planning Departments and current land development regulations to predict future buildout water and sewer demands at buildout.

These future water and sewer projections were then modeled in the existing water and sewer system configurations to evaluate future capacity needs within the systems.

4.1 Future Use Projections

Future flows were projected for all parcels within Teton County based on land use and overall development potential as allowed by the current Land Development Regulations, although these projections were performed county wide, only those parcels within the existing contract service area, both the TOJ and Non TOJ customers, were utilized in the capacity evaluation. Determining the future flow projections within the contract service areas required three individual steps.

The three steps in the buildout flow projection were:

1. Determine August (peak water) and winter (sewer) flow by land use.
2. Project land use at buildout.
3. Apply the flow-by-land-use model to the projected buildout.

Flows acquired in the existing capacity analysis based on individual parcels were utilized to determine the maximum flows based on land use. Teton County Assessor records and planning department records were used to determine the land use of each parcel within Teton County. Following the determination of the flows by land use, the land use at buildout demand was estimated utilizing maximum floor area allowed for individual parcels based on current TOJ and Teton County zoning. Once this data was gathered, a projected buildout water and sewer demand was estimated for each parcel within the existing contract service areas.

4.2 Buildout Water System Capacity

The same methodology was utilized to perform the future capacity analysis that was used for the existing capacity. The future water demands were projected for the TOJ and also out-of-town users which are currently served by the TOJ water system utilizing the same peaking factors. Water demands were projected for Zones 1, 2, 3A, and 3B of the TOJ Water System along with Saddle Butte, Teton Science

School, and 3 Creek. The calculated maximum monthly demand of the water system increases by approximately 64% at buildout from existing demands. Table 6.1 Buildout Projected Water Demands was included in the report noting the increase from existing to buildout flows.

Table 6.1 Buildout Projected Water Demands

Zone	Existing Flows			Buildout Flows		
	Average Max Month (Million Gal/month)	Max Day Factor 1.10 (MGD)	Peak Hour Factor 1.5 (GPM)	Average Max Month (Million Gal/month)	Max Day Factor 1.10 (MGD)	Peak Hour Factor 1.5 (GPM)
Zone 1	30.7	1.09	1,136	44.3	1.57	1,637
Zone 2	59.5	2.11	2,199	114.0	4.04	4,213
Zone 3A	20.0	0.71	739	30.9	1.10	1,144
Zone 3B	48.6	1.72	1,795	72.0	2.56	2,663
Total Demands	158.8	5.63	5,869	261.3	9.27	9,657
3 Creek	11.4	0.41	423	15.5	0.55	574
Saddle Butte	1.5	0.05	55	2.3	0.08	83
Science school	0.3	0.01	11	0.6	0.02	23

- Zone 3B includes future flows for the Northern South Park Suburban and CN-PRD zoning.

4.3 Future Water System Analysis

The projected water demands were utilized to analyze the existing water system to determine long range recommendations for the water system to supply the increased flows. As with the existing water capacity analysis, the TOJ water model was utilized to determine hydraulic deficiencies within the system.

As with the existing capacity analysis, the most important items to address in the water system are the construction of the storage tank in Zone 3 and construction of a new Well #9 within Zone 3.

4.4 Buildout Sewer System Capacity

As with the water system capacity, the buildout sewer system capacity analysis used the same methodology to determine flows, the existing sewer system was reviewed using the buildout projected flows. The wastewater flows projected included not only the TOJ but also the existing out-of-town contract service areas. Just as with the water system, components of the sewer system were analyzed with recommendations noted such that the TOJ can perform some basic sewer system master planning efforts for buildout demands.

4.5 Future Sewer Demands

The future sewer demands were projected for the TOJ and the out-of-town users which are currently served by portions of the TOJ collection system and the WWTP. Sewer demands were projected for the TOJ, Wilson Sewer, Airport, Spring Creek, Gros Ventre Utilities, Melody Ranch, Rafter J, Munger Mountain, Three Creek, and the Northern South Park/CN-PRD Units. As described in the report, the TOJ and Teton County have reserved 570 units for the CN-PRD zoning. While the exact number and location of CN-PRD

units will vary as development is approved, the community buildout cap limits the total number of units that can be built. To model that maximum impact to the TOJ sewer system it was assumed all CN-PRD units would be located in the Northern South Park region and connected to the TOJ system. Comparisons between existing peak flows and future flows for each contract service area indicated an overall increase in 125% for the peak buildout daily flow for both summer and winter.

4.6 Future Sewer System Analysis

The projected sewer demands were utilized to analyze the existing sewer system to determine long range upgrade recommendations for the system to address the increased flows. As with the existing sewer capacity analysis, the TOJ sewer model was utilized to determine capacity deficiencies within the system.

4.7 Wastewater Treatment Plant

The analysis of the WWTP indicated that WYDEQ permit discharge requirements will be met for the current design and permitted maximum treatment monthly average daily volume of 5.0 MGD. The existing plant evaluation noted that with minimum improvements to the plant and operations, and an amended WYDEQ permit, the plant could treat up to 6.5 MGD during the summer with 5.0 MGD during winter, in the future. Using the calculated estimated flows for all of the currently sewer customers both in the TOJ and Teton County, the calculated buildout flows are close in the winter and slightly over in the summer to the plant capacity. The average daily flow in the winter is projected at 3.59 MGD and 4.79 MGD in the summer.

Table 7.1 Future Buildout Sewer Flows was included in the report indicating existing and buildout flows.

Table 7.1 Future Buildout Sewer Flows

Service Area	Existing					Buildout				
	Average Day, Winter Month (GPD)	Average Day, Peak Month (GPD)	Peak Factor (PF)- Average Day, Peak Month	Peak Day, Winter Month (PF = 1.12) (GPD)	Peak Day, Peak Month (PF = 1.20) (GPD)	Average Day, Winter Month (GPD)	Average Day, Peak Month (GPD)	Peak Factor (PF) - Average Day, Peak Month	Peak Day, Winter Month (PF = 1.12) (GPD)	Peak Day, Peak Month (PF = 1.20) (GPD)
TOJ	1,302,667	1,693,468	1.30	1,458,987	2,032,162	2,345,365	3,048,975	1.30	2,626,809	3,658,770
Wilson Sewer	58,803	75,556	1.28	65,859	90,667	165,380	212,498	1.28	185,225	254,997
Airport ⁶	12,520	16,587	1.32	14,022	19,905	32,000	42,397	1.32	35,840	50,876
Spring Creek ⁴	43,028	67,393	1.57	48,191	80,871	73,814	115,612	1.57	82,672	138,735
Gros Ventre District	42,830	54,726	1.28	47,969	65,671	87,304	111,553	1.28	97,781	133,864
Melody Ranch ^{1,5}	71,693	93,200	1.30	80,296	111,840	258,974	336,666	1.30	290,051	403,999
Rafter J	56,449	98,537	1.75	63,222	118,244	120,177	209,781	1.75	134,593	251,737
Munger Mountain / WYDOT	17,669	23,558	1.33	19,789	28,270	22,086	29,448	1.33	24,736	35,337
Three Creek	17,270	25,757	1.49	19,342	30,908	37,863	56,471	1.49	42,407	67,765
All other flow ^{2,7}	248,461	339,939	1.37	278,276	407,927	322,999	465,097	1.37	361,759	558,117
Northern South Park Suburban Zoning and CN-PRD Units (Future) ^{3,8}	-	-	-	-	-	124,734	162,155	1.30	139,702	194,585
TOTAL (MGD)	1.87	2.49		2.10	2.99	3.59	4.79		4.02	5.75

¹ Melody Ranch Contract Service Area includes Valley View, South Park Service Center, and Adams Canyon Sewer

² All Other Flow was calculated from the difference between all monthly meter readings combined and the total monthly influent flow to the WWTP

³ Accounts for the future development of 570 units within vacant land of northern South Park

⁴ The Average Day in the Peak Month for Spring Creek assumed 100,000 GPD in inflow from flood irrigation removed from metered flow

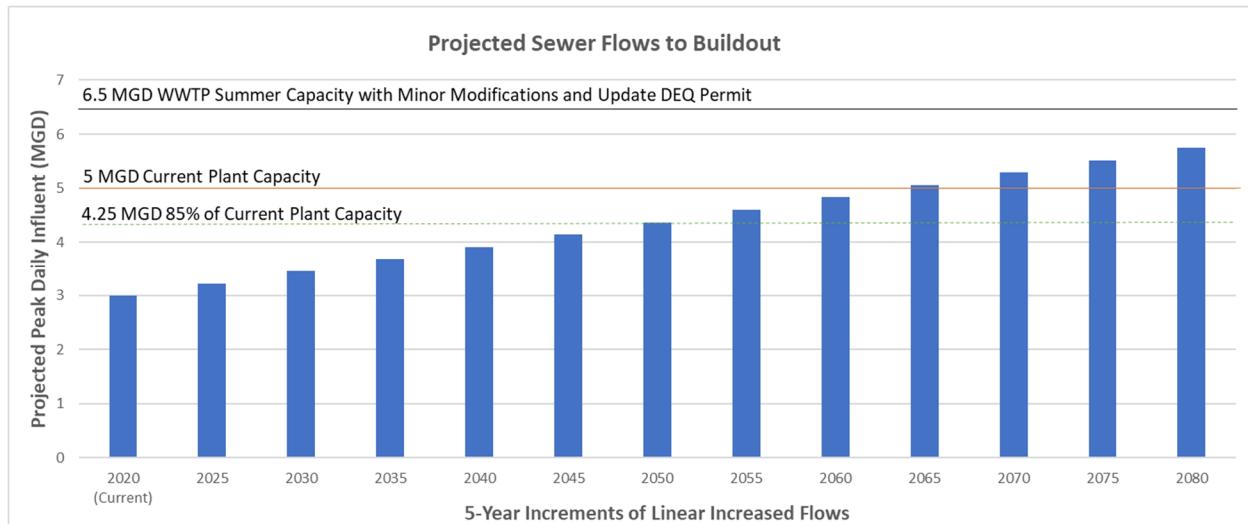
⁵ Assumed 1.3 Peaking Factor used for Melody Ranch due to billing structure

⁶ Airport buildout flows were obtained by previous reports prepared by the Airport

⁷ All Other Flow buildout average day winter month was assumed 30% higher than existing

⁸ Assumed peaking factor of 1.3 was used from Average Day Winter to Average Day Peak Month

General operational procedure is to begin the planning process for increased WWTP capacity when 85% of the existing capacity is met. Figure 13 in the report assumes a linear growth pattern over 60 years. It can be noted that in 30 years the threshold will be reached to begin to plan for future treatment needs and expansion.



4.8 Future Sewer System Conclusions/Recommendations

Many of the recommendations for the sewer system which will accommodate the increased capacity needs were identified in the existing capacity analysis. Unlike the water system, there are no major impacts to the sewer system which will need to be addressed for the buildout flows other than those noted in the existing system capacity.