ORDINANCE NO. 18-01

ADOPTING CAPITAL FACILITIES PLAN AND IMPACT FEE FACILITIES PLAN FOR THE WASTEWATER TREATMENT PLANT

RECITALS

WHEREAS, Tremonton City has established and is currently collecting impact fees for a Wastewater Treatment Plant; and

WHEREAS, from time to time the Utah State Legislature amends statutory requirements of the Impact Fee Act contained in Title 11, Chapter 36a of the Utah Code Annotated (UCA); and

WHEREAS, UCA 11-36a-301 requires that, prior to amending or enacting new impact fees, a City shall prepare an Impact Fee Facilities Plan; and

WHEREAS, UCA 11-36a-501 also requires a City must cause to be posted on the Utah Public Notice Website, a notice of intent to prepare an Impact Fee Facilities Plan (see Appendix A); and

WHEREAS, UCA 11-36a-502 also requires, and Tremonton City has fulfilled, all noticing requirements included therein that public notice be provided to adopt or amend an Impact Fee Facilities Plan (see Appendix A); and

WHEREAS, there is no statutory requirement to create a Capital Facilities Plan in conjunction with enacting impact fees; but

WHEREAS, Tremonton City decided that, prior to creating an Impact Fee Facilities Plan, it would be expedient to prepare a Capital Facilities Plan that included a larger planning period, which is in excess of the 6 to 10-year planning period allowed in an Impact Fee Facilities Plan.

NOW, THEREFORE, BE IT ORDAINED that the Tremonton City Council hereby adopts the Capital Facilities Plan for the Wastewater Treatment Plant as attached in Appendix B.

Moreover, the Tremonton City Council ordains the adoption of the Impact Fee Facilities Plan for the Wastewater Treatment Plant as attached in Appendix B.

If any term or provision of this Ordinance shall, to any extent, be determined by a court of competent jurisdiction to be void, voidable, or unenforceable, such void, voidable or unenforceable term or provision shall not affect the enforceability of any other term or provision of this Ordinance.

This Ordinance shall not take effect until ninety (90) days after the date of approval.

ADOPTED AND PASSED by the Tremonton City Council this 2nd day of January, 2018.

TREMONTON CITY, a Utah Municipal Corporation

By ____________________
Roger Fridal, Mayor

ATTEST:

____
Linsey Nessen, City Recorder

TREMONTON CITY CORPORATE SEAL
•1903•
TREMONTON
CITY
STATE OF UTAH

Appendix A- Notice of intent to prepare an Impact Fee Facilities Plan and Impact Fee Analysis & Notice to Adopt Impact Fee Facilities Plan

PUBLIC NOTICE

Public Body: Tremonton City Council

Subject: Notice of Intent/Preparation of Impact Fee Facilities Plan and Impact Fee Analysis

Notice Title: Notice of Intent/Preparation

Notice Type: Notice of Intent to Prepare Impact Fee Facilities Plan and Impact Analysis

Notice Date: February 22, 2017

Description/Agenda:

Tremonton City Corporation, Utah in accordance with the requirements of Utah Code Annotated 11-36a-501 and 11-36a-503, posts a notice of its intent to prepare or amend an Impact Fee Facilities Plan and Impact Fee Analysis for the Tremonton City Wastewater Treatment Plant. The area(s) that will be included in the Impact Fee Facilities Plan and Impact Fee Analysis is/are all area within the legal Tremonton City limits and the declared annexation areas of Tremonton City, Utah. A map of the aforementioned area may be obtained by contacting Linsey Nessen, City Recorder at 435-257-9506 or lnessen@tremontoncity.org For additional information regarding the intent to prepare or amend an Impact Fee Facilities Plan and Impact Fee Analysis for the Tremonton City Wastewater Treatment Plant please contact Shawn Warnke, City Manager at swarnke@tremontoncity.com

Notice of Special Accommodations: If you need special accommodations to participate in a City Council Meeting, please call the City Recorder, Linsey Nessen, at 435-257-9506. Please provide at least 24 hours notice for adequate arrangements to be made.

Notice of Electronic or telephone participation: Tremonton City passed Ordinance No. 13-04 approving Electron Meeting Procedures in accordance with Section 52-4-207 of Utah Code Annotated.

PUBLIC NOTICE

Public Body: Tremonton City Council

Subject: Impact Fee Facilities Plan

Notice Title: Notice to Adopt Wastewater Treatment Plant Impact Fee Facilities Plan

Notice Type: Notice to Adopt Wastewater Treatment Plant Impact Fee Facilities Plan

Notice Date: December 6, 2017

Description/Agenda:

Tremonton City Corporation, Utah in accordance with the requirements of Utah Code Annotated 11-36a-502, gives public notice to adopt an Impact Fee Facilities Plan for the Tremonton City Wastewater Treatment Plant. The location(s) that are included in the Wastewater Treatment Plant Impact Fee Facilities Plan is the entire area of the incorporated limits of Tremonton City and any area outside of Tremonton City, which may hereafter be annexed into Tremonton City or serviced by the Tremonton City Wastewater Treatment Plant.

A public hearing shall be held by the City Council on January 2, 2018, at 7:00 pm or soon thereafter in the Tremonton City Council Chambers, located at 102 S. Tremont Street, Tremonton, Utah 84337, to receive public comment on the adoption of the aforementioned Wastewater Treatment Plant Impact Fee Facilities Plan. Draft copies of: (1) the ordinance adopting the Wastewater Treatment Plant Impact Fee Facilities Plan; (2) a summary of the Wastewater Treatment Plant Impact Fee Facilities Plan; and (3) a complete draft of the Wastewater Treatment Plant Impact Fee Facilities Plan shall be available on or before December 20, 2017 at www.tremontoncity.com , at the Tremonton City Library located at 210 N. Tremont Street, Tremonton, Utah, and the Satellite Library Branch located in the Bear River Valley Senior Center located at 510 West 1000 North, Tremonton, Utah during regular business hours. Additionally, on or before December 20, 2017, copies of the aforementioned documents are available to the public at the Tremonton City Recorder's Office located at 102 S. Tremont Street, Tremonton Utah during regular business hours. The public may file written objection associated with the adoption of the Wastewater Treatment Plant Impact Fee Facilities Plan for the Tremonton City Council's consideration. Written objections, questions pertaining to this notice, or contents of the Impact Fee Facilities Plan may be directed to Shawn Warnke, Tremonton City Manager at (435) 257-9504, swarnke@tremontoncity.com , or mailed to Shawn Warnke, 102 S. Tremont St. Tremonton, UT 84337.

Notice of Special Accommodations: If you need special accommodations to participate in a City Council Meeting, please call the City Recorder, Linsey Nessen, at 435-257-9506. Please provide at least 24 hours notice for adequate arrangements to be made.

Notice of Electronic or telephone participation: Tremonton City passed Ordinance No. 13-04 approving Electronic Meeting Procedures in accordance with Section 52-4-207 of Utah Code Annotated.

Appendix B- Capital Facilities Plan and Impact Fee Facilities Plan for the Wastewater Treatment Plant

Publication or Posting Date: 1/10/18

STATE OF UTAH)
: ss.
County of Box Elder)

I, Linsey Nessen the City Recorder of Tremonton, Utah, do hereby certify that the above and foregoing is a full and correct copy of Ordinance No. 18-01, entitled **"ADOPTING CAPITAL FACILITIES PLAN AND IMPACT FEE FACILITIES PLAN FOR THE WASTEWATER TREATMENT PLANT"** adopted and passed by the City Council of Tremonton, Utah, at a regular meeting thereof on the 2nd day of January, 2018, which appears of record in my office.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the corporate seal of the City this 3rd day of January, 2018.

Linsey Nessen
City Recorder

TREMONTON CITY CORPORATE SEAL 1903 city seal TREMONTON CITY STATE OF UTAH

CITY OF TREMONTON

WASTEWATER TREATMENT PLANT 2017 CAPITAL FACILITIES PLAN & IMPACT FEE FACILITIES PLAN

REGISTERED PROFESSIONAL ENGINEER
No.318716
BRADLY M. RASMUSSEN
01/03/2018
STATE OF UTAH

AQUA
ENGINEERING

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DEFINITIONS & ABBREVIATIONS

The following is a list of definitions for terms and abbreviations used throughout this plan for reference, presented in alphabetical order.

ADF: Average Daily Flow or the total average flow received by the plant over a typical 24 hour period.

Aerobic: An environment with sufficient dissolved oxygen to allow aerobic microorganisms to thrive.

Anaerobic: An environment with little to no available oxygen. This environment is required by certain microorganism and is used primarily for certain types of digestion and for biological phosphorus removal from wastewater.

Anoxic: An environment with relatively low dissolved oxygen levels in which typical aerobic microorganisms cannot thrive.

BNR: Biological Nutrient Removal – term used to describe biological (i.e. non-chemical) treatment processes to remove nutrients such as phosphorous and nitrogen. BNR traditionally consists of anaerobic and anoxic processes.

BOD: Biological Oxygen Demand, the amount of dissolved oxygen needed by aerobic microorganisms in water to break down and process organic material. This is a typical measure of the loading or "strength" of wastewater entering into a wastewater treatment plant.

Biosolids: Nutrient rich organic material produced from waste sludge at wastewater treatment plants, frequently used as compost.

Denitrification: The anoxic (low oxygen environment) process by which nitrates (e.g. NO_3, NO_2 etc…) are converted to nitrogen gas (N_2) by special denitrifying bacteria that thrive in anoxic environments. Conversion of nitrates to N_2 essentially removes nitrogen from wastewater, reducing the overall total nitrogen content of the water.

GPD: Gallons Per Day.

GPCD: Gallons Per Capita (per) Day.

Effluent: Term used for the treated wastewater from the treatment plant that is being discharged from the plant to its discharge point, typically an adjacent stream, canal, or other surface waterway.

ERU: Equivalent Residential Unit, a standard unit that represents wastewater flow and demand from one typical residential household.

HRT: Hydraulic Retention Time, references the design average storage time a given basin or volume provides for a given flow rate.

Influent: Term used for the raw, untreated wastewater flow from the sewer collection system into the wastewater treatment plant.

MGD: Million Gallons (per) Day.

MLSS: Mixed Liquor Suspended Solids, a measurement of the concentrations of the suspended solids in an aeration or other biological treatment basin at a wastewater treatment plant.

MOM: Malt-O-Meal (MOM) Foods.

NH_3: Chemical formula for ammonia, a common component of wastewater.

NO_x: Generic chemical formula for the family of nitrate/nitrite type compounds, essentially any dissolved compound in wastewater that consists of a combination of nitrogen and oxygen atoms.

Nitrification: The aerobic (oxygen rich environment) process by which ammonia is converted to nitrates (e.g. NO_3) by nitrifying microorganisms.

O_2: Chemical formula for oxygen gas.

PHF: Peak Hour Flow or the anticipated maximum flow rate occurring during the peak hour over a typical 24 hour period.

Sludge: Mixture of solids from clarifiers and biological process basins and other solids removal processes consisting of a mixture of organic and inorganic material. Sludge is routinely removed from the main processes basins and sent to digesters for additional treatment.

TN: Total nitrogen, a measurement of the total nitrogen in a given water sample.

TKN: Total Kjeldahl Nitrogen is the total concentration of organic nitrogen and ammonia in a given water sample. This specific parameter is commonly measured for wastewater applications as it gives more accurate nitrogen loading in terms of impact and capacity for wastewater treatment plants.

TSS: Total Suspended Solids, a measurement of all solids, both organic and inorganic, contained in a given water or wastewater sample. This is another standard measure of the loading or "strength" of wastewater entering into a wastewater treatment plant.

UAC: Utah Authority Code.

UPDES Utah Pollution Discharge Elimination System

UV: Ultraviolet light, UV light is a common method used to disinfect wastewater.

WLF: Western Liberty Foods.

WWTP: Wastewater treatment plant, referencing the City of Tremonton's wastewater treatment plant.

EXECUTIVE SUMMARY

The capacity and current demand for Tremonton City's Wastewater Treatment Plant (WWTP) was analyzed in order produce a Capital Facilities Plan and Impact Fee Facilities Plan. The existing WWTP has a design capacity of 1.9 MGD, including BOD and TSS capacities of 5,757 and 3,177#/day respectively. Flow data from 2008 through September 2014 were analyzed to determine actual loading and establish the remaining capacity to accommodate future growth.

Data show that average daily flow to the plant is 1.5 MGD and, based on current industrial contributions of 0.6 MGD and a population estimate in 2015 was 11,097 in the current service area (This includes Tremonton and Garland), a design basis of 100 gallons per person per day was established. With the planned exit of Garland from the WWTP service area and using population growth projections and this per capita flow estimate, the current WWTP's capacity of 1.9 MGD will reached by 2032. In terms of hydraulic and biological capacity, this represents an additional 1,308 ERUs. Major capacity expansion is not anticipated to be required in the next 10 years but some improvements including increased solids handling capacity to treat TSS and nutrient removal processes need to be implemented over the next few years.

TSS loading has frequently exceeded the plant's TSS design capacity, with 28 months exceeding 3,177 #/day since 2008. TSS loading is high due in part to contributions from approved industrial connections. Thus, while the hydraulic and BOD capacities of the current WWTP are estimated to be sufficient through 2032, the existing plant has no remaining capacity to accommodate growth in terms of TSS loading and solids handling. TSS capacity should be added relatively soon to accommodate growth and ensure that all processes at the WWTP have the capacity to treat 1.9 MGD ADF. These estimates include capacity already dedicated for industrial loads and anticipated loading from new ERUs. Data show that current effluent quality is still within Utah Pollution Discharge Elimination System (UPDES) permit requirements, but TSS and solids handling capacity should be increased to ensure adequate capacity is available for future loads. While these values may be conservative for typical days, the WWTP must be designed to handle peak loading conditions or the WWTP risks violating its operating permit. Expansion to increase TSS capacity would provide the existing level of service to new ERU connections.

The current UPDES permit issued to Tremonton City from the State of Utah Department Environmental Quality Division of Water Quality, does not list any requirements for total nitrogen (TN) or phosphorous removal. However, recent rule changes from the State of Utah Department of Water Quality have limited effluent phosphorus that are scheduled to be implemented by 2020. In addition, a limit for TN in the effluent has also been proposed and is scheduled to be in place somewhere around 2025. Accordingly, any expansion and upgrade of the WWTP should accommodate nutrient removal processes to meet these new limits. These new requirements should also be considered for any existing or future pre-treatment programs for industrial users. Costs associated with nutrient removal are not eligible for impact fees as they represent a new level of service for all connections.

Recommended upgrades consist of two main stages. A summary of these costs and other impact fee items is as follows:

1. Improvements needed immediately to accommodate growth to 1.9 MGD ADF. This includes a new screw press, sludge feed pump, polymer feed system, and conveyor to increase capacity of solids handling and dewatering. This project is eligible for impact fees and the estimated cost of the upgrade is $803,660. (See Table 4-1 for additional details)

2. Improvements to provide phosphorous and nitrogen removal to address new permit limits that will be required in 2020 and 2025 respectively. The recommended alternative includes the installation anaerobic and anoxic basins to provide biological nutrient removal. The total estimated cost for these upgrades is $1,461,460. (See Table 4-2 for additional detail)

3. In addition to the new upgrades and improvements detailed in this plan, impact fees from previously completed projects and impact fee plans are still in effect and will be required in addition to the costs for Items #1 and #2 above. Specifically, as reported by the city,

previous improvements at the WWTP still have $1,383,166.62 in impact fees associated with improvements to achieve 1.9 MGD capacity that have yet to be collected (also referred to as buy-in). This results in a total of $2,186,826.62 in existing and proposed impact fee eligible improvements to accommodate an estimated 1,308 additional ERUs. (See Table 4-9 for additional detail)

Expansion to increase the entire WWTP's capacity to 2.5 MGD is not anticipated to be required until 2032 and is therefore beyond the scope of this Impact Fee Facilities Plan (IFFP). However, improvements for 2.5 MGD capacity and beyond are summarized in this plan for reference.

CHAPTER 1 - INTRODUCTION

1.1 Introduction and Purpose

This document is a *Wastewater Plant Capital Facilities Plan & Impact Fee Facilities Plan* for the City of Tremonton, located in Box Elder County, Utah. The purpose of this plan is to appraise the capacities and condition of existing equipment and processes at the City of Tremonton wastewater treatment plant (WWTP) and to evaluate the current and future needs of the WWTP. Information from previous facilities plans including the 2013 *Sanitary Sewer Collection System Capital Facilities Plan & Impact Fee Facilities Plan* by Jones and Associates Consulting Engineers (Jones, 2013); and the 2003 *Tremonton City Water Reclamation Plant Facility Plan / Impact Fee Development* by Aqua Engineering (Aqua, 2003) are referenced in this plan, and older projections are compared against actual growth and WWTP record data to justify continuing with or adjusting previous recommendations and expansion plans.

This plan provides additional data and evaluation to:

- Establish the design criteria for short-term and long-term expansion at the WWTP including projected influent flows, organic loading, nutrient loading, and solids handling based on projected population growth.
- Review the condition and capacities for all major processes and equipment at the WWTP.
- Explain and justify the recommended equipment, processes, and upgrades at the WWTP to accommodate projected growth.
- Present preliminary design and site plans for the recommended expansion alternatives, as well as establish a preliminary budget for the improvements.
- Summarize remaining capacities at the WWTP, projected 10-year growth, and required expansion/improvements at the WWTP to accommodate 10-year growth in an Impact Fee Facilities Plan.

1.2 Wastewater Treatment Plant Overview

The current WWTP is located at 300 East and 1200 South. The WWTP incorporates several processes including fine screens, Saslnes Filters, primary clarifiers, STM-Aerotor basins, secondary clarifiers, sand filters, UV disinfection, solids handling, digestion, solids dewatering, and composting of bio-solids as well as sewage collection system transmission lines.

In general, the WWTP as currently constructed is designed to handle average daily flows (ADF) of 1.9 million gallons per day (MGD) and peak hour flows (PHF) up to 3.8 MGD equivalent. The wastewater treatment plant removes solids, organic material, nutrients, and other constituents from wastewater as required by the WWTP's operating permit, issued to Tremonton by the State of Utah Department of Water Quality. Treatment of wastewater is required before treated effluent is discharged into the Malad River. The WWTP uses a series of mechanical and biological processes to treat wastewater to an acceptable standard prescribed by the State of Utah Department of Water Quality. After mechanical removal of larger debris and heavier solids with screens and clarifiers, wastewater enters concrete basins that rely on microorganisms to breakdown and remove organic materials and nutrients from the wastewater. WWTP operators monitor the conditions in these basins to maintain ideal environments in which these key microorganisms thrive. The microorganisms produce biosolids waste that is periodically removed from the basin and sent to digesters for additional treatment. Treated flow from these basins passes through additional clarifiers and sand filters to remove remaining solids. Finally, wastewater is disinfected using ultraviolet (UV) light prior to discharging to the Malad River. Solids from the clarifiers and biosolids from the treatment basins are sent to digesters where additional bacteria break down some of the remaining organic material. Left over solids from the digesters are then sent to special compressing equipment that removes water from the solids in preparation for transport, storage and additional drying. Dewatered biosolids are trucked from the WWTP to the Tremonton City composting site located on 6800 North in the unincorporated area of Box Elder County for additional drying and eventual land application in the form of compost.

CHAPTER 2 - DESIGN CRITERIA SUMMARY

2.1 Population and Loading Estimates

The WWTP currently services the rural communities of Tremonton and Garland, Utah. However, Garland recently elected to discontinue sending wastewater to the Tremonton WWTP and this change is expected to take place in the near future. Accordingly, this document focuses on the capacity of WWTP and growth associated with Tremonton only. Wastewater into the WWTP is a mixture of typical municipal wastewater and industrial wastewater from manufacturing facilities such as MOM Brands and West Liberty Foods. Influent flow data including flow rates, biological oxygen demand (BOD) loading, total suspended solids (TSS) loading, and effluent water quality measurements from 1989-2013 are available and were used to establish per capita loading and flow rates. Detailed monthly data from 2008 through September 2014 were also used to refine these estimates, especially data that post-date the startup of major industrial contributors to the WWTP. The primary design criteria to be established and confirmed are:

- Population and Growth (ERUs)
- Flow
- BOD
- TSS
- Ammonia
- Other nutrients (Nitrogen and Phosphorous)

The estimated growth rate for Tremonton has been previously established at 2.45% (Jones, 2013; Aqua, 2003) and the same value is used in this plan for consistency. Flow data is compared against the estimated population to establish a per capita flow in terms of gallons per day and estimate current and projected equivalent residential units (ERUs). Data indicate that wastewater flow rates and organic loading increase during summer months and in March. On average, Tremonton and Garland contribute 72% and 28% of the total flow to the WWTP respectively. For this analysis, this means that when Garland stops utilizing the WWTP, the available capacity (hydraulic and biological) will increase, effectively postponing capacity-related expansion. This plan summarizes the most recent data available to establish and confirm the design criteria for the expansions and upgrades necessary at the WWTP.

The following sections summarize the projected growth, flow per capita, and organic loading per capita that have been established in previous analysis and facility plans. Previous values are compared against the most recent data available in order to confirm or justify changing the design criteria for the WWTP.

2.1.1 Existing Population, Projected Growth & ERU's

The 2015 estimates show a total population of 11,097 in the WWTP service area, with 8,631 in Tremonton and 2,466 in Garland. Note that some population and loading numbers from Garland are still utilized in this document to quantify WWTP capacity that will become available once Garland stops sending wastewater to Tremonton's WWTP. The established growth rate for Tremonton (Jones, 2013) is 2.45%. This rate slightly underestimates the actual growth from 2000 to 2010, which is closer to 3%, but historically 2.45% appears to be a good estimate and is the basis for projected growth in this plan. Table 2-1 provides a summary of projected population for Tremonton through 2075.

Table 2-1: Summary of projected population growth

PROJECTED POPULATION		
Year	**Population**	**ERUs***
2010	7,647	2,185
2015	8,631	2,466
2020	9,741	2,783
2025	10,994	3,141
2030	12,409	3,545
2035	14,005	4,001
2040	15,807	4,516
2045	17,841	5,097
2050	20,136	5,753
2055	22,726	6,493
2060	25,650	7,329
2065	28,950	8,271
2070	32,674	9,335
2075	36,878	10,537

*ERU's for population only - does not account for additional ~1,700 ERU's from existing or future industrial connections.

The use of and cost to construct/expand sewer collection systems and wastewater treatment plants is typically divided among users, existing and future, connected to the system. The basic unit used to equate population growth to sewage flow rates and loading is an Equivalent Residential Unit (ERU). An ERU represents the contribution of a typical detached single family dwelling to the sewer collection system and WWTP. Since population is closely related to ERU count, population growth is used to estimate future ERU's and their impact on flow and loading on the WWTP. For the purposes of this plan and to stay consistent with the *2013 Sanitary Sewer Collection System Capital Facilities Plan & Impact Fee Facilities Plan* prepared by Jones and Associates Consulting Engineers, 1 ERU is equivalent to 350 gallons per day (GPD) flow. The 2013 plan also relates ERU's to population, stating that 1 ERU is equivalent to 2.62 people. This assumption is common though many cities in Utah use values ranging from 3.0 to 3.5 people per ERU. The average for the State of Utah is 3.2 persons per ERU. For the purposes of this plan ERUs will be related to flow such that 1 ERU is equal to 350 GPD which, as shown later in this plan, equates to 3.5 persons. Growth and increased loading to the WWTP will be evaluated in terms of additional flow, which is estimated from new ERU's and population growth. These values will be used to project when sewage flow rates and loading may reach critical values that require expansion or upgrades to the WWTP. This plan focuses on growth and recommended improvements to the WWTP for the next 10-years while providing some guidance for expansion and growth over the next several decades.

2.1.2 Influent Flow

Monthly average influent flow data collected from January 2008 through September 2014 are shown in Figure 2-1. The overall average daily influent flow during this time period is 1.50 MGD. The current design capacity of the WWTP is 1.9 MGD, though in terms of hydraulic capacity the plant can pass through higher flows as explained later in this section. Flow data from 2011 is anomalously high for most months, including peaks of 2.32 and 2.00 MGD in March and April. Data from all months in 2011 are higher than most years, indicating an extended period of unusually high influent flow to the plant. These high flows are attributed to an unusually wet year with extended precipitation events and runoff into summer and fall. While these events are important to note, peak values from 2011 are not typical and are therefore not considered for establishing average flow and growth estimates in this plan.

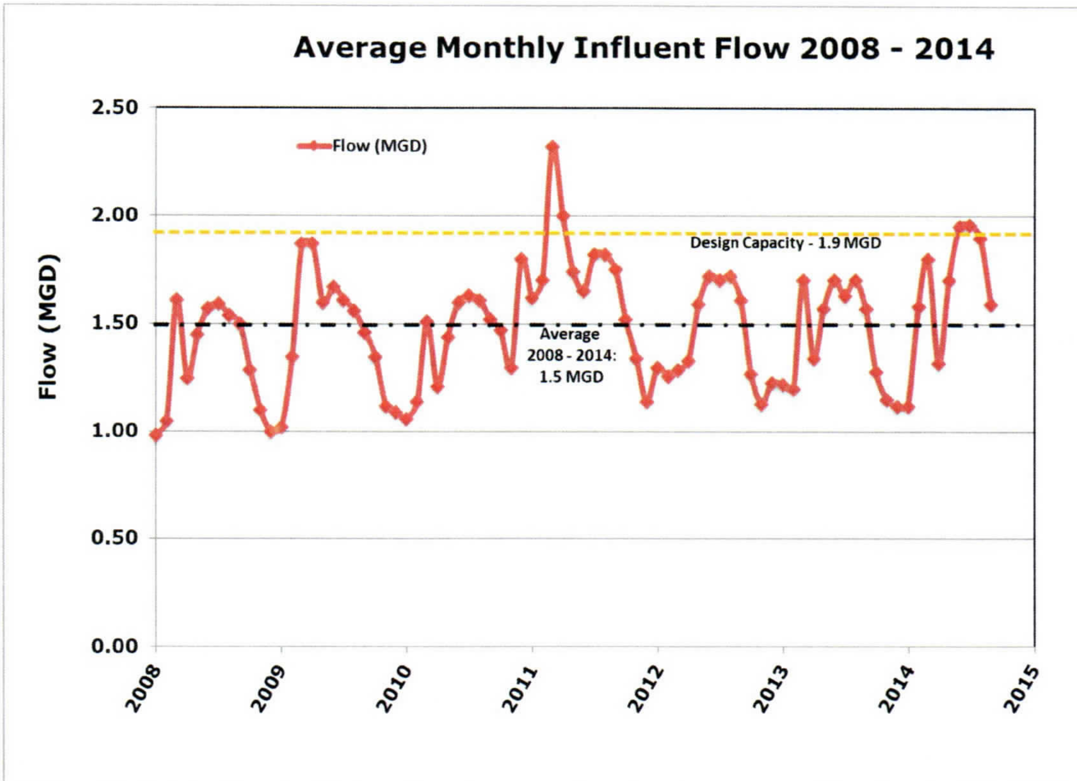


Figure 2-1: Average monthly influent flow of Tremonton between 2008 and 2014

Monthly average influent flow over this time period ranges from 0.98 MGD to 2.32 MGD as shown in Figure 2-2. Excluding data from 2011, peak monthly values include 1.87 MGD in March and April of 2009 and 1.90-1.96 MGD from June through August of 2014. For the past three years (2012-2014), the annual ADF has ranged from 1.44 to 1.50 MGD. The data show that influent flow varies throughout the year, with peak values in March most years and summer months (June through August) being 20-30% higher than winter flows. Flow from May through September tends to be higher than the 1.5 MGD average, ranging from 1.5 to 1.9 MGD, attributed to infiltration from flood irrigation of agricultural fields that occurs during these months. Flows during the winter months are lower, ranging from 1.0 to 1.3 MGD. In every year except 2012, March flow rates are above average and range from 1.5 to 1.8 MGD.

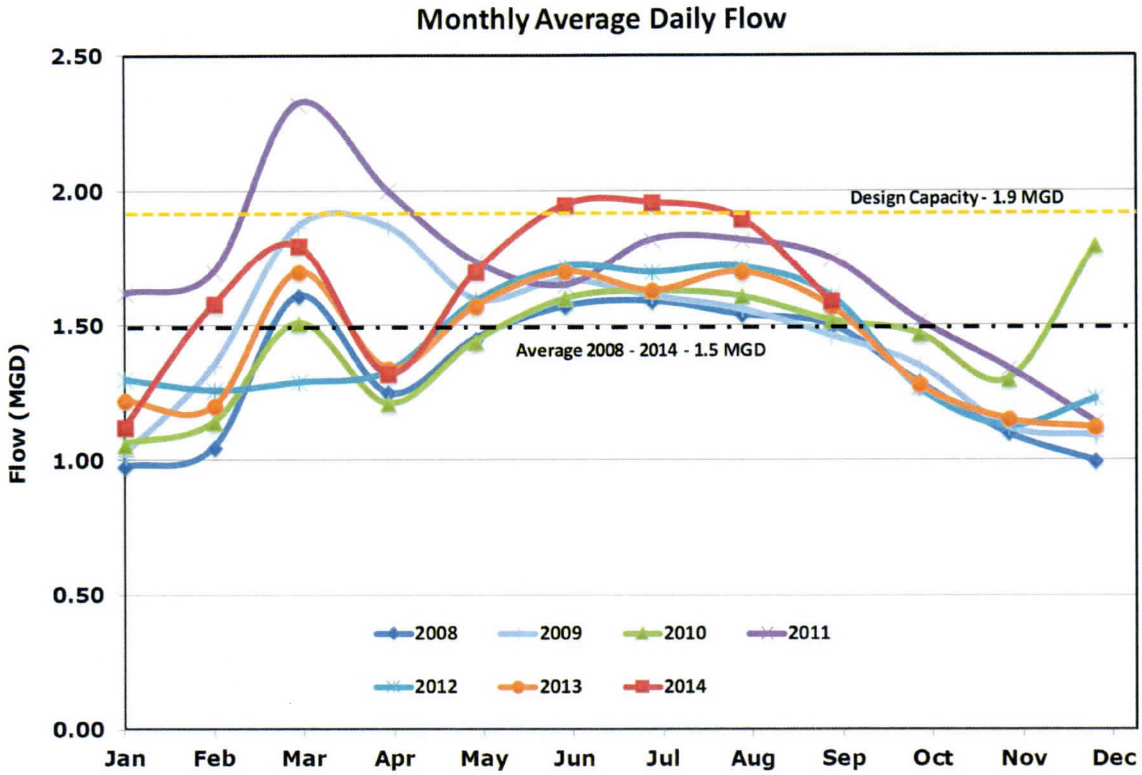


Figure 2-2: Monthly average daily flow for Tremonton

Several months show ADFs exceeding 1.9 MGD, which is beyond the hydraulic design capacity of the WWTP. Higher flow rates reduce retention times in process basins and increase velocities through clarifiers, reducing the overall effectiveness of the WWTP process to treat wastewater which can yield lower quality effluent. Flow capacity is only one factor when determining the actual load on a WWTP. Relatively lower concentrations of wastewater constituents such as BOD and TSS in the influent combined with higher flow rates can still be within design criteria. However, even if BOD and TSS loading are within design criteria, extremely high flow rates or extended periods of high flow can negatively impact operations at the WWTP. BOD and TSS loading are discussed in the next section.

From the data, it is apparent that March and summer months have higher ADFs. Though the overall average flow is 1.5 MGD, influent into the plant exceeds this value for several months at a time (Figure 2-3), with ADF from peak summer months (including March) around 1.7 MGD.

April, May, and September fall closer in line with the overall average flow at 1.5 MGD, and the low-flow winter months average 1.34 MGD. Higher March flows are mostly attributed to spring runoff and infiltration of ground water into the sanitary sewer collection system. Higher flow rates in summer also involve infiltration due to flood irrigation and agricultural activity, with leaking irrigation ditches likely contributing most the infiltration flow into the sanitary sewer collection system. The prolonged and consistent higher flows during summer months must be considered when establishing per capita flow rates and projecting future conditions at the WWTP. However, as population growth continues, agricultural areas will transition into residential, effectively reducing the amount of infiltration. Accordingly, as growth continues infiltration should become less of a factor.

Monthly flow data from 2013 recorded from Tremonton and Garland are summarized in Figure 2-4. Overall, Tremonton accounts for 72% of all influent into the plant, with percent contribution from Garland ranging from 18% to 40%. During the summer months, Garland accounts for as much as 40% of the flow, and the data indicate that both cities increase flow in summer months. The West Liberty Foods and MOM Brands processing plant discharge between 300,000 and 600,000 GPD, which is included in the influent flow data from Tremonton.

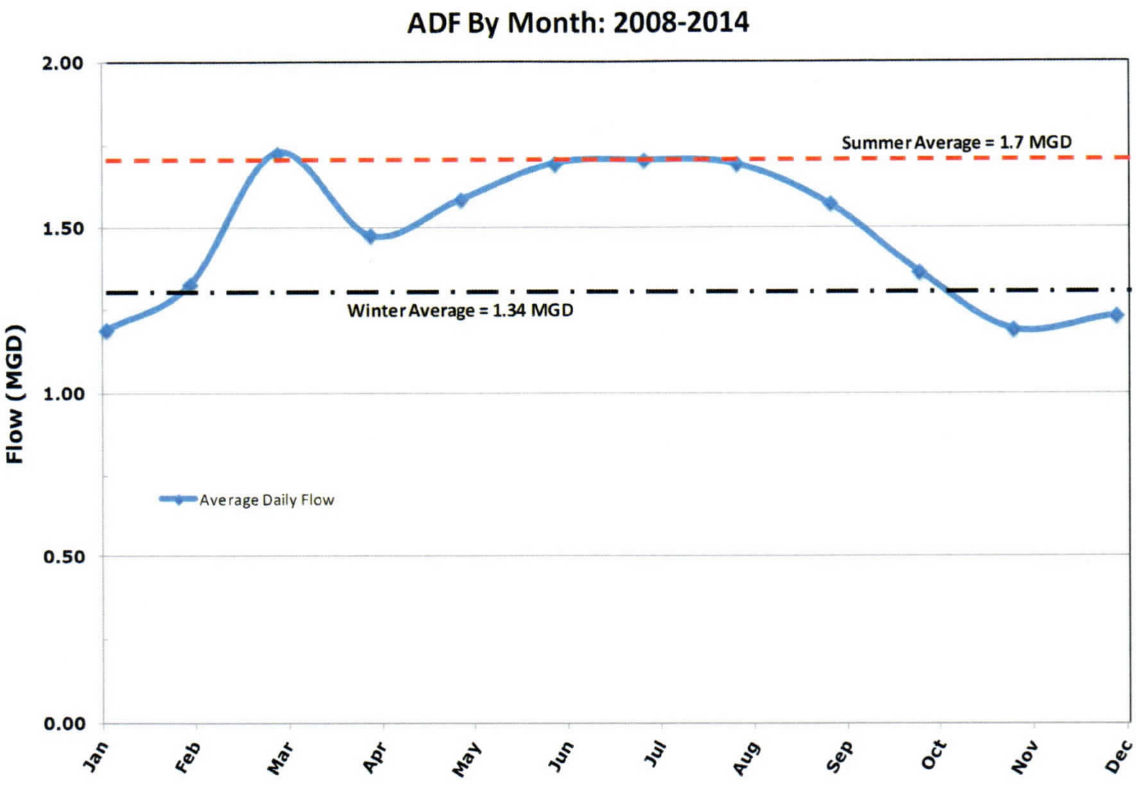


Figure 2-3: Average Daily Flow by Month

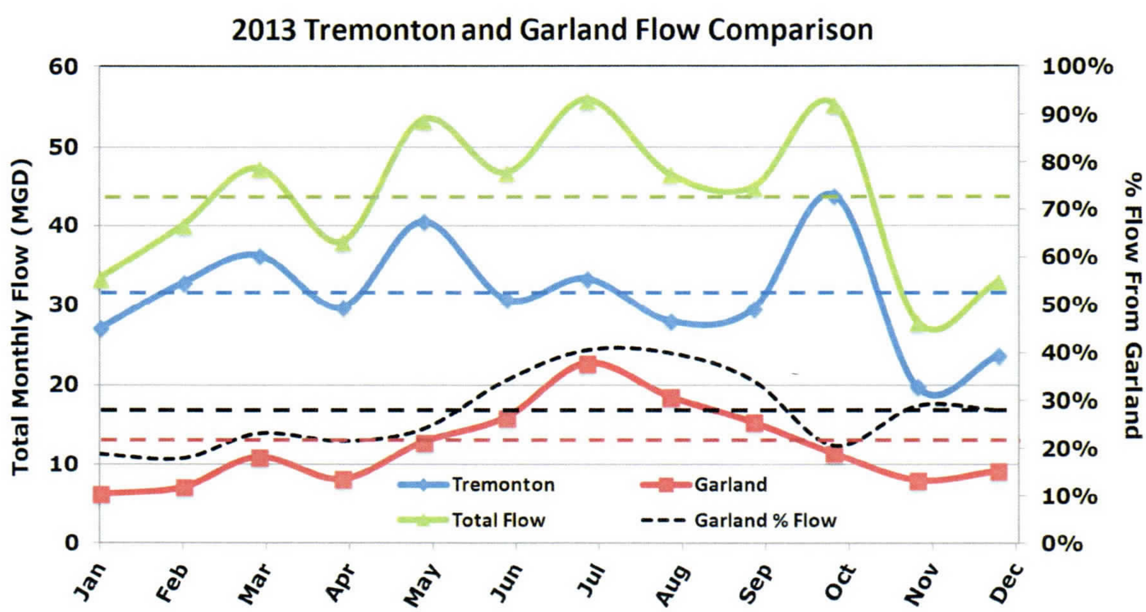


Figure 2-4: Tremonton and Garland Flow Comparison 2013

The average influent flow rates into the plant for 2013 and 2014 were 1.43 MGD and 1.5 MGD respectively. With estimated populations of 10,838 (2013) and 11,115 (2014), this equates to 132 and 135

Gallons Per Capita Per Day (GPCD). Based on 2010 influent flow rates and census data, the calculated GPCD is 143 GPD. The 2003 *Tremonton City Water Reclamation Plant Facility Plan / Impact Fee* established a GPCD value of 143 GPD, and the *2013 Sanitary Sewer Collection System Capital Facilities Plan & Impact Fee Facilities Plan* estimates 133 GPCD. These estimates however do not consider the impact of industrial flow relative to the total flow. Two industrial users contribute a large volume of the flow to the WWTP, which can artificially inflate the estimated per capita flow rate and skew future flow estimates based on population growth alone. Specifically the West Liberty Foods (WLF) and MOM Brands (MOM) plants contribute flows of 260,000 to 480,000 GPD and 110,000 to 120,000 GPD respectively. This equates to an average combined contribution of 370,000 to 600,000 GPD. Data from August and September of 2014 indicate flows from MOM and WLF averaged around 580,000 GPD. For projections in this analysis, an industrial baseline flow contribution of 600,000 GPD (0.6 MGD) is assumed. Other industrial connections exist, but their relative wastewater flow contributions are small and do not significantly impact average per capita flow estimates.

At this juncture, the assumption of 130-140+ GPCD presented in previous plans appears unreasonable as it does not account for the industrial influent flow rate that may not change at the same rate as residential flow. It is difficult to project what future industrial flows will be. Industrial connections may have comparable, lower, or higher wastewater influent flow rates depending on the specific nature of the industry. If and when future industrial connections or expansions are proposed, the projected loads and capacity of the WWTP will need to be reevaluated for each application. Flows and organic loading from each connection will need to be accounted for when adjusting industrial baseline contributions to the plant. Thus, this plan accounts for the current and presumed steady industrial flow rate of 0.6 MGD and assumes that the remaining flow represents a reasonable estimate from existing residential connections. With these assumptions, a more accurate estimate for GPCD flow is established which facilitates projecting future demands associated with population growth. Deducting the industrial contribution of 0.6 MGD from the total average flow of 1.5 MGD yields 0.9 MGD from residential, commercial, and other industrial connections. With a current population of 11,115 (Tremonton and Garland combined), this equates to 81 GPCD. This value is reasonable, but lower than values typically used for rural and semi-rural municipalities in Utah. The required Utah design criterion, as stated in the Utah Authority Code (UAC) Section 317, is 100 GPCD which is a conservative estimate for the purposes of this plan. In summary, where previous estimates assumed 130-140+ GPCD, a more realistic yet still conservative value of 100 GPCD is used for this plan based on the flow data summarized in this section and the required. The flows associated with Garland are accounted for and added back into the available WWTP capacity in the following paragraphs. The WWTP transition to service Tremonton only is assumed to occur between 2019 and 2020.

Using population growth estimates from section 2.1.1, the established industrial flow rate of 600,000 GPD and a per capita flow rate of 100 GPD, future flow rates are estimated. Based on 100 GPCD and a 2014 Tremonton-only population of 8,424 (or 842,400 GPD) combined with the industrial flow of 600,000 GPD, the remaining hydraulic capacity is 458,000 GPD, sufficient for an additional 1,308 ERUs. These values assume that the ~770 ERUs associated with Garland will no longer be connected to the WWTP. A summary of projected growth and influent flow is provided in Figure 2-5 and Figure 2-6. Critical flow rates, relative to the current WWTP and proposed expansions, are noted in the figure for reference. Based on these projections, the existing plant will reach its hydraulic capacity of 1.9 MGD sometime in 2032 (estimated total population of 13,024 in 2032) at which point major expansion will be required. The next proposed phase of expansion increases the WWTP's capacity from 1.9 to 2.5 MGD, which is projected to handle growth through 2048. For reference, with Garland connected to the WWTP, this flow would be reached must sooner (around 2021).

Beyond 2032, additional expansion from 2.5 to 4.0 MGD is anticipated which is estimated to accommodate growth until approximately 2071. Note that many factors such as economy, industry etc. can change or influence growth rate and therefore projections beyond 10-15 years are for preliminary planning purposes only.

In summary, data show that ADF to the WWTP is 1.5 MGD and, based on current industrial contributions of 0.6 MGD and population estimates 8,424, a design basis of 100 gallons per person per day was established. Using population growth projections and this per capita flow estimate, the current WWTP's capacity of 1.9 MGD will reached in 2032. In terms of hydraulic capacity, 458,000 GPD is sufficient for 1,308 additional ERU's. Expansion to 2.5 MGD should be completed prior to this date and is projected to have capacity through 2048, sufficient for an additional 1,714 ERUs. The WWTP's ultimate site capacity is 4.0 MGD and is estimated to be reached by 2071.

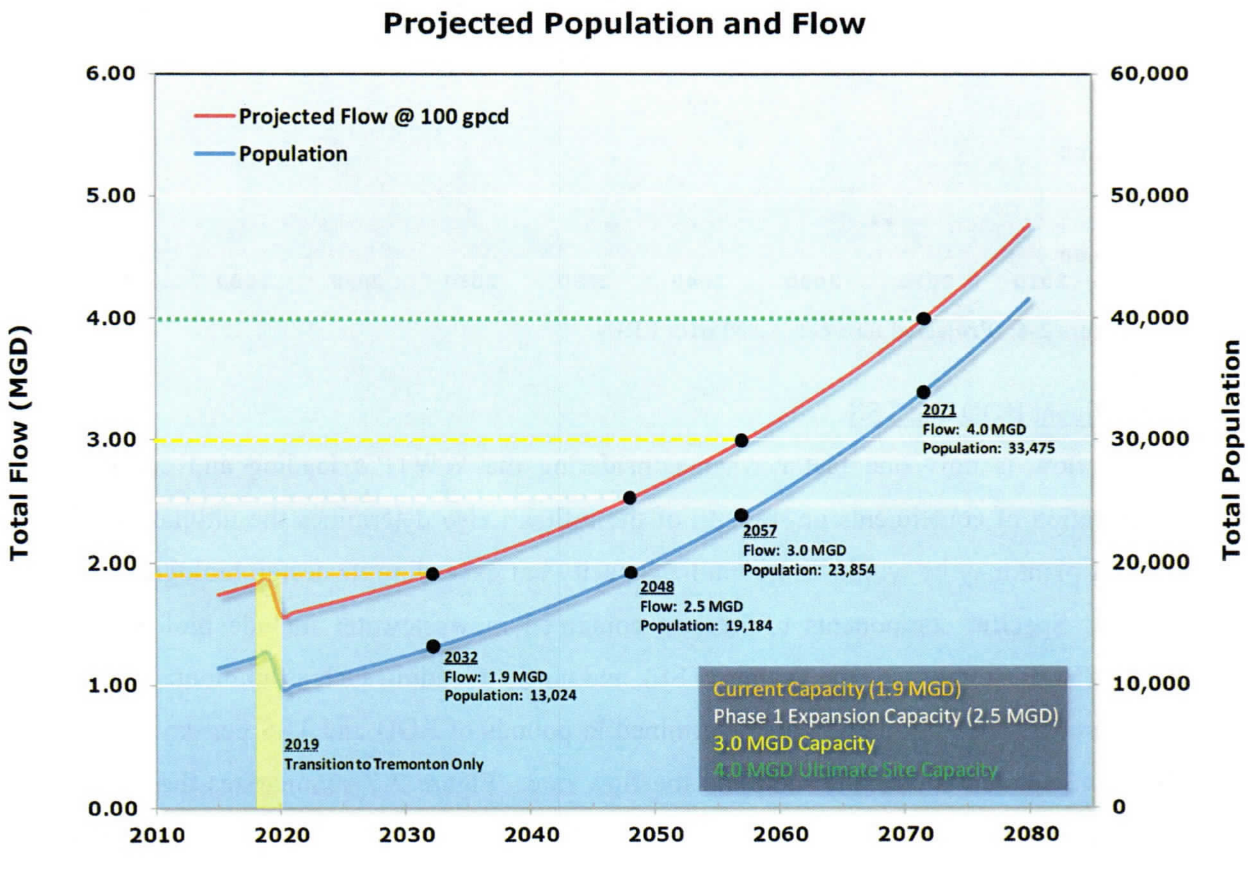


Figure 2-5: Projected population compared with Flow.

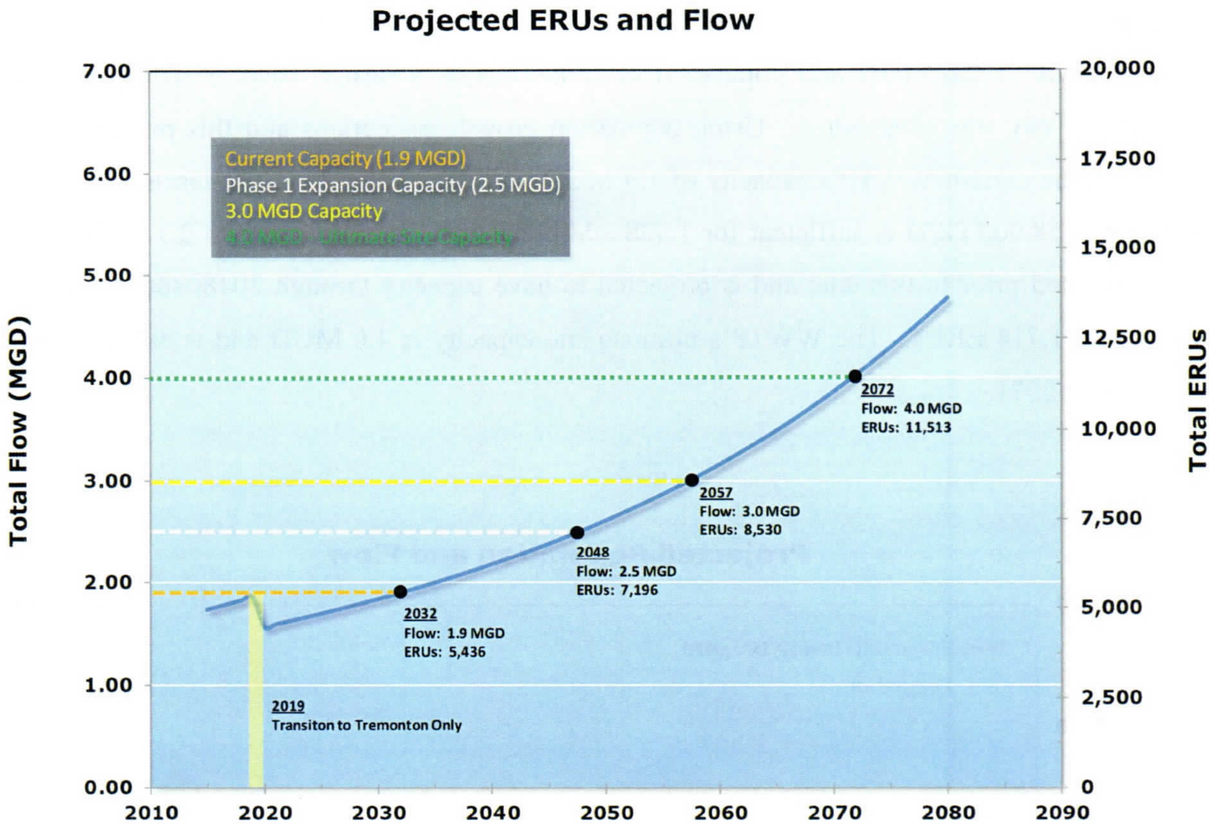


Figure 2-6: Projected flow compared with ERUs.

2.1.3 Influent BOD and TSS

Influent flow is only one factor when considering the WWTP's loading and capacity. The concentration of constituents or strength of the influent also determines the ultimate load on the plant. A plant may be within its hydraulic capacity but exceeding its design biological and solids loading. Specific components of interest contained in wastewater include biological oxygen demand (BOD), total suspended solids (TSS), and nutrient loading such as ammonia, nitrogen, and phosphorous. The total daily load, determined in pounds of BOD and TSS per day, is a function of each component's concentration and the flow rate. Figure 2-7 summarizes the influent flow data and BOD/TSS loading data from January 2008 through September 2014. The WWTP is designed for influent BOD and TSS loads of 5,773 and 3,177 #/day respectively.

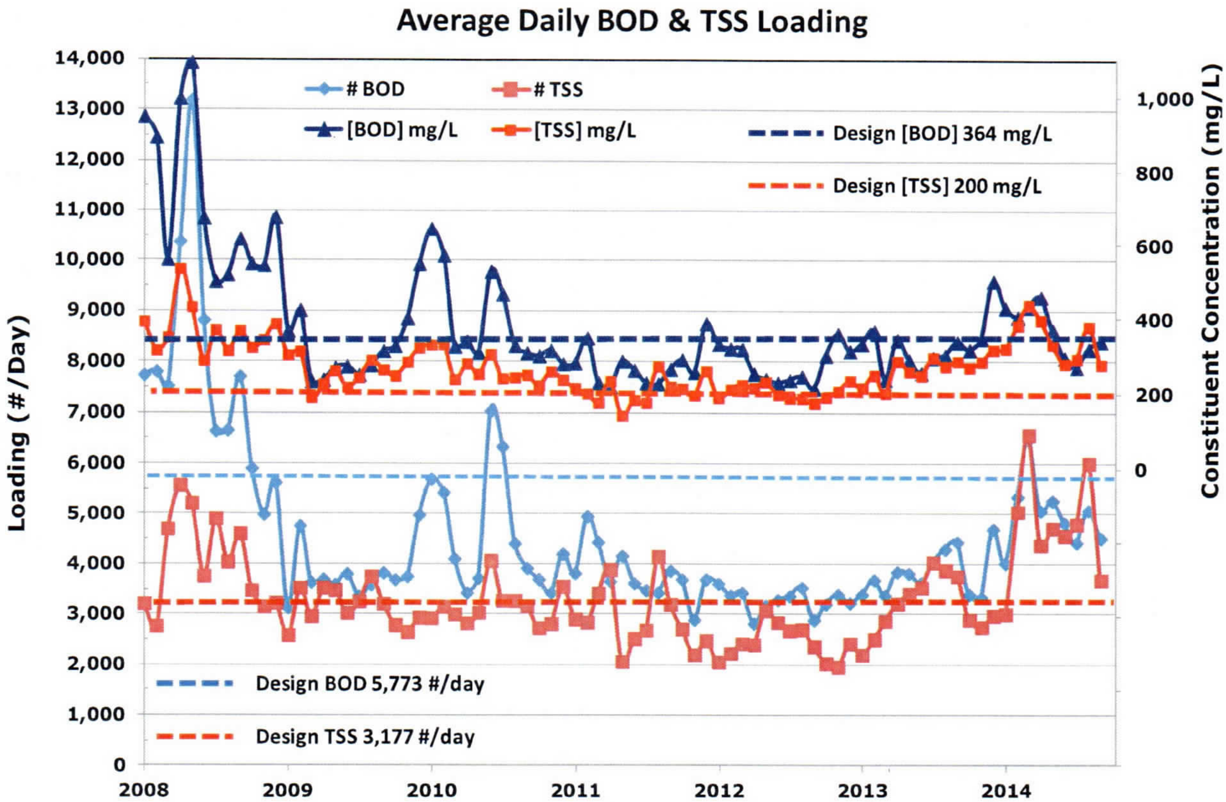


Figure 2-7: Average BOD and TCC Loading

The data indicate that, after pre-treatment for industrial users' influent was established in 2008, BOD load has typically been within the WWTP's design capacity. However, even with pre-treatment in place, the average monthly BOD exceeded the design capacity three times between 2009 and 2014. Considering the average flow rate of 1.5 MGD, the equivalent value for BOD loading based on ratio of design capacity should be 4,557 # BOD/day. However, a total of 54 months out of 69 between 2009 and September 2014 exceeded 4,557 # of BOD, with nine months exceeding 5,000 #/day. BOD loading may be higher than anticipated in large part to the City's agreements with two industrial connections: MOM and WLF.

The City has allocated 1,757 #BOD/day capacity to WLF, this is a fixed agreement between WLF and the City and this capacity is considered unavailable for other uses. In addition, the WWTP is currently receiving around 1,000 #BOD/day from MOM. Data from MOM was compiled in July of 2015 to determine MOM's actual BOD and TSS loadings. These data indicate that MOM's average BOD loading over the past three years is 695 #/day; the 95th percentile over this same time period is 1,061 #/day. Note that the last 3-4 years of flow data represent loads after MOM's pre-treatment program was implemented and fully operational. Accordingly, these values best represent the present-day BOD loading from MOM. A summary of BOD monthly loading data is provided in Figure 2-8. Based on these data, it is recommended that 1,100 #BOD/day be dedicated to handle current BOD loading from MOM. This value will accommodate all but the highest peak loading days, and the data indicate that no month since mid 2012 has exceeded this loading value. In addition, it is not likely that a peak day exceeding this value will coincide with a peak residential BOD event. Even so, in the rare instance where this may occur the WWTP can handle temporary spikes in BOD loading without long-term adverse effects to performance or effluent quality. Therefore, it is recommended to allocate 1,100 #BOD/day for MOM and 1,757 #/day for WLF, for a total current dedicated industrial BOD load of 2,857 #/day. This leaves 2,916 # BOD/day to accommodate new and existing ERUs. If industrial loading requirements change in the future, these estimates and proposed design criteria for the WWTP will need to be adjusted accordingly.

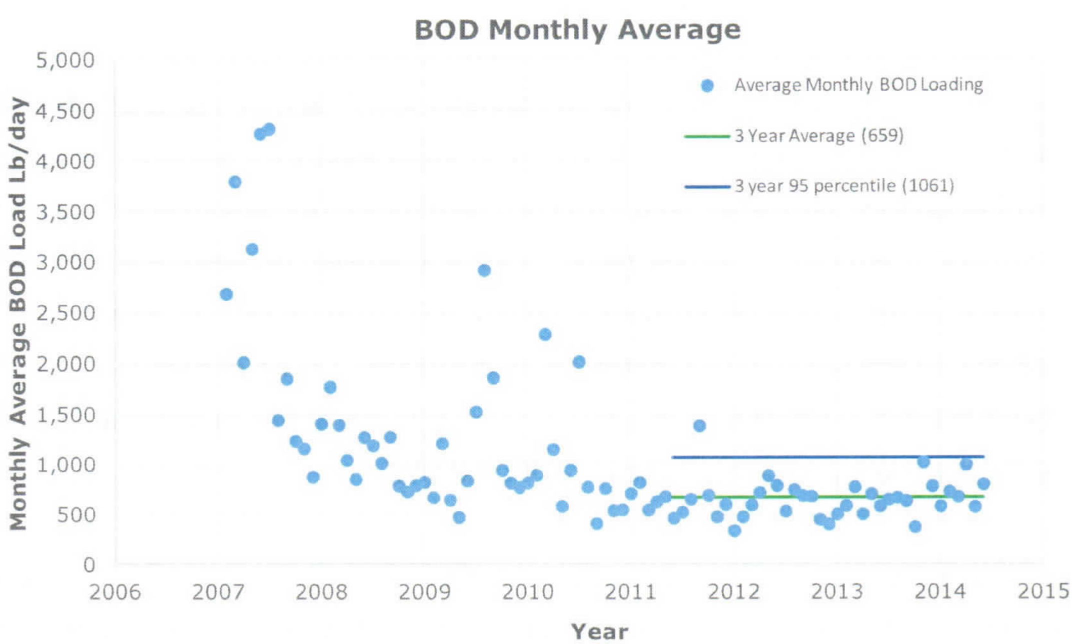


Figure 2-8: Average monthly BOD loading from MOM.

The design criteria from the State of Utah for typical residential connections with garbage disposals is 0.22 # BOD per person per day or 0.77 #/ERU per day. This is a conservative estimate for suburban residential loading, and will be utilized for the analysis in this plan. With the combined 2014 population estimated to be 11,115 (representing 3,176 ERUs), the current residential BOD load is 2,445 #BOD/day. The average daily BOD loading in 2014 was 5,000 #/day, with values ranging from 4,000 to 6,485 #BOD/day. Assuming that the load from the residential population remains fairly constant (e.g. 2,445 #/day), the load from MOM and WLF varies from 1,600 to over 4,000 #BOD/day with an average of around 2,600 #BOD/day. As previously stated, the recommended industrial demand has been established as 2,857 #/day based on the 95th percentile of BOD loading data.

After Garland no longer is connected to the WWTP, the residential BOD load from Tremonton will reduce from 2,445 #/day to 1,853 #/day. This value is used as the basis from which future BOD loading is established. As with influent flow rates discussed in the previous sections, the BOD load from industrial users is considered fixed and separate from the residential load. If additional industrial users or loads are added in the future, their specific impact on BOD loading and the WWTP's capacity will need to be reanalyzed accordingly. The current daily BOD load dedicated to industrial users is 2,857 # BOD. Combined with the estimated residential load of 1,853 #BOD, 4,710 #BOD/day or 82% of the WWTPs capacity has been allocated. In other words, 1,063 #BOD/day capacity remains to accommodate growth, equivalent to an additional 1,380 ERUs (roughly equivalent to the remaining ERUs estimated from hydraulic capacity). Population growth estimates indicate that these additional ERUs will be added by 2032. Thus, it appears that the WWTP is on pace to be at its capacity in terms of hydraulic flow and BOD loading sometime around 2032. A graph of projected BOD loading over time is provided in Figure 2-9.

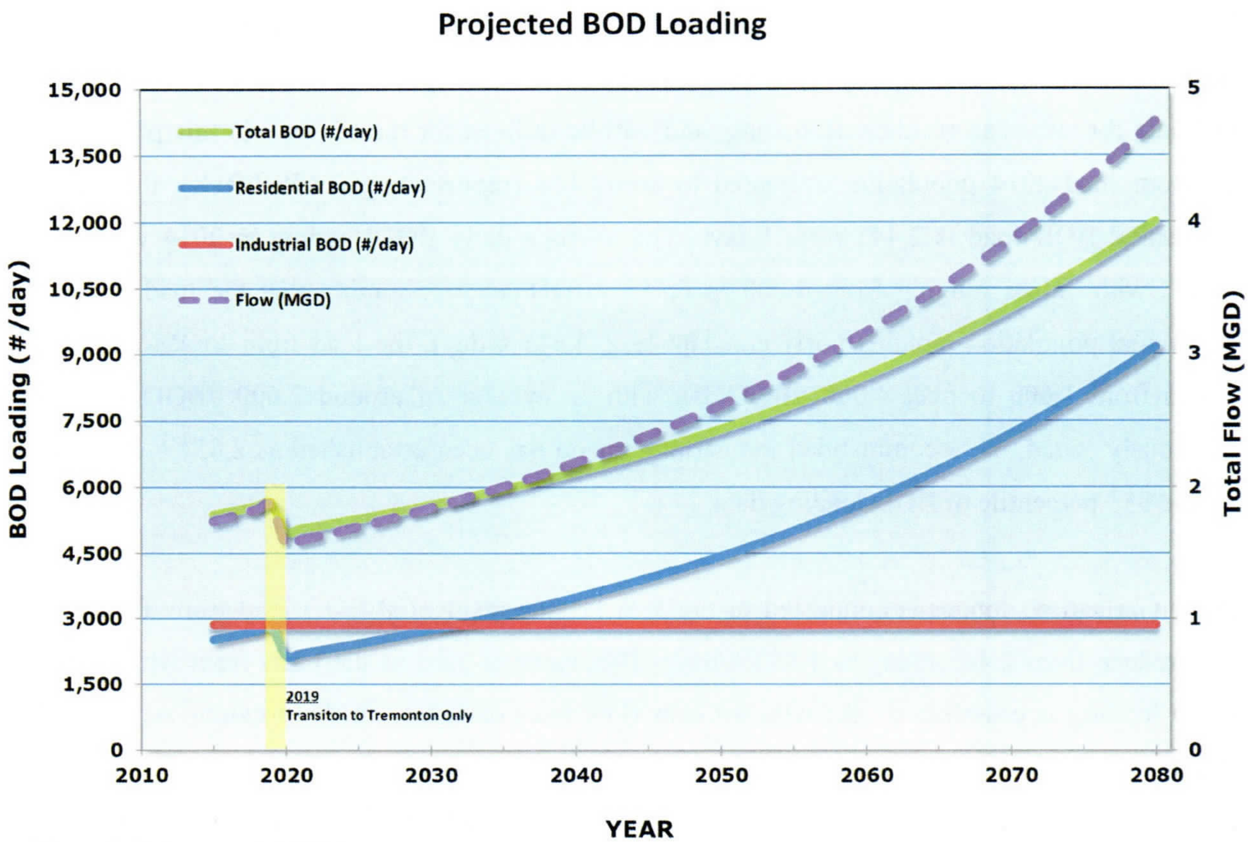


Figure 2-9: Projected BOD Loading

As with BOD, the data indicate that after pre-treatment for industrial users was established in 2008, TSS loading decreased. Based on the 2014 average flow rate of 1.5 MGD, the equivalent ratio for TSS loading based on ratio of design criteria should be 2,508 # TSS/day. However, TSS loading has exceeded this value and even the plant's design capacity on several occasions. A total of 56 out of 69 months between 2009 and September 2014 have exceeded 2,508 # of TSS, with 28 months exceeding the design capacity of 3,177 #/day. This indicates that the influent TSS loading is higher than anticipated and that the WWTP's TSS capacity may be reached before the hydraulic capacity. Similar to BOD, the industrial connections from MOM and WLF impact TSS loading.

The City has allocated 986 #TSS/day capacity to WLF, this is a fixed agreement between WLF and the City and this capacity is considered unavailable for other uses. In addition, the WWTP is currently receiving between 200 and 800 #TSS/day from MOM. Data from MOM (through July

2015) indicate that TSS loading over the past three years averages 267 #/day; the 95th percentile over this same time period is 724 #/day. Note that the last 3-4 years of data represent data after MOM's pre-treatment program was implemented and fully operational. Accordingly, these values best represent the present-day TSS loading from MOM. A summary of TSS monthly loading data is provided in Figure 2-10. Based on these data, it is recommended that 724 #TSS/day be dedicated to handle current TSS loading from MOM. Therefore, it is recommended to allocate 724 #TSS/day for MOM and 986 #TSS/day for WLF, for a total current dedicated industrial TSS load of 1,711 #/day. This leaves 1,466 #TSS/day to accommodate new and existing ERUs. If industrial loading requirements change in the future, these estimates and proposed design criteria for the WWTP will need to be adjusted accordingly.

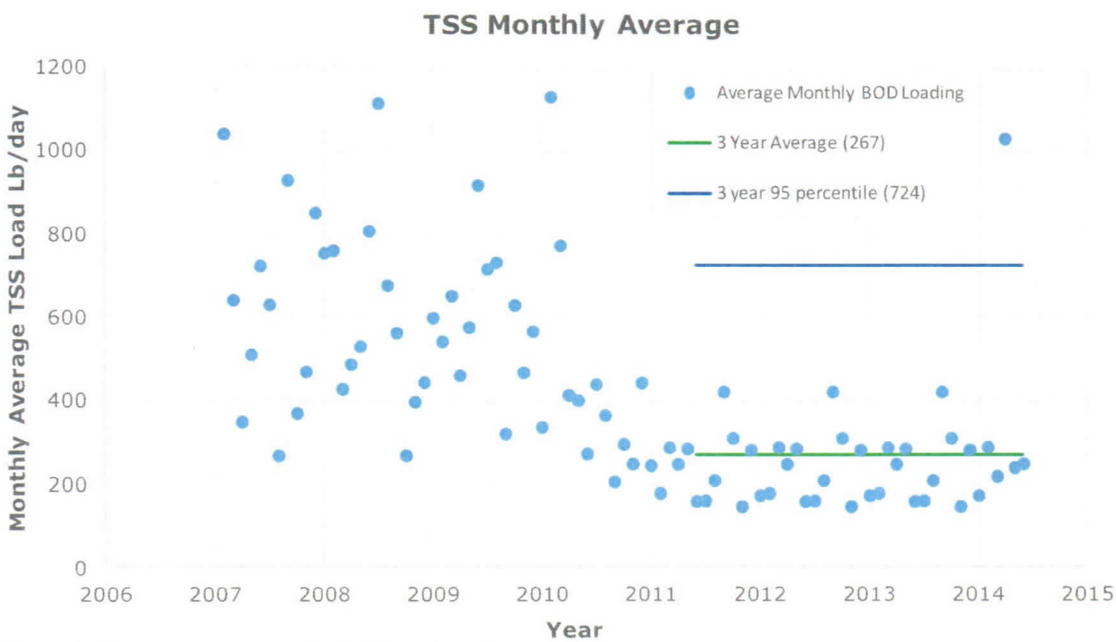


Figure 2-10: Average monthly TSS loading from MOM.

The established design criteria for residential TSS loading is 0.20 # TSS per person per day or 0.7 #TSS/day per ERU. This is the design criteria used by the State of Utah which is conservative but seems to reasonably match the City's data and is utilized for this analysis. With the total 2014 population estimated to be 11,115 (Garland and Tremonton), the current estimated residential TSS load is 2,223 #TSS/day. The average daily TSS loading from 2009 through September 2014 was

3,192 #/day, with values ranging from 1,950 to 6,575 #TSS/day. In 2014, the average through September is 4,753 #/day, ranging from 3,000 to 6,575 #/day. The combined average load based on residential and industrial values established above is 3,934 #TSS/day. Hence, the current average TSS load exceeds the WWTP's design capacity. With TSS loading from Garland removed, TSS loading will lessen but will still be above the WWTP's current design capacity.

As with flow rates discussed in the previous sections, the TSS load from industrial users is considered fixed and separate from the residential load. If additional industrial users are added in the future, their specific impact on TSS loading and the WWTP's capacity will need to be reanalyzed accordingly. Assuming a load of 1,711 #/TSS per day from industrial users and a Tremonton-only residential load of 1,685 #TSS/day, the WWTP requires a TSS capacity of 3,396 #/day. To correlate this to the current design hydraulic capacity of 1.9 MGD and estimated 2032 population, the WWTP should have a design TSS capacity of ~4,350 #/day in order to treat 1.9 MGD under projected conditions. Again, it appears that the WWTP needs to be upgraded as soon as possible to handle an additional ~1,170 #TSS/day to ensure sufficient capacity for growth up to 1.9 MGD. This additional capacity of ~1,170 #TSS/day will handle growth between now and 2032, equivalent to the 1,308 ERUs of hydraulic and 1,380 of BOD capacity that remain.

While the hydraulic and BOD capacity of the current WWTP is estimated to be sufficient through 2032, it is apparent that the TSS capacity of the plant has already been reached and exceeded on multiple occasions. Even with TSS loads from Garland removed from the estimates, average TSS loads will frequently exceed the current stated capacity of 3,177 #/day. This indicates that upgrades to TSS treatment capacity should be added relatively soon to help buffer the plant's capacity. The specific upgrades will be discussed in the next chapter.

The TSS loading of 3,177 #/day may be conservative for most average days, but the WWTP must be designed to handle peak TSS conditions or effluent quality may diminish. Effluent data indicate that the WWTP has been able to still meet effluent quality during these peak events, but relying on exceptional performance beyond the facility's design capacity is not a viable long-term solution and puts the WWTP at risk of violating its UPDES permit. Operating at these conditions requires optimal equipment performance with no allowance for redundancy or emergency conditions. A graph of projected TSS loading is provided in Figure 2-11. Options to increase TSS capacity are discussed in the next chapter.

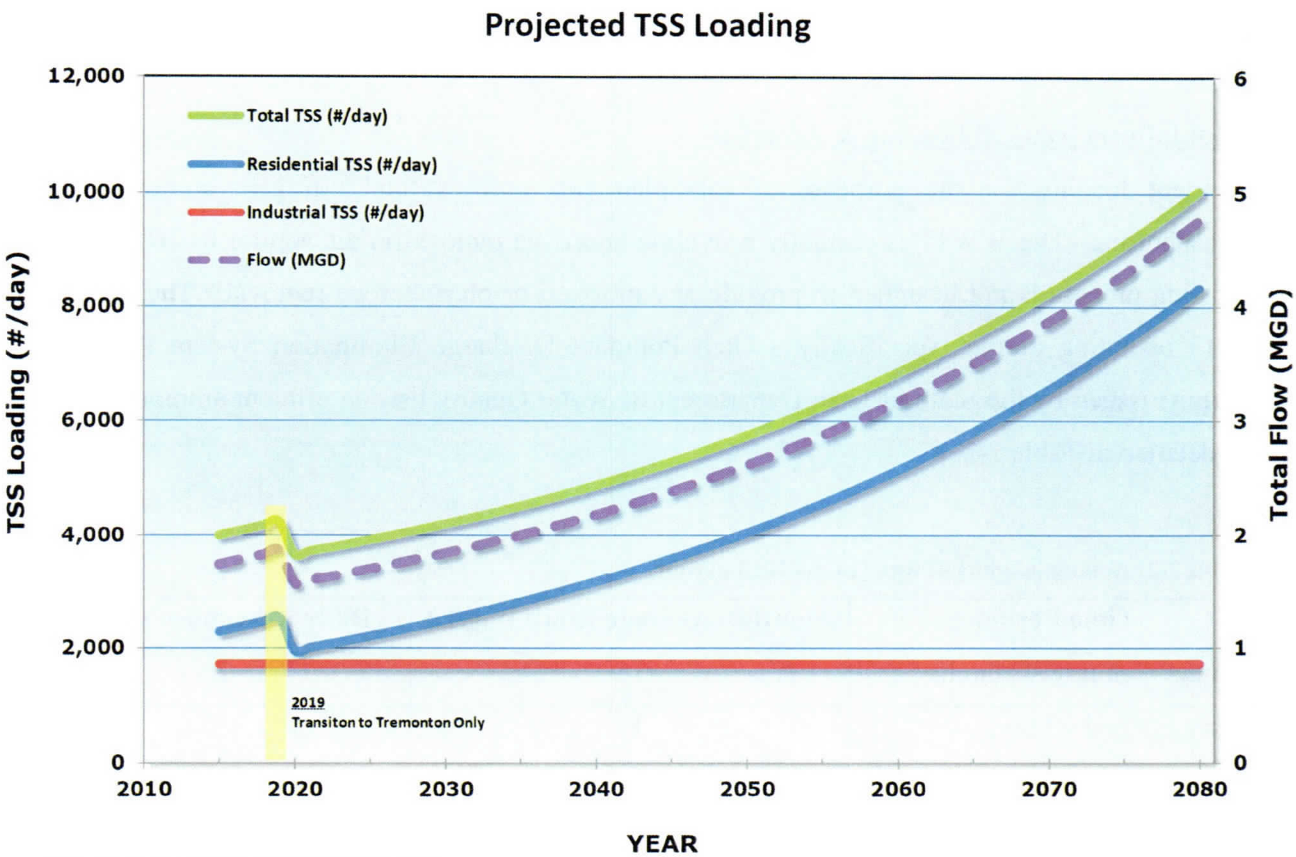


Figure 2-11: Projected TSS Loading

In summary, the data show that the WWTP has sufficient capacity to accommodate increased hydraulic (additional 1,308 ERUs) and BOD loading (additional 1,380 ERUs) into 2032. Current TSS loading frequently exceeds the WWTP's design capacity, though the WWTP has still been able to meet effluent permit requirements. Most design criteria for plants are conservative and allow for some buffer, but relying on exceptional performance beyond the stated design capacity puts the WWTP at risk of violating the UPDES permit requirements, especially during a peak loading event. The likelihood of violating the permit increases as growth continues and the WWTP's capacity is stretched more and more. Thus, it is recommended that the TSS capacity be increased as soon as possible to ensure adequate capacity is available to handle expected TSS loads and allow the WWTP to continue to meet the UPDES permit requirements. Planning and design to expand the entire WWTP's capacity to 2.5 MGD (for an additional 1,714 ERUs) will likely not be required until the late 2020's, except where permit changes (e.g. nutrient removal) are concerned. Which are discussed in the next section.

2.1.4 Influent Nutrient Loading & Removal

Nutrient loading for the purposes of this plan encompasses total nitrogen, ammonia and phosphorous. The WWTP is currently providing ammonia removal in the aerotor basins, but the existing process is not designed to provide any nitrogen or phosphorous removal. The October 2013 operating permit (specifically a Utah Pollutant Discharge Elimination System (UPDES) permit) issued by the State of Utah Department of Water Quality lists an effluent ammonia limit, as detailed in Table 2-2.

Table 2-2: Ammonia limits as listed in the 2013 permit.

Time Period	Monthly Average Limit (mg/L)	Daily Maximum (mg/L)
Winter (January – March)	15	25
Spring (April – May)	15	30
Summer (June – August)	2.5	12
Fall (September – December)	5	17

The current UPDES permit does not list any requirements for total nitrogen (TN) removal or phosphorous removal – though it does require monitoring and reporting of the effluent concentrations of these constituents. Recent rule changes from the State of Utah Department of Water Quality indicates that a limit for effluent phosphorus has been established and is scheduled to be required by 2020. It is anticipated that Tremonton's UPDES permit, issued by State of Utah Department of Water Quality will reflect that new requirement by 2020. In addition, a limit for TN in the effluent has also been discussed and it is anticipated to be implemented by 2025. Accordingly, any expansion and upgrade of the WWTP should account for and accommodate nutrient removal processes to meet these new operating permit limits. These limits should also be considered for any existing or future pre-treatment programs for industrial users.

Typical municipal influent concentrations for total nitrogen, commonly reported as Total Kjeldahl Nitrogen (TKN), are 40 mg/L. Influent total phosphorus typically ranges from 4 to 10 mg/L. Limited data is available for the Tremonton area; nonetheless values of 40 mg/L and 4 mg/L for nitrogen and phosphorous respectively are assumed for preliminary design purposes. Prior to establishing final design criteria in the design phase, it is recommended that influent values of phosphorous and nitrogen be measured and recorded to confirm or adjust these preliminary values. Recommended methods for nutrient removal are discussed in the next chapter. These concentrations equate to nitrogen and phosphorus loadings of 635 and 80 pounds per day at 1.9 MGD.

2.1.5 Solids Handling and Dewatering

Another major component of the WWTP is solids handling and dewatering. All of the biological processes at the plant produce solid waste that, combined with other organic and inorganic solids removed in the clarifiers, are collectively known as sludge. Sludge is periodically removed from the clarifiers and biological treatment basins and sent to aerobic digesters where another group of microorganism breakdown and digest more of the organic material in the sludge. The digested sludge is then sent to a screw press where it is dewatered and compacted to facilitate transport from the WWTP to the compost facility for additional drying, composting and eventual land application. The existing digesters are nearing their capacity and, as discussed in Chapter 3, will require expansion soon. Furthermore, the WWTP is equipped with one (1) screw press unit that is already operating at its full capacity. Thus, an additional screw press unit is required in the near future to accommodate additional solids loading at the WWTP. It should be noted that excess TSS loading typically ends up in the digesters and dewatering equipment. Thus, upgrades to solids handling and dewatering equipment are the most urgent improvements to help handle TSS loading.

CHAPTER 3 - RECOMMENDED WWTP UPGRADES & IMPROVEMENTS

This chapter discusses the recommended upgrade and improvement strategy for the WWTP to handle and properly treat the projected flow and loading discussed in Chapter 2. This chapter summarizes the existing facilities and capacities at the WWTP, and discusses the recommended phasing of upgrades to accommodate growth in Tremonton. Each process at the WWTP is described and summarized, followed by the recommended improvements and comparison to the projected demand at each process. This plan focuses on improvements that should be implemented or at least designed in the next 1-10 years, and only briefly discusses expansion beyond this time frame. Improvements are broken down into several phases as follows:

- Phase 1: Immediate improvements to accommodate current TSS loading and allow the WWTP to handle increased TSS loading from growth through 2032. These improvements entail upgrades to dewatering and solids handling equipment.
- Phase 2: Install new process basins and equipment to provide phosphorous and nitrogen removal that will become permit requirements in 2020 and 2025 respectively.
- Phase 3: Expansion and improvements to increase all aspects of the WWTP to handle ADF up to 2.5 MGD.
- Phase 4: Final site improvements to increase capacity for ADF flows up to 4.0 MGD.

Phases 1 and 2 represent more short-term improvements that should be completed within the next 3 years. These phases will be broken down and discussed in more detail in this chapter. Phases 3 and 4 represent long-term expansion strategies for the WWTP site and are only summarized in this plan for reference.

3.1 Phase 1: Improvements for 1.9 MGD Capacity

While the WWTP has a design capacity of 1.9 MGD, current TSS loading already exceeds design capacity resulting in solids handling and dewatering processes to be operating at full capacity. Consequently, additional sludge dewatering and solids handling capacity is required.

3.1.1 TSS Capacity & Solids Dewatering

The existing design TSS capacity of the WWTP has been reached and will be exceeded with increasing frequency as growth continues. TSS is handled at many different processes throughout the plant as the total suspended solids consist of several different constituents including organic material, feces, inorganic material, sand, silt, and other sediments. Much of the heavier, inorganic solids are removed by the grit trap prior to flow entering the clarifiers and aerator basins. Remaining solids, consisting of both organic and inorganic material, and waste from various processes at the WWTP are collectively known as sludge. Sludge is collected from various processes such as clarifiers and aeration/aerotor basins and sent to aerobic digesters. The digesters breakdown and remove some of the remaining organic materials to decrease the overall volume and weight of sludge that must be transported from the WWTP site for disposal. Digested sludge is sent to a screw press that dewaters and compacts the sludge to further reduce the volume and weight for transport. Dewatered sludge, also known as biosolids, is transported from the WWTP to the compost facility for composting, storage, and land application.

Increased dewatering capacity is required to meet near-future growth as the existing screw press is already operating at capacity. Specifically, in order to maintain screw press operating times within desired limits (i.e. 8 hours or less per day to match operator shift hours), an additional screw press unit should be installed in the compost building at the WWTP. A solids conveyor will also be installed to transport solids from the dewatering units to a pickup point near the western access door to facilitate transport of the sludge to the off-site composting facility. The second screw press unit will increase dewatering capacity to handle sludge. The digesters are nearing capacity as well, but expansion of the digesters can be replaced with additional screw press units as growth and loading dictate.

The additional screw press unit will provide a secondary benefit of mitigating potential odor issues with the digesters as digester aeration can continue uninterrupted, rather than turning the diffusers off to allow sludge to settle while decanting from the top. Solids handling and dewatering capacity, for the purpose of increasing TSS capacity, is the most urgent issue at the WWTP, and should be addressed as soon as possible. A summary of the preliminary cost estimates for adding the additional screw press is provided in Table 3-1.

Table 3-1: Cost estimate for additional sludge dewatering equipment.

Sludge Dewatering & Solids Handling - 1.9 MGD			
	Item	**Cost**	
	Screw Press	$	429,000.00
	Feed Pump	$	21,450.00
	Polymer Feed System	$	21,450.00
	Conveyors	$	114,400.00
	Equipment Installation	$	100,100.00
	Electrical, Controls & Instrumentation	$	117,260.00
	TOTAL	**$**	**803,660.00**

The total cost estimate for Phase 1 upgrades is $803,660 to increase TSS capacity. These improvements will allow the WWTP to bring TSS capacity up to 1.9 MGD ADF and increase dewatering capacity to handle actual sludge loads, allowing dewatering to take place during normal operating hours. These improvements are needed to allow the WWTP to accommodate growth between now and 2032, at which point additional expansion from 1.9 MGD to 2.5 MGD will be required. This equipment will accommodate growth to 1.9 MGD, or an additional 1,308 ERUs. With this improvement, all processes at the WWTP will be sufficient to handle loading associated with 1.9 MGD.

3.2 Phase 2: Improvements for Nutrient Removal

While the WWTP's current design capacity is not anticipated to be reached until 2032, phosphorous removal will become a UPDES permit requirement in 2020. Nitrogen removal will soon follow in 2025. Accordingly, planning, design, and construction of required nutrient removal upgrades must commence before these requirements are in place. As phosphorous and nitrogen removal will be required in the near future, it is reasonable to design and implement removal strategies for both constituents at the same time. It is recommended that the improvements for nutrient removal outlined in this section be completed by 2020. Phase 2 will not add any additional ERU capacity to the WWTP, but will upgrade the existing WWTP service to meet new

UPDES permit requirements. Furthermore, as these requirements will be in place when general expansion to 2.5 MGD is required, these upgrades should allow for easy future expansion in Phase 3. Phase 3, which includes expansion of the entire WWTP from 1.9 to 2.5 MGD, will accommodate an additional 1,714 ERUs.

Several strategies exist to provide nutrient removal. This plan compares two approaches for nutrient removal: 1) biological treatment (utilizing anaerobic and anoxic basins discussed later in this plan as option 2A); and 2) chemical addition and flocculation (for phosphorous removal) with anoxic basins to remove nitrogen discussed later in this plan as option 2B. Both options are briefly explored here and should each be considered in detail before selecting a nutrient removal strategy for Tremonton.

3.2.1 Option 2A – Anaerobic and Anoxic Basins

As mentioned above, phosphorous removal is scheduled to be required by the UPDES permit in 2020, and a total nitrogen limit is planned for 2025. Biological nutrient removal (BNR) of phosphorous (as orthophosphates) can be achieved with anaerobic basins and is an option for the Tremonton WWTP. Anaerobic means environments that have limited to no oxygen available, including free O_2 and easily accessible oxygen associated with nitrates (NO_x). This environment promotes growth of specialized bacteria that create volatile fatty acids (VFA's) which increase the uptake of phosphorous in the aeration basins. Through biological nutrient removal, phosphorous can be reduced to as low as 1 mg/L (Metcalf, 2003 & MPCA, 2006). Anaerobic basins are sized based on hydraulic retention time (HRT), with a minimum of one hour required to achieve efficient phosphorous removal. HRT's in excess of three hours are also not desirable as prolonged exposure to the environment can cause the uptake phosphorus to release back into the influent waste stream. Thus, the basin is sized to provide a minimum of one hour HRT during peak flow events, while preventing HRT's of more than three hours during normal flow. By 2020, ADF will be around 1.6 MGD. Based on this preliminary flow combined with a current design capacity for 1.9 MGD and future expansion to 2.5 MGD, the recommended anaerobic basin volume is ~200,000 gallons. This will provide 2.5 hours HRT at 1.9 MGD, two hours HRT at 2.5 MGD, and at least one hour HRT at future peak flows (5.0 MGD). The HRT at 1.6 MGD would be three hours which is acceptable. Note that the design would likely incorporate two basins or trains, so if flows are less than 1.6 MGD at startup, or three hour HRT causes issues with process performance, only one train need be operated until flows merit operating both. These estimates yield a proposed basin that is 48-feet wide by 38-feet long with an operating water depth of 15.5-feet. The basin would be divided into two (2) separate trains, each ~24-feet wide by 38-feet long. Some form of mechanical mixing would be required for these basins.

Nitrogen removal, using denitrification, involves the conversion of nitrate molecules (NO_3, NO_2, N_2O, etc.) into nitrogen gas (N_2). This is commonly achieved in anoxic basins, meaning environments where free oxygen (O_2) is not readily available, promoting the growth of denitrifying bacteria that utilize the oxygen tied up in the nitrate molecules. Requirements for anoxic basins are based on multiple factors including minimum design water temperatures, mixed liquor suspended solids (MLSS) concentration and other site specific operating parameters. Preliminary estimates show that the anoxic basins require a volume of ~365,000 gallons (suitable to handle current flows through 2.5 MGD). The proposed anoxic basin is 48-feet wide (to match the anaerobic basin width used to remove phosphorus) by 70-feet long with an operating water depth of 15.5-feet. The entire combined concrete structure for the anaerobic and anoxic basins would be ~48'x108' with 18-foot tall walls. Note that the wall height exceeds the design water depth, allowing for some protection from overflow and providing surface area on which equipment and access walkways can be mounted.

These basins are sized to handle nutrient loading for average daily flows ranging from ~1.6 to 2.5 MGD. The larger size basin is recommended as it will facilitate growth through 1.9 MGD and into Phase 3 upgrades (2.5 MGD) at minimal additional cost compared to smaller basins designed exclusively for lower flow rates. The outlets of these basins could also be equipped with overflow weir gates, allowing for adjustable (and therefore lower) operating water depths during startup and early operating years. This would give operators the flexibility to adjust the operating volume of each process to optimize performance at lower influent flow rates, while allowing the flexibility and capacity to gradually increase the volume as flows increase to 1.9 MGD and beyond. In addition, single trains may be operated during early years when influent flow and loading do not require both trains operating in parallel. Preliminary cost estimates for this option are summarized in Table 3-2.

Table 3-2: Cost estimate for new anaerobic/anoxic nutrient removal basins.

Option 2A - Anaerobic and Anoxic Basins		
Item	**Cost**	
Concrete Aeration Basin (50'x108'x18')	$	858,000.00
Mixing Equipment	$	85,800.00
Yard Piping	$	71,500.00
Earthwork	$	143,000.00
Equipment Installation	$	71,500.00
Electrical, Controls & Instrumentation	$	231,660.00
TOTAL	**$**	**1,461,460.00**

3.2.2 Option 2B – Chemical Phosphorus Removal and Anoxic Basins

Phosphorous removal can also be achieved using chemical addition/flocculation in conjunction with existing clarifiers, aeration basins, and sand filters. Chemical removal is typically used where effluent phosphorus limits range from 0.5 to <1.0 mg/L (or anticipated to drop below 1.0 mg/L; Metcalf, 2003). However, this approach is still be viable for higher phosphorus limits too as it can be easier to manage than biological removal. Chemical removal mixes coagulant chemicals into the influent stream to promote the formation of phosphorous-containing solids known as floc. These solids are removed via settling (in clarifiers) or filtration (in sand filters) and are collected with the sludge that is sent to digestion and dewatering.

Some testing and research is required to select the best chemical for each application along with the required dosing rate. Coagulant chemicals consist of multivalent metal ions such as calcium, aluminum, and iron. Common chemicals include alum, sodium aluminate, ferric (or ferrous) chloride and sulfate (Metcalf, 2003). Dosing strategies depend on the specific chemical and the concentration of phosphorus in the wastewater. Typically, where phosphorous concentrations exceed 2 mg/L, a molar ratio of 1:1 (moles of aluminum or iron to phosphorus) is sufficient for effective removal (MPCA, 2006). Dosing up to 1.5:1 may be required, depending on the desired removal efficiency. Chemical costs vary, but recent estimates show liquid alum ranging from $0.20 to $0.25 per pound of liquid, and ferric chloride costs ranging from $0.20 - $0.30 per pound of liquid. Sampling from the WWTP combined with some testing will be required to establish actual chemical requirements. Chemical addition can impact biological processes, especially in aeration basins and digesters. For example, aluminum coagulants can adversely affect microbial populations in activated sludge (especially protozoa and rotifers) at higher dosing rates (Metcalf, 2003). In contrast, ferric can have less biological impact, but is less safe to handle and more corrosive than alum (MPCA, 2006). Chemical balances and impacts of chemical addition on processes throughout the plant will need to be carefully reviewed before finalizing a design.

As the WWTP already has clarifiers (both primary and secondary), aeration basins, and sand filters, no additional major structures would be required to implement chemical phosphorous removal. Equipment would include two chemical dosing pumps and a small building to house the pumps and chemical storage tanks. Small -diameter containment piping would be run from the dosing pumps to each potential chemical addition point. Chemical addition can be added at one or more locations, with injection points at clarifiers and/or mixing basins where sludge collection is already available being the most ideal. For Tremonton, likely locations include at the primary clarifier and/or the aeration basins. Chemical addition at one or both of these spots will likely provide sufficient phosphorus removal, with the precipitated solids settling with the primary sludge and waste activated sludge. Chemical addition in the final clarifiers and possibly before the sand filters is also possible, but would only be used to provide some additional polishing. It should be noted that chemical phosphorus removal can increase sludge production significantly, with increases up to 20-30% noted in activated sludge plants (MPCA, 2006). The increased solids loading will need to be accounted for with solids handling equipment and will require a third screw press unit to be installed.

Chemical addition will not address nitrogen removal, thus anoxic basins similar in size and volume to Option 2A will still be required (i.e. total basin footprint for ~48' by 70' with an operating depth of 15.5 feet). The advantage of this strategy however is that phasing for nutrient removal is much easier. The chemical addition pumps and piping for phosphorous removal can be incorporated by 2020 to meet the phosphorus requirement, with design and construction of the anoxic basins completed by 2025 to meet the nitrogen requirement (rather than constructing all nutrient removal basins by 2020 as with Option 2A). This option would also provide better and more reliable phosphorus removal. However, handling of chemicals, chemical storage, and impacts that chemical addition can have on other processes at the plant should be considered. In addition, both BNR and chemical addition options will produce higher volumes of sludge and solids that must be sent to the digesters, dewatering, and offsite disposal.

A preliminary cost estimate for this option is provided in Table 3-3. This estimate assumes that a small, new structure will be required to house the dosing pumps and that the chemical storage tanks will be installed outdoors. The need for a new structure and final layout will need to be confirmed and this estimate updated accordingly.

Table 3-3: Cost estimate to implement chemical phosphorus removal with anoxic basins for nitrogen removal.

Option 2B – Chemical Removal & Anoxic Basins			
	Item	**Cost**	
	Building (to house pumps & chemical tank)	$	35,000.00
	Chemical Dosing Pumps	$	20,000.00
	Chemical Storage Tank	$	20,000.00
	Concrete Foundation & Pad for Chemical Tanks	$	50,000.00
	Yard Piping	$	15,000.00
	Earthwork	$	25,000.00
	Equipment Installation	$	20,000.00
	Electrical, Controls & Instrumentation	$	40,000.00
	2020 P Removal SubTotal	**$**	**225,000.00**
	Anoxic Bain Concrete (70'x48'x18')	$	425,000.00
	Anoxic Basin Mixers	$	65,000.00
	Yard Piping	$	20,000.00
	Earthwork	$	110,000.00
	Equipment Installation	$	75,000.00
	Electrical, Controls & Instrumentation	$	40,000.00
	2025 TN Removal SubTotal	**$**	**735,000.00**
	TOTAL FOR THIS OPTION	**$**	**960,000.00**

In summary, both options are viable to increase the level of service for new and future ERUs by adding phosphorus and nitrogen removal. The addition of these processes will be required to meet upcoming UPDES permit changes and will serve existing and future ERUs. Comparison of the advantages and disadvantages of these option are summarized as follows:

Options 2A: Biological Removal of P and N.

Advantages:

- No chemical handling/storage required.
- Provides both P and TN removal by 2020 and can handle loads from flow up to 2.5 MGD without additional expansion.
- Less operating costs than chemical removal option resulting in lower life-cycle costs.

Disadvantages:

- More upfront expense relative to chemical removal as it is less practical to separate construction of P and TN concrete structures.
- Not reliable for effluent P levels less than 1.0 mg/L – may not be sufficient for future P limits.
- Can be more difficult to operate as biological uptake is more sensitive to operating conditions and upsets (i.e. temperature, HRT, pH, biological balance, availability of carbon, etc.).
- Risk of releasing P back into flow stream if anaerobic process or downstream conditions are not properly managed.

Options 2B: Chemical Removal of P with Biological Removal of N

Advantages:

- P removal easier to manage and operate than with biological treatment.
- Can reliably provide removal levels below 1.0 mg/L
- Reduction in installation costs and smaller footprint as anaerobic basins are replaced by small chemical dosing pumps.
- Can implement P removal separate from TN, allowing for costs to be spread out over a longer period.
- Least expensive in terms of initial capital cost.
- Easy to expand P removal capacity with growth (increase chemical dosing).

Disadvantages:

- Requires handling and storage of chemicals onsite and higher O&M costs associated with chemical use.
- Chemical addition can cause issues with other biological processes.
- Higher life-cycle costs relative to BNR due to chemicals.

Table 3-4 compares the initial capital and 20-year NPV (including estimates for O&M) for options 2A and 2B. A site plan showing how each could be implemented at the WWTP site is provided in Figure 3-1 and Figure 3-2. An option for nutrient removal will need to be selected and designed within the next 1 to 2 years to allow time for installation and startup prior to new permit requirements taking effect. Expenses related to changing effluent requirements (i.e. new level of service) that effect the use and processes of the entire plant, such as new nitrogen and phosphorous limits, are shared costs that benefit new and existing users and are therefore not strictly associated with growth and impact fees.

Table 3-4: Cost comparison for nutrient removal process options.

Phase 2 – 20 NPV Comparison (2.5 MGD)		
Parameter	**BNR (2A)**	**Chemical (2B)**
Capital Costs	$1,461,460	$960,000
Annual O&M Costs*	$42,000	$151,000
20-Year NPV	**$2,599,000**	**$3,443,000**

* **O&M costs for power and chemical only.**

In conclusion, while chemical removal (option 2B) offers some potential capital cost savings, the advantages of lower operating costs and no chemical addition make BNR (option 2A) favorable for this application. Accordingly, option 2A is the recommended alternative for Tremonton. However, these costs are close enough to merit additional review by the City as part of the expansion design.

3.3 Phase 3: Improvements for Expansion to 2.5 MGD Capacity

By 2032, it is estimated that flows will reach 1.9 MGD, requiring the expansion of several processes at the WWTP to 2.5 MGD. Most aspects of the existing WWTP will require some improvement at this point, though a few facilities are designed to handle 2.5 MGD ADF. Essentially all of the items listed for Phase 3 are to handle growth and would be considered eligible for future impact fees. In summary, the following processes will require upgrades/expansion during Phase 3:

Phase 3 – General Expansion to 2.5 MGD

- Additional headworks screen and compactor.
- Construction of additional aeration basins to increase biological (BOD/ammonia and TSS) capacity.
- New 75-foot diameter final clarifier.
- Additional screw press dewatering units.
- Additional UV Disinfection Modules.
- Improvements to the offsite compost facility.

A preliminary site plan showing proposed locations for all improvements to expand capacity to 2.5 MGD is provided in Figure 3-3. The following sections discuss each of these aspects in more detail.

3.3.1 Headworks Screens

The existing headworks building has two influent channels, one containing a 1/4" combination mechanical fine screen and washpactor unit and the other a manual bar screen for bypass/emergency service. The fine screen is listed as having an ADF flow capacity of 1.9 MGD and a peak capacity of at least 2.5 MGD. The manual bar screen can handle peak flows of 2.5 MGD and is utilized whenever the mechanical screen is offline for maintenance or repairs. The manual bar screen has wider openings and is intended for emergency bypass use only. However, an additional screen/washpactor should be installed to replace the manual bar screen to ensure that the headworks can accommodate peak hour flows of 5.0 MGD (i.e. the design PHF for an ADF of 2.5 MGD). This addition can be achieved with minimal impact or upgrades to the existing building and the cost is mostly associated with the new equipment itself. The preliminary cost estimate for this improvement is shown in Table 3-5.

Table 3-5: Cost estimate for headworks expansion.

Headworks Expansion			
	Item	**Cost**	
	Screening & Washpactor Equipment	$	250,250.00
	Equipment Installation	$	42,900.00
	Electrical, Controls & Instrumentation	$	50,050.00
	TOTAL	**$**	**343,200.00**

3.3.2 Biological Treatment Capacity

The existing WWTP has design BOD capacity of 5,773 #/day. In order to accommodate the dedicated industrial load (2,857 #/day) established in Chapter 2 and the projected increased load growing from 1.9 to 2.5 MGD, the WWTP requires a total BOD capacity of 7,020 #/day, or an additional 1,250 #/day. This expansion is not anticipated to be required until 2032, and is beyond the primary intent of this plan. However, a preliminary analysis is provided for reference purposes. At this juncture, the simplest and most efficient way to increase BOD and ammonia removal capacity is to build an additional concrete aeration basin to house fine bubble diffusers. The additional storage volume and oxygen provided by these basins will increase BOD capacity and provide nitrification of ammonia, which will ensure that the WWTP remains in compliance with UPDES permit effluent limits. Typical design requires 1.2 pounds of oxygen (O_2) per pound of BOD removed and 4.6 pounds of oxygen per pound of ammonia (NH_3) converted into nitrates (NO_x). Assuming a design effluent value of less than 5 mg/L ammonia, approximately 35 mg/L of ammonia must be removed in the new aeration basins. Thus, an additional 3,360 pounds of oxygen is required for ammonia removal and 1,550 pounds are needed for BOD removal, for a total increased oxygen demand of 4,910 #O_2/day. This value will be used to size the new aeration basins, fine bubble diffuser system and new blower units.

The specific geometry and layout of the new aeration basin will be finalized after the design can be analyzed in detail. In general, the basin will need a footprint of around 2,500 ft^2 depending on the specifics of the fine bubble diffusers utilized in the design. This footprint is roughly equivalent to the same dimensions as one of the anoxic and anaerobic trains discussed in Option 2A above (25' wide by 110' long by 18' tall) and represents a good estimate for the new aeration basin. This configuration allows the aeration basin to be converted into a 3rd anaerobic/anoxic basin (as described for Option 2A) in the future, which will facilitate expansion from 2.5 MGD to 4.0 MGD. At that time, additional, dedicated aeration basins would also need to be constructed.

Nutrient removal should not require any major upgrades as Option 2A provides sufficient capacity for 2.5 MGD. Installation of the 3rd screw press unit can be delayed for this phase. These improvements should be designed and implemented by 2032. Preliminary cost estimates for the concrete basins, diffusers, blowers, mixers, and etcetera for biological capacity are shown in Table 3-6.

Table 3-6: Cost estimate for new aeration basin.

New Aeration Basin for 2.5 MGD		
Item	**Cost**	
New Blowers	$	286,000.00
New Blower Building (40'x20')	$	143,000.00
Concrete Basin (25x108'x18')	$	500,500.00
Fine Bubble Diffusers	$	157,300.00
Yard Piping	$	64,350.00
Earthwork	$	92,950.00
New Flow Splitting Structure	$	92,950.00
Equipment Installation	$	214,500.00
Electrical, Controls & Instrumentation	$	267,410.00
TOTAL	**$**	**1,818,960.00**

3.3.3 Final Clarifiers

The WWTP's existing final clarifiers consist of one 45-foot diameter and one 55-diameter clarifier basins. Assuming a maximum design loading of 500 gallons per day per square foot, the two basins have a combined capacity of 2.0 MGD. Additional capacity is required to handle flows beyond 2.0 MGD. With current ADF of 1.5 MGD, the capacity of either basin is significantly exceeded if one of the basins is offline. Thus, a third final clarifier is recommended to both increase the WWTP's capacity and provide some operating flexibility for operators to facilitate maintenance and repair of the final clarifiers.

The proposed final clarifier is a 75-foot diameter basin which would have a design capacity of 2.2 MGD. Once this new unit is in place, either of the smaller units could be offline and still allow the WWTP to handle at least 2.5 MGD, and redundancy for up to 3.0 MGD is provided. With the larger basin offline, the remaining capacity is less than 2.5 MGD but the clarifiers would still perform reasonably well in an emergency situation. The ability to have one unit offline is standard good practice in WWTP design and will allow operators to perform routine maintenance and repairs without risking a degradation in effluent quality. The estimated cost for the new final clarifier is summarized in Table 3-7.

Table 3-7: Cost estimate for new final clarifier.

New Final Clarifier			
	Item	**Cost**	
	Concrete for 75' Diameter Clarifier	$	572,000.00
	Clarifier Mechanism	$	250,250.00
	Earthwork	$	114,400.00
	Yard Piping	$	107,250.00
	New Flow Splitting Structure	$	71,500.00
	Equipment Installation	$	114,400.00
	Electrical, Controls & Instrumentation	$	223,080.00
	TOTAL	**$**	**1,452,880.00**

3.3.4 Ultraviolet (UV) Disinfection

The WWTP's existing UV disinfection modules are designed to handle peak hour flows up to 2.0 MGD. Accordingly, additional UV banks will need to be installed in the old chlorine contact chamber channels to increase capacity while maintaining the standard practice (and State's requirement) of having at least one redundant UV bank. Costs for additional UV equipment are shown in Table 3-8.

Table 3-8: Cost estimate for UV disinfection expansion.

UV Disinfection – 2.5 MGD		
Item	**Cost**	
UV Modules Equipment	$	107,250.00
Equipment Installation	$	50,050.00
Electrical, Controls & Instrumentation	$	21,450.00
TOTAL	**$**	**178,750.00**

3.3.5 Aerobic Digesters & Compost Facility

The effectiveness and efficiency of aerobic digestion depends primarily on providing sufficient oxygen and hydraulic/sludge retention times. As influent flows increase, the hydraulic retention time (HRT) of the two existing 40-diameter aerobic digesters will continue to decrease, meaning an increased sludge load to the screw press units and ultimately more sludge to dispose. This can be addressed with either additional screw press units and/or more digester volume. Incorporating an additional digester would require a new building (to house pumps, blowers, and other equipment) along with a new 40-foot diameter tank. Estimate costs for this additional building and digester are around $2,000,000 versus another ~$570,000 for an additional screw press. Accordingly, it is recommended that increased solids loading be accommodated by additional screw press units rather than expansion of the aerobic digesters. The estimated costs for the third screw press unit is summarized in Table 3-9.

Table 3-9: Cost estimate for additional dewatering capacity.

Additional Screw Press – TSS Capacity 2.5 MGD		
Item	**Cost**	
Screw Press Unit	$	429,000.00
Feed Pump	$	21,450.00
Polymer Feed System	$	21,450.00
Equipment Installation	$	50,000.00
Electrical, Controls & Instrumentation	$	50,000.00
TOTAL	**$**	**571,900.00**

In addition, the composting facility will require some site work to provide additional drying and storage space. The preliminary cost estimate for site work and asphalt paving at the compost facility is shown in Table 3-10.

Table 3-10: Cost estimate for expansion of offsite compost facility.

Compost Facility Expansion – 2.5 MGD			
	Item		**Cost**
	Site Work & Grading	$	429,000.00
	Asphalt Work	$	286,000.00
	TOTAL	**$**	**715,000.00**

The total cost estimate for the improvements recommended for these Phase 3 upgrades is $5,080,690. Note that cost estimates and values are not adjusted for inflation and are shown in today's (2017) dollars. These improvements will allow the WWTP achieve the following goals:

- Bring capacities for all processes up to 2.5 MGD ADF, including the final clarifiers, solids handling, UV disinfection, BOD/TSS, and nutrient removal.
- Provide more redundancy and sufficient peak hour capacity for critical processes such as headworks fine screening and final clarification.

The design capacity of 2.5 MGD is projected to serve a population of ~18,900 in addition to the current fixed industrial loading outlined in Chapter 2. In terms of ERUs, expansion from 1.9 to 2.5 MGD will accommodate an additional 1,714 ERUs; this population is projected to be reached by 2057. Based on growth estimates, the existing capacity of 1.9 MGD will be reached by 2032, meaning that these improvements will need to be finalized, designed, and implemented before then. Figure 3-1 and Figure 3-2 provide preliminary site plans showing proposed locations of all improvements to expand capacity to 2.5 MGD.

3.4 Phase 4: Improvements for 4.0 MGD Capacity

Based on growth projections, planning and implementation to increase capacity from 2.5 MGD to 4.0 MGD will need to begin around 2055. Expansion to 4.0 MGD is well beyond scope and primary objective of this facilities plan and is only summarized here for reference. The grit classifier is designed for 2.5 MGD and would need to be replaced with a larger capacity system. In addition, the sand filters have a maximum capacity of 2.5 MGD and would also need to be upgraded to handle larger flows. Furthermore, UV disinfection units will need to be installed to increase capacity. Finally, additional headworks screen, Salsnes filter, final clarifier, and dewatering capacity are required to obtain 4.0 MGD capacity. The combined estimated costs for all Phase 4 improvements are summarized in the table at the end of this section. Improvements would increase capacity while maintaining at least one redundant unit for all critical processes. A summary of the major items for expansion includes:

- Expand the headworks building to accommodate a third influent channel and screening/washpactor unit.
- Install new grit trap and grit washer/classifier in the expanded headworks building to replace 2.5 MGD grit removal system.
- Install new, larger feed pumps – possibly housed in the old grit basin.
- Install an additional Salsnes filter unit to increase primary clarifier capacity and provide redundancy.
- Convert the new aeration basin into anoxic/anaerobic basins to expand nitrogen and phosphorous removal (or expand selected nutrient recovery process as selected from the options listed for Phase 2).
- Install additional aeration basins to provide 4.0 MGD biological treatment capacity and possibly allow for one redundant aeration basin – note that these basins would operate in parallel with the STM aerotor basins.
- Install additional blower units to supply air for the additional aeration basins.
- Install new splitter structures as required to accommodate new clarifiers and aeration basins.
- Construct one (1) new 75-foot diameter final clarifier basin to maintain capacity.

- Upgrade sand filters to increase capacity.
- Install two (2) additional screw press units in the composting building (total of 4 or 5 screw press units depending on the selected nutrient removal process).
- Install additional UV modules in existing channels.

These improvements will increase capacity to 4.0 MGD ADF, enough for an additional 4,285 ERU's beyond the 2.5 MGD expansion. The estimated costs for the improvements are summarized in Table 3-11. Note that all values cited in this Chapter are not adjusted for inflation and are shown in 2017 dollars. A preliminary site plan showing proposed locations for all improvements to expand capacity to 4.0 MGD is provided in Figure 3-3.

Table 3-11: Cost estimate summary for expansion form 2.5 MGD to 4.0 MGD.

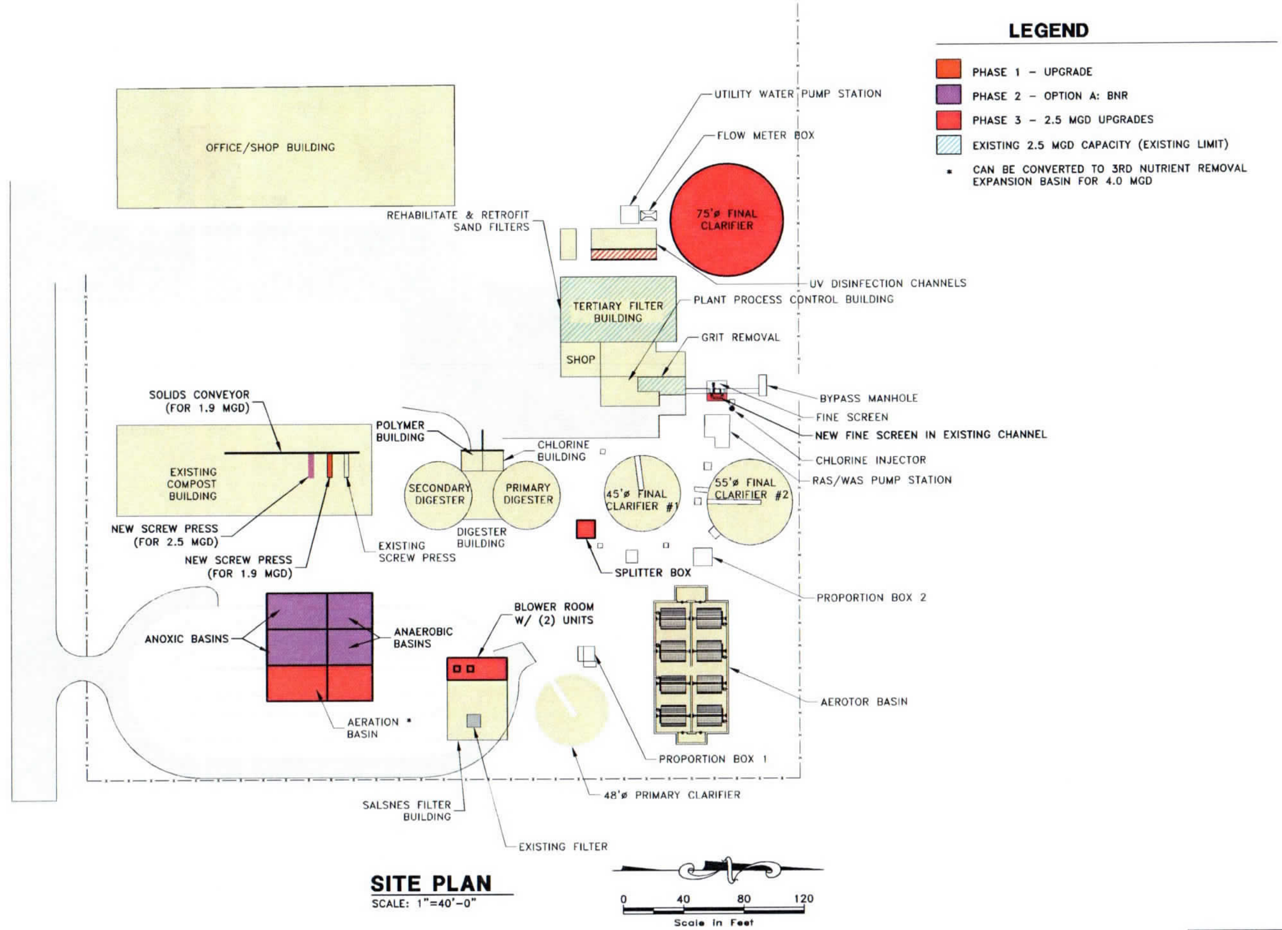
4.0 MGD EXPANSION	
Item	**Cost**
Headworks	
Building Expansion (20'x40')	$100,000.00
New Fine Screen	$150,000.00
New Channel Work	$80,000.00
New 10' Diameter Grit Trap	$60,000.00
New Grit Classifier	$40,000.00
Earthwork / Dewatering	$80,000.00
Yard Piping	$20,000.00
Grit Trap Concrete	$25,000.00
Subtotal	$555,000.00
Primary Lift Station Upgrade	
New Pumps	$100,000.00
Demolition & Mechanical Work	$50,000.00
Subtotal	$150,000.00
SALSNES Filters	
New Salsnes Filter	$300,000.00
Influent Splitter Box	$75,000.00
Subtotal	$375,000.00
Convert 24'x80' Basin from Aerobic to Anoxic/Anaerobic	
Demolition/Reconfiguration Aeration Basin	$30,000.00
Mixing Equipment	$30,000.00
Piping/Mechanical	$20,000.00
Subtotal	$80,000.00
New Aeration Process Basin	
New Basin (50'x90'x'18') Concrete	$500,000.00
New Blowers	$200,000.00
Diffusers	$200,000.00
Earthwork	$100,000.00
Yard Piping	$80,000.00
Subtotal	$1,080,000.00

(Table 3-11 continued on next page)

(Table 3-11 continued)

Final Clarifiers	
Concrete for 75' Diameter Clarifier	$400,000.00
Clarifier Mechanism	$175,000.00
Earthwork	$80,000.00
Yard Piping	$75,000.00
Subtotal	$730,000.00
Sand Filter Rehabilitation & Upgrade	
Rehab & New Equipment	$600,000.00
UV Disinfection	
Additional UV Equipment	$200,000.00
Sludge Dewatering	
(2) Additional Screw Press	$800,000.00
Conveyor Work	$60,000.00
Subtotal	$860,000.00
Misc. Costs	
Electrical (25%)	$1,220,000.00
Misc. Metals/Materials	$250,000.00
Subtotal	$1,470,000.00
SUBTOTAL COST	**$6,100,000.00**
Contingency (25%)	$1,525,000.00
Engineering Services (7.5%)	$457,500.00
Construction Management (7.5%)	$457,500.00
TOTAL COST	**$8,540,000.00**

PHASE 2 - OPTION A
W/ 2.5 MGD EXPANSION



SITE PLAN
SCALE: 1"=40'-0"

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DRAWING IS NOT TO SCALE IF BAR DOES NOT MEASURE 1"

NO.	DATE	DESIGN	DRAWN	CHECKED
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WASTEWATER TREATMENT PLANT UPGRADE
2.5 MGD EXPANSION REQUIREMENT

AQUA ENGINEERING

FIGURE 3-1

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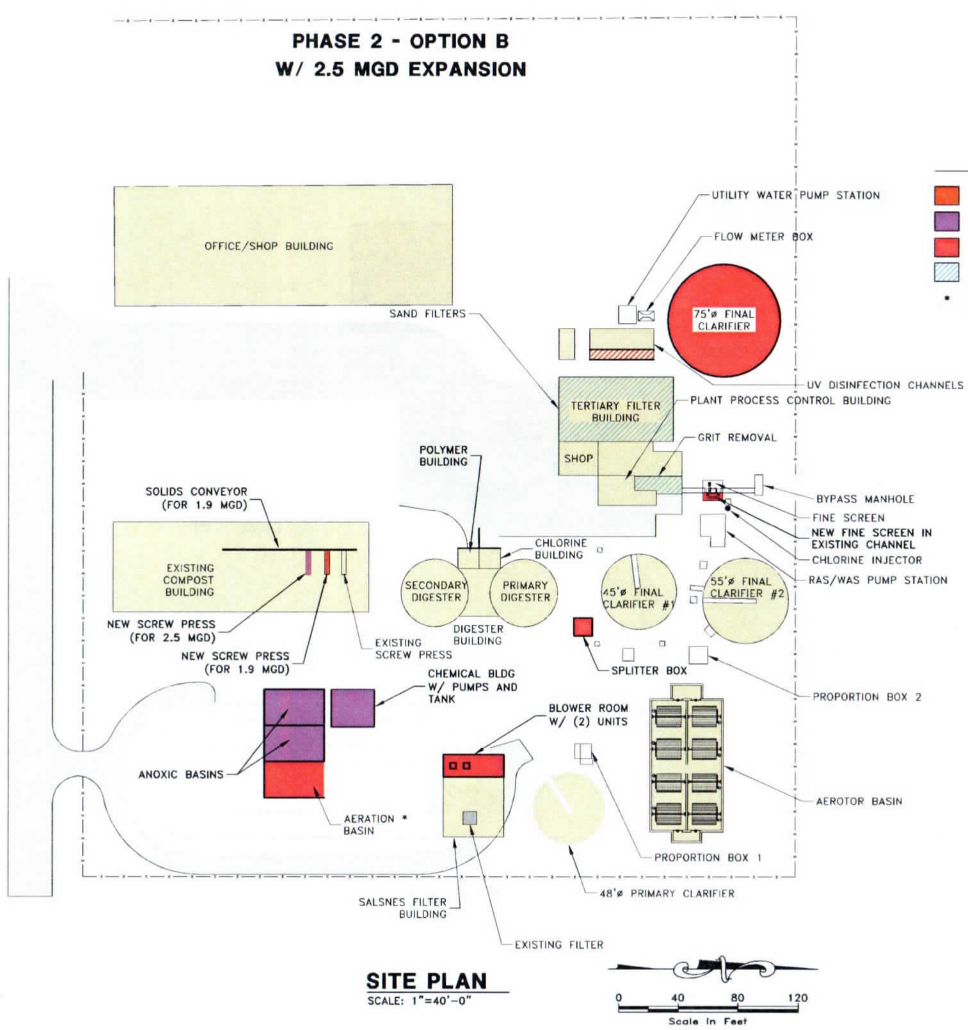
PHASE 2 - OPTION B
W/ 2.5 MGD EXPANSION



SITE PLAN
SCALE: 1"=40'-0"

LEGEND

- PHASE 1 – UPGRADE
- PHASE 2 – CHEMICAL P* W/ ANOXIC BASIN
- PHASE 3 – 2.5 MGD UPGRADES
- EXISTING 2.5 MGD CAPACITY (EXISTING LIMIT)
- * CAN BE CONVERTED TO 3RD ANOXIC REMOVAL BASIN FOR 4.0 MGD EXPANSION

NO.	DATE	DESIGN	DRAWN	CHECKED
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WASTEWATER TREATMENT PLANT UPGRADE
2.5 MGD EXPANSION REQUIREMENT

AQUA ENGINEERING

FIGURE 3-2

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DRAWING IS NOT TO SCALE IF BAR DOES NOT MEASURE 1"

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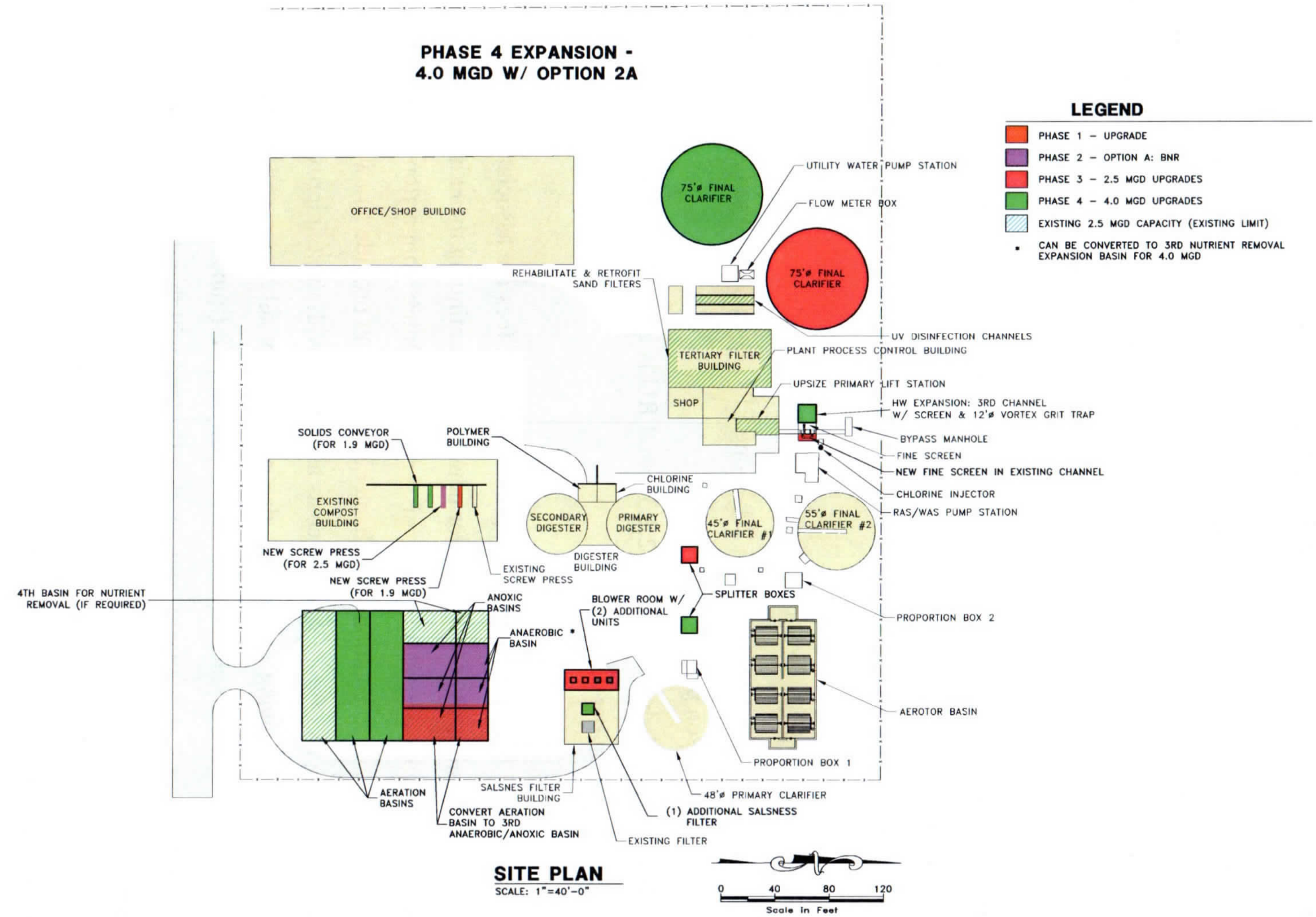

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WASTEWATER TREATMENT PLANT UPGRADE

4.0 MGD EXPANSION REQUIREMENT

AQUA ENGINEERING

0 1/2 1

DRAWING IS NOT TO SCALE IF BAR DOES NOT MEASURE 1"

FIGURE 3-3

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CHAPTER 4 - IMPACT FEE FACILITIES PLAN SUMMARY

This chapter provides a plan for the 10-year projected growth for the Tremonton City Wastewater Treatment Plant (WWTP) service area along with the existing capacity (and remaining buy-in capacity) and required expansions to the WWTP to accommodate future growth. This plan is used to identify the remaining buy-in capacity and costs of required expansions over the next 10 years.

For consistency, existing and future capacities are discussed in terms of equivalent residential units (ERUs) which aid in establishing buy-in and impact fees. The following is the defined existing levels of service for one typical detached single-family dwelling:

- Flow: As established in Section 2.1.1, one ERU is equivalent to 350 GPD.
- BOD: As established in Section 2.1.3, one ERU is equivalent to 0.77 #BOD/day (or 0.22 # BOD per person per day).
- TSS: As established in Section 2.1.3, one ERU is equivalent to 0.70 #TSS/day (or 0.20 # TSS per person per day).

In general, all costs that are considered eligible for impact fees are associated with improvements that provide the existing level of service for new ERUs. Continuing the existing level of service is what the City is proposing as the level of service for future connections. Some improvement projects (namely Phase 2) mentioned in chapter 3 in this plan provide a new level of service for all connections, existing and future, and the costs associated with these improvements are not impact fee eligible. The following summaries also assume that all flows and loads associated with Garland will no longer be treated by the Tremonton WWTP (transitioning sometime in 2019). As described in Chapter 2, the capacity now serving Garland will therefore be considered as available to accommodate growth and additional ERU's in Tremonton.

4.1 Excess Capacity and Future Loading

The design capacity of the WWTP is 1.9 MGD. The design capacity and analysis detailed in Section 2.1.2 indicate that the WWTP has 458,000 GPD excess capacity, equivalent to 1,308

ERU's. (Note that this excess capacity only represents certain processes and facilities at the plant. As previously discussed, data indicate that solids handling and total suspended solids (TSS) removal are already at capacity and will therefore require immediate expansion in order to accommodate these additional 1,308 ERU's to 1.9 MGD ADF to the existing level of service. Otherwise, the present WWTP will provide existing level of service for the remaining 1,308 ERU capacity. The existing facilities and improvements are also eligible for impact fees, meaning that new ERUs will receive benefit to the existing level of service from previous WWTP improvements. In order to estimate the appropriate buy-in for new ERUs in terms of an impact fee, the actual historic costs of the WWTP were tabulated and compared against the plant's remaining excess capacity. Since the WWTP's preliminary inception in 1964, the total actual historic cost for improvements and infrastructure is $5,736,900.11. Note that this value is the sum of all eligible improvements and equipment directly associated with the WWTP in actual dollars spent by Tremonton City. This value has not been adjusted for inflation and simply represents the actual total historic cost of the WWTP as it exists today. From the evaluation in Chapter 2, an estimated 458,000 GPD capacity (or 1,308 ERUs) remains at the existing facility. This represents 24.11% of the WWTP's total capacity (1.9 MGD). Thus, the calculated buy-in value eligible for impact fees for the remaining 1,308 ERUs to be served by the existing WWTP is 24.11% of the historic cost, or $1,383,166.62. These figures are included in the total costs summarized in Table 4-9.

The existing level of service of the WWTP includes treatment for BOD, ammonia, TSS, solids handling, and disinfection to meet the 2013 UPDES permit requirements as regulated by the State of Utah Department of Water Quality. As previously mentioned, while the WWTP has excess hydraulic and biological (BOD) capacity, the existing facility will be unable to treat additional flow to the existing level of service in terms of TSS loading and solids handling. Accordingly, some upgrades are required in order for the WWTP to handle TSS loading associated with 1.9 MGD ADF to the existing level of service. Furthermore, since the initial design and construction of the WWTP, additional requirements for removal of phosphorus and total nitrogen and have been approved by the State of Utah Department of Water Quality Division of Water Quality and are scheduled to be implemented by 2020 and 2025 respectively. These additional regulatory requirements represent a new proposed level of service that is required for both existing and future connections. Specifically, an effluent phosphorous limit of <1.0 mg/L is scheduled to be enforced beginning in 2020 and, by 2025, a total nitrogen limit will also take effect. Accordingly, this plan will address and distinguish between improvements and costs solely to accommodate growth to the existing level of service (e.g. TSS and solids handling) versus those improvements intended to address the new proposed level of service that benefits both existing and new connections. Only costs associated with providing the existing level of service for new connections will be considered for impact fees, while other costs related to increasing the level of service for existing and future connections are not eligible for impact fee assessments.

Current TSS loading has already reached and exceeded the WWTP's design TSS capacity. Even with the removal of TSS loads from Garland (anticipated sometime in 2019), existing connections push the limit of TSS capacity. Thus, there is currently no remaining capacity to accommodate additional TSS loading from new connections, and growth is therefore limited by the WWTP's TSS capacity. As stated in Section 2.1.3, the WWTP has a TSS capacity of 3,177 #/day. Based on current loading and TSS capacity dedicated to industrial users, no excess capacity for TSS remains to accommodate growth. In order to handle 1.9 MGD, the WWTP must increase TSS capacity to 4,350 #/day. Expanding the TSS capacity of the WWTP will increase the capacity of all processes at the facility to 1.9 MGD, which is sufficient for an additional 1,308 ERU's, and will allow new connections to be treated to the existing level of service.

Expansion to increase TSS and solids handling/dewatering capacities are needed as soon as possible. These improvements, as detailed in Chapter 3 and Section 4.2, will ensure that all processes at the WWTP are sized to reliably handle loading at 1.9 MGD flow. It is estimated that all aspects of the WWTP's 1.9 MGD capacity will be reached sometime around 2032, at which point additional capacity and more extensive upgrades will be required. After the improvements necessary to reliably handle TSS loading from 1.9 MGD ADF (Phase I discussed in Chapter 3) flow to the existing level of service, planning and design to implement nutrient removal (as a new level of service Phase 2 discussed in Chapter 3) should commence and be operable by 2020.

4.2 Preliminary Cost Estimates for Recommended Improvements

Chapter 3 summarizes the recommended improvements to provide the additional TSS and solids handling capacity (Phase 1) needed to match the WWTP's hydraulic and biological capacity of 1.9 MGD, along with options to add nutrient removal processes (Phase 2). These improvements will handle projected loads to the plant for the next 10 to 15 years as shown in the population and growth projections detailed in Section 2.1.1. Increasing the WWTP's overall capacity to 2.5 MGD (Phase 3) is beyond the time frame of this plan. However, these are summarized here for reference and to help establish potential future impact fees. The projects listed below may be completed simultaneously or separately, depending on available funding, and are presented separately to facilitate expansion planning in phases.

4.2.1 Short-Term Improvements for 1.9 MGD Capacity

The improvements recommended in this section should be implemented as soon as possible as they address near-future growth and capacity issues with equipment and processes. Preliminary cost estimates from Chapter 3 are included for reference.

One of the simplest improvements to implement is installation of a new screw press and conveyor for sludge dewatering. The existing unit already runs at maximum capacity during operating hours. Adding a second unit will increase capacity to handle growth and will provide the existing level of service for new connections up to at least 1.9 MGD. A preliminary cost estimate for this addition is provided in Table 4-1. In summary, these preliminary improvements should be implemented as soon as possible to increase solids handling and ensure that all processes at the WWTP can handle flows and loading up to 1.9 MGD or 1,308 more ERUs.

Table 4-1: Cost estimate for sludge dewatering.

Sludge Dewatering & Solids Handling - 1.9 MGD		
Item		**Cost**
Screw Press	$	429,000.00
Feed Pump	$	21,450.00
Polymer Feed System	$	21,450.00
Conveyors	$	114,400.00
Equipment Installation	$	100,100.00
Electrical, Controls & Instrumentation	$	117,260.00
TOTAL	**$**	**803,660.00***

* All costs for these items are to accommodate new users to the existing level of service and the total amount is considered eligible for impact fees.

4.2.2 Addition of Nutrient Removal Processes

The improvements recommended in this section should be designed and implemented by 2020 to provide a new level of service (i.e. nutrient removal) for existing and future connections. As this is a new level of service, costs associated with the addition of nutrient removal are not eligible for impact fees. These costs (Table 4-2) are provided for reference and to demonstrate how costs will be distributed between existing and new connections shown in Table 4-9.

Table 4-2: Cost estimate for recommended nutrient removal process.

Option 2A - Anaerobic and Anoxic Basins		
Item		**Cost**
Concrete Aeration Basin (50'x108'x18')	$	858,000.00
Mixing Equipment	$	85,800.00
Yard Piping	$	71,500.00
Earthwork	$	143,000.00
Equipment Installation	$	71,500.00
Electrical, Controls & Instrumentation	$	231,660.00
TOTAL	**$**	**1,461,460.00**

As previously mentioned, this upgrade will provide a new level of service for the existing 1.9 MGD capacity plant and is therefore not eligible for impact fees.

4.2.3 Improvements for 2.5 MGD Capacity

The improvements recommended in this section will be required as ADF approaches 1.9 MGD. This is not anticipated to happen for at least 10-15 years and is beyond the scope of the impact fees discussed in this plan. However, recommendations and costs associated with this upgrade are provided here for reference. These upgrades increase the design capacity from 1.9 MGD to 2.5 MGD and accommodate an additional 1,714 ERU's. The major improvements are listed here in the order they appear in the treatment process. Though it is assumed that most of these improvements will be implemented at or near the same time, individual cost estimates are presented to facilitate planning. These upgrades are solely to accommodate additional growth to the existing level of service and are therefore eligible for impact fees.

The manual bar screen in the headworks building should be replaced with a mechanical unit similar to the exiting unit in the other influent channel. This will provide sufficient capacity to handle peak hour flows (PHF) of 5.0 MGD and ADF of 2.5 MGD. The primary clarifier and Saslnes filter unit currently installed are designed to accommodate flows up to 2.5 MGD without additional improvements or equipment. A preliminary cost estimate for the headworks improvements is provided in Table 4-3.

Table 4-3: Cost estimate for new headworks equipment.

Headworks Screen – 2.5 MGD			
	Item	**Cost**	
	Screening & Washpactor Equipment	$	250,250.00
	Equipment Installation	$	42,900.00
	Electrical, Controls & Instrumentation	$	50,050.00
	TOTAL	**$**	**343,200.00***

* All costs for these items are to accommodate new users to the existing level of service and the total amount is considered eligible for impact fees.

The biological processes for BOD and ammonia removal to provide the existing level of service for new connections will require expansion to handle flows beyond 1.9 MGD. In addition, nutrient (or phosphorous and nitrogen) removal will need to be added for all existing and future connections associated with 2.5 MGD flows. Expansion from 1.9 to 2.5 MGD represents increased BOD and ammonia loads of 1,320 and 175 #/day respectively. This equates to an increased oxygen demand of 2,390 #O_2/day that will be delivered in a new aeration basin. Costs for the new aeration basin and associated equipment are summarized in Table 4-4.

Table 4-4: Cost Estimate for new aeration basin.

New Aeration Basin for 2.5 MGD		
Item		**Cost**
New Blowers	$	286,000.00
New Blower Building (40'x20')	$	143,000.00
Concrete Basin (25'x108'x18')	$	500,500.00
Fine Bubble Diffusers	$	157,300.00
Yard Piping	$	64,350.00
Earthwork	$	92,950.00
New Flow Splitting Structure	$	92,950.00
Equipment Installation	$	214,500.00
Electrical, Controls & Instrumentation	$	267,410.00
TOTAL	**$**	**1,818,960.00***

* All costs for these items are to accommodate new users to the existing level of service and the total amount is considered eligible for impact fees.

The existing final clarifiers have a combined capacity of 2.0 MGD. In order to accommodate growth to 2.5 MGD, an additional 75-foot diameter final clarifier will be constructed. The additional unit will increase capacity of final clarification to 2.5 MGD. A preliminary cost estimate for the additional final clarifier is provided in Table 4-5.

The existing UV disinfection modules are designed for flows up to ~1.9 MGD. Additional banks of UV modules will need to be installed in the channels of the converted chlorine contract chamber to increase capacity. Preliminary costs for this additional equipment, including installation, are summarized in Table 4-6.

As TSS and BOD loads increase and depending and because of the nutrient removal process, additional dewatering capacity is required to handle the waste sludge associated with 2.5 MGD flows. A preliminary cost estimate for the third screw press unit and associated elements is provided in Table 4-7.

Table 4-5: Cost estimate for final clarifier.

New Final Clarifier			
Item		Cost	
	Concrete for 75' Diameter Clarifier	$	572,000.00
	Clarifier Mechanism	$	250,250.00
	Earthwork	$	114,400.00
	Yard Piping	$	107,250.00
	New Flow Splitting Structure	$	71,500.00
	Equipment Installation	$	114,400.00
	Electrical, Controls & Instrumentation	$	223,080.00
	TOTAL	**$**	**1,452,880.00***

* All costs for these items are to accommodate new users to the existing level of service and the total amount is considered eligible for impact fees.

Table 4-6: Cost estimate for additional UV disinfection equipment.

UV Disinfection – 2.5 MGD			
Item		Cost	
	UV Modules Equipment	$	107,250.00
	Equipment Installation	$	50,050.00
	Electrical, Controls & Instrumentation	$	21,450.00
	TOTAL	**$**	**178,750.00***

* All costs for these items are to accommodate new users to the existing level of service and the total amount is considered eligible for impact fees.

Table 4-7: Cost estimate for new aerobic digester.

Additional Screw Press – TSS Capacity 2.5 MGD			
Item		Cost	
	Screw Press Unit	$	429,000.00
	Feed Pump	$	21,450.00
	Polymer Feed System	$	21,450.00
	Equipment Installation	$	50,000.00
	Electrical, Controls & Instrumentation	$	50,000.00
	TOTAL	**$**	**571,900.00**

* All costs for these items are to accommodate new users to the existing level of service and the total amount is considered eligible for impact fees.

Finally, the off-site compost facility that is used to dry, compost, and store solids until they can be land applied will require expansion to handle the increased solids loading from the WWTP. Improvements consist of earthwork and paving to provide additional areas for composting and storage. Cost estimates to expand the compost facility are summarized in Table 4-8.

Table 4-8: Cost estimate for expanding the compost facility.

Compost Facility Expansion – 2.5 MGD		
Item	**Cost**	
Site Work & Grading	$	429,000.00
Asphalt Work	$	286,000.00
TOTAL	**$**	**715,000.00***

* All costs for these items are to accommodate new users to the existing level of service and the total amount is considered eligible for impact fees.

The expansions listed in this section will increase the WWTP's capacity from 1.9 MGD to 2.5 MGD, and provide sufficient hydraulic, BOD, TSS, nutrient removal, and solids handling capacity for the anticipated loads and are all impact fee eligible in the future. The expansion from 1.9 to 2.5 MGD represents an additional 1,714 ERUs. The improvements discussed here will add capacity to treat new users to the existing level of service. Note that all cost estimates provided in this document are in 2017 dollars and do not account for inflation.

4.3 WWTP Proposed Expansion and Preliminary Costs

The improvements summarized in Section 4.2 will increase total capacity of the WWTP by an additional 1,308 ERUs, which represent expansion to 2.5 MGD ADF. In addition to providing the existing level of service to these 1,308 new ERUs a new level of service, namely nutrient removal, will be added that will serve existing and new ERUs. Accordingly, costs associated with nutrient removal are not eligible for impact fees as noted below and in Table 4-9. These improvements are estimated to handle growth to 2032. At this point, expanding the entire WWTP to 2.5 MGD capacity is required and will accommodate 1,714 more ERUs. Preliminary estimates for future costs and potential future impact fees for this expansion are summarized in Table 4-10 for reference.

Table 4-9: Summary of cost estimates for all IFFP improvements.

TREMONTON WWTP EXPANION & UPGRADE SUMMARY - 1.9 MGD								
Item	**Planning (Year)**	**Installation (Year)**	**Flow Capacity**	**Additional ERU's**	**Total ERU's**	**Total Cost**	**% for New ERUs**	**% Eligible for Impact Fees**
Existing Impact Fee to be Collected*	2017	2018	1.9 MGD	1,308	5,429	$ 1,383,166.62	100%	100%
Dewatering Screw Press & Conveyor						$ 803,660.00	100%	100%
Nutrient Removal†	2018	2019	1.9 MGD	-	5,429	$ 1,461,460.00	24%	0%
TOTAL COST FOR ALL NEW IMPROVEMENTS						**$2,265,120.00**		
TOTAL COSTS FOR ALL NEW IMPROVEMENTS TO ACCOMMODATE NEW CONNECTIONS						**$1,156,018.01**		
TOTAL OF NEW COSTS ELIGIBLE FOR IMPACT FEES						**$803,660.00**		
EXISTING IMPACT FEES TO BE COLLECTED*						**$1,383,166.62**		
TOTAL COSTS ELIGIBLE FOR IMPACT FEES‡						**$2,186,826.62**		

* Remaining impact fees from existing WWTP historic cost also referred to as Buy-in.

† Nutrient removal represents a new level of service for all connections and is therefore not eligible for impact fees.

‡ All values have not been adjusted for inflation and therefore represent values in today's (2017) dollars.

Table 4-10: Summary of cost estimates for future IFFP improvements associated with 2.5 MGD expansion.

TREMONTON WWTP EXPANION & UPGRADE SUMMAR - 2.5 MGD								
Item	**Planning (Year)**	**Installation (Year)**	**Flow Capacity**	**Additional ERU's**	**Total ERU's**	**Total Cost**	**% for New ERUs**	**% Eligible for Impact Fees**
Headworks Screen/Washpactor	2030	2032	2.5 MGD	1,714	7,143	$ 343,200.00	100%	100%
Additional Aeration Basin						$ 1,818,960.00	100%	100%
Final Clarifier						$ 1,452,880.00	100%	100%
UV Disinfection						$ 178,750.00	100%	100%
Additional Screw Press						$ 571,900.00	100%	100%
Compost Facility Expansion						$ 715,000.00	100%	100%
TOTAL COST FOR ALL NEW IMPROVEMENTS						**$5,080,690.00**		
TOTAL COSTS FOR ALL NEW IMPROVEMENTS TO ACCOMMODATE NEW CONNECTIONS						**$5,080,690.00**		
TOTAL COSTS ELIGIBLE FOR IMPACT FEES‡						**$5,080,690.00**		

The costs summarized in Table 4-9 yield an estimated (also referred to as Buy-In) impact fee of $1,671.89 per ERU, assuming the impact fee eligible amount is distributed over the estimated 1,308 ERUs remaining to reach 1.9 MGD. This amount includes existing impact fees remaining to be collected and costs to expand TSS handling and dewatering capacity (Phase 1), all representing an expanding capacity to provide the existing level of service to new connections. Costs to implement a new level of service (nutrient removal as Phase 2) are not included in this impact fee. The actual calculation of the impact fee of the WWTP will be formalized in the impact fee analysis performed by Zions Bank Public Finance.

Several funding options are available to facilitate the improvements and expansions required at the WWTP. To date, the City has used a combination of user fees, impact fees and developer funds (although only actual historical costs paid by Tremonton are included for the Buy-In calculation) to finance the majority of the improvements to the WWTP. In addition, preliminary investigation indicates that no state or federal grant money will be available for these projects in the futur. Therefore, funding must come from sources such as user rate increases, bonds, and impact fees. Funding for improvements to provide a new level of service for existing connections will likely come from bonding that will be repaid with increased user rates. As the improvements to accommodate growth must each be planned and constructed before any of the new connections they serve are in place, the most likely funding source for these improvements will be via bonding. Impact fees from future connections will then be used to pay back these bonds. The City does not anticipate that there will be any interloan funds or dedication of system improvements that would be used to fund the expansion of the WWTP. Moreover, Tremonton City finds that it is necessary to impose an impact fee on development activities to maintain the existing level of service for new connections.

REFERENCES

Aqua Engineering, 2003 – *Tremonton City Water Reclamation Plant Facility Plan / Impact Fee Development* by Aqua Engineering. (*Aqua, 2003*)

Jones & Attwood, 2013 – *2013 Sanitary Sewer Collection System Capital Facilities Plan & Impact Fee Facilities Plan* by Jones and Associates Consulting Engineers. (*Jones, 2013*)

Metcalf & Eddy, 2003 – *Wastewater Engineering*; 2003 Edition (Metcalf, 2003)

Minnesota Pollution Control Agency, 2006 – *Phosphorus Treatment and Removal Technologies* by the Minnesota Pollution Control Agency www.pca.state.mn.us; (MPCA, 2006)

EXHIBIT A

Certification of Impact Fee Facility Plan by Consultant

In accordance with Utah Code Annotated, 11-36a-306(2), Brad Rasmussen on behalf of Aqua Engineering, makes the following certification:

I certify that the attached impact fee facilities plan:

1. includes only the costs of public facilities that are:

   a. allowed under the Impact Fees Act; and

   b. actually incurred; or

   c. projected to be incurred or encumbered within six years after the day on which each impact fee is paid;

2. does not include:

   a. costs of operation and maintenance of public facilities;

   b. costs for qualifying public facilities that will raise the level of service for the facilities, through impact fees, above the level of service that is supported by existing residents; or

   c. an expense for overhead, unless the expense is calculated pursuant to a methodology that is consistent with generally accepted cost accounting practices and the methodological standards set forth by the federal Office of Management and Budget for federal grant reimbursement; and

3. complies in each and every relevant respect with the Impact Fees Act.

Brad Rasmussen, Aqua Engineering