Revised
FINAL REPORT

City of Francis

Wastewater Collection, Treatment, and Discharge System

CAPITAL FACILITIES PLAN

November 2012

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CITY OF FRANCIS

WASTEWATER COLLECTION, TREATMENT, AND DISCHARGE PLAN

CAPITAL FACILITIES PLAN

FINAL (Revised)

November 2012

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Chapter 1

POPULATION AND LOADING PROJECTIONS

1.0 INTRODUCTION

The City of Francis, Utah (Francis), has authorized an evaluation of the city's wastewater treatment and collection system infrastructure and the development of a capital facilities plan (CFP) in order to ensure sufficient capacity through the year 2060. This CFP is intended to establish population and flow projections, evaluate the performance of both existing wastewater treatment and collection systems, and to identify alternatives for meeting the capacities and discharge limitations during the 50-year planning period. The specific objectives of this report are to:

- Provide population projections for planning periods of 5, 25, and 50 years for the Francis wastewater service area.
- Determine the future wastewater flows and loading based on population.
- Identify limitations on wastewater disposal as a result of water rights
- Review existing condition of the wastewater treatment system and evaluate treatment alternatives based on immediate needs, the project planning periods, and potential disposal locations.

  Review existing condition of the collection system and summarize the scope and cost of future improvements based on the project planning periods.

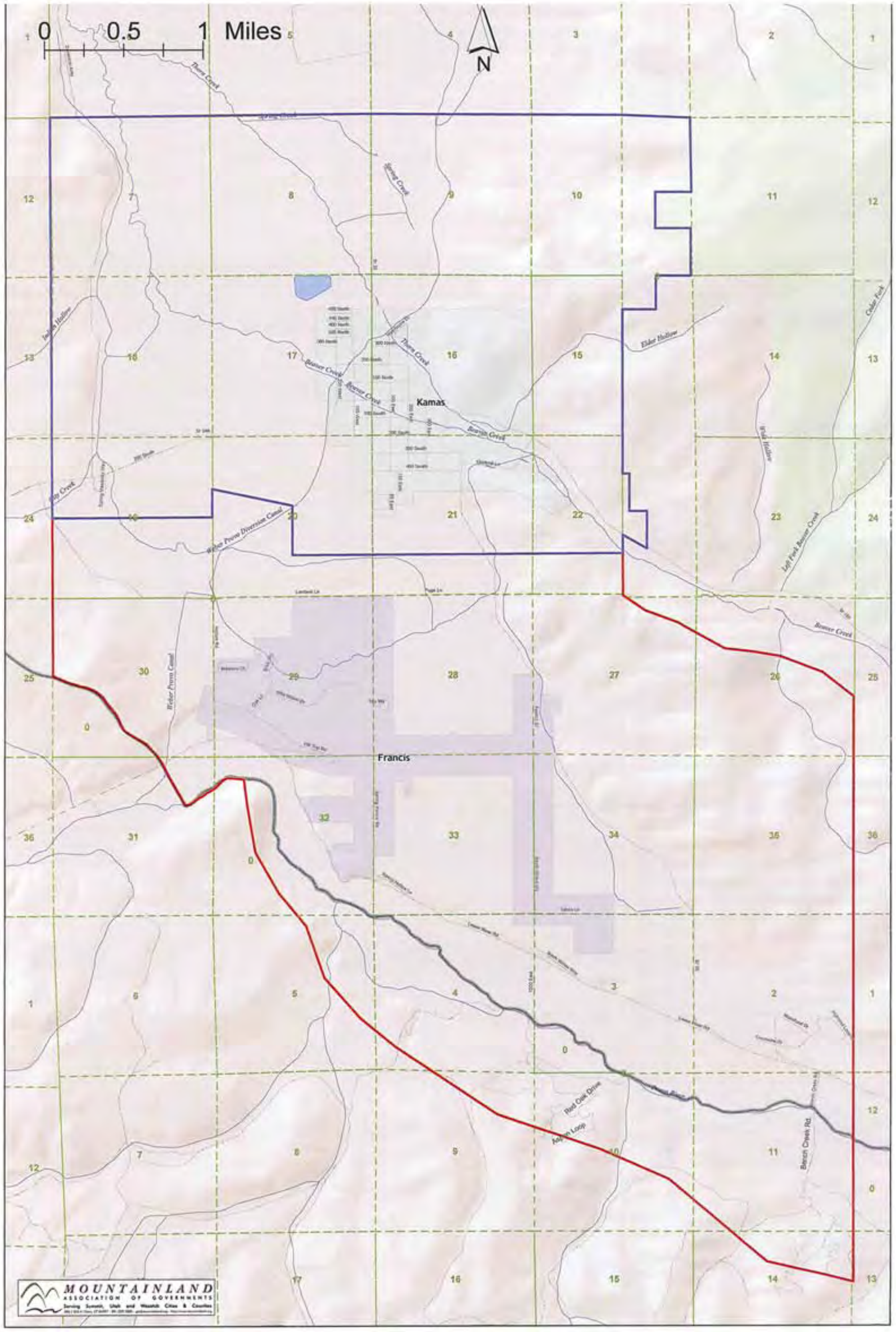
An impact fee study will be performed for new wastewater infrastructure projects identified in this report.

1.1 BACKGROUND

Francis is located in Summit County, Utah approximately 20 miles east of Park City by way of State Road 248. Francis is located in the southern end of the Kamas Valley, and is approximately two miles south of Kamas via State Route 32. Figure 1.1 shows the location of Francis relative to Kamas, and also displays the city's proposed future boundaries. Francis may be best known for its rural setting with close proximity to Salt Lake City, Park City, and the Uinta Mountains. A popular event is the annual Frontier Days Celebration, held each Labor Day, and includes a rodeo.

Francis is a growing community. In the 2000 census, the population of Francis was 698 residents. In the recent 2010 census, the population of Francis was 1,077 residents and the status of the community was upgraded from a town to a city. Continued growth is expected for the area, as currently the number of new lots permitted equals those in existence (personal communication, former Councilor Adair).

Francis provides and maintains wastewater collection and treatment systems. Currently, wastewater within the city limits is collected and conveyed to a non-discharging



FRANCIS PROPOSED FUTURE BOUNDARY

FIGURE 1.1

FRANCIS CITY
CAPITAL FACILITIES PLAN

lagoon treatment system. Treated water is used for alfalfa crop and/or pasture grass irrigation during summer months and held in storage during winter months.

1.2 ESTABLISH BASIS OF DESIGN

This section of the report is to establish the population and flow projections that will be used as the basis of design for this CFP. The projections will be summarized in planning increments of 5, 25, and 50 years as requested by Francis City Councilors. Projections established in this section will be used for facility planning for both the collection and treatment systems.

1.2.1 POPULATION PROJECTIONS

In 2000, the population of Francis was 698, and in 2006, the population was 889. The population of Francis increased by 27 percent over this six-year period or at a rate of approximately 4.5 percent per year. In April of 2008, the Mountainland Association of Governments (MAG) published population projections through 2060 for Francis based on the growth rate calculated from 2000 and 2006 census data. Given an expected annual growth rate of greater than four percent, MAG projections show nearly an eight-fold increase in population is expected for Francis over the next 50 years. Table 1.1 shows current and projected populations for Francis based on MAG data. MAG projections are provided for review in the Appendix of this report. These projections are identical to the projections published by the Governor’s Office of Planning and Budgets. Population projections for the wastewater service area should be revisited at least every five years to include the most current growth trends and information such as future industries and local economy.

The current population of Francis is 1,077 based on results from the 2010 census. The total number of housing units in Francis is 374. A summary of this data as reported by MAG can be found in the Appendix of this report. The ratio of population to total housing units is used to determine the average number of people per residential unit. For Francis, based on the population and total number of housing units the Equivalent Residential Unit (ERU) is 2.9 (1,077/371 = 2.9). The current Francis population of 1,077 can be expressed as 371 ERUs.

Table 1.1 Population and ERU Projections
Capital Facilities Plan
Francis City

	2010	**2015**	**2035**	**2060**
Francis	1,077	1,498	3,524	8,300
ERUs	371	516	1,215	2,862

Projections adapted from Mountainland Association of Governments April 2008.
ERU for 2010 calculated from MAG data at 2.9 residents per household.

1.2.2 WASTEWATER FLOW ANALYSIS

The lagoon treatment system receives wastewater flow from three lift stations and a portion of the collection system that flows by gravity. Francis provided historical influent flow data from 2007 through April of 2011. A summary of this data is presented in the Appendix of this report. This data was used to calculate historical influent flow conditions such as average annual day flow (AADF), maximum month average day flow (MMADF), and maximum day flow (MDF), which are presented in Table 1.2.

The peaking factor between MDF and AADF is calculated at 2.7 for the available data. The peaking factor for a small community is often higher than that seen for larger communities with more consistent flows. A small community of a 1,000 residents like Francis can have peaking factors as high as 4.0, meaning the peak flow is four times greater than the average daily wastewater flow (Metcalf and Eddy, 2003).

Table 1.2 Historical Influent Flow Summary
Capital Facilities Plan
Francis City

	Influent flow (gals per day)	Influent flow (MGD)
Average Annual Day Flow	110,000	0.11
Max Month Average Day Flow	240,000	0.24
Max Day Flow	300,000	0.30

Based on Francis historical flow data from 2007-April 2011.

Inflow and infiltration (I&I) is a variable component of wastewater flow. I&I is a result of water entering the collection system from open manhole lids, drains, defective pipe joints, and porous concrete. I&I flows are greatest during storm or surface runoff events, and in areas or seasons of high groundwater. There is a seasonal difference in wastewater flow to the lagoons. During the 2010-11 winter season, the average daily flow was calculated to be 86,000 gallons of wastewater per day. This winter season average daily flow is assumed to be the base flow, or the amount of wastewater generated in the system without contributions from I&I.

Typical textbook values of wastewater production, in terms of gallons per person per day (gal/cap/day), are within 50-100 gal/cap/day (Metcalf and Eddy, 2003). For Francis, with a current population of 1,077 residents and an average day flow of 110,000 gallons, the per capita production rate is 110 gal/cap/day, which is above the typical range. Given the discussion about I&I above, the higher production per capita wastewater flows are likely due to infiltration. If the base flow of 89,000 gallons per day is considered, Francis has a wastewater production rate of 89 gal/cap/day, which is more typical.

There is a quantity of wastewater collection and treatment capacity that Francis must provide to meet a level of service for each ERU. This level of service can be described as gallons per day per ERU. For projection purposes and for an initial definition of a required level of service, the average day wastewater flow of 110,000 gallons will be used. The level of service per ERU is currently 296 gallons per day.

1.2.3 HISTORICAL LOADINGS

Francis provided copies of a few lab reports from samples collected in 2006 for influent and effluent wastewater at their lagoons (see Appendix). Data from these two different sampling events showed that influent wastewater was of medium strength based on the results for five-day biological oxygen demand tests (BOD_5) that were 127 mg/L and 203 mg/L respectively. A textbook definition of medium strength wastewater is 190 mg/L BOD_5 (Metcalf and Eddy, 2003), however, a minimum BOD_5 design number of 200 mg/L is required by the Utah . The sampling results also showed that the lagoon treatment system was performing well, as effluent samples for BOD_5 and total suspended solids (TSS) were below the required effluent limit of 25 mg/L for both constituents.

The sampling data provided, however, is insufficient for design purposes as there are no historical trends and there is no data for other constituents such as influent ammonia and phosphorus that should be considered. In the absence of this data, textbook numbers for loading of key wastewater constituents will be used for design of future facilities at Francis. Table 1.3 presents the current flow and assumed loading data for influent wastewater. Key constituents are BOD_5, TSS, Ammonia (measured as nitrogen), and total phosphorus.

Table 1.3 Current Wastewater Loading & Per Capita Loading
Capital Facilities Plan
Francis City

	Flow (MGD)	BOD_5* (mg/L)	TSS* (mg/L)	Ammonia* (mg/L)	Phosphorus* (mg/L)
	Average Daily	Average	Average	Average	Average
Francis	0.11	200	210	25	7
	Flow (gal/cap/day)	**BOD_5* (lb/cap/day)**	**TSS* (lb/cap/day)**	**Ammonia* (lb/cap/day)**	**Phosphorus* (lb/cap/day)**
Francis	101	0.17	0.18	0.02	0.01

*Typical textbook values used in the absence of historical data (Metcalf & Eddy, 2003)

1.2.4 PROJECTED FLOW AND LOADINGS

Table 1.4 shows the projected wastewater flows and constituent loadings over the 5, 25, and 50-year planning periods. Flow and load projections were calculated based on the population projections and per capita loadings presented in the previous sections.

Table 1.4 Projected Flows and Loadings
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Francis City

Parameter	**2010**		**2015**		**2035**		**2060**	
	(mgd)		(mgd)		(mgd)		(mgd)	
Flow								
Average	0.11		0.14		0.36		0.84	
Max Month	0.24		0.32		0.79		1.85	
Max Day	0.30		0.39		0.98		2.31	
	(mg/L)	**(lbs/day)**	**(mg/L)**	**(lbs/day)**	**(mg/L)**	**(lbs/day)**	**(mg/L)**	**(lbs/day)**
BOD_5								
Average	200	183	200	234	200	600	200	1401
Max Month	200	400	200	534	200	1318	200	3086
Max Day	200	500	200	651	200	1635	200	3853
TSS								
Average	210	193	210	253	210	630	210	1485
Max Month	210	420	210	552	210	1375	210	3239
Max Day	210	525	210	690	210	1719	210	4049
Ammonia-N								
Average	25	23	25	30	25	75	25	177
Max Month	25	50	25	66	25	164	25	386
Max Day	25	63	25	82	25	205	25	482
Total Phosphorus								
Average	7	6	7	8	7	21	7	49
Max Month	7	14	7	18	7	46	7	108
Max Day	7	18	7	23	7	57	7	135

2.0 IMPACT OF WATER RIGHTS ON WASTEWATER DISPOSAL

Disposal of treated wastewater is complicated by water rights issues given the location of Francis on the boundary between the Provo and Weber River Watersheds. Currently, Francis withdraws water for culinary use from the Provo River Watershed via two wells, the Francis Well and Woodland Hills Well respectively. Wastewater produced in Francis is treated and applied to crops at a land application site located in the Weber River watershed. This is a potential problem as water originating in Provo River is transferred to the Weber River Watershed.

The water rights that allow Francis to withdraw water typically have a defined consumptive volume and return flow volume. Water rights were created with a defined return flow, which is a portion of the total right that is returned to the watershed as a result of flood irrigation either through surface runoff or groundwater recharge. Even though the nature of the water rights have changed to municipal use, the return flow portion of the water right must be left in place (i.e. not withdrawn from the well) or returned to the watershed of origin after use (e.g. treated wastewater disposal).

Recently, the River Bluffs Water Right was transferred from private ownership to Francis City. The State Engineer reviewed and approved this transfer, but also warned against enlarging the underlying right by using more than the consumptive portion (letter for 55-12331 provided in the Appendix). The River Bluffs Water Right allows for a diversion of 62.0 acre-feet per year and a total depletion of 41.529 acre-feet. The source of this water was also identified as the Provo River. That means Francis may withdraw up to 41.529 acre-feet and not have to account for any return flows, even if this water is disposed of at the land application site. However, if Francis were to withdraw the full 62.0 acre-feet, the return flow portion of 20.471 (total diversion less allowable depletion) must be accounted for as having been returned to the watershed of origin after use, and cannot be disposed of at the existing land application site.

As Francis is poised for additional growth, the State Engineer has indicated that future development and treated wastewater disposal must address return flow requirements. Enlargement of underlying water rights will not be allowed. Francis is required to totalize and record all water usage to account for depletion of water against the total water shares held. The exact boundary of the watershed or groundwater divide is not known (Hurlow 2002), but is roughly defined as running from Northeast to Southwest through the town of Francis (See Groundwater Divide Memo in Appendix). The State Engineer has identified the land application and treatment facility as located on the Weber River side of the groundwater divide.

A summary of water rights currently held by Francis City is presented in Table 1.5. This summary is for the water rights Francis is currently using, and is based on water right identification numbers that were provided by Francis staff. Two of the four water rights have approval letters from the State Engineer with clearly defined information (i.e. total volume, allowable depletion, and watershed of origin), however the other two show totals and discuss agreements between different entities but no formal confirmation or recognition from the State Engineer could be found for the water rights. Utah Department of Water Rights staff indicated that these two water rights may require additional discussion and negotiation with their office and the involved parties to receive formalized approval, however they also indicated that the total water volume listed in the two water rights is likely available to Francis without depletion limits (Mr. John Briem, DWR Engineering Technician, personal communication, October 2010). Table 1.5 will need to be updated if Francis has claim to additional water rights not presented in this report, or when additional water rights are acquired from private owners in the future.

For the purposes of this project, the allowable depletion values from the four water rights are presented in Table 1.5. The total volume of allowable depletion water should then be compared to the forecasted water needs of Francis . If water needs can be met without exceeding the depletion, the current land application operation may continue. However, if water needs exceed the allowable depletion, then return flows must be discharged back to the Provo River watershed, which would require Francis to modify the current wastewater disposal practices. This would likely require a higher level of treatment and may require the Francis to apply for a new discharge permit, especially for disposal to the Provo River directly. Treatment alternatives discussed later in this report were selected to meet a range of water quality limitations and potential disposal locations.

Table 1.5 Francis City Water Rights Summary
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Francis City

Description	Water Right ID #	Source	Water Right Irrigation Area (acres)	Defined Consumptive Use (acre-feet/acre)	Total Water Right (acre-feet)	Allowable Withdrawal[1] (acre-feet)	Allowable Depletion (acre-feet)
River Bluffs	55-12331	Provo	25.835	1.6075	77.5	62.0	41.529
Washington Irrigation Co.	55-12355	Provo	5.2	1.6075	15.6	12.0	8.36
Washington Irrigation Co.	55-9139[2]	Provo			160.2	160.2	160.2
South Kamas Irrigation Co.	55-7830[3]	Provo			162.36	162.36	162.36
				Total	**415.66**		**372.45**

Source: Francis City Records and Utah Division of Water Rights website

[1] Total Water Right minus water dedicated as carrier water is the Allowable Withdrawal

[2] Agreement allows private shares from Washington Irrg. Co. to be moved to Francis Well, allowable depletion not known, however Mr. John Briem, DWR Engineering Technician, indicated that the full amount may be available to Francis as a result of agreed Provo/Weber Canal returns (personal communication, Oct 2010).

[3] Francis shares ownership with Woodland Hills Mutual Water Company, depletion amount on Francis portion not known, however Mr. John Briem, DWR Engineering Technician, indicated that the full amount may be available to Francis as a result of agreed Provo/Weber Canal returns (personal communication, Oct 2010).

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CHAPTER 2

COLLECTION SYSTEM EVALUATION

1.0 INTRODUCTION

As part of the Francis City (Francis) capital facilities plan, the capacity and condition of the existing collection system was evaluated. A software model of the current system was built and calibrated against existing conditions. The model will be used as a design tool to identify capacities and infrastructure necessary to deliver the projected flows to the treatment facility through the year 2060, as outlined in Chapter 1.

This chapter describes the current collection system, the development of the software model, results from the investigation of conditions in the current system, and identifies current deficiencies. The evaluation of the collection system was done for the current conditions with population and flow data taken from 2010. The collection system modeling software used was Innovyze H20Map Sewer. The input data to the software model was taken from as-built and record drawings of the main system and subdivisions that were provided by Francis. The system was evaluated against Utah Administrative Code R317-3 Design Requirements for Wastewater Collection, Treatment, and Disposal Systems (R317) for compliance.

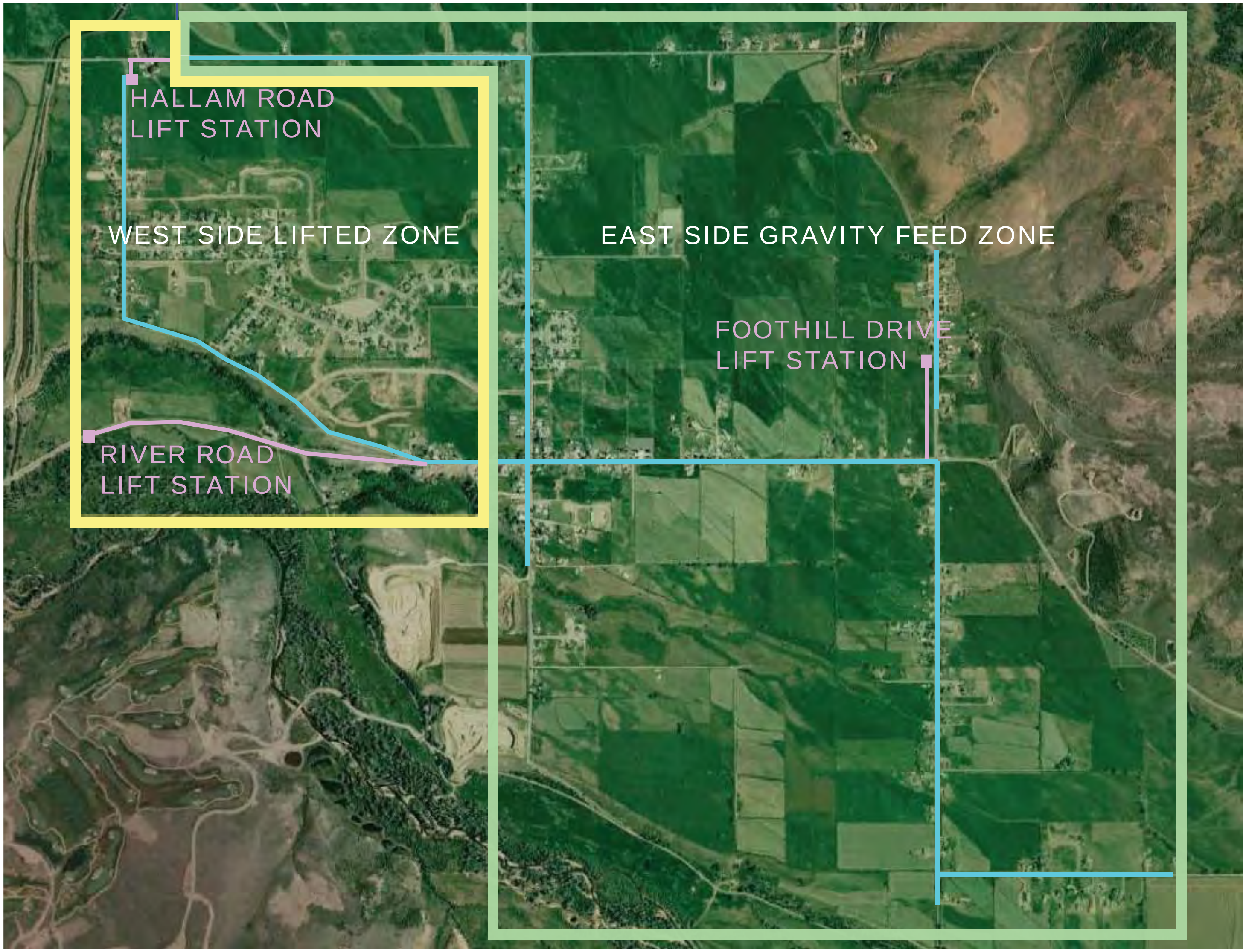
2.0 DESCRIPTION OF COLLECTION SYSTEM

2.1 Overview

The Francis sewer collection system is divided into two main sections or zones. The east side of town is mainly a gravity feed section to the lagoons and the west side of town is lifted up to the lagoons by a lift station.

2.2 Lift Stations

As shown in Figure 2.1, there are three lift stations in Francis. The first lift station is the Hallam Road Lift Station located near the intersection of Hallam Road and Lambert Lane. This lift station is the main lift station for the west side of town. These pumps lift the wastewater from the wet well through a force main and into the east side gravity feed system on Lambert Lane before heading north to the lagoons. This lift station was built around 1993 as part of the Rock Cliff Off-Site Utilities Project but has been retrofitted with new pumps in the last five years. The lift station consists of two submersible sewer pumps in a wet well with a valve vault and a standby generator. The submersible pumps are Mody MS252 type pumps with a rated 700 gpm at 10 feet of head. The wet well contains four level floats to turn on and off the lead and lag pumps when the level in the wet well reaches certain heights.



WASTEWATER COLLECTION ZONES

FIGURE 2.1
FRANCIS CITY

CAPITAL FACILITIES PLAN

The second lift station is the Foothill Drive Lift Station located on Foothill Drive in the east section of the collection system. This smaller system lifts the sewage from the homes on Foothill Drive up to the gravity system on Willow Drive. This lift station was built originally around 1984 as part of the Town of Francis Wastewater System Collection System Phase I project. Because of maintenance issues with the pumps, the lift station was retrofitted with a new system in 2009. The lift station consists of two above grade sewage pumps with suction piping down to the wet well and a standby generator. The system is a Smith & Loveless Standard Duplex Wet Well Mounted Pump Station. The pumps are rated for 75 gpm at 20 feet of head. This wet well also contains four level floats for lead and lag operation.

The third lift station is the River Road Lift Station located on State Route 32 headed toward Jordanelle State Park. This lift station is intended to lift the wastewater from the state park up to the gravity feed system on Hilltop Road in the west side of the collection system. The lift station was built around 1993 as part of the Rock Cliff Off-Site Utilities Project. The type of pumps and design head and flow could not be verified. Because this section of Jordanelle State Park has been closed down, this lift station is currently not in service.

2.3 Piping and Manholes

The piping system consists of gravity mains and force mains with intermittent manholes. The gravity mains are primarily eight-inch PVC lines. Where the two sections of town come together on Lambert Lane, the main line is upsized to a 10-inch PVC gravity main to the lagoons. The force main from the Foothill Drive Lift Station to the gravity system on Willow Drive is a three-inch PVC line. The force main for the Hallam Road lift station is a six-inch PVC line and the force main for the River Road Lift Station up to Hilltop Road is a six-inch PVC line. The manholes are standard pre-cast or cast in place four-foot diameter manholes.

3.0 COLLECTION SYSTEM MODEL

The collections system model was done in Innovyze H20Map Sewer. This software is a GIS based software package that provides the user with wastewater collection modeling and also stormwater collection modeling. The software lets the user model a collection system for a steady state condition and also simulate the system for an extended period of time. The extended period of time model allows for peaking factors and input of diurnal patterns. Because of the limited flow data available, the evaluation of the collection system was only done for the steady state condition under Peak Daily Flows. The Peak Day Flow would simulate a worse case scenario for the system. Steady state flow was the only option for modeling the Francis collection system because the flow into the lagoons is monitored only once a day.

3.1 Steady State Flow

The collection system was modeled at the Peak Day flow for 2010 of 0.3 million gallons per day (MGD). The population and flow data showed that the flow in the Francis collection system was found to be roughly 103 gallons per person per day. Each household was estimated for the amount of people by using the Governor's office statistics. For the State of Utah, it was estimated that in 2010 the average household size was three people. Each lateral connection into the system was assigned a flow of 309 gallons/day. Churches and other commercial buildings were assigned a flow equal to five people. This was based on recommendations from R317.

3.2 Manhole Input Data

Manholes in H20Map sewers are input as nodes. These nodes require the input data for rim elevation and manhole diameter.

The flow in and out of the system is also input into the manhole nodes. Several different loadings and types can be placed on the nodes to correspond with the wastewater and stormwater flows. Inflows into the system from rain entering holes in manhole lids and incorrect plumbing connections can also be entered as loadings on manholes. Infiltration caused by groundwater flowing into cracks or joints in the system can be input as loadings on manholes. For this study, inflow and infiltration are assumed as included in the Peak Day Flow of 0.3 MGD as discussed in Chapter 1.

For the Peak Day Flow in 2010 of 0.3 MGD, the flows were assigned to the manholes to correlate with the estimated number of lateral connections being added to the system between manholes. The loadings were done by looking at the as-built drawings and the most current aerial drawings of the system, and estimating the number of connections. The loadings in the manholes were adjusted and corrected until the outfall into the lagoons matched the desired flow rate of 0.3 mgd for the Peak Day Flow.

3.3 Pipe Input Data

The piping in the collection system has gravity flow lines and force main lines. The pipes in the model connect the nodes or manholes. The required input data for each pipe is diameter, length, invert elevation at each end, and a roughness coefficient for the corresponding pipe material. Only the pipes between manholes are modeled in the software. The laterals are neglected in the software and the service lateral flows are included in the model as manhole loadings.

3.3.1 <u>Lift Stations</u>

The three lift stations were modeled as a steady state condition. In the H20 Map Sewer software, the lift stations are assigned to a wet well. The wet well inputs provide the necessary lift station geometry such as diameter, minimum level, and maximum level. The pumps are then connected from the wet well to an output node. The pumps are then assigned a low level, high level, and flow characteristics. In an extended period of time model, the pumps can be given a pump curve and then the pump will operate based on the inflows into the wet well. In the steady state condition that we did for the Francis system, we assigned one pump, the lead pump, to be on at the pump's designed maximum flow. This gave a good approximation of the velocities that the force mains would see during a normal operation.

4.0 COLLECTION SYSTEM MODEL RESULTS

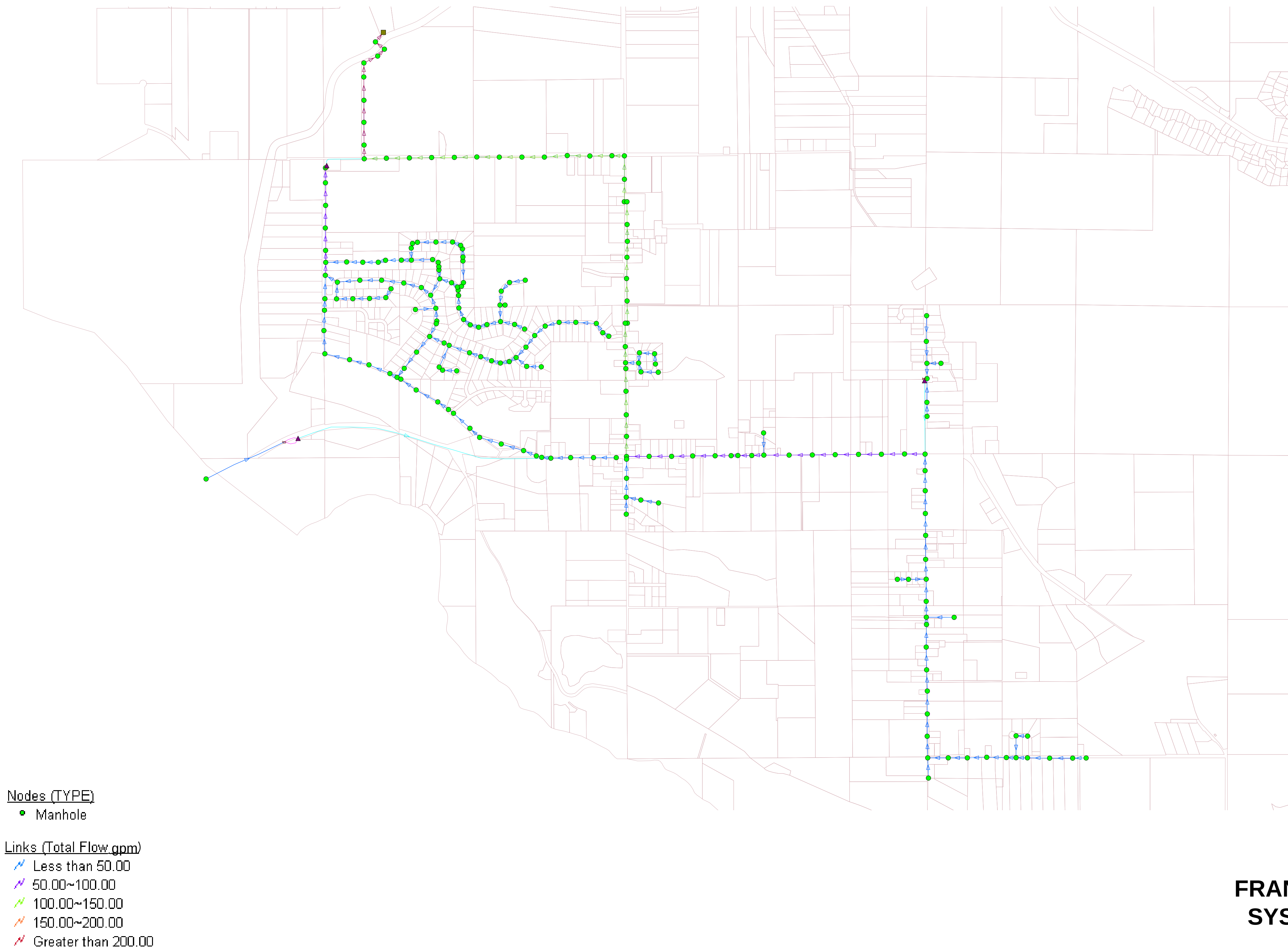
Once all the inputs to the system had been entered, the model was run to calculate the flows in the main lines during the steady state flow. The results of the flow data are shown in Figure 2.2.

The current capacity of the system was evaluated by looking at the d/D values of the pipes during the Peak Day Flow for 2010. The d/D value is the ratio of the depth of flow in the pipe (d) versus the diameter of the pipe (D). The standard practice for sewer mains is that they are designed for maximum capacity at 75-80 percent full, meaning the d/D value is below 0.8. Figure 2.3 shows that the d/D values for the system were well below the recommended value of 0.8.

During the build-out of new subdivisions in a system, pipe velocities can be a concern while the subdivision is still fairly vacant. The small number of homes built and connected to the system sometimes does not provide the necessary velocities in the pipes to flush out any sediment. R317 calls out that sewer mains are designed so that the velocities do not go below 2 ft/s. Standard practice is to design sewer mains with at least one point in a flow event exceeding 2 ft/s so that any sediment can be flushed out. The current Francis collection system was evaluated at the Peak Day Flow to determine if there were any concerns of low velocities. The results are shown in Figure 2.4.

5.0 RECOMMENDATIONS

The collection system model developed for Francis in this section will be used to forecast future needs and projects. In the review of the existing collection system, however, there are deficiencies that were found that should be addressed in the near future by Francis. The deficiencies, with suggested repairs or modifications, are described in the following paragraphs.



FRANCIS SEWER COLLECTION SYSTEM MODEL TOTAL PIPE FLOW (gpm)

FIGURE 2.2

FRANCIS CITY
CAPITAL FACILITIES PLAN

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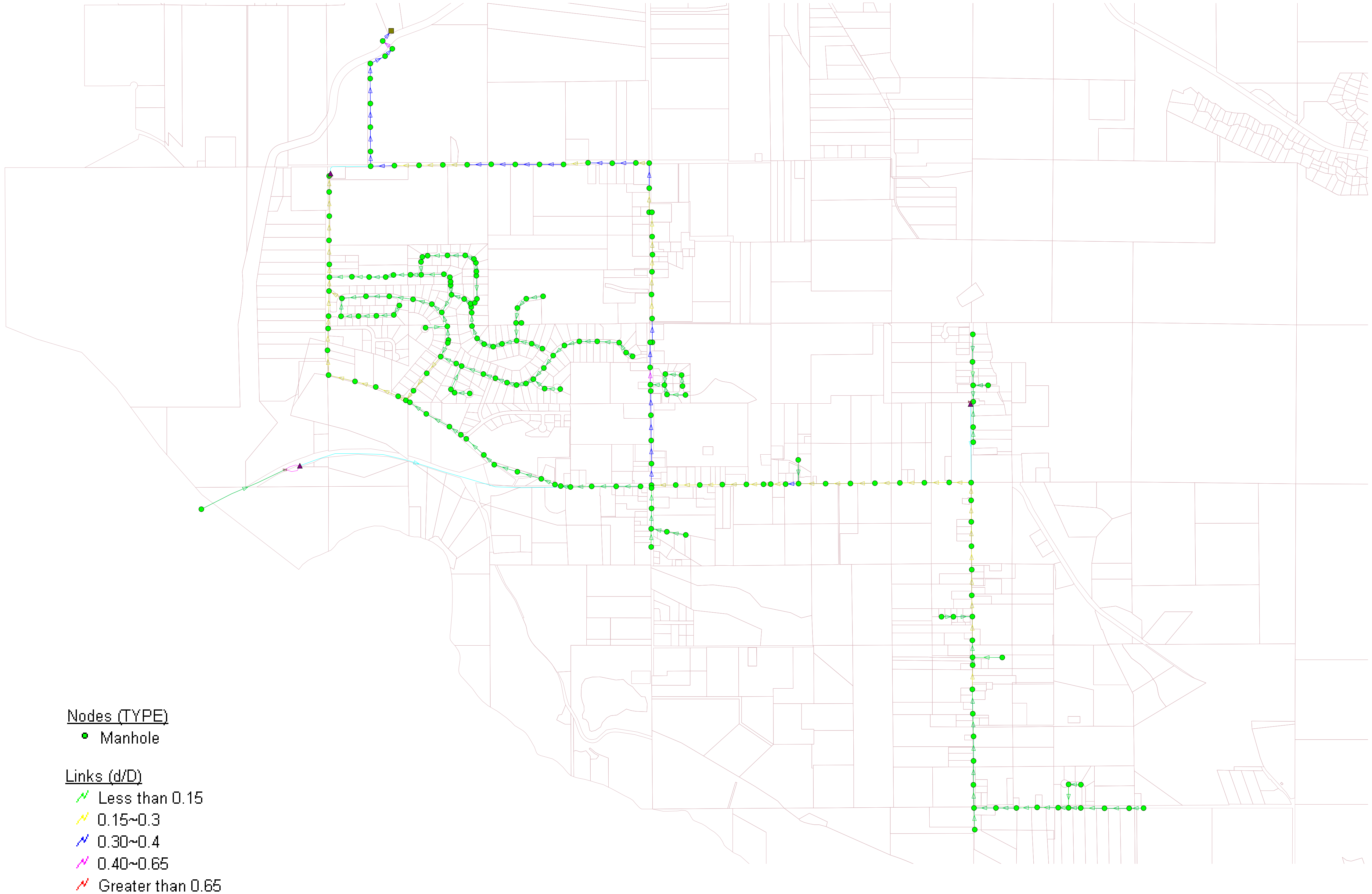
Client\UT\Francis\8714A00\Deliverables\Reports\90%\Figure 2.2 Francis Sewer Collection System Model Total Pipe Flow.indd

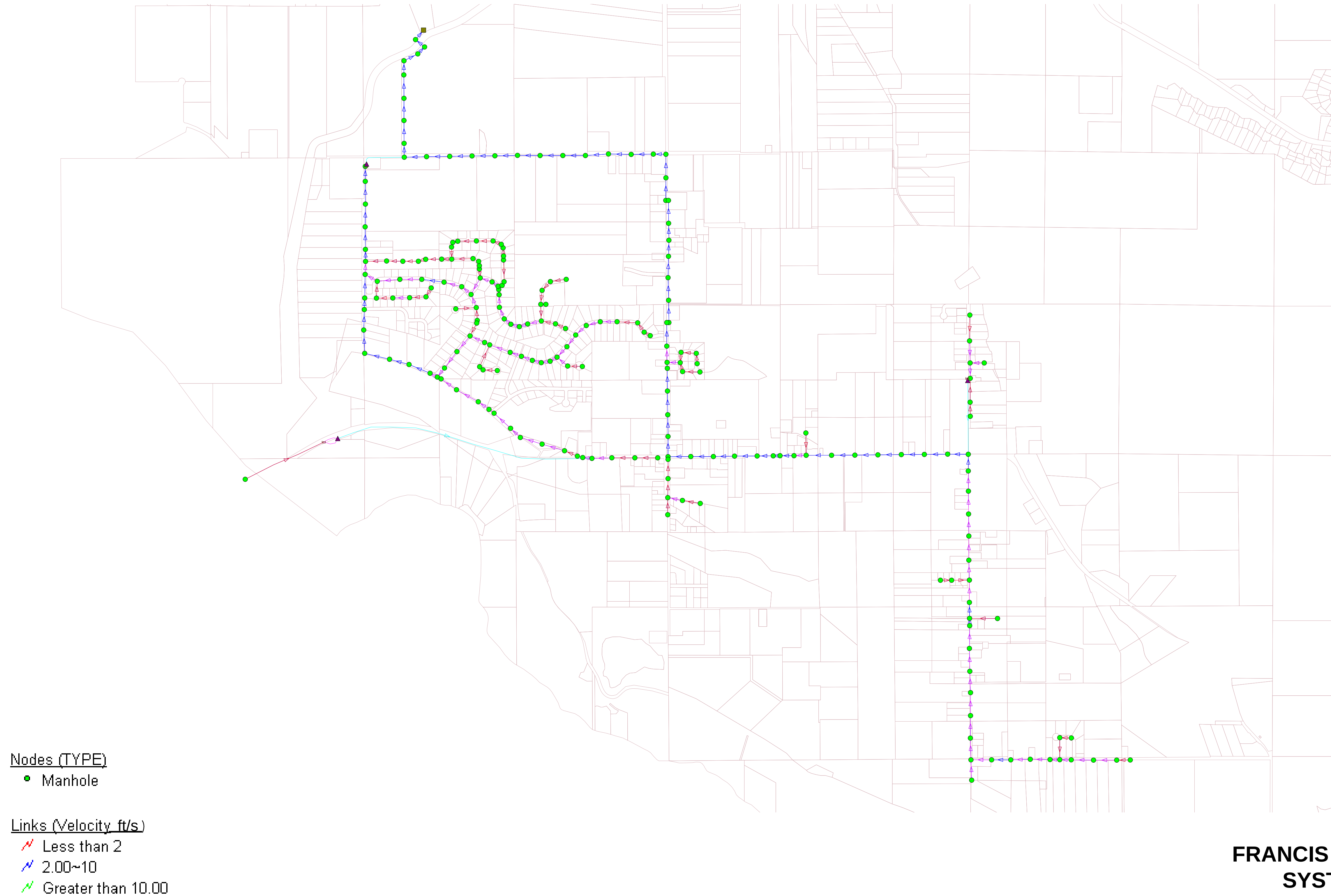


FRANCIS SEWER COLLECTION SYSTEM MODEL PIPE RESERVE CAPACITY (d/D)

FIGURE 2.3

FRANCIS CITY
CAPITAL FACILITIES PLAN

Client\UT\Francis\8714A00\Deliverables\Reports\90%\Figure 2.3 Francis Sewer Collection System Model Pipe Reserve Capacity.indd



FRANCIS SEWER COLLECTION SYSTEM MODEL PIPE VELOCITY (ft/s)

FIGURE 2.4

FRANCIS CITY
CAPITAL FACILITIES PLAN

5.1 Lift Stations

5.1.1 Standby Generator

The lift station at Hallam Road has a standby generator but it is not functional. When the power goes out at the lift station, a portable trash pump has to be dropped into the wet well and piped over the road to the manhole on Hallam Road that heads to the lagoons.

It is recommended that the standby generator be replaced or rebuilt to provide backup power for any outages.

5.1.2 Sewage Grinder

The lead and lag pumps are connected to the discharge pipes with Fernco type couplings. This doesn't allow for the pumps to be lifted out of the wet well and serviced or cleared of any clogs without taking the wet well completely offline. Because of this condition, it is recommended that a grinder be installed on the inlet line to help eliminate clogging of the pumps.

5.2 Subdivision Main Lines

It was found during the steady state analysis of the collection system that the main lines in the subdivisions that have not been fully built out, never reach velocities in the eight-inch main lines greater than the state recommended 2 ft/s. This was for the Peak Day Flow in 2010 of 0.3 MGD. Because the velocities never exceed 2 ft/s during peak day flow, these sections of line may accumulate solids and experience odor events. It is recommended that a standard operating procedure be implemented to periodically flush the manholes and main trunk lines that do not reach the recommended 2 ft/s. The flushing of the main lines and manholes will need to be continued until the subdivisions have been fully built out and the peak day velocities are high enough to self-flush the system.

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EXISTING TREATMENT SYSTEM

1.0 INTRODUCTION

This chapter describes the current Francis City (Francis) wastewater treatment facility and land application site for disposal of treated effluent, and provides an evaluation of performance against the requirements set forth in the Utah Administrative Code R317-3 Design Requirements for Wastewater Collection, Treatment, and Disposal Systems. The evaluation of the wastewater treatment facility was completed using recent flow data and information found in as-built drawings provided by Francis. Deficiencies and recommendations for the current facilities are provided at the end of this chapter. Treatment alternatives to address projected flows through 2060 will be presented in a later chapter.

2.0 DESCRIPTION OF EXISTING TREATMENT FACILITY

2.1 Overview

Francis wastewater is currently treated using a non-discharging lagoon system that consists of four cells or ponds. The facility is a facultative biological system, meaning organic wastes are converted to energy by microbes without the addition of air from mechanical blowers. Separation of liquids and solids occurs inside the lagoons, and clear water is discharged to a land application site for disposal. The facility is defined as non-discharging as treated effluent is stored onsite during the winter and applied to land for crop growth during the summer, rather than being discharged directly to a lake or stream. Non-discharging systems are not required to test the effluent routinely, but this type of lagoon system typically delivers an effluent quality that would meet the 25 milligram per liter (mg/L) standard required of permitted discharging lagoons for both biological oxygen demand (BOD_5) and total suspended solids (TSS) .

The wastewater treatment facility (WWTF) is located at the northwest corner of Francis, near State Route 248 as shown in Figure 3.1.

Wastewater from Francis is delivered to the treatment plant by one 10-inch diameter pipe, which terminates into a six-inch wide Parshall flume used to measure the incoming flow. Downstream of the flume, the influent enters the first pond through an eight-inch diameter pipe.

Ponds 1, 2, and 3 are primary treatment ponds. These three ponds have a combined surface area of 4.5 acres, and depth of 6 feet. Pond 4 was designed to store treated effluent over the winter months when land application of the treated effluent is not possible. Pond 4 has a surface area of 3.1 acres and is 11 feet deep.

FRANCIS WWTF LOCATION

FIGURE 3.1

FRANCIS CITY
CAPITAL FACILITIES PLAN

Treated effluent leaves Pond 4 through a pump intake structure at the northeast end of the pond. At the intake structure, chlorine is added and the effluent is piped to the effluent pump station, located at the northwest corner of Pond 4, through a 36-inch diameter pipe. The effluent is pumped to the land application site located directly northeast of Pond 4. The effluent is then applied to a 46-acre plot, where alfalfa is typically grown. Francis also has an agreement in place with an adjacent landowner where disposal can occur on an additional 20 acres, for a total land application area of 66 acres. Figure 3.2 provides a more detailed view of the treatment and land application facilities.

2.2 Treatment Facility Evaluation

2.2.1 Facultative Lagoon System Evaluation

The State of Utah requires a hydraulic detention time in facultative lagoons of 120 days based on winter flows, or 60 days based on summer flows and maximum inflow and infiltration. Based on flow data available for 2010, Francis has an average winter flow of 89,000 gallons per day (gpd) and a summer flow of about 239,000 gpd. Winter flows were determined by taking the average flow in 2010 from the months of December through March, as described in Chapter 1 and in the Appendix. The maximum month, average day flow was used for the summer flow value. Table 3.1 shows the volume and hydraulic detention times for each of the three lagoons and the entire system based on winter and summer flows.

Table 3.1 Hydraulic Detention Time of Existing Lagoon System
Capital Facilities Plan
Francis City

Winter Flow	89,000	gpd	
Summer Flow	239,000	gpd	
Pond	**Volume (gal)**	**Detention Time, Winter Flow (Days)**	**Detention Time, Summer Flow (Days)**
1	4,396,034	51.4	18.4
2	1,685,940	19.7	7.1
3	1,786,013	20.9	7.5
Total	**7,867,987**	**88.3**	**33.0**

FRANCIS WWTF AND LAND APPLICATION SITE

FIGURE 3.2

FRANCIS CITY
CAPITAL FACILITIES PLAN

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Client\UT\Francis\8714A00\Deliverables\Reports\90%\Figure 3.3 Land Application Site.indd

Table 3.1 shows that the existing lagoon treatment system has an average detention time of 88 days for winter flows and 33 days for summer flows. Based on this review, the system does not meet capacity requirements for a facultative lagoon system as per Utah Administrative Code R317-3, which requires 120 days of winter detention, or 60 days based on summer flows. Additional capacity is needed to achieve the required detention time.

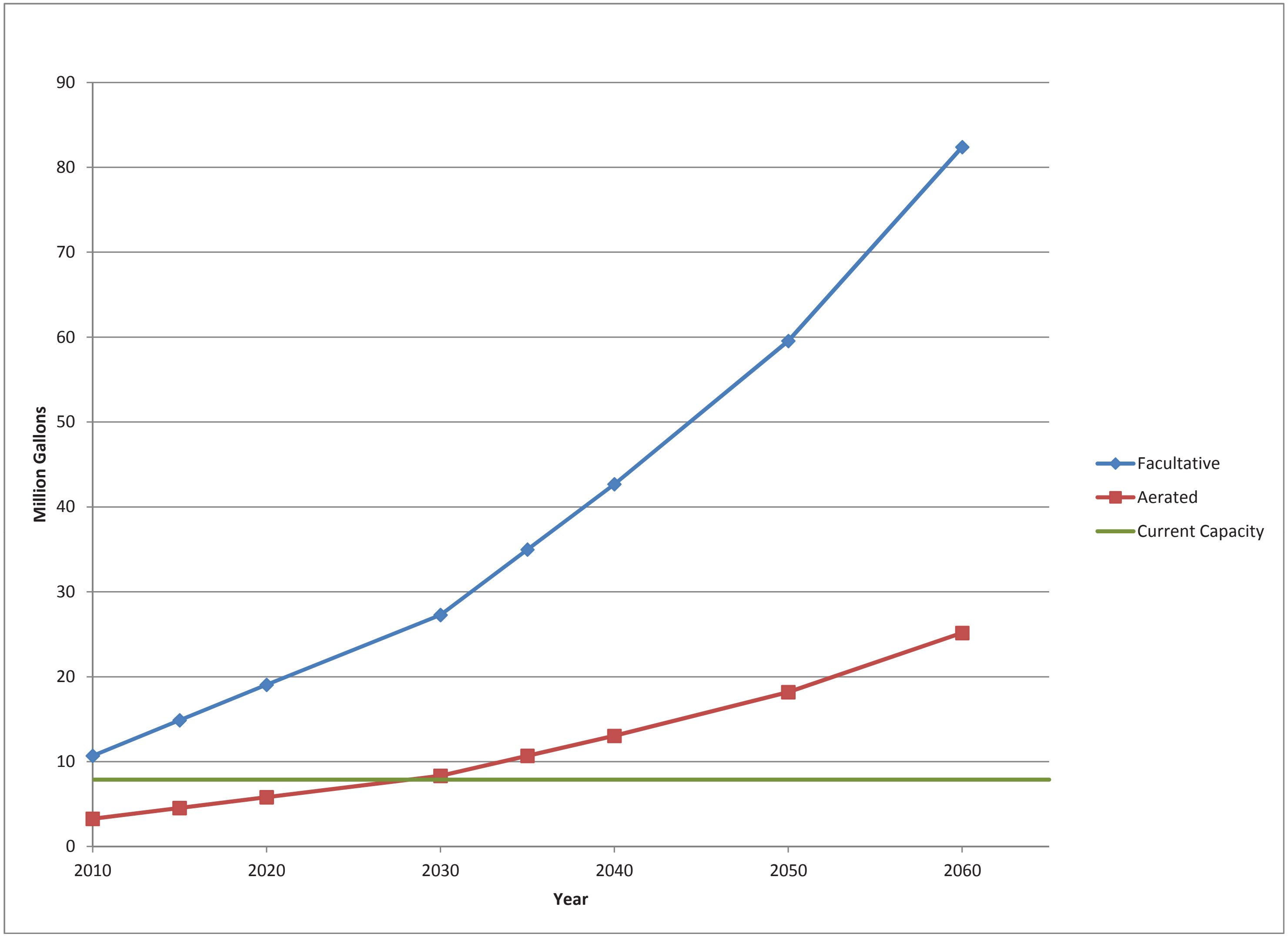
Currently the Francis lagoon system has approx 7.9 million gallons of storage. To meet the minimum detention requirement for winter flows at an average of 89,000 gpd, the Francis system needs 2.7 million gallons of additional detention capacity. For summer flows at an average of 240,000 gpd, the system would need an additional 6.4 million gallons of detention capacity. Only one of these detention conditions needs to be met in order to satisfy treatment requirements. Therefore, at a minimum to meet the requirements of facultative treatment, the Francis lagoon system needs to be expanded by approximately 3.0 million gallons for a total of 11.0 million gallons for adequate treatment of current flows (See calculations in Appendix).

Figure 3.3 graphically shows the capacity requirements for a lagoon system over the 50-year planning period. The current capacity of the lagoon system is shown at approximately 8 million gallons. The required capacity for a facultative facility is shown at approximately 11 million gallons, which as described above is greater than the current system capacity.

Figure 3.3 also shows the capacity required for an aerated lagoon system. Utah Administrative Code R317-3 sets forth a detention requirement of 30 days minimum for an aerated lagoon system. Mechanical equipment is required to deliver two pounds of oxygen for every pound of BOD_5 loading in the system. The current Francis system has sufficient capacity until approximately the year 2028 if converted to an aerated system.

2.2.2 Winter Storage Pond Evaluation

Pond 4 in the Francis lagoon system is currently being used as winter storage when land application is not possible. Pond 4 is 11 feet deep and has a volume of about 9.5 million gallons. Irrigation companies typically start water in April and run through the end of October. It is assumed that the winter storage season matches the non-irrigation season of November through the end of March, or approximately 150 days. In 2010, the average day flow during the winter season was approximately 89,000 gpd. If the land application system is operated such that Pond 4 is empty at the beginning of the winter season, the pond provides approximately 107 days of storage. If the average annual day flow of 110,000 gallons per day is used for this same estimate, Pond 4 provides approximately 86 days of storage. Pond 4 does not provide sufficient winter storage for the current flows. The volume required to store 150 days of the current winter flow (89,000 gpd), is 13.4 million gallons.



CURRENT VS. REQUIRED LAGOON CAPACITIES

FIGURE 3.3

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Francis needs an additional winter storage volume of nearly 4.0 million gallons. Table 3.2 and Figure 3.4 show the required volume of the storage pond over the project study period based on the projected increase in flows.

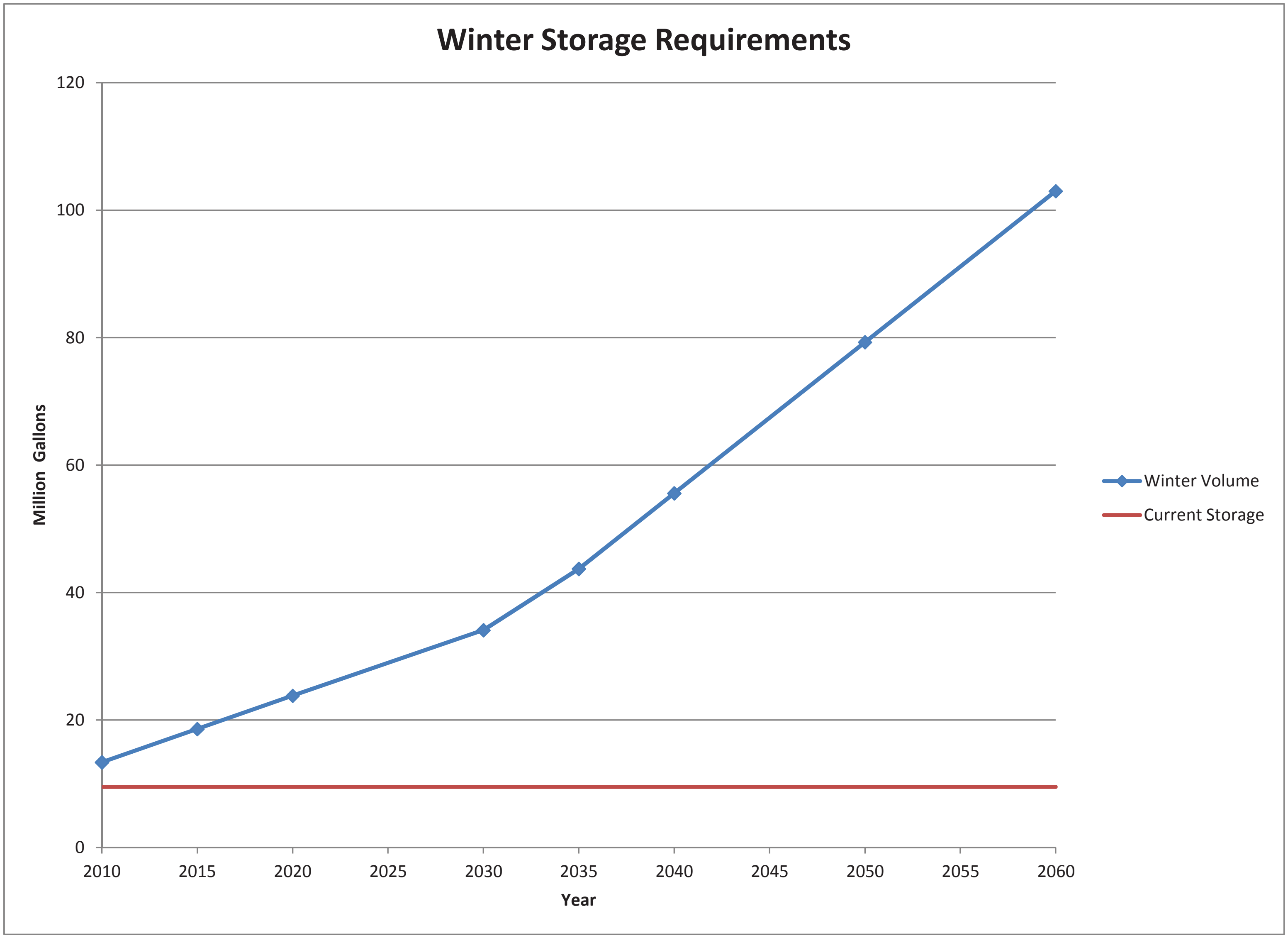
Table 3.2 Effluent Winter Storage Volume Requirement
Capital Facilities Plan
Francis City

Year	Winter Flow gpd	150 day Winter Storage Volume (mgal)	Additional Volume Required[1]
2010	89,081	13.36	3.9
2015	123,903	18.59	9.1
2020	158,725	23.81	14.3
2030	227,294	34.09	24.6
2035	291,478	43.72	34.2
2040	355,663	53.35	43.9
2050	496,274	74.44	64.9
2060	686,513	102.98	93.5

1 Existing storage volume is 9.5 MG, values shown are additional volume that needs to be added to meet storage requirement.

2.2.3 Land Application Facility Evaluation

Treated wastewater effluent from the Francis lagoon system is land applied to a 46-acre plot adjacent to the lagoons as shown in Figure 3.2. The land is leased to a local farmer and the treated effluent is used for alfalfa crops and/or pasture grass irrigation. Francis also has an agreement in place with an adjacent landowner where disposal can occur on an additional 20 acres, for a total land application area of 66 acres. This method of effluent disposal is permitted as Type II Reuse as defined in the Utah Administrative Code R317-3. Application of treated effluent is limited by nutrient loading and agronomic uptake rates. Treated effluent contains nutrients like nitrogen and phosphorus. Plants uptake these nutrients for growth, however, if more nutrients are applied than can be used the soil and groundwater can become polluted. The annual precipitation an area receives and type of crop grown are important factors to consider in the analysis. A well-designed land application site balances the nutrients contained in the treated effluent against the uptake rate of the receiving crop so as to prevent degradation of groundwater. The Utah Division of Water Quality (DWQ) reserves the right to require a nutrient management and agronomic uptake analysis on land application permits.



EFFLUENT WINTER STORAGE VOLUME REQUIREMENTS

FIGURE 3.4

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The capacity of the Francis land application site was evaluated based on the annual precipitation, crop water needs, crop specific agronomic rates, and crop yield specific to Summit County, Utah (See Calculations for Plant Uptake of Nitrogen in the Appendix). This evaluation was preformed for both alfalfa and pasture grasses. Results of the evaluation are presented in Table 3.3.

Table 3.3 Required Land Area for Effluent Disposal
Capital Facilities Plan
Francis City

Crop	Alfalfa	Pasture Grass
Total N Uptake[1] (lb/acre)	131.04	48.71
Required Irrigation Volume[2] (gal/acre)	467,978	260,068
Max Disposal Volume[3] (gal/acre)	628,489	233,621
Design Volume[4] (gal/acre)	500,000	230,000

Year	AADF (mgd)	Annual Effluent Volume	Alfalfa Land Area Required for Disposal (acres)	Pasture Grass Land Area Required for Disposal (acres)
2010	0.11	40.2	80.4	174.8
2015	0.14	51.1	102.2	222.2
2035	0.36	131.4	262.8	571.3
2050	0.84	306.6	613.2	1,330.0

1 Based on Summit County crop production and published USDA agronomic uptake rates.
2 Irrigation required based on average precipitation and evapotranspiration rates for Summit County.
3 Effluent total nitrogen concentration estimated at 25 mg/L, assume effluent provides all crop nitrogen.
4 Volume per acre used for design of land application site.

The monthly water requirement (includes both evaporation and transpiration) for alfalfa and pasture grass grown in Summit County, Utah is estimated at 24.53 inches and 19.17 inches per growing season, respectively (Hill and Banks, 2000). The required irrigation volume for each crop was determined by comparing monthly average precipitation (WRCC, 2011) to monthly crop water needs. Seasonal precipitation totals were reduced by a small percentage to estimate actual available water (Hill, 1999). Annual average yield for these crops is estimated at 2.6 tons per acre for alfalfa and 1.8 tons per acre for pasture grass (Godfrey et al., 2005). Based on the yield for each of these crops, published agronomic uptake rates for nitrogen were found to be 131.04 pounds per acre for alfalfa and 48.71 pounds per acre for pasture grass (USDA, 2011). In the absence of historical data, a textbook value for total nitrogen from secondary effluent of 25 mg/L was applied to determine the limits of land disposal (Metcalf and Eddy, 2003).

Alfalfa production requires a minimum irrigation amount of approximately 468,000 gallons per acre (gpa). If total plant nitrogen requirements are to be met by disposal of the nitrogen containing effluent approximately 628,500 gpa is required. The minimum irrigation volume of 468,000 gpa is exceeded by the maximum allowed disposal volume (based on nitrogen uptake) of 628,500 gpa. For the purposes of this study, the design irrigation volume for alfalfa used to determine the land area required for effluent disposal is 500,000 gpa. Although more water could be applied based on nitrogen uptake, there is risk in over watering as it could lead to saturated soil conditions that could affect crop health or drainage issues such as excess surface runoff and soil erosion. Alfalfa plants use nitrogen gas from the atmosphere and convert it, in a process called nitrogen fixation, to obtain this nutrient. The amount of nitrogen fixation required is based on nitrogen available from soil, fertilizer and water sources (Russelle 2004). In the case of effluent disposal for Francis, concerns from overwatering prevent the full nitrogen requirement from being met with effluent water. However, the nitrogen requirement remaining in the alfalfa will be met by nitrogen fixation. As shown in Table 3.3, 80.4 acres of alfalfa cropland is required for effluent disposal based on a disposal rate of 500,000 gpa. The existing land area available for disposal is 66 acres, an additional 14.4 acres is needed to dispose of effluent without increasing the nitrogen concentration of the underlying groundwater.

The effluent disposal site has also been used at times as a feedlot for cattle with pasture grasses grown as the feed crop. Nitrogen uptake from pasture grass crops is much less than that required for alfalfa. Table 3.3 shows that nitrogen uptake is 40 percent less in terms of pounds per acre for pasture grass when compared to alfalfa. Nitrogen uptake limits the amount of effluent disposal. Only 90 percent of the irrigation need can be met with effluent. Additional low nitrogen irrigation supply would be required, nitrogen concentrations in the effluent would need to be reduced with additional treatment, or crop yield (and as a consequence nitrogen uptake) may be reduced by insufficient water. For the purposes of this study, the design irrigation volume for alfalfa used to determine the land area required for effluent disposal is 230,000 gpa. As shown in Table 3.3, 174.8 acres of alfalfa cropland is required for effluent disposal based on a disposal rate of 230,000 gpa. The existing land area available for disposal is 66 acres, an additional 108.8 acres is needed to dispose of effluent without increasing the nitrogen concentration of the underlying groundwater. Because of the large area required, pasture grass is not recommended as a receiving crop for effluent disposal.

3.0 IMMEDIATE TREATMENT NEEDS (INTERIM PROJECT)

Several deficiencies in the current Francis wastewater treatment systems have been identified in this section. First, the lagoons no longer have sufficient detention to meet the requirements of facultative treatment. Second, the winter storage pond, Pond 4, does not have sufficient storage capacity. Last, the capacity of the land application facility has been exceeded and is at risk for causing nitrogen contamination of groundwater.

In Chapter 5, treatment alternatives that address the full 50-year planning period and possible changes to effluent disposal methods will be presented as long-term options for Francis. However, there are treatment system deficiencies that require immediate attention. Francis needs to consider a project to correct the deficiencies and bring treatment within compliance of state standards until a long-term option could be built and brought online. Upgrades and facilities built as part of the interim project may be abandoned after a few years of use or could be incorporated into the future project depending on the treatment alternative selected.

The project should consist of the following improvements: converting the lagoons to an aerated system, adding additional winter storage capacity, and increasing the size of the land application area. For cost estimation purposes, the interim improvement project is sized for 2015 design flows or 516 ERUs. Aeration capacity is sized for an annual average day flow of 0.14 mgd and influent BOD_5 loading of 234 pounds per day (See Table 1.4). Storage capacity in Pond 4 needs to be increased by 9.1 million gallons for a total storage capacity of 18.6 million gallons (See Table 3.2). The size of the land application site needs to be increased by 36.2 acres for a total disposal area of 102.2 acres (See Table 3.3). A cost estimate for these improvements is presented in Table 3.4. Land acquisition costs are not included. It is assumed that Francis could build winter storage facilities on existing property and find agricultural users for effluent disposal.

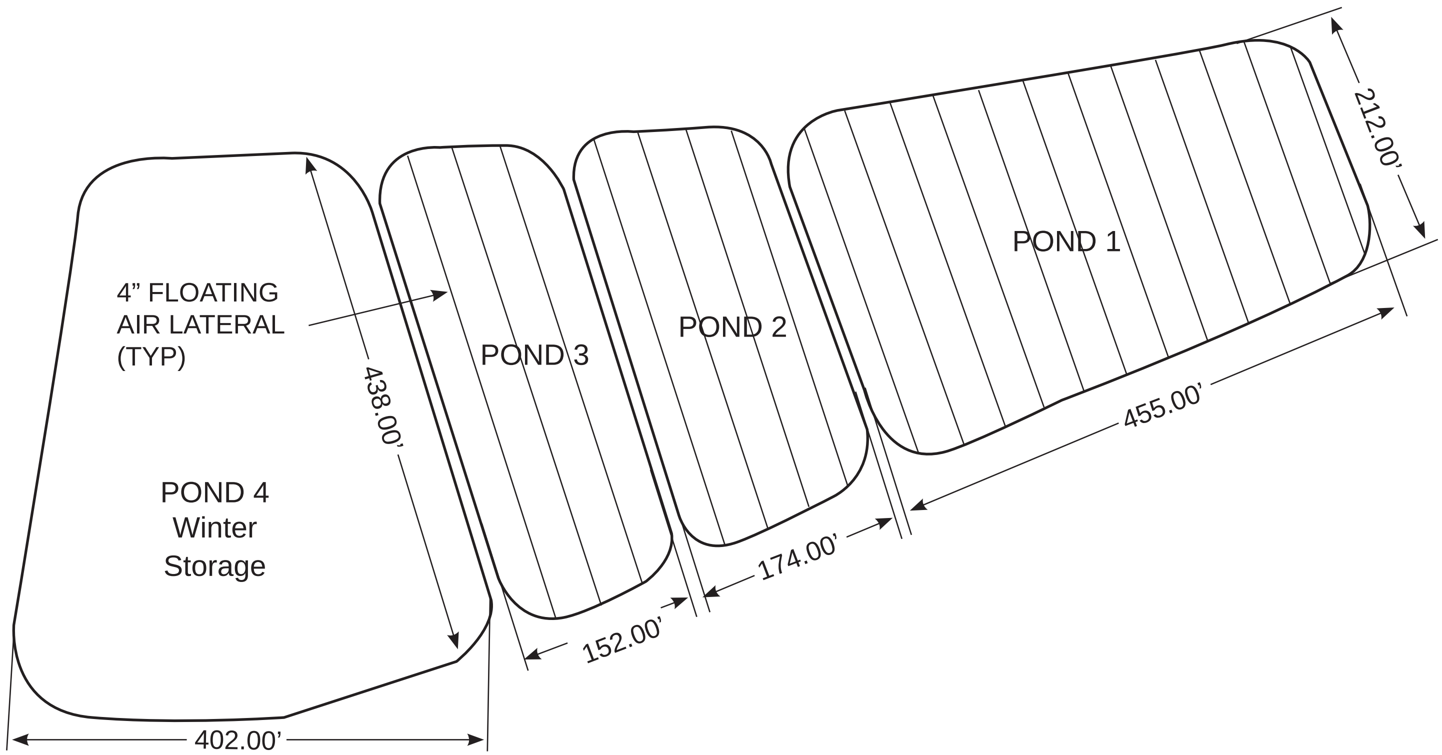
Aeration equipment will include blowers in an enclosed building with airlines running out to diffusers in the lagoons, or floating aerators that are held in place with steel cables and powered from electrical gear enclosed in a building. Although the cost between the aeration methods is similar, the addition of diffusers to the lagoons is the option shown in the Figure 3.5 to illustrate a potential layout. The lines across the ponds represent diffuser assemblies.

In Figure 3.6 a proposed new storage pond is shown located on the existing land application site. This new pond would be built balancing cut and fill, to a depth similar to Pond 4. This new pond will provide 9.1 million gallons of additional storage capacity, for a total storage capacity of 18.6 million gallons. An additional 2.5 acres of land are required to make up for the loss in disposal area.

Although sized for the year 2015, the aeration portion of this system could be used to meet treatment capacities until 2028 (an average annual day flow of 0.237 mgd), just by adding additional blower equipment. The ability to store and dispose of treated effluent is the limiting factor on operational life of the interim solution. This interim project could be built and online in early 2013. The need for this interim solution will be revisited with the recommendations from Chapter 5.

Table 3.4 Interim Project Cost Estimate
Capital Facilities Plan
Francis City

Item	Unit	Quantity	Total
Mobilization, O&P	LS	1	$40,000
Lagoon Aeration	LS	1	$60,000
Blower/Elec Building	LS	1,000	$200,000
Winter Storage Ponds – 2.5 acres	CY	30,000	$300,000
Yard Piping	LS	1	$50,000
Sitework	LS	1	$30,000
Electrical	LS	1	$100,000
Subtotal			**$780,000**
Contingency (25%)			$195,000
Estimated Total Construction Cost			**$975,000**
Engineering			$156,000
Estimated Total Project Cost			**$1,131,000**



INTERIM IMPROVEMENT PROJECT
CONCEPTUAL LAYOUT

FIGURE 3.5

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INTERIM IMPROVEMENT PROJECT CONCEPTUAL STORAGE POND EXPANSION LAYOUT

FIGURE 3.6

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Francis City

Capital Facilities Plan

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COLLECTION SYSTEM EVALUATION – FUTURE POPULATION

1.0 INTRODUCTION

As part of the Francis City Capital Facilities Plan, the capacity and conditions of the existing collection system were evaluated. A software model of the current system was built and calibrated against existing conditions. The existing system model was used as a starting point to generate 5, 10 and 25-year future models that evaluate and identify infrastructure necessary to deliver the projected flows to the current treatment facility location through the year 2025. Modeling past the 25-year condition was not performed, rather it is recommended that the model be revisited and updated periodically in the future to improve long-term forecasting.

This chapter describes the future collection system scenarios, the development of the software model, results from the investigation of conditions in the future system, and identifies potential deficiencies. The evaluation of the collection system was done for 5, 10, and 25-year conditions with population and flow data projected from 2010 data as described in Chapter 1. The collection system modeling software used was Innovyze H20Map Sewer. The input data to the software model was taken from as-built, record drawings, and zoning maps that were provided by Francis City and parcel maps provided by Summit County. The system was evaluated against Utah Administrative Code R317-3 Design Requirements for Wastewater Collection, Treatment, and Disposal Systems (R317) for compliance.

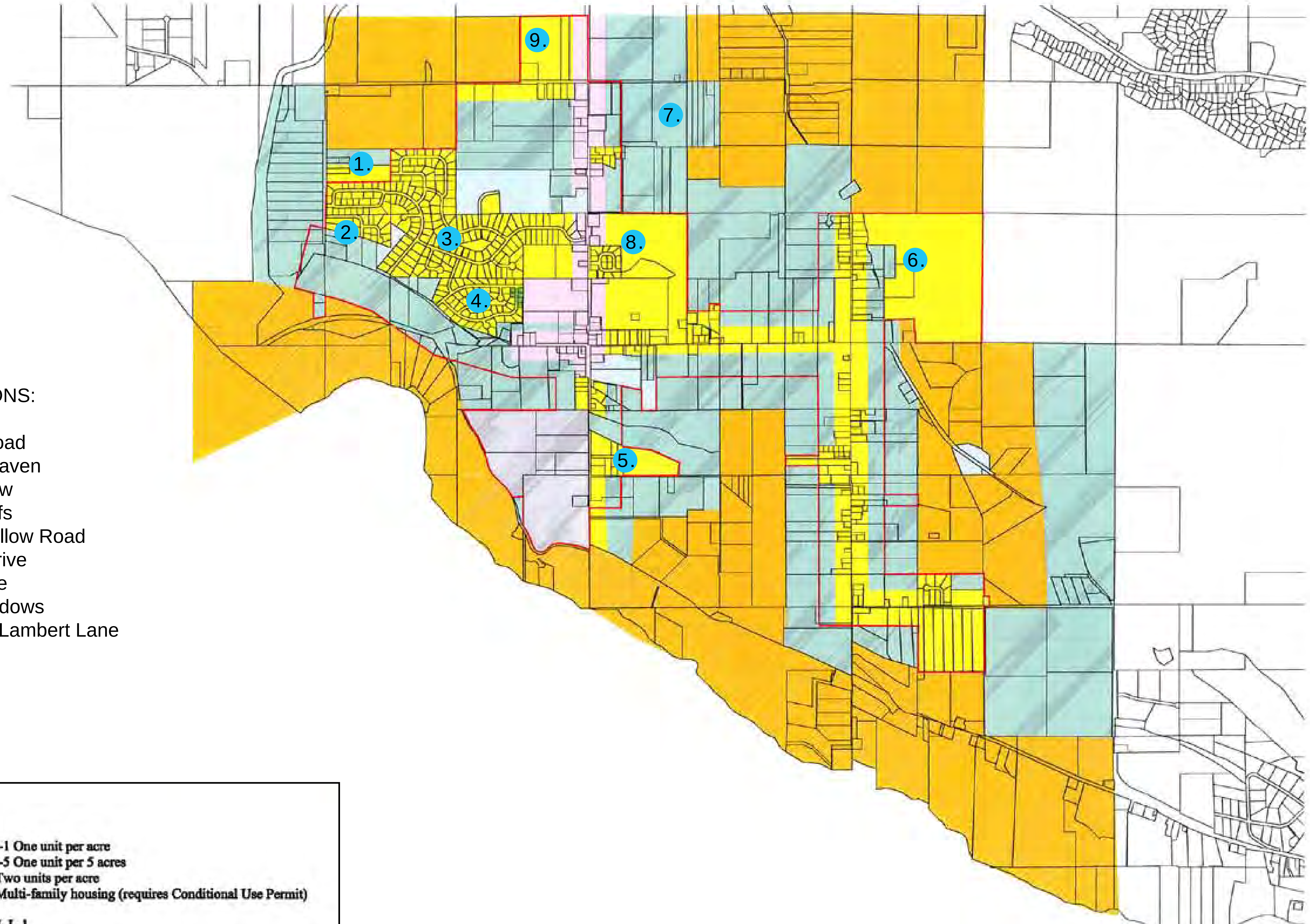
2.0 DESCRIPTION OF FUTURE COLLECTION SYSTEM MODELS

2.1 Overview

The 5, 10, and 25-year future collection system models used the 2010 existing model as a starting point. During each of the future scenarios, the population projection was used as a guide for future wastewater flow rates. The subdivisions that are already in development were modeled at maximum build out before other areas of growth were considered. Once the subdivisions had reached designed capacity, the zoning map that was provided by Francis was used to estimate locations of future residential growth. In the future models, the Residential R-1 zoning acreage was utilized primarily before estimating growth in other zoning designations. See Figure 4.1 for the zoning map of the current Francis Town boundary and outlying areas.

2.2 Lift Stations

The current lift stations on Hallam Road and Foothill Dr. were evaluated in each of the three future model scenarios. As the future collection system models were again developed as



SUBDIVISIONS:

1. Hallam Road
2. Summit Haven
3. Wild Willow
4. River Bluffs
5. Spring Hollow Road
6. Foothill Drive
7. Page Lane
8. Uinta Shadows
9. Village at Lambert Lane

ZONING DESIGNATIONS

- AGRICULTURE AG-1 One unit per acre
- AGRICULTURE AG-5 One unit per 5 acres
- RESIDENTIAL R-1 Two units per acre
- RESIDENTIAL R-2 Multi-family housing (requires Conditional Use Permit)
- COMMERCIAL C-1
- LIGHT INDUSTRIAL L-1
- PUBLIC FACILITIES
- PARCELS
- TOWN BOUNDARY

Zoning Map provided by Francis City

FRANCIS ZONING MAP

FIGURE 4.1

FRANCIS CITY
CAPITAL FACILITIES PLAN

Peak Day Flow, the pumps in the lift stations were modeled as steady state flow to match the incoming wastewater quantity. Because there was no indication of when the Jordanelle State Park would re-open, the lift station that carried flow from the park to the Francis collection system was again shown in the model but did not contribute any flow to the system.

2.3 Piping and Manholes

The Piping and Manholes were evaluated in the 5, 10, and 25-year models primarily by looking at the capacities. Evaluation of soundness, infiltration and inflow, and material condition were not evaluated in this study. The ratio of wastewater flow depth (d) and pipe diameter (D) was evaluated for determining if the pipes and manholes had reached capacity. The recommended d/D value of 0.75 or 75% was designated as "full" pipe because beyond this point, the pipe begins to loose hydraulic capacity. Figures of the future collection system models showing d/D values can be seen for each of the future scenarios in Appendix 4.

3.0 COLLECTION SYSTEM MODELS

The collections system model was done in Innovyze H20Map Sewer. This software is a GIS based software package that provides the user with wastewater collection modeling and also stormwater collection modeling. The software lets the user model a collection system for a steady state condition and also simulates the system for an extended period of time. The extended period of time model allows for peaking factors and input of diurnal patterns. Because of the limited flow data available, the evaluation of the collection system was only done for the steady state condition under Peak Daily Flows. The Peak Day Flow would simulate a worse case scenario for the system. Steady state flow was the only option for modeling the Francis collection system because the flow into the lagoons is monitored only once a day.

The flow data for the future scenarios was calculated by using the 2010 average household size of three people per home as stated in Chapter 2 and the calculated 2010 gallons per person per day of 103 as stated in Chapter 1. During the flow modeling of each of the future scenarios, a flow of 0.575 gpm was assigned to each current and future estimated houses to arrive at the projected flow populations. Utah state code R417 was again used in assigning flow projections to commercial areas.

3.1 5-Year Future

The collection system was modeled at the Peak Day flow for 2015 of 0.39 million gallons per day (MGD). To arrive at this projected flow, the Wild Willows subdivision was modeled at complete build out. The record drawings for the Wild Willows subdivision showed a total of 195 lots in the Phase I and Phase II developments. For 0.575 gpm for each household, the Wild Willows subdivision would contribute roughly 112 gpm to the collection system at complete buildout. The flow for the existing model was adjusted to include the future homes to arrive at the 5-year projection of 0.39 MGD. It was estimated that the majority of the future growth would take place in the Wild Willows subdivision so the rest of the Francis collection system was not adjusted for 2015. With the Wild Willows subdivision at capacity, the Hallam Road lift station had an incoming flow of 141.5 gpm. At this flow, one pump, with a design point of 700 gpm, was able to handle all the incoming flow to the lift station. The second pump at the Hallam Road lift station was modeled in the standby position. The Foothill Dr. lift station did not change from the existing configuration, which was modeled with 19 gpm incoming flow with one pump running and the second pump in standby.

3.2 10-Year Future

The projected flow for 2020 for Peak Day was 0.53 MGD or 367.77 gpm. The River Bluffs, Summit Haven, and Village at Lambert Lane subdivisions were added at complete build-out. The subdivisions added 62, 12, and 12 lots respectively with corresponding flows of 35.65 gpm, 6.9 gpm, and 6.9 gpm. Adding these subdivisions to the model still did not provide enough flow to reach the projection 2020 Peak Day flow of 367.77 gpm. Areas that were not current planned communities would have to be added to reach the population projections. The zoning map was used to find acreage that could be used in the model for future population growth. The Residential R-1 acreage was evaluated first. For the 10-year future, the acreage southeast of Wild Willow was added for an estimated 30 more homes for a flow rate of 17.25 gpm. The Residential R-1 acreage on the Zoning Map shown on the south end of Spring Hollow Rd was considered for the 10-year future model but was determined unfeasible because of the ravine that the sewer line would have to cross. Crossing the ravine would either necessitate a bridge to span the ravine or a lift station to lift the wastewater back up out of the ravine. It was determined that other residential areas shown on the zoning map would more likely be developed first. The acreage east of Uinta Shadows was partially added to reach the flow projections. This zoning area was estimated to be 83 acres which would provide 166 homes and a total added flow to the collection system of 95.45 gpm. The partial flow of 31.05 gpm or 54 homes was added to the 10-year future model. With the future population added to the system, the model was run at steady state and the collection system was evaluated. The Hallam Rd lift station was modeled at steady state with one pump running at the incoming flow rate of 199.5 gpm and the other pump in standby. This incoming flow rate is still well below the design point of the lift station pumps. Because future development wastewater flows were not added to the Foothill Dr. lift station, it was modeled the same as in the existing and 5-year future models.

3.3 25-Year Future

The Peak Day flow for the year 2035 was projected to be 0.97 MGD or 675.37 gpm. To reach this Peak Day flow, the Residential R-1 zoning areas were again evaluated first for future developments. The remaining 112 estimated homes, or 64.4 gpm of the zoning East of Uinta Shadows was added to the model. The Residential R-1 zoning east of Foothill Dr was added to the model for an additional 114 acres or 228 homes. This provided an additional flow of 131.1 gpm to the collection system. The smaller R-1 zoning area on Hallam Road was then added for an additional 15 homes or 8.6 gpm. At this point, the Residential zonings had been maximized and the Agriculture AG-1 areas would need to be evaluated for future growth at one unit/acre. The three main AG-1 areas that were looked at were the east end of 3200 S or the Jones Annex, the Page Lane acreage, and the AG-1 acreage east of Uinta Shadows. Because the areas on Page Lane and Uinta Shadows were more centrally located to the system, these were added instead of the Jones Annex area. The AG-1 area east of Uinta Shadows was estimated at 221 acres or 221 homes. Of the possible 221 homes for that area, 55 homes or 31.6 gpm were added to the system. The Page Lane AG-1 areas were estimated at 165 acres or 165 homes. Added to the 25-year future model were 125 homes or 71.9 gpm of the potential homes for that area. These added population flows were enough to reach the projected flow rates for 2025. The model was again run at steady state and the system was evaluated. The Hallam Road lift station was run at steady state with one pump running at the inflow of 208.15 gpm and the second pump in standby. As part of the development agreement for the Foothill Drive R-1 zone, the developer must install a new sewer line from Foothill Drive to Highway 32. This new sewer line could carry all the flow from the Foothill Dr area and the Foothill Dr lift station could be removed with some modifications to the existing sewer line on Foothill Dr. In modeling these future flows, the 131.1 gpm from the new Foothill Drive development was carried in the new sewer line and the existing flow of 18.15 gpm was sent to the Foothill Drive lift station and set to operate with one duty and one standby pump. The duty pump was set to run at the inflow rate of 18.15 gpm.

3.4 Future Projection Considerations

In Chapter 1, a population was projected out 50 years to the year 2060. The projected population in 2060 was 8300 people, which is almost eight times what the population of Francis is currently. Developments to accommodate this increase in population would have to extend into large portions of the agriculture zoning areas and ultimately require that these zoning designations be reevaluated for greater densities. The residential zonings would also more likely be rezoned for greater population densities. Because these zoning designations would be very difficult to estimate at the current date, the flow rates for the wastewater collection system were not evaluated for 50 years. Significant changes to the collection system would need to be made to accommodate this growth. Main trunk lines would possibly need to be upsized or a parallel line be laid adjacent to the existing lines. Pump stations would also need to be reevaluated once the future zoning designations were addressed.

4.0 COLLECTION SYSTEM MODEL RESULTS

4.1 5-Year Future

With the future population added and the model run, the system was evaluated for reserve capacity by looking at the d/D value which corresponds to the water depth (d) vs pipe diameter (D) ratio. The system was also evaluated for any velocity issues that might occur. The 5-Year future model showed that the system still had plenty of reserve capacity. The highest d/D value for any branch was 0.44 or just under half full. This was the collection line that came off Lambert Lane and carried the entire wastewater flow to the lagoons.

The incoming flows to the lift stations were still well below the design capacity of the pumps for the respective lift station. With an increase in population and wastewater flow in the Wild Willows subdivision, the velocities in the pipes increased but were still not above the recommended 2 ft/s for the majority of that subdivision with some branches still below 1 ft/s. The collection line carrying wastewater on 3200 S. and Willow Way were again below the recommended velocity as seen in the existing condition model. Foothill Dr. to the lift station was also another area of the collection system that showed low velocities for the Peak Day Flow event.

4.2 10-Year Future

The 10-year future model showed that the system again had plenty of reserve capacity. The collection line that carried wastewater from Lambert Lane to the Lagoons was the highest d/D value at 0.5 with a large majority of the collection system around 0.2 or less.

The lift stations were able to handle the incoming flows at the projected population. The velocities in the Wild Willow subdivision increased some with the addition of the built out subdivision but again showed areas of concern with velocities below 2 ft/s. Without added flow to Foothill Drive and Willow Way, these collections line still showed lower than recommended velocities for Peak Day Flow.

4.3 25-Year Future

The main line that carries wastewater from Lambert Lane to the Lagoons had reached a d/D value of 0.8 for the 25-year future flow scenarios. This pipe is now considered full and will result in backwater to the manholes. Some stretches of pipe along Lambert Lane were also above the recommended maximum d/D value of 0.75. Highway 35 and Highway 32 also had areas that were at or above capacity in the gravity lines. This was due to the large development that was added east of Foothill Drive.

The Foothill Drive Lift station could be removed with the addition of the new sewer line from Foothill Dr to Highway 32. In the 25-year future model, the existing lift station was set to run at the previous scenario flow rates of 18.15 gpm and operated without problems with plenty of capacity.

Little change was made to the Hallam Road lift station and it appeared to function adequately with the 25-year future projected flows with room for build out if the acreage in that area were to be developed.

The velocities in the pipes were again a problem for the 25-year future scenarios with multiple location in the system never reaching 2 ft/s at the Peak Day Flow, primarily the Wild Willow subdivisions and the main lines down Willow Way and 3200 S.

5.0 RECOMMENDATIONS

5.1 Pipe Velocities

In each of the collection system model scenarios, there were areas in the system that showed velocities less than the recommended 2 ft/s. This will result in built up solids over time and create odor problems in the system. It is recommended that a program be implemented for periodic flushing of pipe and manhole systems. This will keep the solids from settling in the pipe and creating odor. It is also recommended that any future additions to the system be evaluated for maximum build out and design the collection system accordingly so that at a Peak Day Flow, a 2 ft/s velocity in the pipe could be achieved.

5.2 Main Gravity Line

The collection piping appears to be adequate for the projected flows out to 25 years. At this point the main trunk line down Lambert Lane and to the lagoon area will either need to be upsized or a parallel line be added to allow for the higher flow rates to pass unrestricted.

5.3 Lift Stations

In the future, if the development to the East of Foothill Dr included the addition of the new sewer line from Foothill Dr to Highway 32, the additional flow that was sent to the lift station on Foothill Dr could be piped into the new gravity line. Some modifications would have to be made to the sewer line on Foothill Dr. This would affect 4 sewer manholes and roughly 1300 lf of 8” sewer line. By making these adjustments to the existing sewer line, the lift station could be removed and the operating costs and maintenance costs of this station would cease.

5.4 Capital Improvements Costs

Cost estimates for the recommended collection system modifications were calculated based on assumptions made in arriving at the 5, 10, and 25-year future models. Capital improvements funds should be set aside to address the upsizing of the main lines, or laying parallel lines, on Lambert Lane and to the Lagoon for the 25-year future as these trunk lines will ultimately be affected with substantial developments on the east side of town that would add flow to the gravity flow system. Installing a parallel 10” line from Lambert Lane to the lagoons would require roughly 2480 LF of pvc sewer pipe and 8 manholes. The total cost of this line is estimated at $347,200 dollars. A new parallel line on Lambert Lane from Highway 32 to the sewer lines running to the Lagoons would require roughly 10 manholes and 4800 LF of 8” pvc sewer pipe. The total cost of this line is estimated at $643,200 dollars.

The cost associated with installing a new sewer line from Foothill Drive to Highway 32 is included in the development of the area East of Foothill Drive as part of the agreement. This cost was not evaluated but the cost of modifying the existing sewer line on Foothill Drive was evaluated. With roughly 4 sewer manholes and 1300 LF of 8” sewer line, the cost of modifying this line is estimated at $174,200 in today’s dollars. The cost estimates for the recommended improvements are shown in Table 4.1

Table 4.1 Collection System Modifications Cost Estimates
Capital Facilities Plan
Francis City

Location	Sewer Pipe Diameter (in)	Sewer Pipe LF	No. Manholes	$/LF*	Total $
Lambert Lane to Lagoons	Parallel 10”	2,480	8	$140/LF	$347,200
Lambert Lane	Parallel 8”	4,800	10	$134/LF	$643,200
Foothill Dr	Existing 8”	1,300	4	$134/LF	$174,200

*Includes trench excavation and backfill, asphalt cutting and patching, SDR-35 PVC sewer pipe installation including fittings, and one 4’ diameter manhole per 300 lf of pipe. Costs are in Today’s Dollars

Table 4.1 summaries the collection system projects necessary to meet the 25-year future flow condition. The total cost of these projects is estimated at approximately $1.2 million dollars. The 25-year future flow corresponds to an ERU value of 1,215.In the immediate future, funds should be established for the sewer manhole and trunkline flushing program. This will be dependant on whether the necessary equipment is purchased and a crew capable of operating it can be hired and trained, or an outside service is contracted with. The timetable for flushing will be on an as needed basis and should be reevaluated periodically throughout the years as property is developed and population is added to the various subdivisions that have been mentioned as problem areas.

TREATMENT ALTERNATIVES EVALUATION

1.0 INTRODUCTION

The purpose of this capital facilities plan is to identify and evaluate potential wastewater treatment and discharge options for Francis City (Francis). In previous chapters, the projected wastewater flows and loadings from Francis over the 50-year planning period and the limitations of the existing facilities were presented. Treatment alternatives considered in this section will provide capacity through the year 2060 and meet discharge requirements based on the method of disposal. This chapter provides a description of each potential treatment alternative, evaluates the alternatives using economic criteria, and provides a recommended treatment alternative with an implementation plan.

1.1 Scope

This study is not intended to select the precise treatment units and associated equipment. The scope is limited to an evaluation of general types of processes. It is anticipated that a pre-design report will be prepared prior to detailed design in which specific treatment units and equipment will be selected. Therefore, when looking at the treatment options, it should be remembered that the processes used for each option are representative only and are not intended to be the specific installed equipment.

Some of the treatment options cannot meet all of the expected future effluent water quality requirements. For these options it would be necessary to change processes and/or supplement them with additional facilities in forming a 50-year alternative. These alternatives would be phased and are evaluated with the costs and impacts for these additional facilities required to meet the effluent permit limits during the 50-year planning period.

Capital costs for each alternative are estimated using current economic conditions (i.e. 2012 dollars). These costs are based upon industry estimation practices and recent bid costs for similar treatment processes. Cost estimates in this facility plan provide a level of accuracy of 50 percent greater or 30 percent less than the actual construction cost. This level of estimation is used to quickly determine project feasibility or screen conceptual project alternatives. Similarly, the annual operation and maintenance costs for each alternative are estimated in today’s dollars.

2.0 REGULATORY DISCHARGE REQUIREMENTS

As was previously noted, Francis currently land applies all effluent and does not discharge to a water body of the state. As Francis continues to grow, the availability of land for effluent disposal or the limitation of return flows associated with water rights may require different wastewater effluent disposal practices. Five disposal or discharge strategies are presented below, along with water quality standards typical of these strategies. The complexity of the wastewater treatment system will depend largely on the discharge location or strategy used by Francis in the future.

2.1 Current Discharge Requirements

Because Francis land applies all effluent, they do not currently have a discharge permit, however, they must meet the water quality standards of Type 2 Reuse. Type 2 Reuse is defined in the State of Utah as "Use of Treated Domestic Wastewater Effluent Where Human Exposure is Unlikely" (i.e. irrigating non-food crops). Type 2 Reuse water quality standards are presented in Table 5.1. Biological oxygen demand (BOD_5) is a measure of the wastewater strength (i.e. how much oxygen is required by microorganisms to break down the organic wastes). A reduction in the concentration of particles or solids suspended in the wastewater, measured as total suspended solids (TSS), is required during treatment as these solids can contribute to a lack of clarity and provide a means of transport for disease causing microorganisms. A pH measurement is used to determine the acidic or basic nature of a water sample. Treated wastewater is required to remain near the neutral value of 7.0, with an allowed range of 6-9. Effective disinfection of wastewater is determined by sampling for an organism known to inhabit the lower intestine of warm-blooded organisms, *Escherichia coli* (E. *coli*).

Table 5.1 Type 2 Reuse Water Quality Standards
Capital Facilities Plan
Francis City

Constituent	Units	Standard
Biological Oxygen Demand (BOD_5)	mg/L	<25
Total Suspended Solids (TSS)	mg/L	<25 average, <35 weekly average
Acid or Base Measurement (pH)	none	6-9
Disinfection (E. Coli)	Organisms/ 100mL	Weekly median of daily grab samples <126 No samples above 500

The existing wastewater lagoons are capable of producing an effluent in compliance with the current reuse standards.

2.2 Future Discharge Strategies and Requirements

Five discharge strategies for future disposal of treated effluent will be presented in this section, specifically:

- Type 2 Reuse (Agricultural Reuse)
- Type 1 Reuse (Parks and Golf Courses)

- Seasonal Discharge to Provo or Weber Rivers and Seasonal Type 1 Reuse
- Surface Water Discharge to Provo or Weber Rivers
- Rapid Infiltration Basins

Water quality limits for these potential effluent disposal options are shown in Table 5.2. Option 1 is similar to the current practice at Francis, which is to land apply all wastewater effluent to agricultural lands. While there are no nutrient limits for Type 2 Reuse, the nitrogen concentration of the effluent and the agronomic rate of the receiving crops define the acreage needed for proper disposal. As presented in Chapter 3, the 66 acres currently used by Francis does not protect against nitrogen pollution for the current flows and additional acreage is required to continue this disposal practice.

Type 1 Reuse is defined as, “Use of Treated Domestic Wastewater Effluent Where Human Exposure is Likely” (i.e. parks, golf courses, food crops, residential irrigation). Type 1 Reuse has more stringent water quality standards than the requirements for Type 2 Reuse.

Surface water discharge would likely require a high quality wastewater effluent as both the Weber and Provo rivers are protected for recreational uses, for cold-water species of game fish, and used to supply drinking water to downstream users. Effluent quality requirements for a new surface discharge would likely be at least as strict as a Type 1 Reuse standard, and likely would include limits for nitrogen and phosphorus. Nutrient removal is often required for effluent discharge to sensitive surface waters as excess nutrients in these waters can cause excess aquatic plant growth and be detrimental to overall water quality (known as eutrophication). Additionally, recent improvements in laboratory equipment and analysis have made it possible to detect trace levels of pharmaceuticals and personal health care products (PPCPs) that are released to environmental waters as a result of wastewater treatment. Although there currently are no standards or limits related to PPCPs for wastewater treatment, public perception and concern may drive future regulation that would require advanced levels of treatment. When Jordanelle Special Services District (JSSD) recently went through the permitting process for their new wastewater treatment plant, Type 1 Reuse and nutrient removal were required. There were also a substantial number of public comments received from downstream residents with concerns about PPCPs and how these trace compounds might impact the heath of people and livestock when discharged to the Provo River and associated canal systems.

Francis can expect a similar response to a request for a new surface water discharge (both seasonal or year round) to either the Provo or Weber River. A discharge permit application will be subject to intense scrutiny by the state and public, and advanced wastewater treatment techniques will be required to produce a high quality effluent. Francis would need to request a modification to the existing water quality management plan (208 plan established as part of the Clean Water Act) for the Provo River watershed or participate in the TMDL process to secure a loading allocation in the Weber River watershed. The UDWQ advised Francis that a new surface water discharge to either watershed is likely cost prohibitive (See Francis request letter and UDWQ response letter in the Chp 5 Appendix).

Rapid infiltration basins (RIBs) are basins designed to promote rapid infiltration followed by rapid percolation of treated effluent into the soil subsurface. They are typically used in areas with deep groundwater levels and high soil permeability. By design, RIB systems must comply with Utah Gound Water Protection Rule R317 – 6. The RIB system consists of a balance between hydraulic loading, infiltration, and drying cycles. The drying cycle is significantly longer than the hydraulic loading cycle. For this reason, areas with shallow RIB systems are not operated during the winter months (UDEQ DWQ). Due to a high water table and Francis's relatively long winter season the RIB system is not recommended as an effluent discharge strategy and will not receive any further consideration.

Table 5.2 Water Quality Limits for Potential Disposal Options
Capital Facilities Plan
Francis City

Option #	Option Description	BOD (mg/L)	TSS (mg/L)	TN (mg/L)	TP (mg/L)
1	Type 2 Reuse	25	25	-[1]	-
2	Type 1 Reuse	10	5	-	-
3	Seasonal Reuse/Seasonal Discharge	10/10	5/5	-/10	-/0.1
4	Surface Water Discharge[2]	10	5	10	0.1
5	Rapid Infiltration Basin	25	25	10-20	-

1 There is no current Ammonia/Nitrogen limit for land application, however if effluent TN is greater than 18 mg/L, Nitrogen will limit in determining land requirements for land application.

2 Nutrient limits as shown for meeting potential Tier 1N limit as proposed in the Utah DWQ 2009 Statewide Nutrient Removal Cost Impact Study.

Note: Although not shown in this table, as currently no regulations exist, public perception and concern may require advanced treatment for trace levels of pharmaceuticals and other compounds measureable in wastewater effluent prior to surface water discharge.

3.0 DESIGN CRITERIA

As discussed in Chapter 1, the population of Francis is projected to increase by eight times over the 50-year study period. Wastewater flows will follow this increase as shown in Table 1.4 increasing from a present day annual average day flow of 0.11 mgd to 0.84 mgd in the future. Expansion of a treatment facility to meet this increase will have to be accomplished in phases. In early discussions with Francis City Councilors, Carollo proposed an initial increase of two times the current capacity. This first phase would accommodate the expected immediate growth based on the number of lots permitted for development, but not yet occupied. However, Francis will require funding assistance from UDWQ, therefore the scale of the first phase project was increased to include a full 20-year planning period, a requirement for state funding. The design criteria for the first phase project is 0.36 mgd and will provide capacity through approximately 2035. Once the first phase expansion was complete, there would potentially be one or two additional projects to phase up to the planning level required capacity at 2060, of 0.84 mgd. The timing of expansion projects may occur faster or slower than outlined as a result of actual growth rates compared to these projections.

4.0 DEFINITION OF TREATMENT ALTERNATIVES

In the original scope of work for this project, four alternatives were identified as potential methods for treating the wastewater from Francis. Included with these alternatives was an identification of the disposal alternatives that could be met based on the level of treatment each provided. The treatment alternatives and potential disposal options are listed as follows:

- Alternative No. 1 Aerated Lagoon System for agricultural reuse (Type 2) disposal,
- Alternative No. 2 Lagoon system with deep bed filters for nitrogen removal and unrestricted reuse (Type 1),
- Alternative No. 3 Extended aeration process with biological nitrogen and phosphorus removal, with or without tertiary filtration for unrestricted reuse (Type 1) or surface discharge, and
- Alternative No. 4 Membrane bioreactor (MBR) with or without advanced oxidation processes for microconstituent removal for unrestricted reuse or surface water discharge.

Recent Carollo experience has shown that Alternative No. 2 ends up being more expensive than Alternative No. 3 and has a larger footprint. Additionally, Francis City Councilors expressed an interest in exploring potential regional treatment options. It may be possible to outsource treatment to one of the surrounding communities with existing wastewater treatment systems, specifically JSSD, Kamas, or Oakley. Given this information, the scope was adjusted to review three treatment alternatives (aerated lagoons, oxidation ditch, and MBR) and the fourth alternative is a regionalization option. The review of the regionalization option will be a rough estimate of feasibility and cost only, as negotiation of services with other communities is not included in the scope of this project. This chapter will review the treatment alternatives, present capital and O&M costs, and make a treatment recommendation.

4.1 Alternative No. 1 – Aerated Lagoon System

4.1.1 Description

This option consists of providing additional treatment and storage cells equipped with diffusers or floating aerators. Adding air to a lagoon system provides improved mixing, oxygen transfer to microorganisms, and improved BOD degradation. Aeration also improves conversion of the ammonia in wastewater to nitrite, the first step in the nitrification process. A minimum of three treatment cells and 30 days of hydraulic retention is required to meet state requirements.

Figure 5.1 provides a process flow diagram of this treatment option. Modifications include construction of additional treatment and storage cells, constructing a building to house blower and electrical equipment, miscellaneous yard piping and site grading improvements. Cost estimates include the evaluation of both shallow and deep treatment cells. Shallow cells are typically only 6 feet deep. Deep cells can be 10-15 feet deep, which allows for greater oxygen transfer efficiency. However, deep cells require more material to build wider, taller embankments.

4.1.2 Effluent Water Quality

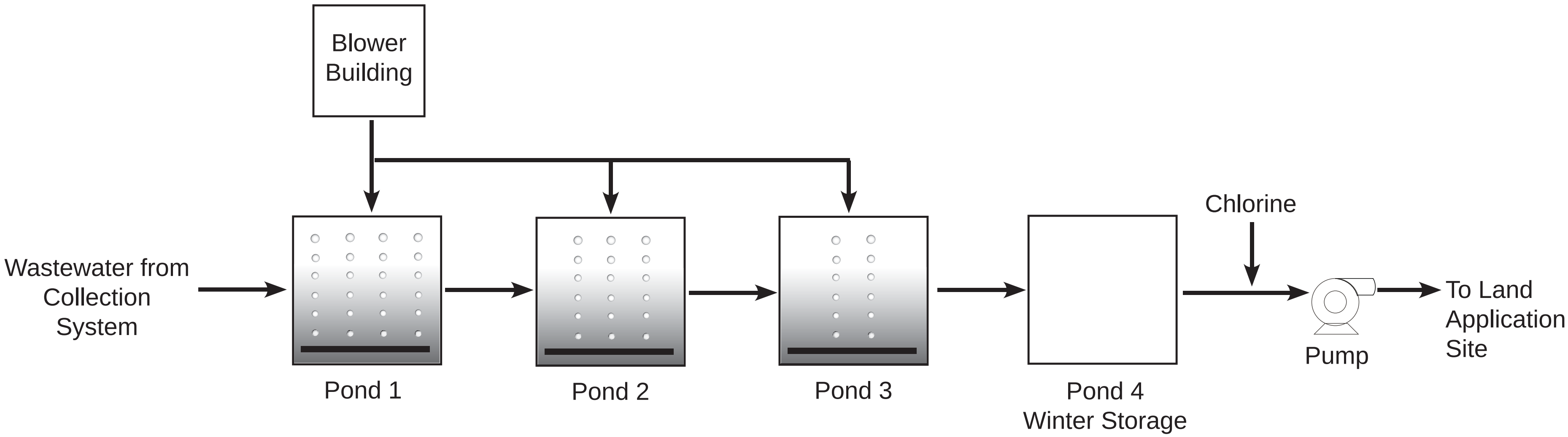
The expected quality of the effluent from the lagoons would be less than 25 mg/L for both BOD and TSS. Ammonia concentration probably would not be less than 10 mg/L and this alternative would not remove phosphorous. This alternative meets the disposal requirements of Type 2 reuse only. If the Type 2 reuse disposal option became prohibitive due to the large amount of land required for both storage and disposal, this treatment alternative would have to be abandoned and replaced with one of the other alternatives that can meet more stringent effluent water quality limits.

4.1.3 Implementation

Converting to an aerated system by adding diffusers to the existing ponds is not recommended due to solids accumulation in pond 1, and the lack of adequate capacity through the 20-year planning period.

Implementation of this option includes the construction of new treatment lagoons and winter storage cells built adjacent to the existing ponds, while the existing system remains in service. Both shallow and deep cell aerated lagoon systems were considered through 2060 (a summary of calculations is provided in the Appendix). The shallow ponds are less expensive for the 20-year planning period. In addition, once the new cells are constructed, pond 1 can be taken off line for solids drying and disposal.

The 50-year planning capacity of 0.84 mgd could be accomplished with parallel treatment systems each with three aerated cells. Concurrent with the construction of treatment cells would be the need of land area for winter storage ponds and Type 2 disposal of treated effluent. Francis would likely need to own the land required for winter storage ponds. Francis may also purchase land for additional land application area or there may be local farmers that would be willing to use the water if it could be delivered to them.



ALTERNATIVE NO. 1
AERATED LAGOON SYSTEM
PROCESS FLOW DIAGRAM

FIGURE 5.1

FRANCIS CITY
CAPITAL FACILITIES PLAN

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4.2 Alternative No. 2 – Extended Aeration

4.2.1 Description

This option consists of replacing the existing lagoons with a mechanical plant. For evaluation purposes, an oxidation ditch plant is used to represent all mechanical plants. There are numerous vendors and styles of mechanical plants that could be used. It is recommended that if the mechanical plant alternative is selected, a pre-design phase be conducted to determine which mechanical process and specific equipment to use.

A process flow diagram of extended aeration is shown in Figure 5.2. Incoming wastewater from the collection system would first pass through a new headworks facility. The headworks would screen inert debris and trash from the wastewater to protect downstream mechanical equipment.

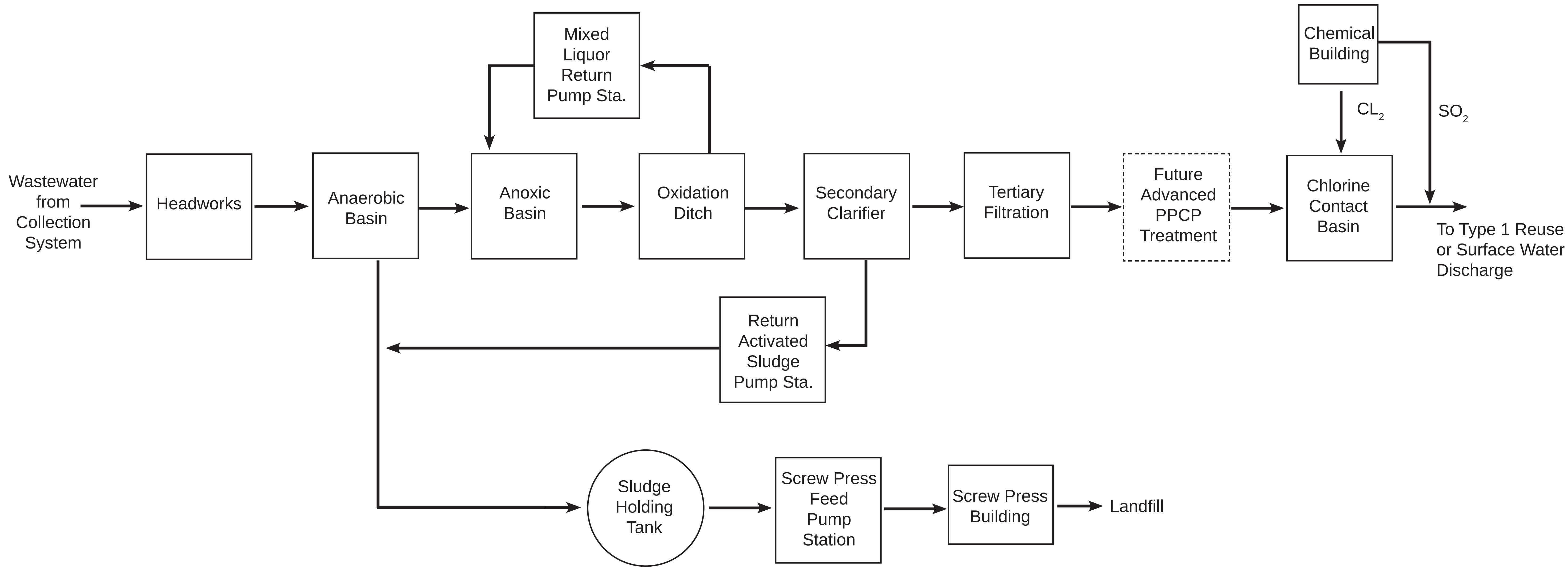
From the headworks, the screened wastewater would flow into the anaerobic basins. The purpose of the anaerobic basin is to create a low oxygen condition that causes microbes to release stored phosphorus. This low oxygen environment stresses the microbial community and results in more phosphorus uptake and storage by the microbes than normal when aerobic conditions occur later on in the process.

From the anaerobic basin, flow is conveyed to the anoxic basin. In the anoxic basin, raw wastewater is mixed with recycled mixed liquor from the aerobic treatment process. The mixed liquor has already passed through the aerobic basin where ammonia was converted to nitrate (nitrification process). In the anoxic basin, microbes use the oxygen stored in the nitrate of the RAS causing a release of nitrogen gas and effectively removing nitrogen from the wastewater (denitrification process). The anoxic basin also provides the benefit of a selector process in which the growth of filamentous organisms, that cause sludge to not settle, are selectively controlled because they cannot use the oxygen in the nitrate.

Wastewater flows next to the aerobic basin. In the aeration basin, oxygen is supplied by a mechanical means (e.g. surface mixers or submerged diffusers) for BOD removal and conversion of ammonia to nitrate. The result of aeration is the creation of microbial biomass, also known as mixed liquor suspended solids. Uptake and store phosphorus by microbes also occurs in the aeration basin, effectively removing up to 80 or 90 percent of it from the liquid wastewater.

The mixed liquor in the aeration basin or oxidation ditch is then conveyed to one or more secondary clarifiers, where solids are settled from the liquid stream. Clear liquid would overflow the weir of the secondary clarifier and then proceed to a filtration process.

Tertiary filtration is required to meet a Type 1 reuse standard. Filtration would occur by gravity through a sand or cloth filter or by forcing the effluent through a membrane by



ALTERNATIVE NO. 2
EXTENDED AERATION MECHANICAL PLANT
WITH BIOLOGICAL NUTRIENT REMOVAL
PROCESS FLOW DIAGRAM

FIGURE 5.2

FRANCIS CITY
CAPITAL FACILITIES PLAN

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mechanical pressure or vacuum. Suspended solids are captured and removed by filtration resulting in higher quality effluent

After filtration, disinfection is the last step prior to effluent discharge to surface waters or delivery to Type 1 reuse applications. Chlorine contact basins followed by sulfur dioxide addition for the removal of residual free chlorine is a common means of wastewater disinfection, as is passing the effluent through ultraviolet light reactors. Effectiveness of the disinfection process is measured by testing for the presence of bacteria (*E. coli*).

Settled solids are pumped back to the anaerobic basin as RAS, or wasted from the process as waste activated sludge (WAS) so as to control the quantity of microbial biomass. WAS would be pumped to a sludge holding tank and then mechanically treated to remove excess water. Dried solids are then processed further for compost or hauled to a landfill and used for daily cover.

4.2.2 Effluent Water Quality

The expected quality of the effluent from an extended aeration process would be less than 10 mg/L for both BOD_5. The inclusion of an anoxic basin in the process would allow the facility to be operated so that the total effluent nitrogen concentration would always be less than 10 mg/L, and could be less than 5 mg/L depending on seasonal and process conditions. Effluent ammonia would be 3 mg/L or less. The anaerobic basins would allow for effluent phosphorus concentrations of approximately 1 mg/L.

Tertiary filtration, required to meet Type 1 reuse, would allow for effluent TSS concentrations of less than 5 mg/L. Tertiary filtration would also allow for further reduction of phosphorus if required. Alumina based salts added upstream of the tertiary filter would bind with any soluble phosphorus remaining and create a solid that would be removed by the filtration process.

In the future, an advanced treatment technique targeting removal or destruction of trace pharmaceuticals and personal care products (PPCPs) may be required. The goal of this advanced treatment may be to reduce the presence of organic carbon, estrogen, or other compounds that indicate the presence of PPCPs. Processes currently being implemented or tested for this purpose include advanced oxidation by ozone, advanced oxidation by ultraviolet light and peroxide addition, and sorption removal by granular activated carbon. All three have been shown to be effective at reducing measurable concentrations of the target compounds mentioned previously.

4.2.3 Implementation

It is anticipated that an extended aeration process could be built adjacent to the existing lagoon system. Francis would have to acquire additional land, but this would allow the existing system to stay in service during construction of the extended aeration facility. Future phases could be built over the land currently occupied by the lagoon system.

4.3 Alternative No. 3 – Membrane Bioreactor (MBR)

4.3.1 Description

This alternative consists of replacing the existing lagoon system with a membrane biological reactor (MBR) plant. MBR technology involves a biological (anaerobic/anoxic/aerobic) process integrated with an ultrafiltration membrane system. Essentially, the membrane system replaces the solids separation function of secondary clarifiers and tertiary filter described in the extended aeration alternative. The advantages are high quality effluent with less of a footprint and infrastructure than the extend aeration alternative. Disadvantages may be higher complexity and intensive power usage, when compared to the extended aeration process.

A process flow diagram for the MBR process is shown in Figure 5.3. Wastewater from the collection system enters a headworks for screening and then proceeds to the biological treatment process. The biological treatment process includes anoxic and aerobic basins performing the similar treatment functions as described in Alternative No. 2.

Once wastewater has passed through the membrane, filtration has taken place, and all that remains is disinfection. Disinfection would be accomplished using chlorine or ultraviolet light as discussed previously.

4.3.2 Effluent Quality

MBR systems are capable of achieving effluent concentrations of less than 5 mg/L for both BOD_5 and TSS. The anoxic and anaerobic basins would allow for total effluent nitrogen and phosphorus concentrations of less than 10 and 1 mg/L, respectively. Chemical addition as described previously could further reduce the effluent phosphorus concentration to 0.1 mg/L or less if required. MBR effluent after disinfection would meet the requirements of both Type 1 reuse and a potential surface water discharge. A future process for treatment of PPCPs could be added after the MBR if required in the future. These advanced treatment processes were discussed previously for Alternative No. 2.

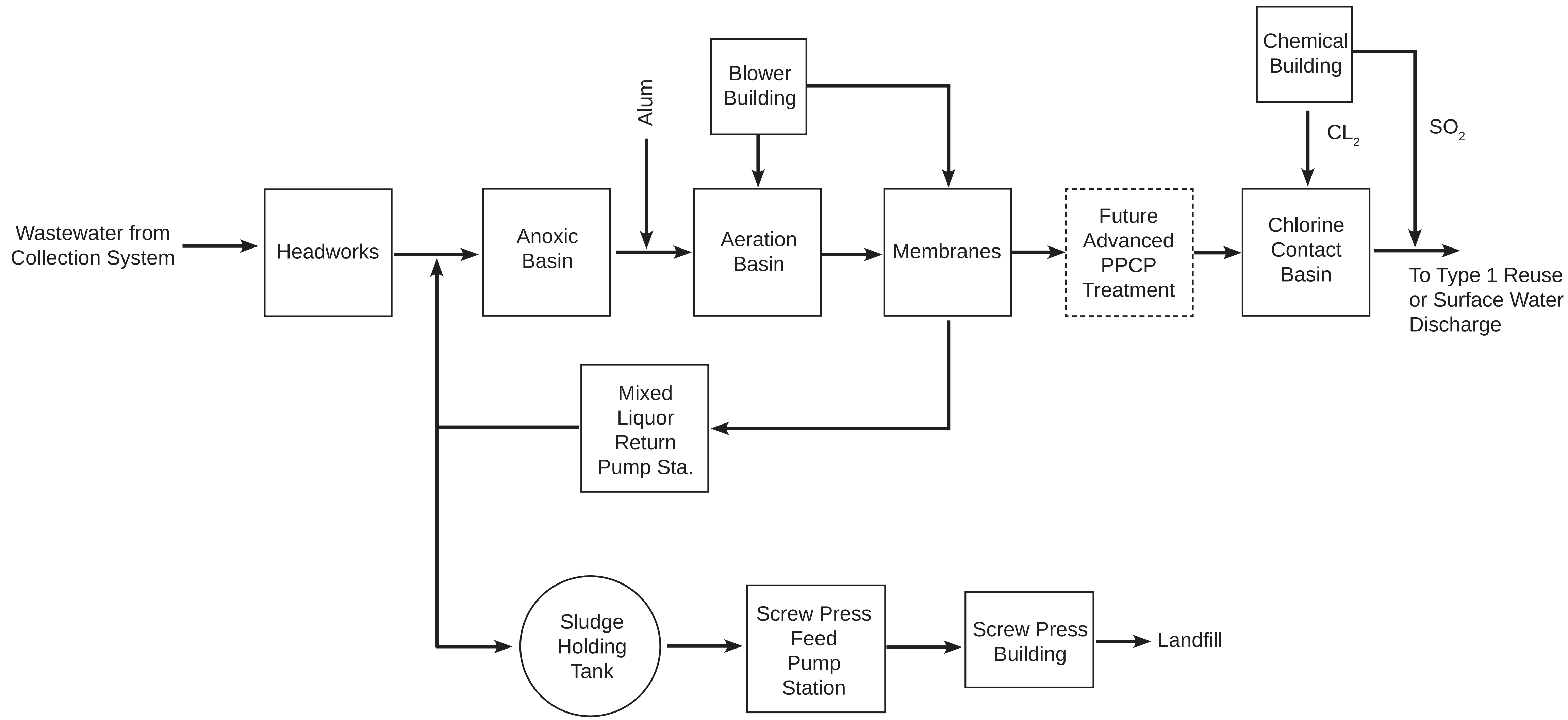
4.3.3 Implementation

It is anticipated that an MBR process could be built adjacent to the existing lagoon system. Francis would have to acquire additional land, but this would allow the existing system to stay in service during construction of the new facility. Future phases could be built over the land currently occupied by the lagoon system.

4.4 Alternative No. 4 – Regionalization Options

4.4.1 Description

This alternative was created to review potential options available to Francis for outsourcing the treatment of wastewater to an existing, nearby facility. There are three nearby



ALTERNATIVE NO. 3
MEMBRANE BIO-REACTOR (MBR)
PROCESS FLOW DIAGRAM

FIGURE 5.3

FRANCIS CITY
CAPITAL FACILITIES PLAN

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communities that Francis could potentially send their wastewater to for treatment: Jordanelle Special Services District (JSSD), Kamas, and Oakley. JSSD owns a MBR facility below Jordanelle Dam, in the northeast corner of Heber Valley that is nearing completion. Kamas has a lagoon facility just west of town, and Oakley has an MBR located in the middle part of town. This is a conceptual discussion of an alternative that may be open to Francis.

Francis could potentially negotiate a price to purchase spare capacity in one of these three facilities, assuming that there is spare capacity available. Wastewater collected within Francis would then be conveyed by a force main sewer to the treatment location. It is anticipated that Francis would need to purchase this capacity from the owner to cover capital costs spent to construct the existing facility. Francis would also incur a monthly or annual fee towards the cost of treatment. Francis would be responsible for modifications to the existing pump station or construction costs for a new pump station and force main to deliver wastewater to the treatment facility. There would be operating and maintenance costs associated with this pump station and force main as well. The existing treatment system would be closed and the land would become available to the city for other purposes.

Possible advantages to Francis in seeking a regionalization option include the following:

- Francis would pay a monthly or annual fee in place of staffing and maintaining a treatment facility,
- Land occupied by the existing treatment system would be available to Francis for other uses,
- Outsourcing treatment to JSSD, which discharges to the Provo River, would mitigate water rights concerns.

Possible disadvantages to Francis in seeking a regionalization option include the following:

- Francis will be subject to agreements and costs negotiated with others for the necessary service of wastewater treatment, and
- Outsourcing treatment to the Kamas or Oakley facilities, which discharge to the Weber River, may limit water usage within Francis from Provo River sources or require negotiation of water rights and water transfers between the Provo and Weber watersheds.
- Sending wastewater from Francis to an existing discharger may require modifications to an existing TMDL or 208 Plan. Modifications to an existing permit may be easier than a new permit but would still require a formal request and working through the regulatory process.

4.4.2 Effluent Quality

For this regionalization option, the three facilities have a discharge permit or are in the process of obtaining a discharge permit (JSSD). Effluent quality required from these facilities has already been defined, and will not be the concern of Francis.

4.4.3 Implementation

Implementation of this alternative begins with Francis approaching the three potential communities about the availability of excess capacity and conducting a feasibility study on the routing and cost of the required force main and pump station. If preliminary findings and discussion seem possible, a third party negotiator familiar with the costs of treatment infrastructure and annual operation and maintenance expenses should be consulted to help Francis in drafting purchase and service contracts.

JSSD may be the most attractive option for Francis to consider based on location, water rights issues, and potential spare capacity in the existing plant.

5.0 EVALUATION OF TREATMENT ALTERNATIVES

Evaluation of the treatment alternatives is based on the capital and annual costs present in this section. A preferred treatment alternative will also be identified. However, it is important to recognize that disposal options between the alternatives are not equal and disposal may ultimately govern over cost due to water rights or water quality concerns.

The construction cost and average annual O&M costs of each alternative are estimated in 2012 dollars. A summary of the cost estimates is presented in this section. Detailed cost calculations may be found in the appendix.

5.1 Capital Cost Estimate for Treatment Alternatives

The capital cost for each treatment alternative is the estimated construction cost plus the engineering cost. The construction cost includes the cost of equipment, facilities construction, an allowance for contractor mobilization and overhead and profit, a 30 percent contingency fee, and 16 percent fee for engineering. Costs are estimated by major categories of equipment or processes, site work, and buildings. Costs for these items are estimated from similar facilities on current or recent Carollo projects, adjusted for capacity, date of construction, and location. Vendors of specific equipment, such as the MBR and diffused air systems, were contacted for equipment costs. A local contractor was consulted for rates on excavation and fill materials. A contingency is set at 30 percent because a detailed design has not been prepared. Table 5.3 shows the estimated capital cost, including engineering cost, for each treatment alternative. The costs shown in Table 5.3 represent a treatment capacity of 0.36 mgd, and provide capacity through approximately 2035.

Table 5.3 Capital Cost Estimate for Treatment Alternatives
Capital Facilities Plan
Francis City

Alternative No.	Description	Capital Cost*
1	Aerated Lagoon System	
	Shallow Treatment Cells	$7.1
	Deep Treatment Cells	$7.9
2	Extended Aeration Process	$6.9
	with Filter	$7.3
3	MBR	$8.8
	with PPCP treatment	$9.7
4	Regionalization Options	$5-7

* Cost in million 2012 dollars.

As seen in Table 5.3, project costs for the different treatment options range from $5 million to almost $10 million. Alternative No. 2 has the lowest capital cost, with alternative No. 1 a close second. Alternative No. 1 has a high cost due to the amount of earthwork necessary to build the pond areas. Alternative No. 2 and 3 show the cost of switching to mechanical treatment. The capital cost shown for Alternative No. 4 is for treatment only based on buying capacity at the JSSD facility. Conveyance to JSSD was not considered as part of this study but is an additional cost item that would increase the overall cost of this alternative. As such, regionalization is likely a higher cost alternative that will not be discussed further in this study. A summary of the project costs for each option is included in the Appendix. Capital costs shown here include land acquisition costs, estimated at $50,000 per acre (as directed by former Councilor Adair). It is assumed that the existing land application would remain in service and that Francis would need to negotiate agreements with additional agricultural users or purchase additional land as needed.

5.2 Alternative O&M Costs

Annual O&M costs are estimated for each treatment alternative based on five major categories: labor, power, replacement materials, chemicals, and solids disposal. Annual labor costs are estimated based on anticipated staffing requirements to operate each alternative. Power costs are based on the estimated operating horsepower required for each treatment alternative, the expected hours of equipment operation, and an estimated rate of 10 cents per kilowatt-hour. The annual material costs are estimated at 5 percent of the total equipment cost. Annual material costs include replacements of parts and equipment maintenance. Chemical costs include chlorine and dechlorination chemicals as well as additional chemicals specific to each treatment alternative. Table 5.3 summarizes the estimated annual O&M costs for the treatment alternatives. A summary of the O&M costs for each individual alternative is included in the Appendix. O&M costs for Alternative No. 4 are not shown as they would have to be negotiated, however they would likely be similar to the range of values shown in Table 5.4.

Table 5.4 Treatment Alternative O&M Costs
Capital Facilities Plan
Francis City

Alternative No.	Description	Annual O&M Cost*
1	Aerated Lagoons	
	Shallow Treatment Cell	$72,000
	Deep Treatment Cell	$62,000
2	Extended Aeration Process	$143,000
3	MBR	$235,000

* Cost in 2011 dollars.

From Table 5.4 it can be seen that Alternative No. 3 has the highest O&M cost of the treatment alternatives. The high costs for Alternative No. 3 are due to the higher power consumption of operating the membrane plant as well as membrane replacements and cleaning chemical costs. The O&M costs for Alternative No. 3 do not include costs for an advanced PPCP treatment process. Although slightly less the O&M costs for Alternative No. 3, the costs for Alternative No. 2 are similar. The O&M costs for Alternative No. 2 do not include costs for tertiary filtration or an advanced PPCP treatment process. Alternative No. 1 has the lowest annual O&M cost, which is due to lower power and labor costs compared to the mechanical option.

5.3 Alternative Lifecycle Costs

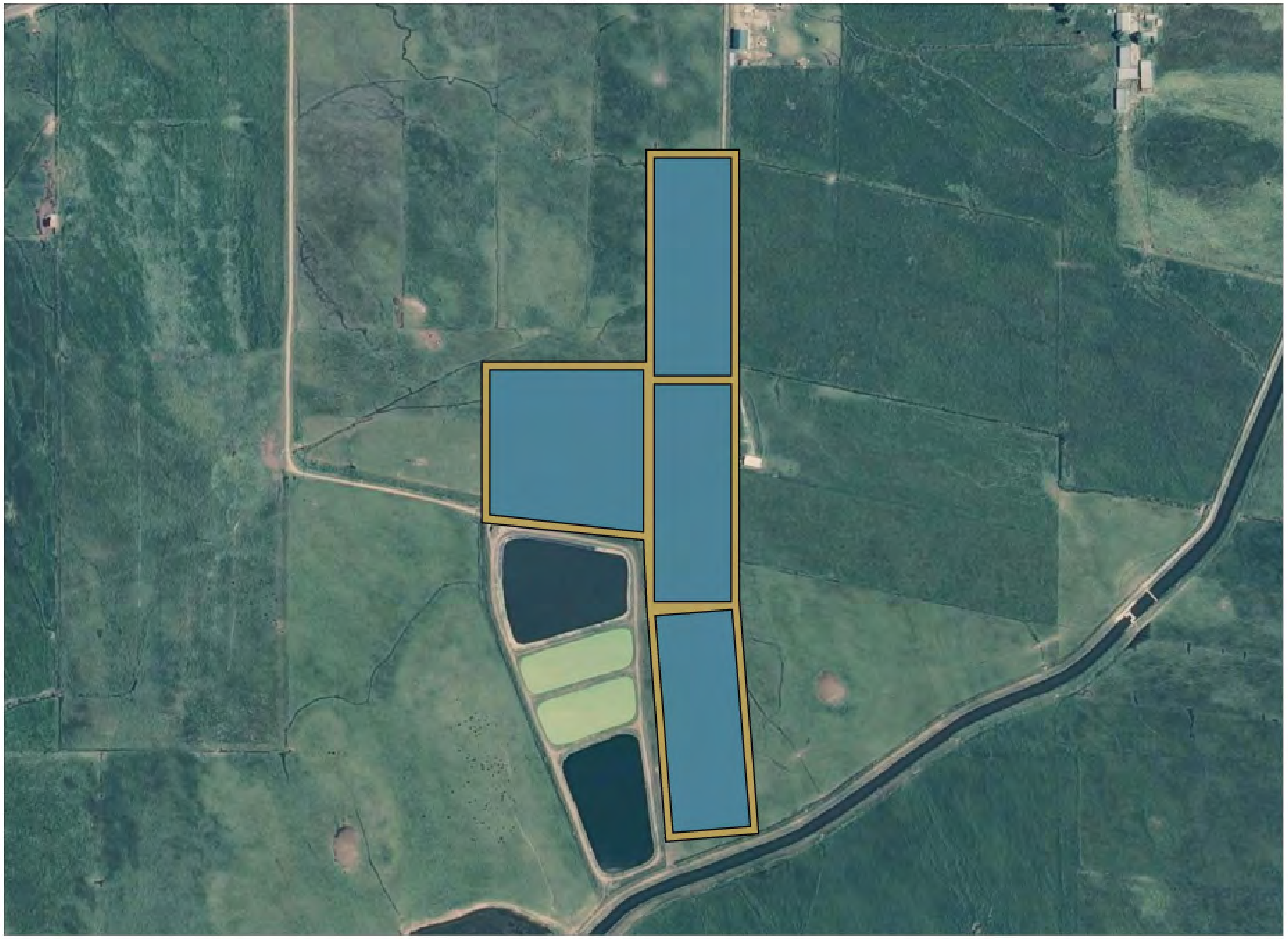
The lifecycle cost or present worth of a project is typically calculated over an assumed useful life of 20 years and is based on the initial capital cost and annual operating and maintenance (O&M) costs. A lifecycle cost is shown for each treatment alternative in Table 5.5. Alternative 1 Shallow Treatment Cells has the lowest overall lifecycle cost.

Table 5.5	Treatment Alternative Lifecycle Costs Capital Facilities Plan Francis City			
Alternative No.	**Description**	**Capital**	**Annual O&M Cost**	**Lifecycle***
1	Aerated Lagoons			
	Shallow Treatment Cells	$7.1 M	$72,000	$8.1 M
	Deep Treatment Cells	$7.9 M	$62,000	$8.7 M
2	Extended Aeration Process	$6.9 M	$143,000	$8.8 M
3	MBR	$8.8	$235,000	$12.0 M
*Lifecycle costs based on 4% at 20 years.				

6.0 RECOMMENDED ALTERNATIVE

The recommended alternative for wastewater treatment at Francis for the current 20-year planning period is Alternative No.1 Shallow Treatment Cells, which consists of expanding the current lagoon system by constructing aerated wastewater treatment and winter storage cells. This recommendation is based on Alternative No. 1 having the lowest 20-year lifecycle cost compared to the other alternatives. Alternative No.1 is also recommended due to the lack of a critical need to convert to a mechanical process in the near future. An aerated lagoon system is the cheapest means for Francis to handle immediate growth needs and address current system deficiencies. Figure 5.4 shows a conceptual site layout of the recommended alternative. The project will provide 0.36 mgd of treatment capacity and will meet Francis' treatment needs until approximately 2035 or 1,215 ERUs. Implementation of the recommended project will be discussed in the next chapter.

2035 SHALLOW LAGOON OPTION



CONCEPTUAL SITE LAYOUT OF RECOMMENDED ALTERNATIVE

FIGURE 5.4
FRANCIS CITY

CAPITAL FACILITIES PLAN

carollo

Francis City

Capital Facilities Plan

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PROJECT IMPLEMENTATION

1.0 INTRODUCTION

In this chapter Francis City's (Francis) implementation of the recommended project is discussed including the topics of funding assistance, loan repayment, public participation, and environmental impacts.

2.0 PROJECT IMPLEMENTATION

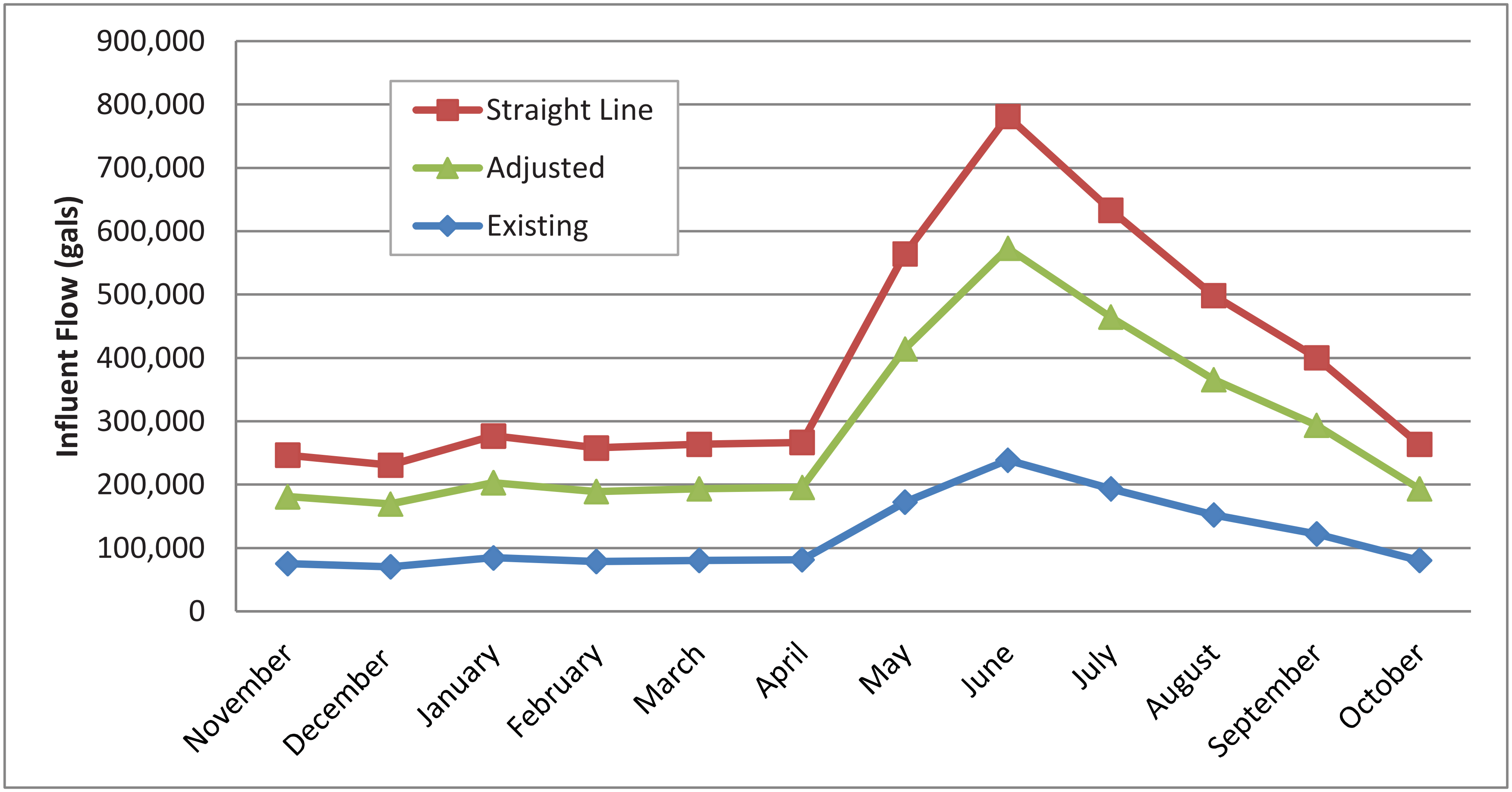
2.1 Refinement of Design Concept

In preliminary discussions with the Utah Division of Water Quality (UDWQ) about project funding, UDWQ staff first helped Francis determine the amount of money legally available for debt service. The sum of monthly sewer rates per ERU may not exceed 1.4 percent of the mean adjusted gross income (MAGI) on an annual basis. The MAGI for Francis is $52,593 based on state tax records. At 1.4 percent of the MAGI, Francis sewer rates may not exceed $61.36 per ERU per month. Francis currently has 371 ERUs, and at $61.36 per month for 12 months the maximum revenue available for O&M and debt service is approximately $273,000 per year. The capital cost of the recommended treatment alternative for Francis is $7.1 million dollars as outlined in Chapter 5. Even at zero percent interest the cost of repayment for this project is approximately $355,000, which exceeds Francis' ability to pay. Because the recommend project was too expensive a review was conducted as to how costs could be reduced.

Upon further review it was determined that inflow and infiltration (I&I) peak during summer months was a significant cost factor for the project as the summer peak was driving the size of the treatment cells. This summer peak was propagated through the full 20-year projections. The current peaking factor for Francis was determined to be 2.2 based on historical data (see Chapter 1), with June as the max month. In discussing this data with Francis and UDWQ, the source of I&I was thought to be the result of irrigation and high groundwater in the lower areas of the system, and overall is that assumes that I&I will remain constant rather than grow with the population. This assumption seems reasonable given that Francis has an I&I reduction program in place, has addressed past known I&I entry points, and requires new growth to meet modern sewer collection standards. In order to hold I&I constant, the I&I volume was estimated from the difference between the peaking factors calculated in Table 1.2 of Chapter 1 versus an equation that provides maximum month and day flow projections based on data collected from over 40 communities as published in the *Design of Municipal Wastewater Treatment Plants*. The constant I&I volume was added to each future projection for maximum month and day flows (see calculations in Appendix). The flow projections for the average annual day flows were determined by a straight-line projection of population growth previously, and remain unchanged. Table 6.1 lists the new projected influent flows resulting from the use of the WEF peaking factor adjustment. Figure 6.1 shows the difference graphically between the original flow projections and the projection adjusted for constant I&I. The size of the treatment lagoons is based on providing 30 days of retention so the small summer peak results in a capital cost savings (see Appendix for summary of calculations).

Table 6.1 Projected Flows and Loadings (with I&I adjustment)
Capital Facilities Plan
Francis City

Parameter	**2010**		**2015**		**2035**		**2060**	
	(mgd)		(mgd)		(mgd)		(mgd)	
Flow								
Average	0.11		0.14		0.36		0.84	
Max Month	0.24		0.29		0.57		1.21	
Max Day	0.30		0.35		0.66		1.34	
	(mg/L)	**(lbs/day)**	**(mg/L)**	**(lbs/day)**	**(mg/L)**	**(lbs/day)**	**(mg/L)**	**(lbs/day)**
BOD_5								
Average	200	183	200	234	200	600	200	1401
Max Month	200	400	200	484	200	951	200	2018
Max Day	200	500	200	584	200	1101	200	2235
TSS								
Average	210	193	210	253	210	630	210	1485
Max Month	210	420	210	508	210	998	210	2119
Max Day	210	525	210	613	210	1156	210	2347
Ammonia-N								
Average	25	23	25	30	25	75	25	177
Max Month	25	50	25	60	25	119	25	252
Max Day	25	63	25	73	25	138	25	279
Total Phosphorus								
Average	7	6	7	8	7	21	7	49
Max Month	7	14	7	17	7	33	7	71
Max Day	7	18	7	20	7	39	7	78



PROJECTED INFLOWS ADJUSTED FOR I&I

FIGURE 6.1

FRANCIS CITY
CAPITAL FACILITIES PLAN

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Footprint reductions to the size of the treatment cells and winter storage reduced the total project cost for Alternative No. 1 to just over five million dollars as shown in Table 6.2 (see Appendix for cost estimates). Repayment over 20 years at zero percent interest results in an annual payment of $255,400 ($5.1M /20 years), which is less than 1.4 percent of MAGI. However, the sewer rate revenue must also cover the annual O&M costs for the system that are estimated at $59,000, which is less than previously estimated due to smaller treatment cells. Total annual cost for debt service and O&M is estimated at $314,400, which still exceeds the allowable sewer rate. However, UDWQ staff advised that project was now feasible with additional assistance in the form of a grant to cover costs above the MAGI limit or in savings resulting from the project potential being constructed for less than the engineer's estimate.

Table 6.2 Cost Estimated for Revised Recommended Alternative
Capital Facilities Plan
Francis City

Item	Total
Mobilization, O&P	$100,000
Lagoon Aeration	$160,000
Building (Elec/Blower)	$100,000
Earthwork (Shallow Cell)	$450,000
Earthwork (Winter Storage)	$1,800,000
Yard Piping	$75,000
Sitework	$50,000
Electrical	$90,000
Subtotal	**$2,825,000**
Contingency (30%)	$848,000
Estimated Total Construction Cost	**$3,673,000**
Engineering	$588,000
Land Acquisition	$800,000
Estimated Total Project Cost	**$5,061,000**

Although the footprint has been reduced, the alternative still provides capacity through approximately 2035, or 1,215 ERUs. Figure 6.2 shows the conceptual site layout of the new reduced footprint recommended alternative.

2.2 Project Funding

Francis approached the UDWQ for funding at the August 2012 board meeting, and requested a funding package that included a zero percent interest loan for $4.3 million dollars and a grant for $808,000 to cover the cost of the project estimated at $5.1 million dollars The funding request included a design advance of $1,094,000 to assist Francis in purchasing necessary land and profession design services.

Francis has shown a commitment to the project by purchasing a piece of property that provides a portion of the land required for the project, applying remaining city funds to pre-funding reserves as required by UDWQ, and by raising sewer rates in anticipation of this project (see letter from Mayor Snelgrove regarding rate increase in the Appendix). The current sewer rate was recently increased to $30 per month per ERU and will continue to be increased incrementally each year up to the allowable MAGI limit or an amount that covers the revenue needs of the project.

The UDWQ Board approved the funding authorization request for Francis in the August 2012 Board meeting. With this approval Francis then held a bond resolution hearing in October 2012 with its citizens where public comment was received and the City Council formally adopted the bond resolution.

2.3 Environmental Assessment

An environmental assessment (EA) report was prepared by UDWQ staff that concludes that there are no significant environmental impacts anticipated from this project The EA incorporates comments received from key environmental stakeholders received in response to a letter sent on behalf of Francis in March of 2012. The letter outlined the need for the Francis project, identified a proposed location, and solicited comments regarding any environmental concerns. A draft copy of EA with the finding of no significant impact is provided in the Appendix of this report. Public notice and a public comment period must take place before this EA becomes official.

CONCEPTUAL LAYOUT FOR RECOMMENDED PROJECT AFTER I&I ADJUSTMENT

FIGURE 6.2
FRANCIS CITY

CAPITAL FACILITIES PLAN

carollo

Client\UT\Francis\8714A00\Deliverables\Reports\90%\Figure 5.6 Wastewater Collection Zones.indd

Francis is committed to reducing impacts associated with the project and following the special conditions imposed as a condition of funding through the State Revolving Fund loan program including:

- requiring that construction documents will contain specific provisions for controlling dust, noise, erosion, and minimizing the size of the overall project area, and
- during the design phase if it is determined that impacts to delineated wetlands, based on Wetland Delineation prepared by Horrocks Engineers in Sept 2012 and approved by US Army Corp of Engineers (USACE), are unavoidable, Francis will adhere to any requirements (Clean Water Act Section 404) imposed by the USACE, and
- during construction if any archeological artifacts are unearthed contract specifications must require that work is stopped immediately and that Francis will contact the State Historical Preservation Officer and UDWQ to assistance in determining how to mitigate adverse impacts in accordance with Section 106 of the National Historic Preservation Act of 1966.

2.4 Public Participation

Francis has taken a proactive approach to community involvement and providing opportunities for public comment. The project has been discussed in at least three city council meetings, the Mayor sent out a letter regarding the project and the need to increase impact fees, and a presentation and public comment period were provided at the bond resolution hearing. Francis is committed to providing their citizens with continued updates and opportunities for input.

2.5 Implementation Schedule

Given the deficiencies identified in this report, implementation of the recommended project alternative is critical. The project will increase the treatment capacity to 0.36 million gallons per day as an annual average day flow and provide capacity through 2035 or a total of 1,215 ERUs. An estimated schedule for this project would be four months of engineering design followed by eight months of construction.

If growth continues as projected, at 2035 the lagoon system would reach maximum capacity. One or two additional expansions would then be required to meet the 50-year planning period. Table 6.3 provides a summary of potential expansion projects through the 50-year planning period. For planning purposes, the expansions are shown as additional shallow aerated treatment cells. Costs were determined using estimates of new cell conduction calculated for previous alternatives.

Table 6.3 Summary of Proposed Treatment Projects
Capital Facilities Plan
Francis City

Description	Date System Online	Estimated Cost ($M)	AADF Capacity (MGD)	Capacity (ERUs)
New aerated lagoon and winter storage	2015	$5.1	0.36	1,215
Two new aerated lagoons	2035	$2.0	0.55	1,872
New aerated lagoon and winter storage	2045	$3.6	0.84	2,862

REFERENCES

Water Environment Federation Manual of Practice No. 8. *Design of Municipal Wastewater Treatment Plants*. Fifth edition. WEF Press. Alexandria, Virgina. 2010.

Chapter 1 Appendix Items

1. MAG Population Projections – April 2008
2. Francis 2010 Census Data
3. Wastewater Flow Data Summary
4. Wastewater Sampling Results
5. Water Rights Information

Mountainland - Municipal Population Projections

Mountainland Association of Governments - April 2008

	Census		Short Range Projection			Long Range Projection		
	2000	2006	2010	2020	2030	2040	2050	2060
MOUNTAINLAND REGION	**413,487**	**531,872**	**627,571**	**828,311**	**1,038,686**	**1,261,701**	**1,479,640**	**1,717,239**
SUMMIT COUNTY	**29,736**	**35,469**	**42,320**	**64,738**	**83,252**	**104,620**	**131,594**	**165,029**
Coalville	1,382	1,419	1,587	2,031	**2,383**	2,400	2,500	2,600
Francis	698	889	1,077	1,919	**2,748**	4,300	6,000	8,300
Henefer	684	722	875	1,558	**2,729**	3,500	3,800	4,100
Kamas	1,274	1,493	1,810	2,779	**3,982**	4,100	4,500	4,900
Oakley	948	1,299	1,601	2,851	**4,993**	6,300	7,000	7,600
Park City	7,371	8,041	9,185	13,382	**15,838**	16,600	18,000	19,400
Unincorporated	17,397	21,606	26,185	40,217	**50,580**	67,420	89,794	118,129
UTAH COUNTY	**368,536**	**475,425**	**560,511**	**727,718**	**907,210**	**1,092,450**	**1,261,653**	**1,438,300**
Alpine	7,146	9,204	9,884	11,340	**12,105**	12,800	12,900	13,000
American Fork	21,941	25,596	29,434	36,139	**42,100**	46,600	48,200	48,300
Cedar Fort	341	396	416	2,485	**9,175**	15,900	23,600	35,000
Cedar Hills	3,094	8,410	11,737	12,295	**12,552**	12,600	12,700	12,800
Draper	X	774	2,400	4,856	**6,307**	8,100	9,600	10,100
Eagle Mountain	2,157	17,391	26,239	45,653	**76,376**	113,200	149,900	180,000
Elk Ridge	1,838	2,296	3,133	5,578	**6,963**	7,100	7,200	7,300
Fairfield	X	146	146	470	**1,585**	4,800	12,000	19,000
Genola	965	997	1,494	2,886	**5,078**	7,500	10,000	15,400
Goshen	874	911	937	1,294	**1,702**	1,800	2,900	6,000
Highland	8,172	13,889	18,107	21,735	**22,775**	23,900	24,400	24,500
Lehi	19,028	36,021	47,555	66,967	**82,487**	100,700	114,300	127,700
Lindon	8,363	9,758	11,318	13,722	**14,500**	14,700	14,800	14,900
Mapleton	5,809	7,157	8,764	11,644	**16,358**	17,500	17,600	17,700
Orem	84,324	90,857	94,725	98,732	**105,000**	109,500	114,000	115,000
Payson	12,716	16,748	19,221	30,234	**43,790**	55,300	63,100	71,900
Pleasant Grove	23,468	30,729	34,446	38,578	**42,877**	48,200	52,600	55,500
Provo	105,166	116,217	121,330	131,258	**138,450**	141,800	141,900	142,000
Salem	4,372	5,632	9,004	17,022	**28,651**	38,000	45,000	51,100
Santaquin	4,834	7,027	10,882	20,219	**29,113**	39,300	47,500	55,700
Saratoga Springs	1,003	10,750	17,936	38,325	**70,386**	94,200	115,200	122,000
Spanish Fork	20,246	27,717	34,173	46,042	**56,651**	66,300	69,400	72,700
Springville	20,424	25,998	30,536	44,438	**50,741**	58,000	58,700	59,200
Vineyard	150	148	1,955	10,526	**15,832**	22,000	23,100	24,000
Woodland Hills	941	1,269	1,461	1,558	**2,245**	2,900	3,000	3,000
Unincorporated	11,164	9,387	13,276	13,723	**13,412**	29,750	68,053	134,500
WASATCH COUNTY	**15,215**	**20,978**	**24,740**	**35,855**	**48,224**	**64,631**	**86,393**	**113,910**
Charleston	378	436	736	995	**1,240**	1,500	1,900	2,500
Daniel	na	726	913	1,152	**1,366**	1,700	2,000	2,600
Heber City	7,291	9,775	12,459	16,581	**20,244**	25,500	30,800	40,600
Midway	2,121	3,117	4,007	6,120	**8,773**	11,600	14,200	18,800
Wallsburg	274	298	557	864	**1,190**	1,700	2,000	2,600
Unincorporated	5,151	6,626	6,068	10,144	**15,411**	22,631	35,493	46,810

Higher numbers in unincorporated areas will most likely be absorbed into current municipalities or into new municipalities.

Town of Francis

Summit County

2010 Official Census Data

Profile of General Population and Housing Characteristics

Subject	2010 Data Number	2010 Data Percent
SEX AND AGE		
Total population	**1,077**	**100.0**
Under 5 years	105	9.7
5 to 9 years	113	10.5
10 to 14 years	88	8.2
15 to 19 years	88	8.2
20 to 24 years	39	3.6
25 to 29 years	48	4.5
30 to 34 years	67	6.2
35 to 39 years	109	10.1
40 to 44 years	83	7.7
45 to 49 years	86	8.0
50 to 54 years	79	7.3
55 to 59 years	53	4.9
60 to 64 years	34	3.2
65 to 69 years	38	3.5
70 to 74 years	20	1.9
75 to 79 years	12	1.1
80 to 84 years	8	0.7
85 years and over	7	0.6
Other Data		
Median age (years)	34.1	.
16 years and over	749	69.5
18 years and over	707	65.6
21 years and over	675	62.7
62 years and over	104	9.7
65 years and over	85	7.9
Male population	**556**	**51.6**
Under 5 years	53	4.9
5 to 9 years	68	6.3
10 to 14 years	45	4.2
15 to 19 years	42	3.9
20 to 24 years	18	1.7
25 to 29 years	21	1.9
30 to 34 years	41	3.8
35 to 39 years	56	5.2

Town of Francis

2010 Official Census Data

Summit County

Profile of General Population and Housing Characteristics

Subject	2010 Data Number	2010 Data Percent
40 to 44 years	38	3.5
45 to 49 years	42	3.9
50 to 54 years	44	4.1
55 to 59 years	25	2.3
60 to 64 years	16	1.5
65 to 69 years	22	2.0
70 to 74 years	10	0.9
75 to 79 years	8	0.7
80 to 84 years	5	0.5
85 years and over	2	0.2
Other Data		
Median age (years)	33.2	.
16 years and over	377	35.0
18 years and over	359	33.3
21 years and over	341	31.7
62 years and over	56	5.2
65 years and over	47	4.4
Female population	**521**	**48.4**
Under 5 years	52	4.8
5 to 9 years	45	4.2
10 to 14 years	43	4.0
15 to 19 years	46	4.3
20 to 24 years	21	1.9
25 to 29 years	27	2.5
30 to 34 years	26	2.4
35 to 39 years	53	4.9
40 to 44 years	45	4.2
45 to 49 years	44	4.1
50 to 54 years	35	3.2
55 to 59 years	28	2.6
60 to 64 years	18	1.7
65 to 69 years	16	1.5
70 to 74 years	10	0.9
75 to 79 years	4	0.4
80 to 84 years	3	0.3
85 years and over	5	0.5

Town of Francis

Summit County

2010 Official Census Data

Profile of General Population and Housing Characteristics

Subject	2010 Data Number	2010 Data Percent
Other Data		
Median age (years)	35.1	.
16 years and over	372	34.5
18 years and over	348	32.3
21 years and over	334	31.0
62 years and over	48	4.5
65 years and over	38	3.5
RACE		
Total population	1,077	100.0
One Race	**1,064**	**98.8**
White	1,021	94.8
Black or African American	2	0.2
American Indian and Alaska Native	5	0.5
Asian	2	0.2
Asian Indian	0	0.0
Chinese	0	0.0
Filipino	0	0.0
Japanese	1	0.1
Korean	1	0.1
Vietnamese	0	0.0
Other Asian [1]	0	0.0
Native Hawaiian and Other Pacific Islander	0	0.0
Native Hawaiian	0	0.0
Guamanian or Chamorro	0	0.0
Samoan	0	0.0
Other Pacific Islander [2]	0	0.0
Some Other Race	34	3.2
Two or More Races	**13**	**1.2**
White; American Indian and Alaska Native	9	0.8
White; Asian	0	0.0
White; Black or African American	0	0.0
White; Some Other Race	0	0.0
Race alone or in combination with one or more other races [3]		
White	1,030	95.6
Black or African American	3	0.3
American Indian and Alaska Native	16	1.5

Town of Francis

2010 Official Census Data

Summit County

Profile of General Population and Housing Characteristics

Subject	2010 Data Number	2010 Data Percent
Asian	2	0.2
Native Hawaiian and Other Pacific Islander	2	0.2
Some Other Race	37	3.4
HISPANIC OR LATINO		
Total population	1,077	100.0
Hispanic or Latino (of any race)	**67**	**6.2**
Mexican	46	4.3
Puerto Rican	5	0.5
Cuban	0	0.0
Other Hispanic or Latino [4]	16	1.5
Not Hispanic or Latino	**1,010**	**93.8**
HISPANIC OR LATINO AND RACE		
Total population	1,077	100.0
Hispanic or Latino	**67**	**6.2**
White alone	20	1.9
Black or African American alone	0	0.0
American Indian and Alaska Native alone	1	0.1
Asian alone	0	0.0
Native Hawaiian and Other Pacific Islander alone	0	0.0
Some Other Race alone	34	3.2
Two or More Races	12	1.1
Not Hispanic or Latino	**1,010**	**93.8**
White alone	1,001	92.9
Black or African American alone	2	0.2
American Indian and Alaska Native alone	4	0.4
Asian alone	2	0.2
Native Hawaiian and Other Pacific Islander alone	0	0.0
Some Other Race alone	0	0.0
Two or More Races	1	0.1
RELATIONSHIP		
Total population	1,077	100.0
In households	**1,077**	**100.0**
Householder	344	31.9
Spouse [5]	254	23.6
Child	417	38.7
Own child under 18 years	353	32.8

Town of Francis

2010 Official Census Data

Summit County

Profile of General Population and Housing Characteristics

Subject	2010 Data Number	2010 Data Percent
Other relatives	36	3.3
Under 18 years	14	1.3
65 years and over	3	0.3
Nonrelatives	26	2.4
Under 18 years	3	0.3
65 years and over	1	0.1
Unmarried partner	11	1.0
In group quarters	**0**	**0.0**
Institutionalized population	0	0.0
Male	0	0.0
Female	0	0.0
Noninstitutionalized population	0	0.0
Male	0	0.0
Female	0	0.0
HOUSEHOLDS BY TYPE		
Total households	344	100.0
Family households (families) [6]	**286**	**83.1**
With own children under 18 years	162	47.1
Husband-wife family	254	73.8
With own children under 18 years	141	41.0
Male householder, no wife present	13	3.8
With own children under 18 years	8	2.3
Female householder, no husband present	19	5.5
With own children under 18 years	13	3.8
Nonfamily households [6]	**58**	**16.9**
Householder living alone	50	14.5
Male	30	8.7
65 years and over	4	1.2
Female	20	5.8
65 years and over	8	2.3
Other Data		
Households with individuals under 18 years	170	49.4
Households with individuals 65 years and over	60	17.4
Average household size	3.13	.
Average family size [6]	3.47	.

Town of Francis

2010 Official Census Data

Summit County

Profile of General Population and Housing Characteristics

Subject	2010 Data Number	2010 Data Percent
HOUSING OCCUPANCY		
Total housing units	374	100.0
Occupied housing units	**344**	**92.0**
Vacant housing units	30	8.0
For rent	1	0.3
Rented, not occupied	0	0.0
For sale only	7	1.9
Sold, not occupied	0	0.0
For seasonal, recreational, or occasional use	4	1.1
All other vacants	18	4.8
Vacancy Rates		
Homeowner vacancy rate (percent)	2.3	.
Rental vacancy rate (percent)	2.4	.
HOUSING TENURE		
Occupied housing units	344	100.0
Owner-occupied housing units	**304**	**88.4**
Population in owner-occupied housing units	958	.
Average household size of owner-occupied units	3.15	.
Renter-occupied housing units	**40**	**11.6**
Population in renter-occupied housing units	119	.
Average household size of renter-occupied units	2.98	.

Notes:

1 | Other Asian alone, or two or more Asian categories.

2 | Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.

3 | Data may add to more than total population or percentage because individuals may report more than one race.

4 | Includes people whose origins are from the Dominican Republic, Spain, and Spanish-speaking Central or South American countries. It also includes general origin responses such as "Latino" or "Hispanic."

5 | "Spouse" represents spouse of the householder. It does not reflect all spouses in a household or "same-sex spouse".

6 | "Family households" consist of a householder and one or more other people related to the householder by birth, marriage, or adoption. They do not include same-sex married couples.

Date and Time	Corrected Sewer Meter Flow (gal)	Instantaneous Sewer Flow (GPM)	Total Daily Flow (GPD)	Monthly Average Day Flow (GPD)
11/7/06 13:50	80,473,637	58.6		
11/8/06 9:24	80,549,174	121.8	92,652	
11/9/2006 8:15	80,631,924	80.4	86,915	
11/13/2006 9:33	81,025,956	70.8	97,192	
11/20/2006 12:06	81,726,492	79.0	98,580	
11/21/2006 8:31	81,804,127	104.9	91,261	
11/27/2006 9:18	82,378,744	80.7	95,251	
11/28/2006 10:01	82,468,527	68.0	87,180	
12/1/2006 9:52	82,732,971	73.9	88,332	
12/4/2006 9:00	83,004,817	107.9	91,719	
12/7/2006 8:43	83,252,610	77.4	82,924	
12/8/2006 10:34	83,341,399	68.7	82,435	92,916
12/11/2006 10:30	83,591,411	115.7	83,415	
12/15/2006 11:21	83,913,243	58.8	79,752	90,017
12/18/2006 9:24	84,180,825	70.9	91,677	
12/19/2006 15:11	84,293,427	89.3	90,737	
12/20/2006 8:34	84,352,602	95.6	81,699	87,969
12/22/2006 9:49	84,536,689	59.1	89,707	87,993
1/4/2007 9:01	85,628,164	64.2	84,175	84,622
1/10/2007 8:50	86,076,784	118.3	74,865	83,038
1/11/2007 10:45	86,159,817	55.8	76,892	
1/17/2007 11:14	86,630,886	59.9	78,249	81,461
1/22/2007 10:09	87,025,444	76.1	79,630	80,246
1/24/2007 13:04	87,185,587	33.9	75,485	
1/29/2007 10:37	87,565,999	100.0	77,668	
1/30/2007 8:42	87,636,934	73.6	77,092	
2/2/2007 8:33	87,867,271	69.2	76,939	77,262
2/5/2007 8:13	88,108,799	81.7	80,884	
2/6/2007 8:02	88,182,229	96.2	73,995	
2/7/2007 9:42	88,264,046	77.7	76,504	
2/8/2007 10:58	88,343,133	89.8	75,122	77,911
2/12/2007 10:05	88,677,719	79.0	84,423	
2/14/2007 13:14	88,845,026	24.4	78,502	78,842
2/21/2007 9:12	89,363,004	80.8	75,817	
2/22/2007 13:47	89,448,803	43.5	72,041	77,793
3/6/2007 8:20	90,338,991	86.5	75,613	
3/7/2007 8:15	90,413,279	91.0	74,547	76,812
3/8/2007 8:57	90,490,466	84.2	75,000	76,843
3/9/2007 9:07	90,580,756	73.7	89,667	77,286
3/12/2007 10:08	90,866,988	68.6	94,082	
3/13/2007 9:09	90,950,477	94.2	87,056	
3/14/2007 9:24	91,038,738	87.8	87,351	78,775
3/15/2007 8:25	91,123,998	112.1	88,903	
3/16/2007 8:50	91,210,964	123.5	85,482	79,350
3/19/2007 10:26	91,463,136	60.3	82,230	
3/20/2007 8:39	91,533,895	101.5	76,439	
3/21/2007 9:20	91,620,210	57.2	83,925	
3/23/2007 8:36	91,775,548	107.0	78,874	80,485
3/26/2007 10:28	92,022,169	64.2	80,130	80,572
3/28/2007 11:30	92,193,748	78.7	83,982	
3/30/2007 8:50	92,363,678	124.0	89,963	
4/3/2007 8:36	92,618,005	130.1	63,737	
4/5/2007 8:53	92,849,516	84.3	115,076	83,620
4/10/2007 9:45	93,225,193	93.9	74,597	81,362

Date and Time	Corrected Sewer Meter Flow (gal)	Instantaneous Sewer Flow (GPM)	Total Daily Flow (GPD)	Monthly Average Day Flow (GPD)
4/12/2007 11:30	93,412,449	55.7	90,335	81,799
4/16/2007 9:10	93,726,375	130.4	80,437	81,106
4/17/2007 8:51	93,808,025	101.1	82,742	81,043
4/24/2007 14:56	94,401,211	59.9	81,780	81,513
5/2/2007 8:22	95,243,771	112.3	109,050	
5/3/2007 2:35	95,407,168	102.4	215,271	93,756
5/11/2007 9:00	96,658,331	290.8	151,338	110,858
5/14/2007 9:06	97,253,953	192.7	198,265	
5/16/2007 9:22	97,689,789	173.9	216,714	132,077
5/17/2007 8:32	97,906,785	255.7	224,802	136,685
5/21/2007 8:41	98,715,774	151.1	201,932	
5/23/2007 8:26	99,307,123	174.1	297,223	
5/25/2007 8:13	99,699,648	227.4	197,152	172,474
5/29/2007 7:42	100,702,512	299.0	252,073	
6/1/2007 9:01	101,583,693	212.9	288,452	211,140
6/5/2007 8:07	102,661,987	234.0	272,125	
6/6/2007 8:33	102,913,630	226.9	247,180	
6/8/2007 8:42	103,411,629	174.9	248,224	
6/12/2007 8:16	104,194,545	151.9	196,617	
6/13/2007 9:25	104,413,157	182.2	208,616	238,535
6/14/2007 11:06	104,629,915	108.8	202,551	238,720
6/18/2007 8:25	105,338,708	201.2	182,294	
6/20/2007 8:50	105,733,424	161.1	195,660	233,873
6/21/2007 9:19	105,917,485	160.1	180,427	227,655
6/28/2007 9:48	107,111,710	126.4	170,114	213,019
7/2/2007 8:31	107,578,907	120.0	118,382	193,524
7/3/2007 8:13	107,691,267	102.9	113,782	
7/5/2007 11:05	107,932,113	108.9	113,636	174,950
7/9/2007 8:15	108,480,829	122.3	141,351	163,622
7/12/2007 10:49	108,889,810	143.1	131,634	155,956
7/16/2007 8:24	109,415,638	127.1	134,852	150,081
7/20/2007 8:08	109,850,489	80.1	109,016	137,369
7/23/2007 9:00	110,175,268	120.3	106,972	133,111
7/25/2007 8:30	110,430,524	127.7	128,971	
7/30/2007 14:52	111,287,476	108.5	162,755	
8/1/2007 8:07	111,577,246	184.9	168,593	133,352
8/3/2007 7:46	111,953,243	116.3	189,379	139,324
8/6/2007 10:33	112,609,531	140.3	210,621	146,951
8/10/2007 13:40	113,188,664	56.7	140,231	147,632
8/15/2007 13:29	113,869,093	53.2	136,294	147,408
8/17/2007 7:49	114,114,251	152.8	138,987	152,349
9/4/2007 8:21	116,145,971	83.8	112,734	122,333
9/6/2007 11:38	116,367,907	95.6	103,863	121,062
9/10/2007 7:37	116,688,487	100.5	83,645	113,823
9/11/2007 7:33	116,766,665	56.0	78,396	
9/12/2007 8:08	116,851,357	99.3	82,682	107,364
9/17/2007 8:49	117,240,482	107.8	77,384	100,711
9/27/2007 13:31	118,081,169	56.0	82,454	
10/1/2007 9:02	118,403,375	65.1	84,498	
10/12/2007 13:16	119,240,197	17.3	74,874	79,064
10/17/2007 10:10	119,662,874	68.5	86,777	80,595
10/25/2007 10:00	120,262,569	473.3	75,027	78,317
11/1/2007 14:28	120,758,022	19.2	68,946	75,406
11/7/2007 14:37	121,183,540	43.6	70,846	

Date and Time	Corrected Sewer Meter Flow (gal)	Instantaneous Sewer Flow (GPM)	Total Daily Flow (GPD)	Monthly Average Day Flow (GPD)
11/13/2007 9:35	121,610,790	71.6	73,787	74,438
11/21/2007 10:18	122,181,705	66.3	71,099	
11/27/2007 9:12	122,599,813	58.2	70,221	70,897
12/6/2007 8:22	123,211,781	77.3	68,260	70,573
12/18/2007 9:38	124,099,667	88.1	73,667	
12/19/2007 9:24	124,171,897	86.3	72,939	
3/12/2008 13:05	130,850,928	72.7	79,367	
3/17/2008 13:09	131,209,404	34.3	71,655	
3/18/2008 14:02	131,275,461	14.0	63,712	
3/26/2008 15:00	131,919,412	54.9	80,091	
4/8/2008 10:50	133,467,442	93.5	120,691	97,246
4/15/2008 13:15	134,334,996	59.8	122,179	107,764
4/17/2008 13:52	134,595,378	70.3	128,540	110,690
4/21/2008 13:46	134,996,044	53.2	100,271	
4/22/2008 14:03	135,087,169	34.2	90,062	117,497
5/1/2008 9:27	135,765,606	84.4	77,022	
5/5/2008 11:43	136,058,175	34.0	71,455	
5/6/2008 7:20	136,103,716	22.1	55,717	
5/7/2008 9:50	136,186,016	102.6	74,536	93,879
5/12/2008 13:25	136,637,011	71.2	87,584	
5/13/2008 9:40	136,739,752	96.2	121,767	
5/14/2008 7:45	136,822,014	81.4	89,402	
5/15/2008 7:30	136,915,887	56.1	94,861	86,722
5/19/2008 7:51	137,328,235	83.2	102,713	86,076
5/28/2008 7:26	138,875,519	99.5	172,253	
5/29/2008 9:45	139,020,098	114.0	131,852	
5/30/2008 12:05	139,184,964	53.7	150,258	117,464
6/2/2008 8:37	139,535,667	131.3	122,814	124,772
6/9/2008 7:39	140,617,456	153.4	155,436	
6/10/2008 7:29	140,750,428	153.5	133,902	143,062
6/13/2008 7:44	141,265,775	168.7	171,188	148,129
6/16/2008 7:48	141,914,935	188.7	216,186	163,823
6/20/2008 7:19	142,846,221	170.6	234,000	
6/23/2008 7:36	143,500,641	186.2	217,285	
7/7/2008 7:39	145,787,254	126.1	163,305	
7/11/2008 7:48	146,286,480	125.9	124,612	178,506
7/14/2008 7:40	146,825,851	170.6	180,124	179,373
7/16/2008 7:44	147,064,440	168.7	119,129	171,666
7/18/2008 9:18	147,296,736	103.9	112,477	
7/21/2008 7:37	147,639,156	104.2	116,872	154,548
7/22/2008 7:54	147,769,058	140.8	128,386	147,123
7/25/2008 7:28	148,477,975	155.1	237,736	
7/29/2008 7:35	148,623,910	110.7	36,439	
8/6/2008 7:37	149,765,422	86.6	142,664	132,612
8/11/2008 7:34	150,607,723	142.6	168,530	139,439
8/18/2008 7:41	151,792,906	122.2	169,194	145,354
8/19/2008 7:35	151,941,522	101.9	149,238	148,365
8/25/2008 7:45	152,836,365	150.9	148,968	145,560
9/3/2008 7:50	153,630,543	128.9	88,208	
9/4/2008 7:46	153,714,621	51.3	84,312	136,150
9/15/2008 8:33	154,583,907	63.2	78,792	
9/17/2008 8:06	154,720,300	57.8	68,842	97,523
10/14/2008 8:07	156,772,861	80.0	76,019	
10/16/2008 7:58	156,838,230	50.6	32,787	72,777

Date and Time	Corrected Sewer Meter Flow (gal)	Instantaneous Sewer Flow (GPM)	Total Daily Flow (GPD)	Monthly Average Day Flow (GPD)
10/30/2008 8:20	157,789,087	102.0	67,844	
10/31/2008 8:08	157,853,736	62.3	65,192	
11/6/2008 8:29	158,308,005	110.4	75,528	
11/18/2008 9:53	159,194,659	99.8	73,530	71,235
11/24/2008 8:45	159,602,202	98.1	68,463	
12/1/2008 8:54	160,082,432	98.5	68,543	71,819
2/3/2009 13:39	164,398,371	27.0	67,229	
2/4/2009 15:09	164,466,328	12.9	63,960	
2/9/2009 10:13	164,766,525	72.7	62,614	
2/19/2009 14:19	165,415,410	12.7	63,799	
2/20/2009 11:24	165,468,012	43.5	59,879	
2/23/2009 9:45	165,650,264	96.0	62,176	
2/24/2009 14:01	165,725,414	16.6	63,807	
2/25/2009 13:23	165,789,509	26.0	65,832	
2/26/2009 13:35	165,859,187	50.9	69,102	
3/9/2009 13:03	166,742,675	32.7	80,480	67,919
3/16/2009 11:09	167,238,375	92.7	71,624	69,591
3/17/2009 14:29	167,317,988	31.7	69,904	73,157
4/6/2009 9:32	168,680,470	128.0	68,834	69,571
4/20/2009 13:10	169,899,535	40.6	86,145	
5/4/2009 8:54	170,933,289	109.9	74,789	80,534
5/14/2009 8:12	171,562,309	71.8	63,086	
5/21/2009 8:58	172,009,582	88.2	63,606	68,452
5/27/2009 8:52	172,604,735	123.0	99,261	
6/11/2009 8:38	175,006,908	232.1	160,249	122,942
7/2/2009 8:27	180,048,459	228.2	240,161	206,870
8/5/2009 8:00	186,834,552	99.2	199,701	
8/6/2009 9:10	186,980,380	136.2	139,068	
8/12/2009 8:25	187,903,459	164.2	154,652	
9/9/2010 9:40	188,421,220	109.0	1,317	
9/10/2010 9:00	188,505,911	74.1	87,111	
9/13/2010 9:50	188,763,267	59.7	84,804	
9/14/2010 8:05	188,828,865	82.3	70,757	
9/15/2010 8:50	188,912,161	119.0	80,772	
9/16/2010 8:33	188,985,450	67.1	74,165	
9/17/2010 8:40	189,057,940	93.4	72,139	
9/20/2010 8:35	189,276,107	119.2	72,807	
9/21/2010 10:10	189,357,582	50.9	76,433	
9/22/2010 8:45	189,425,816	88.6	72,514	
9/23/2010 8:05	189,507,618	86.1	84,139	
9/24/2010 8:20	189,585,117	61.8	76,700	
9/27/2010 9:03	189,805,455	85.7	72,722	
9/28/2010 14:10	189,896,615	115.8	75,140	
10/1/2010 9:50	190,106,162	55.2	74,322	
10/6/2010 9:20	190,493,840	74.3	77,860	
10/7/2010 9:10	190,582,235	68.4	89,013	77,237
10/11/2010 9:40	190,984,212	66.1	99,974	79,874
10/13/2010 8:40	191,179,649	129.5	99,798	80,677
10/14/2010 9:20	191,267,252	96.4	85,235	81,139
10/18/2010 9:45	191,583,233	64.8	78,654	81,343

Date and Time	Corrected Sewer Meter Flow (gal)	Instantaneous Sewer Flow (GPM)	Total Daily Flow (GPD)	Monthly Average Day Flow (GPD)
10/19/2010 10:25	191,670,999	96.1	85,394	
10/20/2010 9:15	191,746,763	70.9	79,635	82,279
10/21/2010 14:08	191,836,061	26.6	74,200	
10/22/2010 8:33	191,890,858	112.1	71,410	82,191
10/27/2010 9:00	192,397,292	69.5	100,908	86,401
10/28/2010 11:34	192,498,625	101.5	91,543	
10/29/2010 13:20	192,598,072	40.0	92,629	87,241
11/2/2010 10:20	192,957,364	81.7	92,721	
11/3/2010 11:15	193,047,451	40.9	86,773	
11/4/2010 15:10	193,139,433	28.5	79,077	90,469
11/5/2010 14:55	193,215,721	33.6	77,091	90,066
11/8/2010 9:30	193,435,418	118.4	79,190	
11/9/2010 13:20	193,548,961	40.6	97,905	87,976
11/12/2010 9:20	193,787,038	98.8	84,027	86,833
11/15/2010 10:30	194,049,135	50.6	85,973	
11/17/2010 9:30	194,219,053	70.4	86,767	87,891
11/18/2010 13:40	194,310,786	30.5	78,163	87,597
11/19/2010 8:20	194,364,779	107.8	69,420	87,378
12/6/2010 11:15	195,898,256	74.1	89,564	86,962
12/7/2010 8:25	195,983,767	86.0	96,957	
12/9/2010 13:05	196,187,079	68.6	92,649	87,968
12/10/2010 10:15	196,267,928	73.7	91,671	
12/13/2010 13:45	196,564,653	61.3	94,323	89,072
12/14/2010 8:50	196,626,876	71.3	78,254	
12/15/2010 10:30	196,721,637	57.1	88,608	89,083
1/11/2011 14:40	199,604,539	30.5	106,092	
1/12/2011 10:45	199,662,843	41.8	69,674	103,705
1/14/2011 8:00	199,817,263	97.9	81,902	103,547
2/14/2011 13:20	202,272,186	78.1	78,627	78,627
2/15/2011 14:00	202,348,226	30.9	73,985	
2/16/2011 10:30	202,407,715	55.7	69,646	
3/15/2011 11:00	204,560,566	55.2	79,674	79,175
3/18/2011 13:55	205,088,864	85.7	169,243	88,950
3/21/2011 13:00	205,587,352	98.2	168,305	
3/22/2011 7:48	205,710,875	138.9	157,689	
3/24/2011 9:08	205,997,225	137.8	139,305	
3/25/2011 9:33	206,142,220	116.6	142,521	
3/28/2011 11:20	206,556,366	87.6	134,712	
3/30/2011 13:05	206,785,698	68.6	110,633	
3/31/2011 8:30	206,872,236	105.6	106,965	
4/1/2011 8:10	206,986,041	115.2	115,408	
4/4/2011 8:55	207,477,637	134.0	162,176	
4/5/2011 10:50	207,649,030	129.3	158,718	
4/6/2011 8:25	207,805,566	154.6	174,063	
4/7/2011 8:30	207,993,366	153.3	187,150	
4/8/2011 8:00	208,191,626	191.6	202,478	
4/11/2011 8:50	208,838,599	164.9	213,190	
4/12/2011 8:25	209,016,100	143.3	180,637	
4/13/2011 9:40	209,186,238	122.9	161,715	159,812
	Peak Flow	**473.3**		
	Max Day Flow		**297,223**	
	Average Day Flow		**108,821**	
	Max Month Average Day Flow			**238,720**
	2010-11Winter Month Average Day Flow			**89,081**

Chemtech-Ford Laboratories

Certificate of Analysis

Lab No.: 06 07317
Lab Group No.: 79625

Name:	Francis Town	***Sample Date:***	7/19/2006 10:30 AM
Sample Site:	Influent	***Receipt Date:***	7/19/2006 12:00 PM
Sample ID:	06 07317	***Sampler:***	ZANE
System No:		***Sample Source:***	
Sample Type:	Waste Water		

Parameter	Sample Result	Mimimum Reporting Limit	Units	Method	Analysis Date	Analysis Time	Analyst Initials	Flag
Group A - Inorganic								
Biochemical Oxygen Demand	203	5	mg/L	SM 5210B	7/19/2006	15:00	SP	
Solids, Total Suspended (TSS)	89	10	mg/L	EPA 160.2	7/21/2006	12:30	TP	

Abbreviations

ND = Not detected at the corresponding Minimum Reporting Limit.
1 mg/L = one milligram per liter = 1 part per million.
1 ug/L = one microgram per liter = 1 part per billion.

Flag Descriptions

APH = The test was performed past the EPA specified holding time.
H = A high bias is suspected.
I = The analysis experienced a matrix interference which may have affected the results.
J = The result is positive and estimated. The result falls between the Minimum Reporting Limit and the Method Detection Limit.
L = A low bias is suspected.
O = The analysis was performed by an outside contract laboratory.
R = The value represents a reanalysis.
SPH = The sample was submitted for analysis past the EPA specified holding time.

6100 South Stratler
Murray, UT 84107
801-262-7299 Office
801-262-7378 Fax

Chemtech-Ford Laboratories

Certificate of Analysis

Lab No.: 06 06135
Lab Group No.: 79158

Name:	Francis Town	*Sample Date:*	6/21/2006 10:30 AM
Sample Site:	Influent	*Receipt Date:*	6/21/2006 11:35 AM
Sample ID:	06 06135	*Sampler:*	ZANE
System No:		*Sample Source:*	
Sample Type:	Waste Water		

Parameter	Sample Result	Mimimum Reporting Limit	Units	Method	Analysis Date	Analysis Time	Analyst Initials	Flag
Group A - Inorganic								
Biochemical Oxygen Demand	127	5	mg/L	SM 5210B	6/21/2006	15:00	RN	
Solids, Total Suspended (TSS)	70	10	mg/L	EPA 160.2	6/23/2006	10:00	TP	

Abbreviations

ND = Not detected at the corresponding Minimum Reporting Limit.
1 mg/L = one milligram per liter = 1 part per million.
1 ug/L = one microgram per liter = 1 part per billion.

Flag Descriptions

APH = The test was performed past the EPA specified holding time.
H = A high bias is suspected.
I = The analysis experienced a matrix interference which may have affected the results.
J = The result is positive and estimated. The result falls between the Minimum Reporting Limit and the Method Detection Limit.
L = A low bias is suspected.
O = The analysis was performed by an outside contract laboratory.
R = The value represents a reanalysis.
SPH = The sample was submitted for analysis past the EPA specified holding time.

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Chemtech-Ford Laboratories

Certificate of Analysis

Lab No.: 06 06136
Lab Group No.: 79158

Name:	Francis Town	***Sample Date:***	6/21/2006 10:30 AM
Sample Site:	Effluent	***Receipt Date:***	6/21/2006 11:35 AM
Sample ID:	06 06136	***Sampler:***	ZANE
System No:		***Sample Source:***	
Sample Type:	Waste Water		

Parameter	Sample Result	Mimimum Reporting Limit	Units	Method	Analysis Date	Analysis Time	Analyst Initials	Flag
Group A - Inorganic								
Ammonia as N	0.9	0.4	mg/L	SM4500 NH3	6/23/2006	9:00	TSM	
Biochemical Oxygen Demand	10	5	mg/L	SM 5210B	6/21/2006	15:00	RN	
Phosphorus, Total, WC	1.06	0.05	mg/L	SM4500 PB5	6/26/2006	13:00	TSM	
Solids, Total Suspended (TSS)	12	4	mg/L	EPA 160.2	6/23/2006	10:00	TP	

Abbreviations

ND = Not detected at the corresponding Minimum Reporting Limit.
1 mg/L = one milligram per liter = 1 part per million.
1 ug/L = one microgram per liter = 1 part per billion.

Flag Descriptions

APH = The test was performed past the EPA specified holding time.
H = A high bias is suspected.
I = The analysis experienced a matrix interference which may have affected the results.
J = The result is positive and estimated. The result falls between the Minimum Reporting Limit and the Method Detection Limit.
L = A low bias is suspected.
O = The analysis was performed by an outside contract laboratory.
R = The value represents a reanalysis.
SPH = The sample was submitted for analysis past the EPA specified holding time.

6100 South Stratler
Murray, UT 84107
801-262-7299 Office
801-262-7378 Fax

Chemtech-Ford Laboratories

Certificate of Analysis

Lab No.: 06 07318
Lab Group No.: 79625

Name:	Francis Town	***Sample Date:***	7/19/2006 10:30 AM
Sample Site:	Effluent	***Receipt Date:***	7/19/2006 12:00 PM
Sample ID:	06 07318	***Sampler:***	ZANE
System No:		***Sample Source:***	
Sample Type:	Waste Water		

Parameter	Sample Result	Mimimum Reporting Limit	Units	Method	Analysis Date	Analysis Time	Analyst Initials	Flag
Group A - Inorganic								
Ammonia as N	2.2	0.4	mg/L	SM4500 NH3	7/20/2006	14:00	TSM	
Biochemical Oxygen Demand	13	5	mg/L	SM 5210B	7/19/2006	15:00	SP	
Solids, Total Suspended (TSS)	7	4	mg/L	EPA 160.2	7/21/2006	12:30	TP	

Abbreviations

ND = Not detected at the corresponding Minimum Reporting Limit.
1 mg/L = one milligram per liter = 1 part per million.
1 ug/L = one microgram per liter = 1 part per billion.

Flag Descriptions

APH = The test was performed past the EPA specified holding time.
H = A high bias is suspected.
I = The analysis experienced a matrix interference which may have affected the results.
J = The result is positive and estimated. The result falls between the Minimum Reporting Limit and the Method Detection Limit.
L = A low bias is suspected.
O = The analysis was performed by an outside contract laboratory.
R = The value represents a reanalysis.
SPH = The sample was submitted for analysis past the EPA specified holding time.

6100 South Stratler
Murray, UT 84107
801-262-7299 Office
801-262-7378 Fax

MEMORANDUM FOR THE FILE

TO: Rhodes Valley

FROM: Ron Jibson

INTRODUCTION: A study was conducted to determine the groundwater divide in Rhodes Valley near Francis, Utah. This study was undertaken because of a conflict in two previously conducted studies in this area.

One study conducted by the USGS shows the groundwater divide running in a Northwest-Southeast direction through the town of Francis and a study by Bryce Montgomery of the Utah division of Water Resources shows the divide to run in more of an East-West direction. The USGS study can be found on pages 38 and 39 of Technical Publication Number 27 entitled, "Water Resources of the Heber-Kamas-Park City Area, North-Central Utah". The study was organized into three main parts.

The first part involved described the subject area and gathering data. Using the plat books in the file room of the State Engineers office, it was possible to locate most of the wells in the Rhodes Valley Area of study. The files were pulled and evaluated as to whether or not a well drillers report was submitted or if proof of appropriation had been completed on the well. These wells were then plotted on a USGS topographic map according to the point of diversion listed on the water right.

The second part of the study involved going to the Rhodes Valley and monitoring the wells previously located on the maps. The well locations were observed and any corrections as to locations were noted on the maps. The static water level in each well was also determined and recorded.

This information was then put onto a new map and rough groundwater contours were drawn using the elevations from the topographic map, and the static depths of the wells. These contours were fairly reliable in most segments with the exception of one or two areas where the direction of the groundwater could change if the interpolation of the topographic map was off slightly. Because of this, part three was conducted which involved the surveying of the wells to determine their actual ground surface elevation. The static water levels in the wells were redetermined the same day as they were surveyed for a more accurate control. These depths and elevations were then put on a map and new contours drawn.

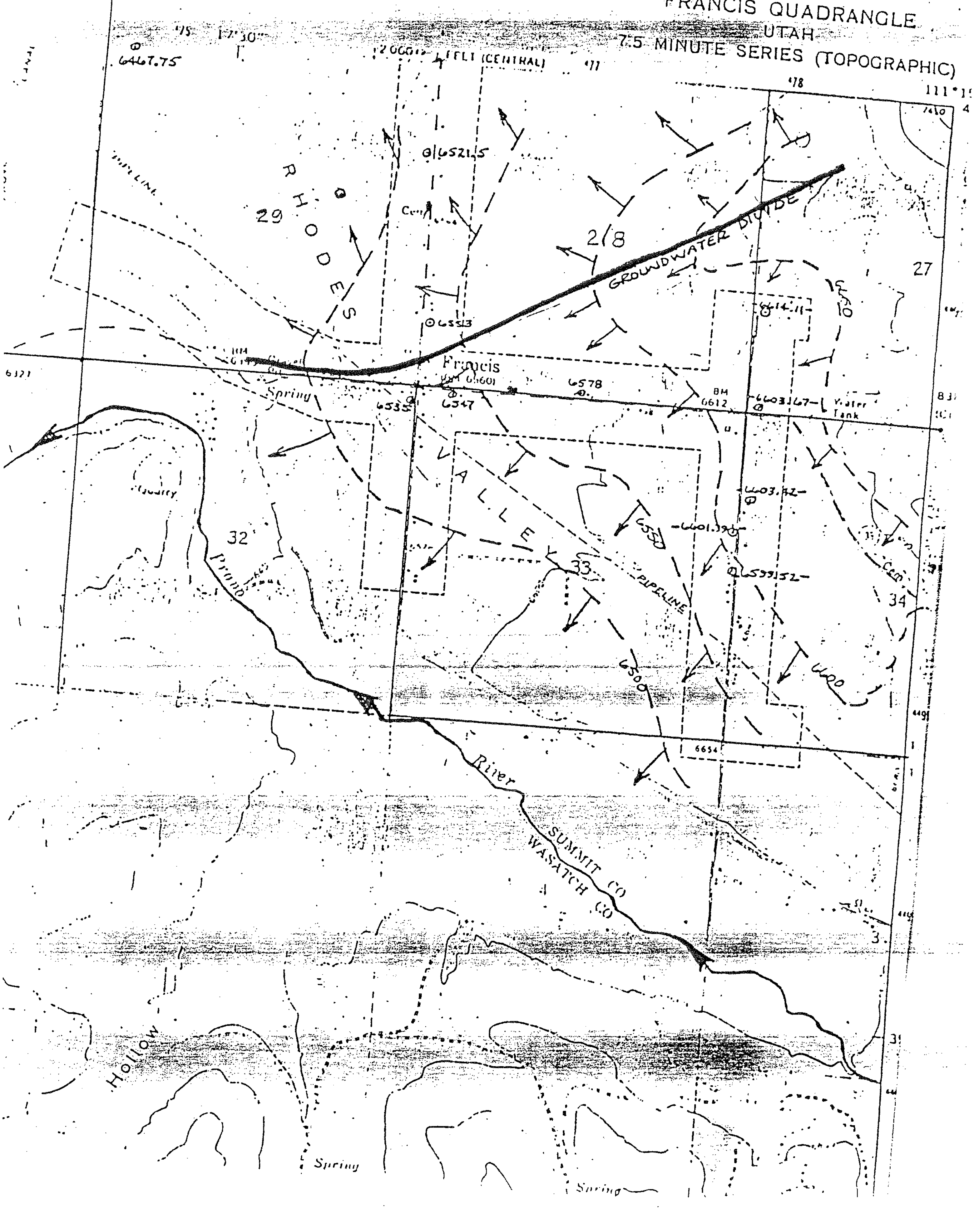
CONCLUSIONS: It was concluded, using the limited information we had, because of a lack of wells, that the groundwater divide in Rhodes Valley is as shown on the attached map.

It should be noted and realized that these contours are approximations and could be somewhat different, as additional information in Rhodes Valley is obtained.

RECOMMENDATIONS: To be completely confident of the location of the groundwater divide in Rhodes Valley would require a more even distribution of underground water wells. For this reason, it is recommended that more small wells could be approved in the divide area and new information gathered as each well is drilled.

Eventually, this should result in a firm and complete study of Rhodes Valley and the groundwater divide could then be firmly established.

... Drainage
Boundry - (Kamas Area)



Utah Division of Water Rights

Select Related Information

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 09/28/2011 Page 1

```
CHANGE: a34183                   WATER RIGHT: 55-12331 CERT. NO.:        COUNTY TAX ID#:
AMENDATORY? No
BASE WATER RIGHTS: 55-12331
RIGHT EVIDENCED BY: 55-12331(A77468)(segregated portion of 55-11134)Based on 46.687 shares South Kamas Irrig Co.
CHANGES: Point of Diversion [X], Place of Use [X], Nature of Use [X], Reservoir Storage [ ].
*-------------------------------------------------------------------------------------------------------------------------------*

NAME: Francis, Town of (Public Water Supplier)
ADDR: c/o Lynette Hallum
      P O Box 668
      Francis, UT 84036
                    REMARKS:

NAME: South Kamas Irrigation Company
ADDR: 3106 East SR 35
      Woodland, UT 84036
                    REMARKS:

NAME: Wasatch Mountain Investment
ADDR: 975 Swiss Alpine Rd
      Midway, UT 84049
                    REMARKS:
*-------------------------------------------------------------------------------------------------------------------------------*
FILED:     03/25/2008|PRIORITY:  03/25/2008|ADV BEGAN: 04/11/2008|ADV ENDED: 04/18/2008|NEWSPAPER: The Summit County News
ProtestEnd:05/08/2008|PROTESTED: [No      ]|HEARNG HLD:          |SE ACTION: [Approved]|ActionDate:01/20/2009|PROOF DUE:  01/31/2014
EXTENSION:           |ELEC/PROOF:[        ]|ELEC/PROOF:          |CERT/WUC:             |LAP, ETC:  |LAPS LETTER:
RUSH LETTR:          |RENOVATE:            |RECON REQ:           |TYPE: [              ]
Status: Approved
*****************************************************************
*****************************************************************
**********************H E R E T O F O R E**********************   ***********************H E R E A F T E R***********************
*****************************************************************
*****************************************************************
```

HERETOFORE	HEREAFTER
FLOW: 77.5 acre-feet	FLOW: 77.5 acre-feet
SOURCE: Provo River	SOURCE: Underground Water Wells (2)
COUNTY: Summit	COUNTY: Summit COM DESC: Town of Francis serv. area
	Sixty-two acre-feet of this water will be diverted from wells in the Town of Francis system. The remaining 15.5 acre-feet will remain in the South Kamas Irrigation Company ditch

as carrier water. |
| || The South Kamas
Irrigation Company | || will continue to divert
the full amount of | || water. The irrigation
company will | || return back to the river
the amount | || diverted by the town.
Upon approval of | || this change application,
the shares in | || the company, as well as
the change | || application will be
transferred to the Town | || of Francis. If the
transfers do not | || occur, this change will
be considered | || cancelled.
| ||
|--||---|

|POINT(S) OF DIVERSION ------> MAP VIEWER*GOOGLE VIEW ||CHANGED AS FOLLOWS: (Click Location link for WRPLAT) |**

--		---
Point Underground:		UNDERGROUND: (Click Link for PLAT data, Well ID# link for data.)
(1) N 910 ft E 675 ft from SW cor, Sec 07, T 3S, R 7E, SLBM		(1) N 134 ft E 1168 ft from SW cor, Sec 27, T 2S, R 6E, SLBM
Diameter: ins. Depth: to ft. WELL ID#: 000000		Diameter: ins. Depth: to ft. WELL ID#:
		(2) N 481 ft E 974 ft from S4 cor, Sec 02, T 3S, R 6E, SLBM
		Diameter: ins. Depth: to ft. WELL ID#:
--		---
Point Rediversion:	
(1) N 1800 ft W 80 ft from SE cor, Sec 12, T 3S, R 6E, SLBM	
Dvrting Wks:	
Source:	
--		---

|PLACE OF USE ------> ||CHANGED as follows:
|
--		---
--NW¼-- --NE¼-- --SW¼-- --SE¼--		--NW¼-- --NE¼-- --SW¼-- --SE¼--
|N N S S||N N S S||N N S S||N N S S||| N N S S||N N S S||N N S S||N N S S|
|W E W E||W E W E||W E W E||W E W E||| W E W E||W E W E||W E W E||W E W E|
Sec 28 T 2S R 6E SLBM * : : :X** : :X: **X:X:X:X**X:X: :X*	
Sec 29 T 2S R 6E SLBM * : : : ** : : : ** :X: :X**X:X: :X*	
Sec 32 T 2S R 6E SLBM * : : : ** :X: :X** : : : ** : : :X*	
Sec 33 T 2S R 6E SLBM *X: :X:X**X: : : **X:X:X:X** :X:X:X*	

```
|Sec 34 T  2S R  6E SLBM     *X: : : ** : : : **X:X: :X** : : : *||
|Sec 02 T  3S R  6E SLBM     * : :X: ** : : : **X: : :X** : : : *||
|Sec 03 T  3S R  6E SLBM     *X: :X:X** : : : ** : : : ** : : : *||
|Sec 04 T  3S R  6E SLBM     * : : : **X:X: : ** : : : ** : : : *||
```

NATURE OF USE ------> **||CHANGED as follows:**

```
|---------------------------------------------------------------||-----------------------------
-----------------------------------|
```

IRR = values are in acres.

STK = values are in ELUs meaning Cattle or Equivalent.

DOM = values are in EDUs meaning Equivalent Domestic Units (or Families).

```
|---------------------------------------------------------------||-----------------------------
-----------------------------------|
|SUPPLEMENTAL to Other Water Rights: No                         ||SUPPLEMENTAL to Other Water
Rights: No                           |
|---------------------------------------------------------------||-----------------------------
-----------------------------------|
|---------------------------------------------------------------||-----------------------------
-----------------------------------|
|IRR:     25.8333 acres.                      USED 04/01 - 10/31||
|...............................................................||..............................
|                                                               ||MUN: Francis
USED 01/01 - 12/31|
|---------------------------------------------------------------||-----------------------------
-----------------------------------|
```

****

***END OF DAT
A***
****

State of Utah
DEPARTMENT OF NATURAL RESOURCES
Division of Water Rights

JON M. HUNTSMAN, JR.
Governor
GARY R. HERBERT
Lieutenant Governor

MICHAEL R. STYLER
Executive Director

BOYD P. CLAYTON
State Engineer/Division Director

JAN 2 0 2009

ORDER OF THE STATE ENGINEER

For Permanent Change Application Number 55-12331 (a34183)

Permanent Change Application Number 55-12331 (a34183) in the names of the Town of Francis, South Kamas Irrigation Company, and Wasatch Mountain Investment Partner LLC, was filed on March 25, 2008, to change the point of diversion, place of use, and nature of use of 77.5 acre-feet (af) of water as evidenced by Water Right Number 55-12331. Heretofore, the water has been diverted from a surface source located at North 910 feet and East 675 feet from the SW Corner of Section 7, T3S, R7E, SLB&M and was re-diverted from a surface source located North 1800 feet and West 80 feet from the SE Corner of Section 12, T3S, R6E, SLB&M. The water has been used for the irrigation of 25.8333 acres from April 1 to October 31. The water was used in all or portion(s) of Sections 28, 29, 32, 33, and 34, T2S, R6E, SLB&M; and Sections 2, 3, and 4, T3S, R6E, SLB&M

Hereafter, it is proposed to divert 77.5 acre-feet of water to points of diversion changed to: (1) Well - North 481 feet and East 974 feet from the S¼ Corner of Section 2, T3S, R6E, SLB&M (existing well); and (2) Well - North 134 feet and East 1168 feet from the SW Corner of Section 27, T2S, R6E, SLB&M (existing well). The nature of use of the water is being changed to municipal purposes within the service area of Francis.

Notice of the application was published in The Summit County News on April 11 and April 18, 2008. No protests were received.

It is noted by the State Engineer that there appears to be an error in description of the historical point of diversion. The application describes the diversion as an underground well, rather than a surface source. However, the application also states the source is the Provo River. It is the opinion of the State Engineer this ambiguity in the application can be corrected by this order rather than amending the application and re-publishing notice.

This change application is based on 46.69 shares of stock in the South Kamas Irrigation Company. Previous memorandum decisions established the value of each share at a value of 1.66 acre-feet for the irrigation of 0.5533 acre. Accordingly, 46.69 shares of stock would allow for the historical diversion of 77.505 acre-feet for the irrigation of 25.835 acres.

In evaluating applications proposing to change the nature of use of a water right, the State Engineer believes it is appropriate to examine the rates and amounts of hydrologic depletion associated with the historical water use as compared to the proposed use to assure that there is no enlargement of the underlying water right. In this case, the estimated historical water use would be (46.69 shares x 1.66 acre-feet per share) = 77.505 acre-feet and a depletion of (25.835 acres x 1.6075 feet)[1] = 41.529 acre-feet.

The application states that 62.0 acre-feet will be diverted from wells in the Town of Francis system and 15.5 acre-feet will remain in the South Kamas Irrigation Company ditch as carrier water. Therefore, if a diversion of 62.00 acre-feet and a total depletion of 41.529 acre-feet are not exceeded for all uses of water based on the shares of stock being changed, this application can be approved without enlarging the underlying right.

However, both the heretofore and hereafter places of use are situated on a groundwater divide between two river systems - the Weber River drainage area to the north and the Provo River drainage area to the south. The proposed use is for municipal purposes within the service area of the Town of Francis which currently delivers its sewage effluent to a treatment plant that discharges to the Weber River drainage. Therefore, water used for indoor purposes is 100% depleted because it constitutes an export from the Provo River drainage. Likewise, water used for irrigation within the surface drainage area of the Weber River is 100% depleted. The Town of Francis must maintain records of the use of water that it delivers so that the water delivered for indoor use can be accounted for, the water used for irrigation or other outdoor purposes within the Provo River drainage can be accounted for, and the water used for irrigation or other outdoor uses within the Weber River drainage can be accounted for. It is reiterated that the use of water for indoor purposes, assuming the sewage is treated at a facility that does not direct effluent back to the Provo River, and all other uses of water within the Weber River drainage must be accounted for as 100% depleted. If all water under this application is used in this fashion, the diversion limit for the water will be 41.529 acre-feet and not 62.00 acre-feet. If water is used for irrigation purposes within the Provo River drainage, up to 3.0 acre-feet per acre irrigated can be diverted. It is, therefore, essential for the applicant to maintain complete and accurate records of water usage in order to estimate the depletion of water associated with its use.

In evaluating the various elements of the underlying rights, it is not the intention of the State Engineer to adjudicate the extent of these rights, but rather to provide sufficient definition of the rights to assure that other vested rights are not impaired by the change and/or no enlargement occurs. If, in a subsequent action, the court adjudicates that this right is entitled to either more or less water, the State Engineer will adjust the figures accordingly.

It is, therefore, **ORDERED** and Permanent Change Application Number 55-12331 (a34183) is hereby **APPROVED** subject to prior rights and the following conditions:

1. The diversion of water under this application is limited such that depletion may not exceed 41.529 acre-feet. Under no circumstances is diversion to exceed 77.505 acre-feet total including any water retained by the South Kamas Irrigation

[1] Consumptive Use of Irrigated Crops in Utah," Research Report 145, Utah Agricultural Experiment Station, Utah State University, Logan, Utah, October 1994, Table 25" Kamas Station.

Company as carrier water. The applicants must maintain records of use sufficient to demonstrate that the depletion of water associated with its use does not exceed 41.529 acre-feet.

2. The Town of Francis must monitor its use of water under this application to determine the number of service connections which are connected to the central sewer system and any uses of water which are made within the Weber River drainage. If it is determined that these uses of water require the delivery of 41.529 acre-feet (the total allowed depletion), no additional water is to be diverted under this application. If Francis' use of water results in return flows to the Provo River, additional water up to 77.505 acre-feet (the maximum allowable diversion) may be diverted provided that the depletion of water attributable to all uses under this application does not exceed 41.529 acre-feet. All water diverted under this application that does not produce return flow to the Provo River must be considered as 100% consumptive and the diversion of water for those purposes must be limited to the depletion.

3. South Kamas Irrigation Company may continue to divert up to 15.5 acre-feet annually under this application for carrier water. The carrier water must be measured at its point of diversion and the cumulative diversion under this change application from all diversions (including the wells and carrier diversions) must not exceed 77.505 acre-feet annually. A volume of water equivalent to the amount diverted as carrier water must be returned to the Provo River.

4. To accommodate the approval of this permanent change application, the irrigation of 25.8333 acres at the historical place of use from the South Kamas Irrigation Company system must cease.

5. All wells used for Town of Francis must be equipped with permanent totalizing meters and the volume of water diverted reported under the Utah Water Use Program. It is also recommended that devices for monitoring water levels in the wells be installed and those water levels be routinely monitored.

6. All diversions under this application must be made under the direction of the commissioner of the Provo River. All measuring devices and meters must be accessible to the river commissioner and other representatives of the State Engineer at any reasonable time. Should additional expenses be incurred in monitoring and regulation of the Provo River or the wells, the applicants are responsible for those distribution costs.

7. The basis for this change right is ownership of 46.69 shares of stock in South Kamas Irrigation Company. This ownership must be maintained in good standing by the co-applicant shareholder and/or the successor(s) in interest for this

application to remain valid. No water may be withdrawn from the wells if valid ownership of this stock is not in effect.

8. This change application grants the right to use water for municipal purposes for the Town of Francis only.

As noted, this approval is granted subject to prior rights. The applicants shall be liable to mitigate or provide compensation for any impairment of or interference with prior rights as such may be stipulated among parties or decreed by a court of competent jurisdiction.

The applicants are strongly cautioned that other permits may be required before any development of this application can begin and it is the responsibility of the applicants to determine the applicability of and acquisition of such permits. Once all other permits have been acquired, this is your authority to develop the water under the above referenced application which under Sections 73-3-10 and 73-3-12, Utah Code Annotated, 1953, as amended, must be diligently prosecuted to completion. The water must be put to beneficial use and proof must be filed on or before **January 31, 2014**, or a request for extension of time must be acceptably filed; otherwise the application will be lapsed. This approval is limited to the rights to divert and beneficially use water and does not grant any rights of access to, or use of land or facilities not owned by the applicants.

Proof of beneficial use is evidence to the State Engineer that the water has been placed to its full intended beneficial use. By law, it must be prepared by a registered engineer or land surveyor, who will certify to the location and uses of the extent of your water right. Upon the submission of proof as required by Section 73-3-16, Utah Code, for this application, the applicants must identify every source of water used under this application and the amount of water used from that source. The proof must also show the capacity of the sources of supply and demonstrate that each source can provide the water claimed to be diverted under this right as well as all other water rights which may be approved to be diverted from those sources.

Failure on your part to comply with the requirements of the applicable statutes may result in the lapsing of this permanent change application.

It is the applicants' responsibility to maintain a current address with this office and to update ownership of their water right. Please notify this office immediately of any change of address or for assistance in updating ownership.

Your contact with this office, should you need it, is with the Utah Lake/Jordan River Regional Office. The telephone number is 801-538-7240.

This Order is subject to the provisions of Administrative Rule R655-6-17 of the Division of Water Rights and to Sections 63-46b-13 and 73-3-14 of the Utah Code which provide for filing either a Request for Reconsideration with the State Engineer or an appeal with the appropriate District Court. A Request for Reconsideration must be filed with the State Engineer within 20 days of the date of this Order. However, a Request for Reconsideration is not a prerequisite to filing a court appeal. A court appeal must be filed within 30 days after the date of this Order, or if a Request for Reconsideration has been filed, within 30 days after the date the Request for Reconsideration is denied. A Request for Reconsideration is considered denied when no action is taken 20 days after the Request is filed.

Dated this 20 day of January, 2009.

INTERIM
Boyd P. Clayton, P.E., Interim State Engineer

Mailed a copy of the foregoing Order this 20 day of January, 2009 to:

Town of Francis
c/o Lynette Hallum
P O Box 668
Francis, UT 84036

South Kamas Irrigation Company
3106 East SR 35
Woodland, UT 84036

Wasatch Mountain Investment Partner LLC
975 Swiss Alpine Rd
Midway, UT 84049

BY: Kelly K. Horne
Kelly K. Horne, Applications/Records Secretary

Utah Division of Water Rights

Select Related Information

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 09/28/2011 Page 1
CHANGE: a34844 WATER RIGHT: 55-12355 CERT. NO.: COUNTY TAX ID#:
AMENDATORY? No
BASE WATER RIGHTS: 55-12355
RIGHT EVIDENCED BY: 55-12355, based on 15.6 shares of stock in the Washington Irrigation Co
CHANGES: Point of Diversion [X], Place of Use [X], Nature of Use [X], Reservoir Storage [ ].
--

NAME: Town of Francis (Public Water Supplier)
ADDR: c/o Lynette Hallum
P.O. Box 668
Francis UT 84036
REMARKS: share-holder

NAME: Washington Irrigation Company
ADDR: c/o David Ure, President
661 South Lambert Lane
Kamas UT 84036
REMARKS:
--
FILED: 09/15/2008|PRIORITY: 09/15/2008|ADV BEGAN: 10/10/2008|ADV ENDED: 10/17/2008|NEWSPAPER: The Summit County News
ProtestEnd:11/06/2008|PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:01/20/2009|PROOF DUE: 01/31/2014
EXTENSION: |ELEC/PROOF:[ ]|ELEC/PROOF: |CERT/WUC: |LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
Status: Approved

H E R E T O F O R E | **H E R E A F T E R**

HERETOFORE	HEREAFTER
FLOW: 15.6 acre-feet	FLOW: 15.6 acre-feet
SOURCE: Provo River	SOURCE: Underground Water Wells (2)
COUNTY: Summit	COUNTY: Summit COM DESC: Town of Francis
	Twelve acre-feet (class A shares) of this water will diverted from wells in the Town of Francis system. The remaining 3.6 acre-feet (represented by class D shares) will remain in the Washington Irrigation Company ditch as carrier water for Francis.

```
|                                                                    ||
|                                                                    ||
|                                                                    ||
|                                                                    ||      The Washington
Irrigation Company will                       |
|                                                                    ||      continue to divert the
full amount of                        |
|                                                                    ||      water.  The irrigation
company will                          |
|                                                                    ||      return back to the river
the amount                          |
|                                                                    ||      diverted by the town.
|                                                                    ||
|--------------------------------------------------------------------||-------------------------------
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|POINT(S) OF DIVERSION ------> [MAP VIEWER]*[GOOGLE VIEW] ||CHANGED AS FOLLOWS: (Click Location link for WRPLAT) |**

```
|--------------------------------------------------------------------||-------------------------------
-----------------------------------|
|Point Surface:                                                      ||
|(1)  N  910 ft E  675 ft from SW cor, Sec 07, T  3S, R  7E, SLBM||
|  Dvrting Wks:                                                      ||
|  Source:                                                           ||
|--------------------------------------------------------------------||-------------------------------
-----------------------------------|
|Point Underground:                                                  ||UNDERGROUND: (Click Link for
PLAT data, Well ID# link for data.)|
|                                                                    ||(1)  N  134 ft E 1168 ft from
SW cor, Sec 27, T  2S, R  6E, SLBM|
|                                                                    ||  Diameter:     ins.  Depth:
to      ft.  WELL ID#:         |
|                                                                    ||(2)  N  481 ft E  974 ft from
S4 cor, Sec 02, T  3S, R  6E, SLBM|
|                                                                    ||  Diameter:     ins.  Depth:
to      ft.  WELL ID#:         |
|--------------------------------------------------------------------||-------------------------------
-----------------------------------|
|Point Rediversion:                                                  ||
|(1)  N 1800 ft W   80 ft from SW cor, Sec 12, T  3S, R  6E, SLBM||
|  Dvrting Wks:                                                      ||
|  Source:                                                           ||
|--------------------------------------------------------------------||-------------------------------
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|PLACE OF USE ------> ||CHANGED as follows:
|

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|--------------------------------------------------------------------||-------------------------------
-----------------------------------|
|                              --NW¼--  --NE¼--  --SW¼--  --SE¼-- ||
--NW¼--  --NE¼--  --SW¼--  --SE¼-- |
|                             |N N S S||N N S S||N N S S||N N S S|||
 N N S S||N N S S||N N S S||N N S S||
|                             |W E W E||W E W E||W E W E||W E W E|||
 W E W E||W E W E||W E W E||W E W E||
|Sec 18 T  2S R  6E SLBM     * : : : ** : :X: ** :X: :X**X: :X:X*||
|Sec 19 T  2S R  6E SLBM     *X:X:X:X**X: :X: **X:X: :X**X:X:X:X*||
|Sec 20 T  2S R  6E SLBM     * : : : ** : : : ** : :X: ** : : : *||
|
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|Sec 27 T  2S R  6E SLBM     * : : : ** : : : **X: :X: ** : : : *||
|Sec 28 T  2S R  6E SLBM     *X:X:X: **X:X:X:X** :X:X:X**X:X:X:X*||
|Sec 29 T  2S R  6E SLBM     * :X:X:X** : : : **X:X: :X**X:X:X: *||
|Sec 30 T  2S R  6E SLBM     * : : : **X:X:X:X** : : : ** :X: : *||
|Sec 33 T  2S R  6E SLBM     *X:X:X:X**X:X:X:X** :X: : **X:X:X:X*||
|Sec 34 T  2S R  6E SLBM     * : :X:X** : :X: ** :X:X:X**X:X:X:X*||
|Sec 02 T  3S R  6E SLBM     *X:X:X:X**X: :X: **X:X:X:X**X:X:X:X*||
|Sec 03 T  3S R  6E SLBM     * :X: : **X:X:X:X** : : : **X:X: : *||
|
```

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|NATURE OF USE ------>                                            ||CHANGED as follows:
|
|----------------------------------------------------------------||------------------------------------------------------------------|
|IRR  = values are in acres.                                      ||
|STK  = values are in ELUs meaning Cattle or Equivalent.          ||
|DOM  = values are in EDUs meaning Equivalent Domestic Units      ||
|       (or Families).                                            ||
|----------------------------------------------------------------||------------------------------------------------------------------|
|SUPPLEMENTAL to Other Water Rights: Yes                          ||SUPPLEMENTAL to Other Water Rights: No                            |
|----------------------------------------------------------------||------------------------------------------------------------------|
|----------------------------------------------------------------||------------------------------------------------------------------|
|IRR:      5.2000 acres.                      USED 04/01 - 10/31||
|...............................................................||..................................
|                                                                ||MUN: Francis                          USED 01/01 - 12/31|
|----------------------------------------------------------------||------------------------------------------------------------------|
```

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**************************************************************************************************
*****************************************************E N D   O F   D A T A*****************************************************
**************************************************************************************************
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State of Utah
DEPARTMENT OF NATURAL RESOURCES
Division of Water Rights

JON M. HUNTSMAN, JR.
Governor
GARY R. HERBERT
Lieutenant Governor

MICHAEL R. STYLER
Executive Director

BOYD P. CLAYTON
State Engineer/Division Director

JAN 20 2009

ORDER OF THE STATE ENGINEER
For Permanent Change Application Number 55-12355 (a34844)

Permanent Change Application Number 55-12355 (a34844) in the names of Town of Francis and Washington Irrigation Company, was filed on September 15, 2008, to change the point of diversion, place of use, and nature of use of 15.6 acre-feet (af) of water as evidenced by Water Right Number 55-12355. Heretofore, the water has been diverted from a surface source located North 910 feet and East 675 feet from the SW Corner of Section 7, T3S, R7E, SLB&M, and was re-diverted at North 1800 feet and West 80 feet from the SW Corner of Section 12, T3S, R6E, SLB&M. The water has been used for the irrigation of 5.2 acres from April 1 to October 31. The water was used in all or portion(s) of Section 18, T2S, R6E, SLB&M; Section 19, T2S, R6E, SLB&M; Section 20, T2S, R6E, SLB&M; Section 27, T2S, R6E, SLB&M; Section 28, T2S, R6E, SLB&M; Section 29, T2S, R6E, SLB&M; Section 30, T2S, R6E, SLB&M; Section 33, T2S, R6E, SLB&M; Section 34, T2S, R6E, SLB&M; Section 2, T3S, R6E, SLB&M; and Section 3, T3S, R6E, SLB&M.

Hereafter, it is proposed to divert 15.6 acre-feet of water to points of diversion changed to: (1) Well - North 134 feet and East 1168 feet from the SW Corner of Section 27, T2S, R6E, SLB&M (existing 16-inch well, 507 feet deep); (2) Well - North 481 feet and East 974 feet from the S¼ Corner of Section 2, T3S, R6E, SLB&M (existing 10-inch well, 330 feet deep). The nature of use of the water is being changed to municipal purposes within the service area of Francis.

Notice of the application was published in The Summit County News on October 10 and October 17, 2008. No protests were received.

In evaluating applications proposing to change the nature of use of a water right, the State Engineer believes it is appropriate to examine the rates and amounts of hydrologic depletion associated with the historical water use as compared to the proposed use to assure that there is no enlargement of the underlying water right. This application represents that 5.2 acres were irrigated. The total diversion for this use would be (5.2 acres x 3 acre-feet per acre) = 15.6 acre-feet. The depletion for this use is estimated at (5.2 acres x 19.29[1] inches / 12 inches per foot) = 8.36 acre-feet. Of the 15.6 acre-feet allocated to be diverted for the historical use only 12.0 acre-feet is to be diverted from wells in the Town of Francis system. The remaining 3.6 acre-feet will remain in the Washington Irrigation Company ditch as carrier water.

However, both the heretofore and hereafter places of use are situated on a divide between two river systems - the Weber River drainage area to the north and the Provo River drainage area to the south. The proposed use is for municipal purposes within the service area of the Town of

[1] *Consumptive Use of Irrigated Crops in Utah*, Research Report 145, Utah Agricultural Experiment Station, Utah State University, Logan, Utah, October 1994, Table 25 Kamas Station.

Francis which currently delivers its sewage effluent to a treatment plant that discharges to the Weber River drainage. Therefore, water used for indoor purposes is 100% depleted because it constitutes an export from the Provo River drainage. Likewise, water used for irrigation within the surface drainage area of the Weber River is 100% depleted. The Town of Francis must maintain records of the use of water that it delivers so that the water delivered for indoor use can be accounted for, the water used for irrigation or other outdoor purposes within the Provo River drainage can be accounted for, and the water used for irrigation or other outdoor uses within the Weber River drainage can be accounted for. It is reiterated that the use of water for indoor purposes, assuming the sewage is treated at a facility that does not direct effluent back to the Provo River, and all other uses of water within the Weber River drainage must be accounted for as 100% depleted. If all water under this application is used in this fashion, the diversion limit for the water will be 8.36 acre-feet and not 12.00 acre-feet. If water is used for irrigation purposes within the Provo River drainage, up to 3.0 acre-feet per acre irrigated can be diverted. It is, therefore, essential for the applicant to maintain complete and accurate records of water usage in order to estimate the depletion of water associated with its use.

In evaluating the various elements of the underlying rights, it is not the intention of the State Engineer to adjudicate the extent of these rights, but rather to provide sufficient definition of the rights to assure that other vested rights are not impaired by the change and/or no enlargement occurs. If, in a subsequent action, the court adjudicates that this right is entitled to either more or less water, the State Engineer will adjust the figures accordingly.

It is, therefore, **ORDERED** and Permanent Change Application Number 55-12355 (a34844) is hereby **APPROVED** subject to prior rights and the following conditions:

1. The diversion of water under this application is limited such that depletion may not exceed 8.36 acre-feet. Under no circumstance is the total diversion to exceed 15.6 acre-feet including any water retained by Washington Irrigation Company as carrier water. The applicants must maintain records of use sufficient to demonstrate that the depletion of water associated with its use does not exceed 8.36 acre-feet.

2. The Town of Francis must monitor its use of water under this application to determine the number of service connections which are connected to the central sewer system and any uses of water which are made within the Weber River drainage. If it is determined that these uses of water require the delivery of 8.36 acre-feet (the total allowed depletion), no additional water is to be diverted under this application. If Francis' use of water results in return flows to the Provo River, additional water up to 12.00 acre-feet (the maximum allowable diversion) may be diverted provided that the depletion of water attributable to all uses under this application does not exceed 8.36 acre-feet annually. All water diverted under this application that does not produce return flow to the Provo River must be considered as 100% consumptive and the diversion of water for those purposes must be limited to the depletion.

3. Washington Irrigation Company may continue to divert up to 3.6 acre-feet annually under this application for carrier water. The carrier water must be measured at its point of diversion and the cumulative diversion under this change application from all diversions (including the wells and carrier diversions) must not exceed 15.6 acre-feet annually. A volume of water equivalent to the amount diverted as carrier water must be returned to the Provo River.

4. To accommodate the approval of this permanent change application, the irrigation of 5.2 acres at the historical place of use from the Washington Irrigation Company system must cease.

5. All wells used for Town of Francis must be equipped with permanent totalizing meters and volume of water reported under the Utah Water Use Program. It is also recommended that devices for monitoring water levels in the wells be installed and those water levels be routinely monitored.

6. All diversions under this application must be made under the direction of the commissioner of the Provo River. All measuring devices and meters must be accessible to the river commissioner and other representatives of the State Engineer at any reasonable time. Should additional expenses be incurred in monitoring and regulation of the Provo River or the wells, the applicants are responsible for those distribution costs.

7. The basis for this change right is ownership of 12 Class B and 3.6 Class D shares of stock in Washington Irrigation Company. This ownership must be maintained in good standing by the co-applicant shareholder and/or the successor(s) in interest for this application to remain valid. No water may be withdrawn from the wells if valid ownership of the stock is not in effect.

8. This change application grants the right to use water for municipal purposes for the Town of Francis only.

As noted, this approval is granted subject to prior rights. The applicants shall be liable to mitigate or provide compensation for any impairment of or interference with prior rights as such may be stipulated among parties or decreed by a court of competent jurisdiction.

The applicants are strongly cautioned that other permits may be required before any development of this application can begin and it is the responsibility of the applicants to determine the applicability of and acquisition of such permits. Once all other permits have been acquired, this is your authority to develop the water under the above referenced application which under Sections 73-3-10 and 73-3-12, Utah Code Annotated, 1953, as amended, must be diligently prosecuted to completion. The water must be put to beneficial use and proof must be filed on or before **January 31, 2014,** or a request for extension of time must be acceptably filed; otherwise the application will be lapsed. This approval is limited to the rights to divert and beneficially use water and does not grant any rights of access to, or use of land or facilities not owned by the applicants.

Proof of beneficial use is evidence to the State Engineer that the water has been placed to its full intended beneficial use. By law, it must be prepared by a registered engineer or land surveyor, who will certify to the location and uses of the extent of your water right. Upon the submission of proof as required by Section 73-3-16, Utah Code, for this application, the applicants must identify every source of water used under this application and the amount of water used from that source. The proof must also show the capacity of the sources of supply and demonstrate that each source can provide the water claimed to be diverted under this right as well as all other water rights which may be approved to be diverted from those sources.

Failure on your part to comply with the requirements of the applicable statutes may result in the lapsing of this permanent change application.

It is the applicants' responsibility to maintain a current address with this office and to update ownership of their water right. Please notify this office immediately of any change of address or for assistance in updating ownership.

Your contact with this office, should you need it, is with the Utah Lake/Jordan River Regional Office. The telephone number is 801-538-7240.

This Order is subject to the provisions of Administrative Rule R655-6-17 of the Division of Water Rights and to Sections 63G-4-302, 63G-4-402, and 73-3-14 of the Utah Code which provide for filing either a Request for Reconsideration with the State Engineer or an appeal with the appropriate District Court. A Request for Reconsideration must be filed with the State Engineer within 20 days of the date of this Order. However, a Request for Reconsideration is not a prerequisite to filing a court appeal. A court appeal must be filed within 30 days after the date of this Order, or if a Request for Reconsideration has been filed, within 30 days after the date the Request for Reconsideration is denied. A Request for Reconsideration is considered denied when no action is taken 20 days after the Request is filed.

Dated this 30 day of January, 2009.

INTERIM

Boyd P. Clayton, P.E., Interim State Engineer

Mailed a copy of the foregoing Order this 20 day of January, 2009 to:

Town of Francis
c/o Lynette Hallum
P.O. Box 668
Francis, UT 84036

Washington Irrigation Company
c/o David Ure, President
661 South Lambert Lane
Kamas, UT 84036

BY: Kelly K. Horne
Kelly K. Horne, Applications/Records Secretary

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 09/28/2011 Page 1

CHANGE: **a16634** WATER RIGHT: 55-7830 CERT. NO.: COUNTY TAX ID#: AMENDATORY? No
BASE WATER RIGHTS: 55-7830
RIGHT EVIDENCED BY: 55-7830, based on 98 shares of the capital stock of South Kamas Irrigation Company (Provo River Decree of 1921, Civil No.2888)
CHANGES: Point of Diversion [ ], Place of Use [X], Nature of Use [X], Reservoir Storage [ ].

NAME: Francis Town Corporation
ADDR: P.O. Box 668
Francis UT 84036
REMARKS:

NAME: Woodland Hills Mutual Water Company
ADDR: c/o Brad McNeil
P.O. Box 668
Francis UT 84036
REMARKS:

FILED: 03/12/1992	PRIORITY: 03/12/1992	ADV BEGAN: 04/03/1992	ADV ENDED:	NEWSPAPER: The Summit County News
ProtestEnd:05/17/1992	PROTESTED: [No Heari]	HEARNG HLD:	SE ACTION: [Approved]	ActionDate:11/13/1992	PROOF DUE: 07/31/2001
EXTENSION:	ELEC/PROOF:[Proof]	ELEC/PROOF:07/31/2001	CERT/WUC: 11/21/2003	LAP, ETC:	LAPS LETTER:
RUSH LETTR:	RENOVATE:	RECON REQ:	TYPE: [ ]	

Status: Certificate

H E R E T O F O R E	**H E R E A F T E R**
FLOW: 162.36 acre-feet	FLOW: 162.36 acre-feet
SOURCE: Underground Water Well 10-inch diameter well, 330 feet deep, drilled under 55-5613; also see E1302.	SOURCE: Underground Water Well
COUNTY: Summit	COUNTY: Summit COM DESC: 0.2 mi. NW of Woodland Church
The total irrigated acreage awarded to the South Kamas Irrigation Company is 1,700 (see paragraph 103(d), page 62, Findings of Facts and Conclusions of Law, Provo River Decree, dated 1921, Civil No. 2888). There are 4104.58 shares in the South Kamas Irrigation Company, and this change application is based on 98 of the shares. A tentative irrigation diversion requirement for the Kamas area is 4.0 acre-feet per acre and the calculated consumptive irrigation requirement is 1.3 acre-feet per acre. The diversion requirement for domestic use is 0.45 acre-feet per family per year and the actual depletion from the hydrologic system is considered to not exceed 20 percent of this quantity, or 0.09 acre-feet. Then 98 shares represents the right to irrigate (1700/4104.58) X 98 = 40.59 acres. The diversion requirement would be 4 X 40.59 = 162.36 acre-feet, and the actual consumptive use (depletion) of water would be 1.3 X 40.59 = 52.77 acre-feet. For a proposed subdivision of 56 families, the domestic diversion requirement is 56 X 0.45 = 25.20 acre-feet, and the depletion of water is 20% of 25.20, or 5.04 acre-feet. This leaves 52.77-5.04 = 47.73 acre-feet that can be depleted through irrigation. An acreage of 36.72 would have a depletion of 1.3 X 36.72 = 47.73 acre-feet. However, the quantity remaining to meet the actual irrigation diversion requirement is 162.36 - 25.20 = 137.16 acre-feet, and 137.16/4 = 34.29 acres, which must be the acreage limitation on the hereafter extent of irrigation.	See explanation to Change application a14920. Each applicant is the owner of 49 shares of the capital stock of South Kamas Irrigation Company. These 98 shares were subject to Change Application a14920 (55-7830), approved by memorandum Decision dated December 8, 1989. Applicants each own a one-half interest in Change Application a14920 (55-7830). (See Exhibits A and B). The Town wishes to use the water attributable to its 49 shares of South Kamas Irrigation Company in its municipal system. In addition, the Town has obtained rights to use the surplus water of Woodland Hills Mutual Company attributable to the Company's 49 shares of South Kamas Irrigation Company in the Francis municipal system pursuant to a certain License Agreement dated September 10, 1991. (See Exhibit C). Finally, the Town is the owner of 56 shares of Woodland Hills Mutual Water Company and desires to use the water attributable to its shares in its municipal water system. (See Exhibit D). Place of use for Municipal use is alternatively within the service are of the Francis Town municipal water system.
POINT(S) OF DIVERSION ------> MAP VIEWER*GOOGLE VIEW**	**SAME AS HERETOFORE**

```
|Point Underground:                                              ||                                                                |
|(1)  N  481 ft E  974 ft from S4 cor, Sec 02, T  3S, R  6E, SLBM||                                                                |
|  Diameter:  10 ins.  Depth:  330 to      ft.  WELL ID#: 000000 ||                                                                |
|----------------------------------------------------------------||----------------------------------------------------------------|

|PLACE OF USE ------>                                            ||CHANGED as follows:                                             |
|----------------------------------------------------------------||----------------------------------------------------------------|
|                             --NW¼--  --NE¼--  --SW¼--  --SE¼-- ||                             --NW¼--  --NE¼--  --SW¼--  --SE¼-- |
|                            |N N S S||N N S S||N N S S||N N S S|||                            |N N S S||N N S S||N N S S||N N S S||
|                            |W E W E||W E W E||W E W E||W E W E|||                            |W E W E||W E W E||W E W E||W E W E||
|Sec 02 T  3S R  6E SLBM     * : : : ** : : : ** :X: :X**X:X:X:X*||Sec 02 T  3S R  6E SLBM     * : : : ** : : : ** :X: :X**X:X:X:X*|

|NATURE OF USE ------>                                           ||CHANGED as follows:                                             |
|----------------------------------------------------------------||----------------------------------------------------------------|
|IRR  = values are in acres.                                     ||                                                                |
|STK  = values are in ELUs meaning Cattle or Equivalent.         ||                                                                |
|DOM  = values are in EDUs meaning Equivalent Domestic Units     ||                                                                |
|       (or Families).                                           ||                                                                |
|----------------------------------------------------------------||----------------------------------------------------------------|
|SUPPLEMENTAL to Other Water Rights: No                          ||SUPPLEMENTAL to Other Water Rights: No                          |
|----------------------------------------------------------------||----------------------------------------------------------------|
|----------------------------------------------------------------||----------------------------------------------------------------|
|IRR:     34.2900 acres.                      USED 04/15 - 09/15||IRR:     17.1500 and     17.1500 Sole Supply  USED 04/15 - 09/15|
|................................................................||................................................................|
|................................................................||................................................................|
|DOM:     56.0000 EDUs.                       USED 01/01 - 12/31||DOM:     56.0000 EDUs.                       USED 01/01 - 12/31|
|................................................................||................................................................|
|                                                                ||MUN: Francis                                USED 01/01 - 12/31|
|----------------------------------------------------------------||----------------------------------------------------------------|

*-----------------------------------------------------------------------------------------------------------------------------------*
*-----------------------------------------------------------------------------------------------------------------------------------*
PROTESTANTS**************************************************************************************************************************
*-----------------------------------------------------------------------------------------------------------------------------------*

NAME: Central Utah Water Conservancy District                     NAME:  US Department of the Interior
ADDR: c/o Don A. Christiansen                                     ADDR: c/o Bruce C. Barrett
      355 West University Parkway                                       P. O. Box 51338
      Orem UT 84058                                                     Provo UT 84605-1338
-------------------------------------------------------------------------------------------------------------------------------------
*-----------------------------------------------------------------------------------------------------------------------------------*
EXTENSIONS OF TIME WITHIN WHICH TO FILE PROOF****************************************************************************************
*-----------------------------------------------------------------------------------------------------------------------------------*
FILED:     07/29/1996|PUB BEGAN:          |PUB ENDED:          |NEWSPAPER:
ProtestEnd:          |PROTESTED: [No Hear ]|HEARNG HLD:         |SE ACTION: [Approved]|ActionDate:08/12/1996|PROOF DUE:  07/31/2001
-------------------------------------------------------------------------------------------------------------------------------------
*************************************************************************************************************************************
*******************************************************E N D   O F   D A T A*********************************************************
*************************************************************************************************************************************
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Utah Division of Water Rights

Select Related Information

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 09/28/2011 Page 1

CHANGE: **a20147** WATER RIGHT: 55-9139 CERT. NO.: COUNTY TAX ID#: AMENDATORY? No
BASE WATER RIGHTS: 55-9139
RIGHT EVIDENCED BY: a portion of Water Right Numbers 55-11221 (5th class), 55-11313 (17th class), 55-11550 (Big Elk Res.), and 55-11551 (Big Elk Res.)
CHANGES: Point of Diversion [X], Place of Use [X], Nature of Use [X], Reservoir Storage [ ].

NAME: Town of Francis
ADDR: PO Box 668
Kamas UT 84036
INTEREST: 0% REMARKS: shareholder (Cert # 139 for 158.1 Class A Shares)

NAME: Washington Irrigation Company
ADDR: c/o Keith W. Naylor, Secretary
333 North 2000 West
Kamas UT 84036
INTEREST: 100% REMARKS: for use by the Town of Francis

FILED: 06/24/1996	PRIORITY: 08/03/2001	ADV BEGAN: 07/05/1996	ADV ENDED: 07/12/1996	NEWSPAPER: The Summit County News
ProtestEnd: 08/01/1996	PROTESTED: [Hear Hel]	HEARNG HLD:	SE ACTION: [Approved]	ActionDate: 11/14/1997 / PROOF DUE: 11/30/2011
EXTENSION:	ELEC/PROOF: [ ]	ELEC/PROOF:	CERT/WUC:	LAP, ETC: / LAPS LETTER:
RUSH LETTR:	RENOVATE:	RECON REQ:	TYPE: [ ]	

Status: Approved

H E R E T O F O R E	H E R E A F T E R
FLOW: 207.59 acre-feet	FLOW: 160.2 acre-feet
SOURCE: Provo River, Boulder Creek, and Big Elk Reservoir	SOURCE: Underground Water Well (existing)
COUNTY: Summit	COUNTY: Summit COM DESC: Francis Town Well
	It is proposed by thins change application to move a portion of the rights owned by the Washington Irrigation Company into a well owned by the Town of Francis for municipal use. The portion of the water being moved is represented by shares of stock owned by Christopher L. Burton. The 15.81 shares of stock owned by Mr. Burton have been evaluated to represent the amount of 207.59 acre-feet that can be withdrawn from the well. A like amount will be returned to the Provo River during the irrigation season from the Company's water delivery system and return flows from seepage. The Company distributes water to its shareholders on a "turns" basis. During Mr. Burton's turn, instead of diverting his share of the Company's water onto his land for irrigation, the water will bypass his property and remain in the Company's ditch. Mr. Burton's share of the Company's water that bypasses his property will be delivered back into the Provo River to satisfy downstream rights. Supporting data for the amount of water delivered per share are attached and represent the average of the years 1965 to 1995, which amounto to 13.13 acre-feet per share. Total shares in the Washington Irrigation Company is 389 shares.

POINT(S) OF DIVERSION ------> MAP VIEWER***GOOGLE VIEW	CHANGED AS FOLLOWS: (Click Location link for WRPLAT)
Point Surface: (1) S 430 ft W 105 ft from E4 cor, Sec 05, T 2S, R 8E, SLBM Dvrting Wks: Big Elk Reservoir Source: Boulder Creek (2) N 910 ft E 675 ft from SW cor, Sec 07, T 3S, R 7E, SLBM Dvrting Wks: Washington & South Kamas Canal Source: Provo River	
Point Underground:	UNDERGROUND: (Click Link for PLAT data, Well ID# link for data.) (1) N 134 ft E 1168 ft from SW cor, Sec 27, T 2S, R 6E, SLBM Diameter: 16 ins. Depth: 504 to ft. WELL ID#: 1883
Point Rediversion: (1) N 1800 ft W 80 ft from SW cor, Sec 12, T 3S, R 6E, SLBM	

```
| Dvrting Wks:                                                   ||                                                                |
| Source:      Provo River                                       ||                                                                |
|----------------------------------------------------------------||----------------------------------------------------------------|

|PLACE OF USE ------>                                            ||CHANGED as follows:                                             |
|----------------------------------------------------------------||----------------------------------------------------------------|
|                             --NW¼--  --NE¼--  --SW¼--  --SE¼-- ||                             --NW¼--  --NE¼--  --SW¼--  --SE¼-- |
|                            |N N S S||N N S S||N N S S||N N S S|||                            |N N S S||N N S S||N N S S||N N S S||
|                            |W E W E||W E W E||W E W E||W E W E|||                            |W E W E||W E W E||W E W E||W E W E||
|Sec 18 T  2S R  6E SLBM     * : : : ** : :X: ** :X: :X**X: :X:X*||                                                                |
|Sec 19 T  2S R  6E SLBM     *X:X:X:X**X: :X: **X:X: :X**X:X:X:X*||                                                                |
|Sec 20 T  2S R  6E SLBM     * : : : ** : : : ** : :X: ** : : : *||                                                                |
|Sec 27 T  2S R  6E SLBM     * : : : ** : : : **X: :X: ** : : : *||                                                                |
|Sec 28 T  2S R  6E SLBM     *X:X:X: **X:X:X:X** :X:X:X**X:X:X:X*||                                                                |
|Sec 29 T  2S R  6E SLBM     * :X:X:X** : : : **X:X: :X**X:X:X: *||                                                                |
|Sec 30 T  2S R  6E SLBM     * : : : **X:X:X:X** : : : ** :X: : *||                                                                |
|Sec 33 T  2S R  6E SLBM     *X:X:X:X**X:X:X:X** :X: : **X:X:X:X*||                                                                |
|Sec 34 T  2S R  6E SLBM     * : :X:X** : :X: ** :X:X:X**X:X:X:X*||                                                                |
|Sec 02 T  3S R  6E SLBM     *X:X:X:X**X: :X: **X:X:X:X**X:X:X:X*||                                                                |
|Sec 03 T  3S R  6E SLBM     * :X: : **X:X:X:X** : : : **X:X: : *||                                                                |

|NATURE OF USE ------>                                           ||CHANGED as follows:                                             |
|----------------------------------------------------------------||----------------------------------------------------------------|
|IRR  = values are in acres.                                     ||                                                                |
|STK  = values are in ELUs meaning Cattle or Equivalent.         ||                                                                |
|DOM  = values are in EDUs meaning Equivalent Domestic Units     ||                                                                |
|       (or Families).                                           ||                                                                |
|----------------------------------------------------------------||----------------------------------------------------------------|
|SUPPLEMENTAL to Other Water Rights: Yes                         ||SUPPLEMENTAL to Other Water Rights: No                          |
|----------------------------------------------------------------||----------------------------------------------------------------|
|----------------------------------------------------------------||----------------------------------------------------------------|
|IRR:     85.7642 acres.                     USED 04/01 - 10/31  ||                                                                |
|................................................................||................................................................|
|STK:    125.0000 ELUs.                      USED 01/01 - 12/31  ||                                                                |
|................................................................||................................................................|
|                                                                ||MUN: Francis                                 USED 01/01 - 12/31|
|----------------------------------------------------------------||----------------------------------------------------------------|

|RESERVOIR STORAGE -->                                           ||SAME AS HERETOFORE                                              |
|----------------------------------------------------------------||----------------------------------------------------------------|
|Storage 01/01 to 12/31, in Big Elk Reservoir                    ||                                                                |
| with a maximum capacity of 782.000 acre-feet, located in:      ||                                                                |
|                             --NW¼--  --NE¼--  --SW¼--  --SE¼-- ||                                                                |
|  Height of Dam:          ft |N N S S||N N S S||N N S S||N N S S|||                                                                |
|  Area Inundat           acs|W E W E||W E W E||W E W E||W E W E|||                                                                |
|Sec 36 T  1S R  7E SLBM     * : : : ** : : : ** : : : **X:X:X:X*||                                                                |
|----------------------------------------------------------------||----------------------------------------------------------------|
|----------------------------------------------------------------||----------------------------------------------------------------|
*---------------------------------------------------------------------------------------------------------------------------------*
*---------------------------------------------------------------------------------------------------------------------------------*
PROTESTANTS***********************************************************************************************************************
*---------------------------------------------------------------------------------------------------------------------------------*

NAME: Provo River Water Users Association                          NAME:  US Department of the Interior
ADDR: Deer Creek Project                                           ADDR: Bureau of Reclamation
      1788 North State                                                   302 East 1860 South
      Orem UT 84057                                                      Provo UT 84606-7317
-----------------------------------------------------------------------------------------------------------------------------------
*---------------------------------------------------------------------------------------------------------------------------------*
EXTENSIONS OF TIME WITHIN WHICH TO FILE PROOF*************************************************************************************
*---------------------------------------------------------------------------------------------------------------------------------*
FILED:     08/03/2001|PUB BEGAN:          |PUB ENDED:          |NEWSPAPER:
ProtestEnd:          |PROTESTED: [Yes     ]|HEARNG HLD:          |SE ACTION: [Approved]|ActionDate:11/15/2001|PROOF DUE:  11/30/2006
-----------------------------------------------------------------------------------------------------------------------------------
FILED:     11/16/2006|PUB BEGAN:          |PUB ENDED:          |NEWSPAPER: No Adv Required
ProtestEnd:          |PROTESTED: [No      ]|HEARNG HLD:          |SE ACTION: [Approved]|ActionDate:02/02/2007|PROOF DUE:  11/30/2011
-----------------------------------------------------------------------------------------------------------------------------------
**********************************************************************************************************************************
******************************************************E N D   O F   D A T A*******************************************************
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Chapter 3 Appendix Items

1. Lagoon Treatment and Winter Storage Capacity Calculations
2. Calculations for Plant Uptake of Nitrogen

Lagoon Capacity Evaluation										
	Flow			Faculative Lagoon System			Aerated Lagoon System		
Year	Winter Average Day Flow (mgd)	Average Annual Day Flow (mgd)	Max Month Average Day Flow (Summer) (mgd)	Winter Required Volume (mg)	Summer Required Volume (mg)	Additional volume needed* (mg)	Required Volume** (mg)	Additional volume needed (mg)	Current volume of Ponds 1-3
2010	89,081	108,821	238,720	11	14.3	3	3.26	0.0	7.9
2015	123,903	151,360	332,036	15	19.9	7	4.54	0.0	
2020	158,725	193,898	425,352	19	25.5	11	5.82	0.0	
2030	227,294	277,661	609,102	27	36.5	19	8.33	0.5	
2035	291,478	356,069	781,105	35	46.9	27	10.68	2.8	
2040	355,663	452,563	953,107	43	57.2	35	13.58	5.7	
2050	496,274	645,652	1,329,917	60	79.8	52	19.37	11.5	
2060	686,513	838,641	1,839,719	82	110.4	75	25.16	17.3	

* Based on winter 120 day storage

**Based on 30 day retention of AADF

Winter Storage					
Year	Population	Winter Flow (gal/day)	150 days of Winter Storage (mgal)	Vol. Needed (mgal)	Current Storage Volume Pond 4 (mg)
2010	1077	89,081	13.36	4	9.5
2015	1498	123,903	18.59	9	
2020	1919	158,725	23.81	14	
2030	2748	227,294	34.09	25	
2035	3524	291,478	43.72	34	
2040	4479	370,469	55.57	46	
2050	6390	528,532	79.28	70	
2060	8300	686,513	102.98	93	

Calculations for Plant Uptake of Nitrogen

Alfalfa

Typical water requirement	24.53	inches/season	(Summit County Ag Profile, Godfrey et al.)
Typical production	2.6	tons/acre	(Summit County Ag Profile, Godfrey et al.)

Pasture Grass

Typical water requirement	19.17	Inches/season	(Summit County Ag Profile, Godfrey et al.)
Typical production	1.8	tons/acre	(Summit County Ag Profile, Godfrey et al.)

Annual Precip for Kamas, UT (WRCC)	
Jan	1.59
Feb	1.56
Mar	1.59
Apr	1.6
May	1.6
Jun	1.1
Jul	1.01
Aug	1.12
Sep	1.36
Oct	1.63
Nov	1.56
Dec	1.42
Total	17.14

Precipitation Summary

Winter	Oct-Mar	9.35	
Summer	Apr-Sep	7.79	
Usable Winter		6.23	(67% usable, Hill 1999)
Usable Summer		6.23	(80% usable, Hill 1999)
Total Usable		12.47	

	Alfalfa		Pasture Grass	
Additional needed	12.06	inches/season	6.70	inches/season
Wheel-line efficiency	70%	(Hill and Banks, 2001)	70%	(Hill and Banks, 2001)
Total Needed	17.24	inches/season	9.58	inches/season

Effluent Total Nitrogen	25	mg/L	Estimated total nitrogen concentration (TN) for secondary effluent (Metcalf & Eddy)

Alfalfa

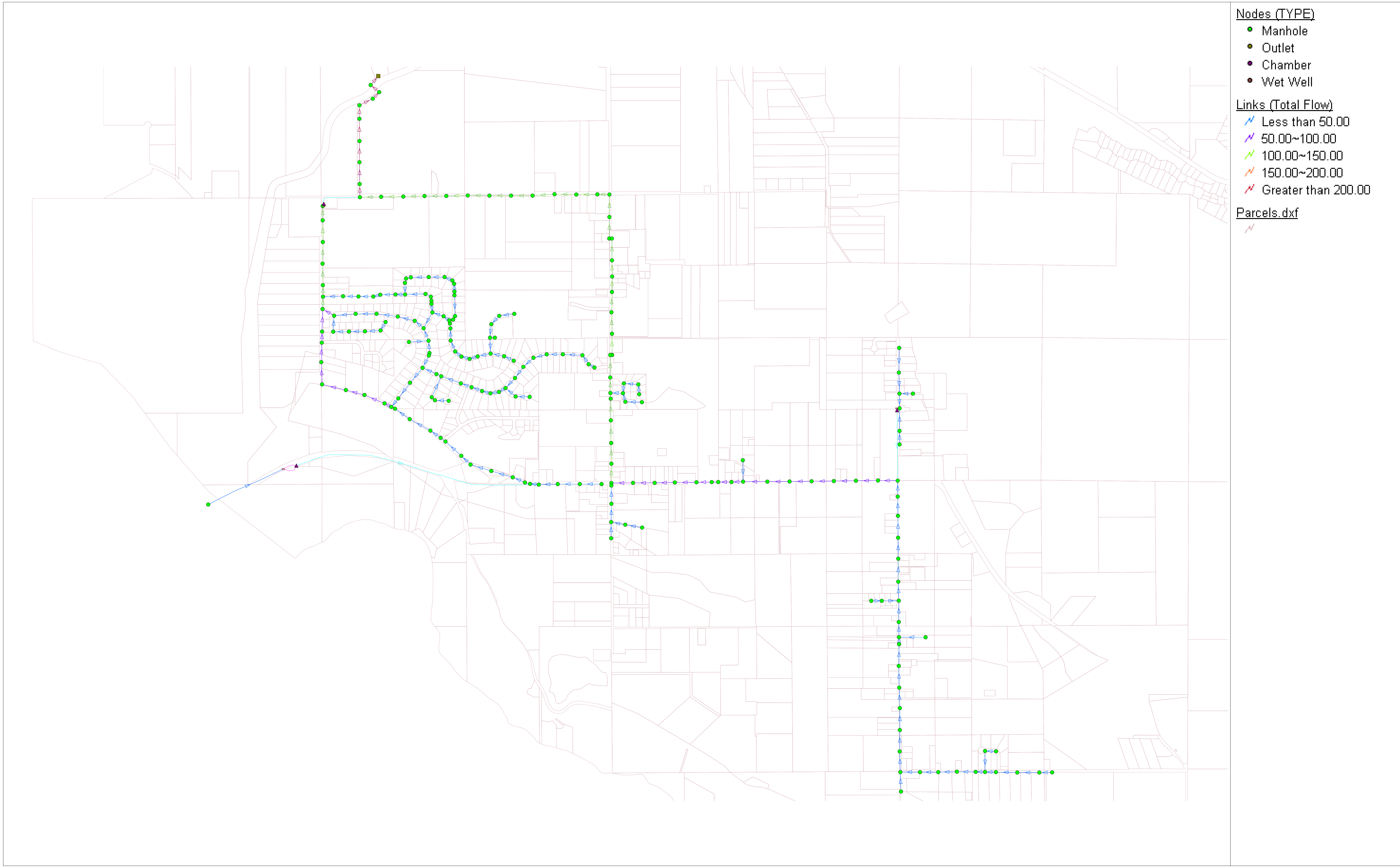
Min water required	467,978	gal/acre	Total water requirement for crop less usuable precip, plus efficiency loss of sprinkler
Total N uptake	131.04	lb/acre	USDA valve for nitrogen uptake based on summit county alfalfa yield of 2.6 ton per acre, alfalfa for hay
Max water based on N	628,489	gals/acre	Based on TN effluent concentration and max crop uptake of TN (lbs/acre)

Pasture

Min water required	260,068	gal/acre	Total water requirement for crop less usuable precip, plus efficiency loss of sprinkler
Total N uptake	48.71	lb/acre	USDA valve for nitrogen uptake based on summit county hay yield (non-alfalfa) of 1.8 ton per acre, grass for hay
Max water based on N	233,621	gals/acre	Based on TN effluent concentration and max crop uptake of TN (lbs/acre)

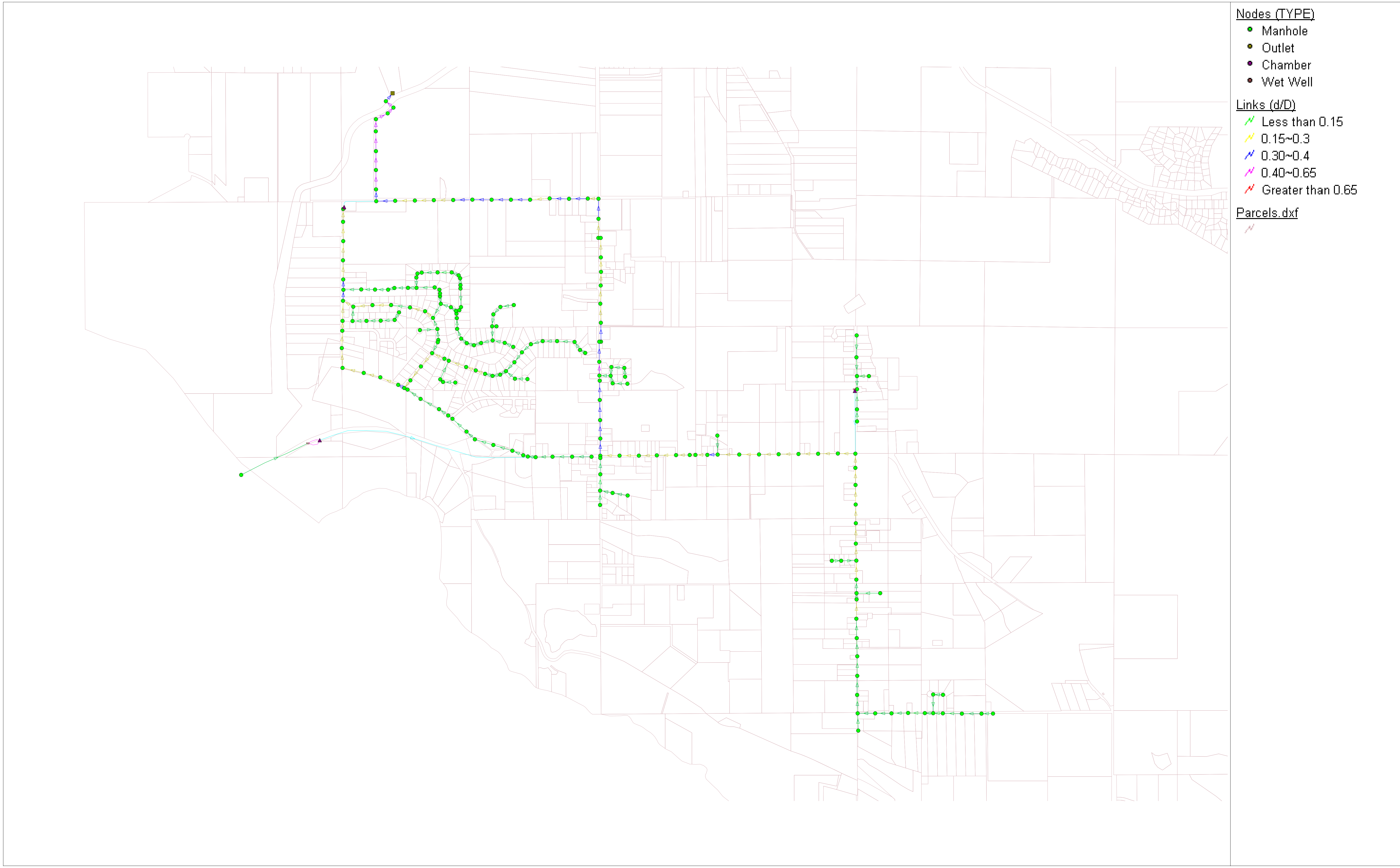
Chapter 4 Appendix Items

1. 5-year future model total flow
2. 5-year future model reserve capacity
3. 5-year future model pipe velocity
4. 10-year future model total flow
5. 10-year future model reserve capacity
6. 10-year future model pipe velocity
7. 25-year future model total flow
8. 25-year future model reserve capacity
9. 25-year future model pipe velocity

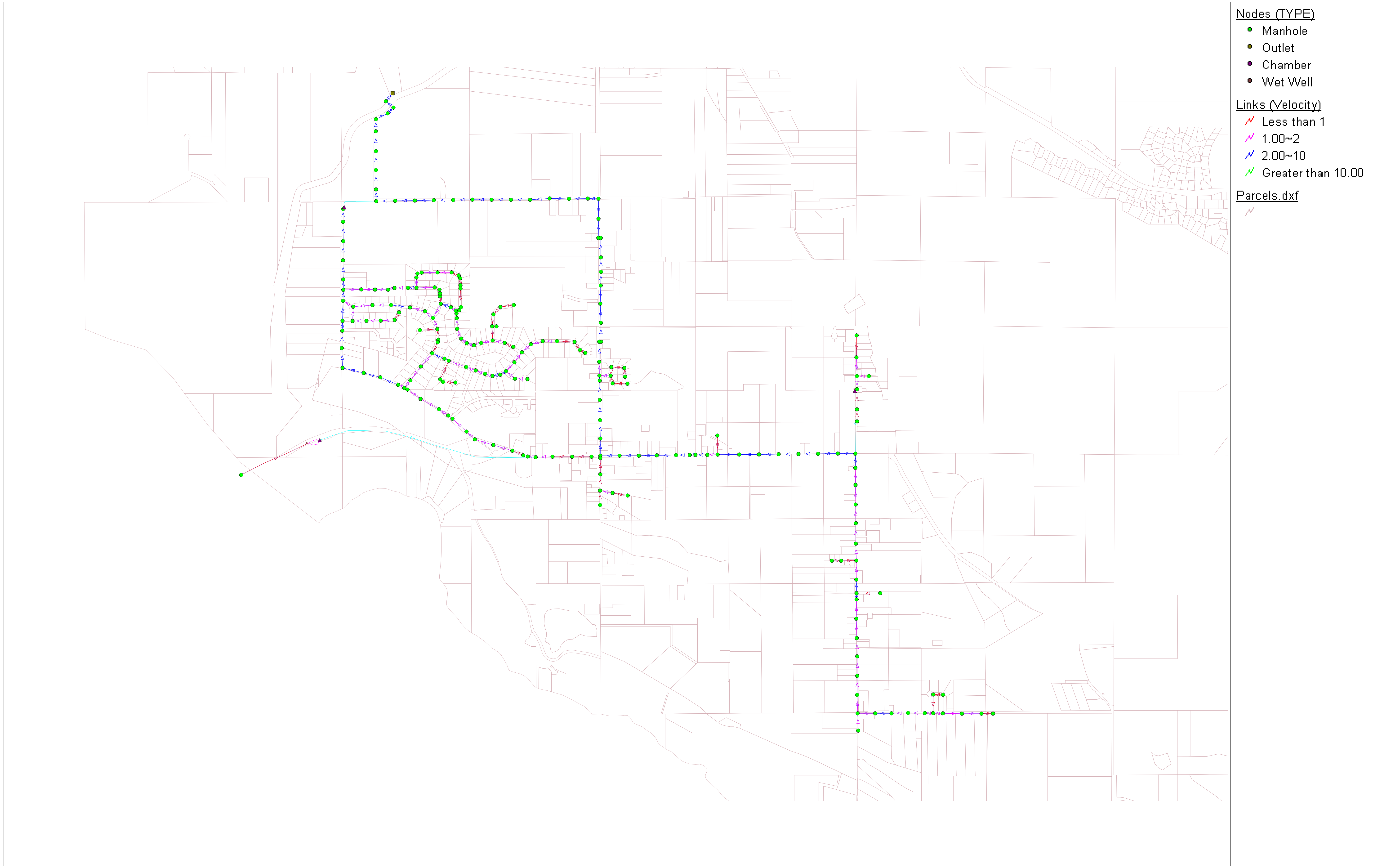

Nodes (TYPE)
Manhole
Outlet
Chamber
Wet Well
Links (Total Flow)
Less than 50.00
50.00~100.00
100.00~150.00
150.00~200.00
Greater than 200.00
Parcels.dxf

Reserve Capacity (d/D)

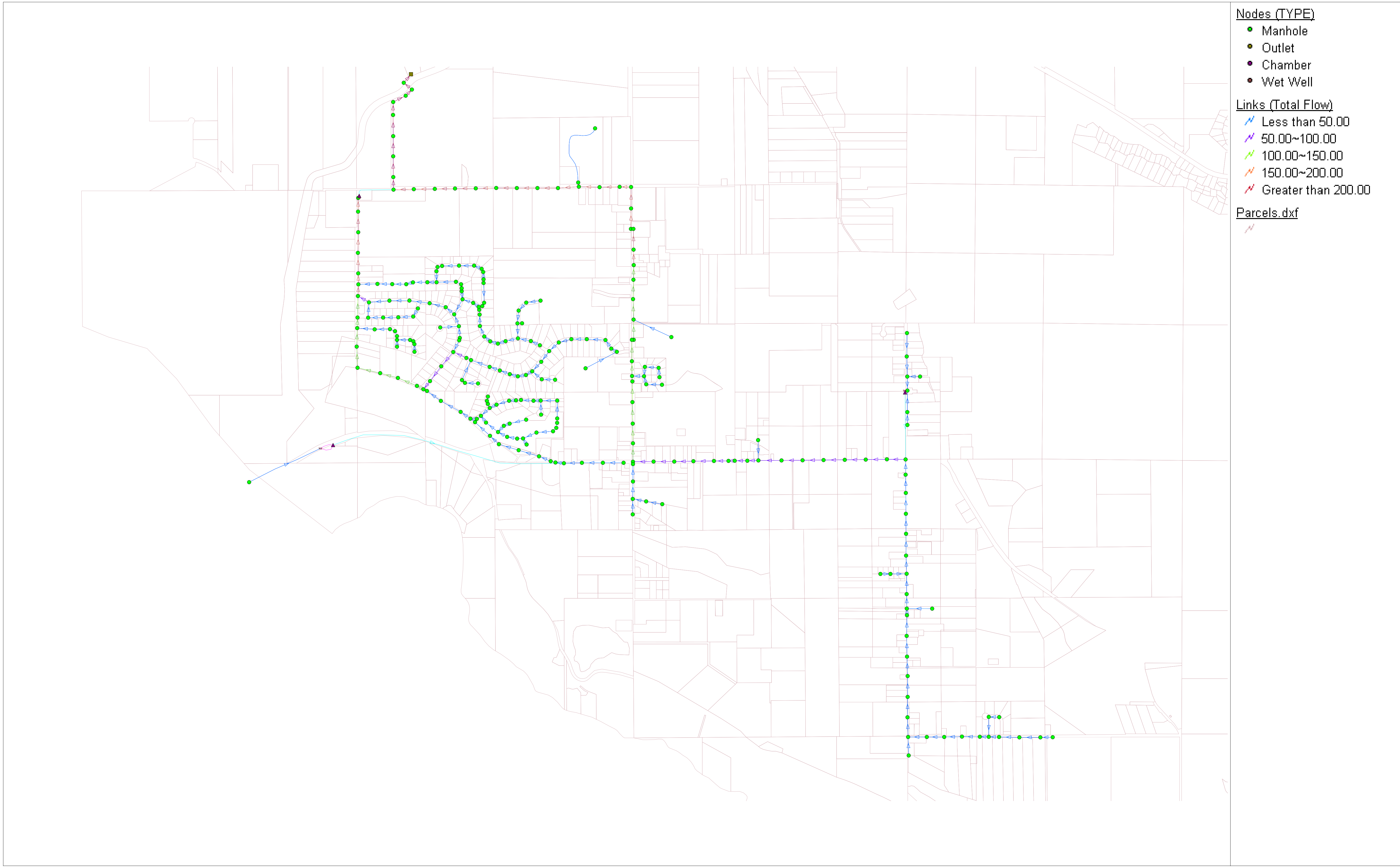
5 Year Future Model



Pipe Velocity (ft/s)

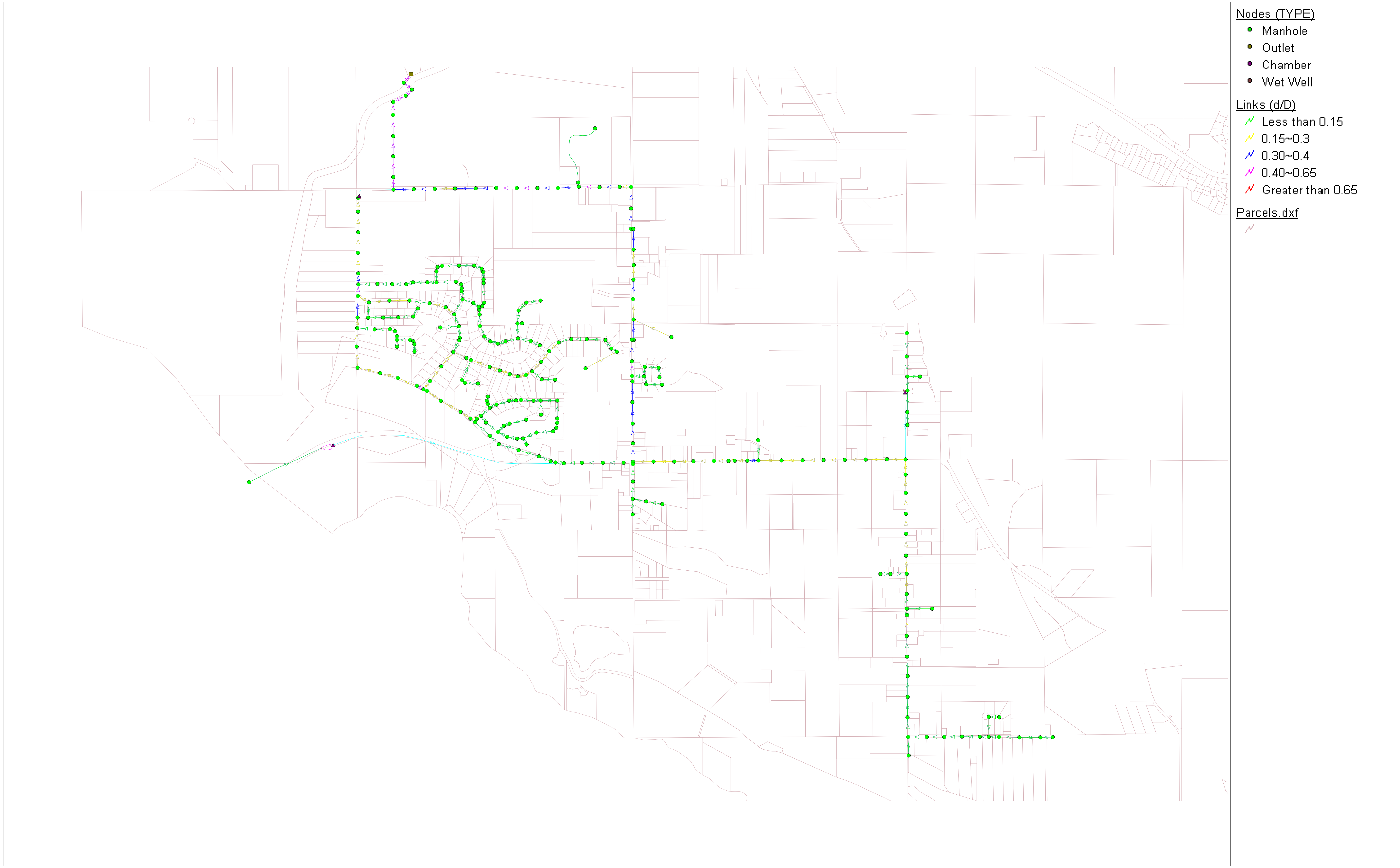


Total Flow (gpm)

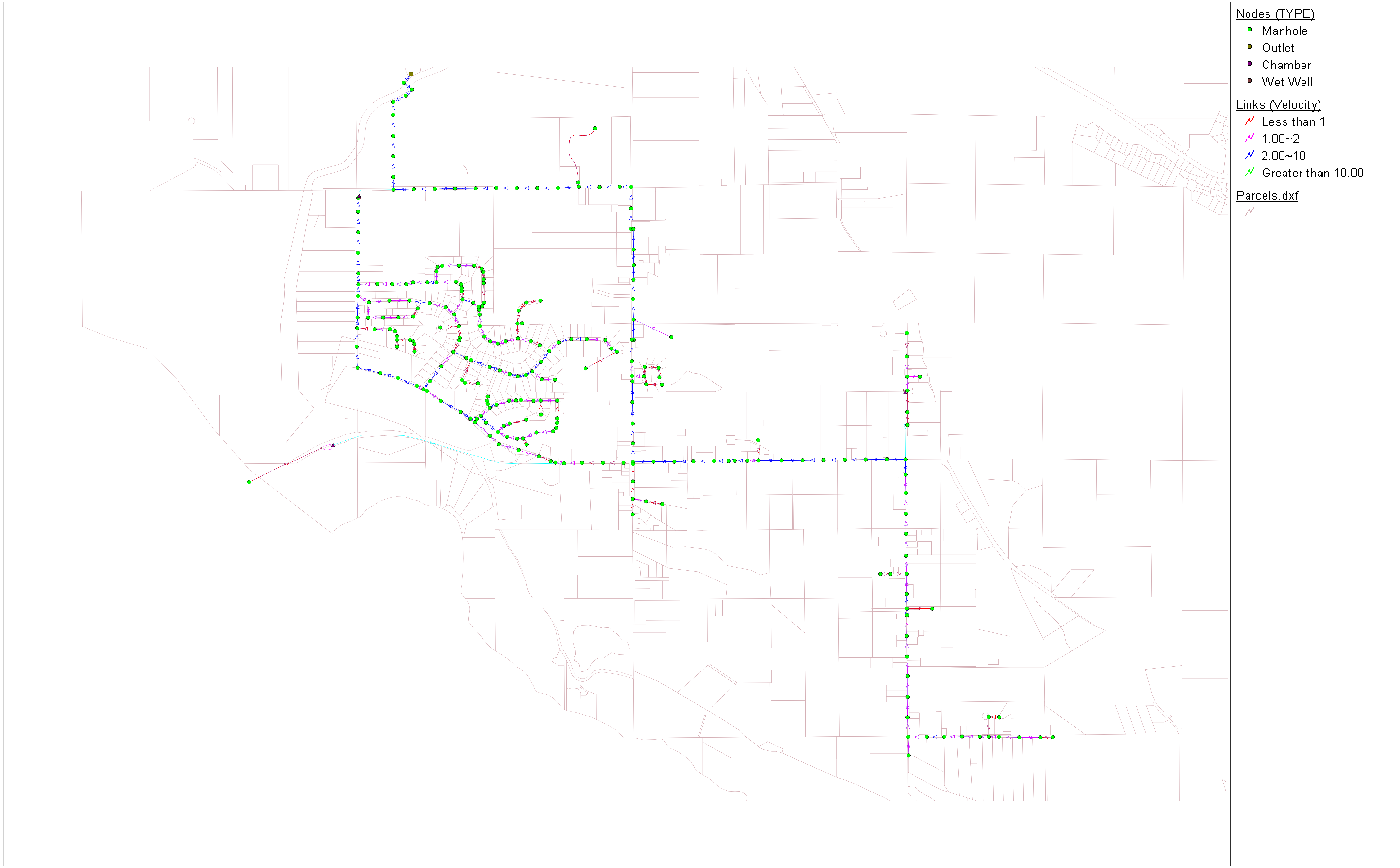


Reserve Capacity (d/D)

10 Year Future Model

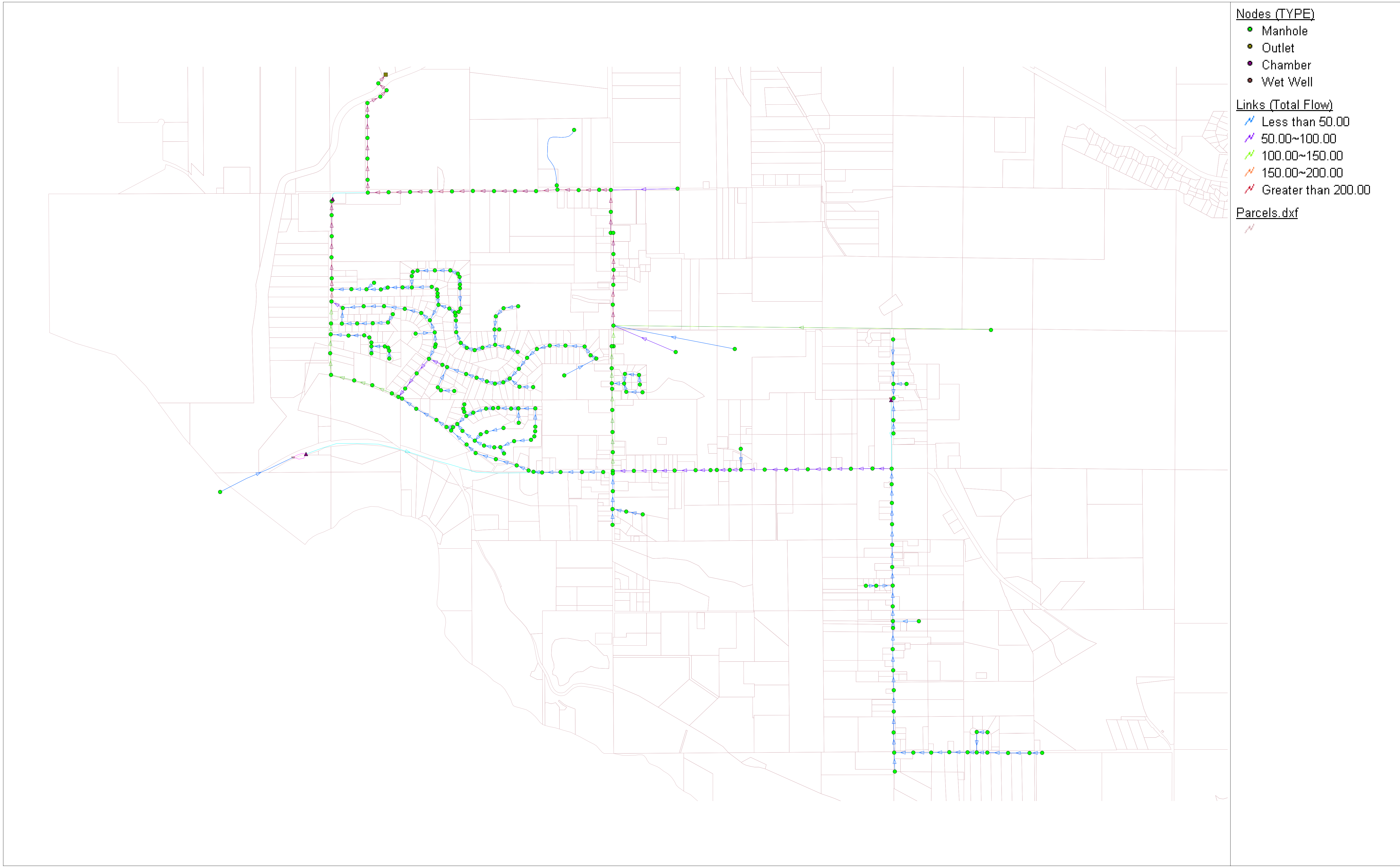


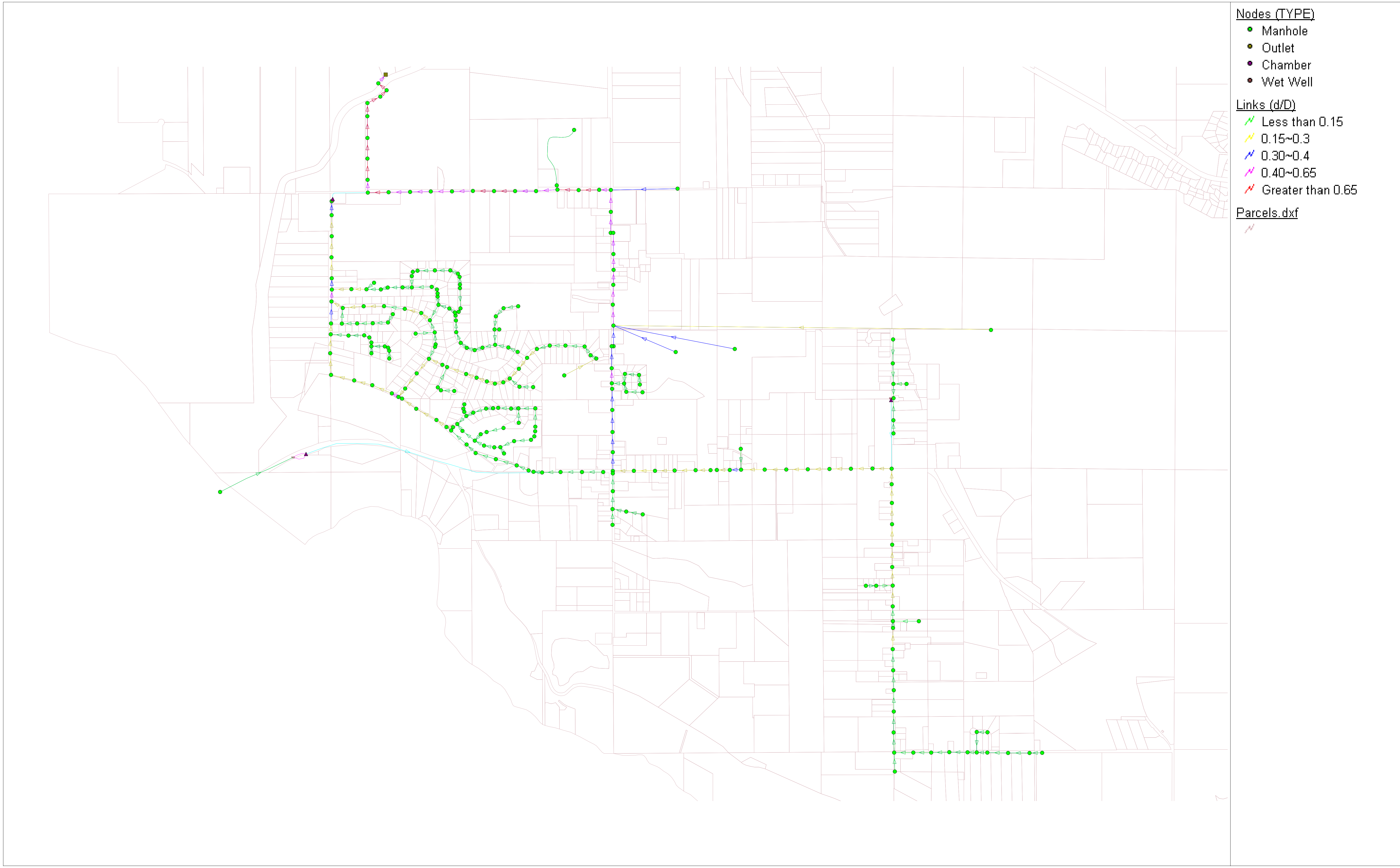
Pipe Velocity (ft/s)



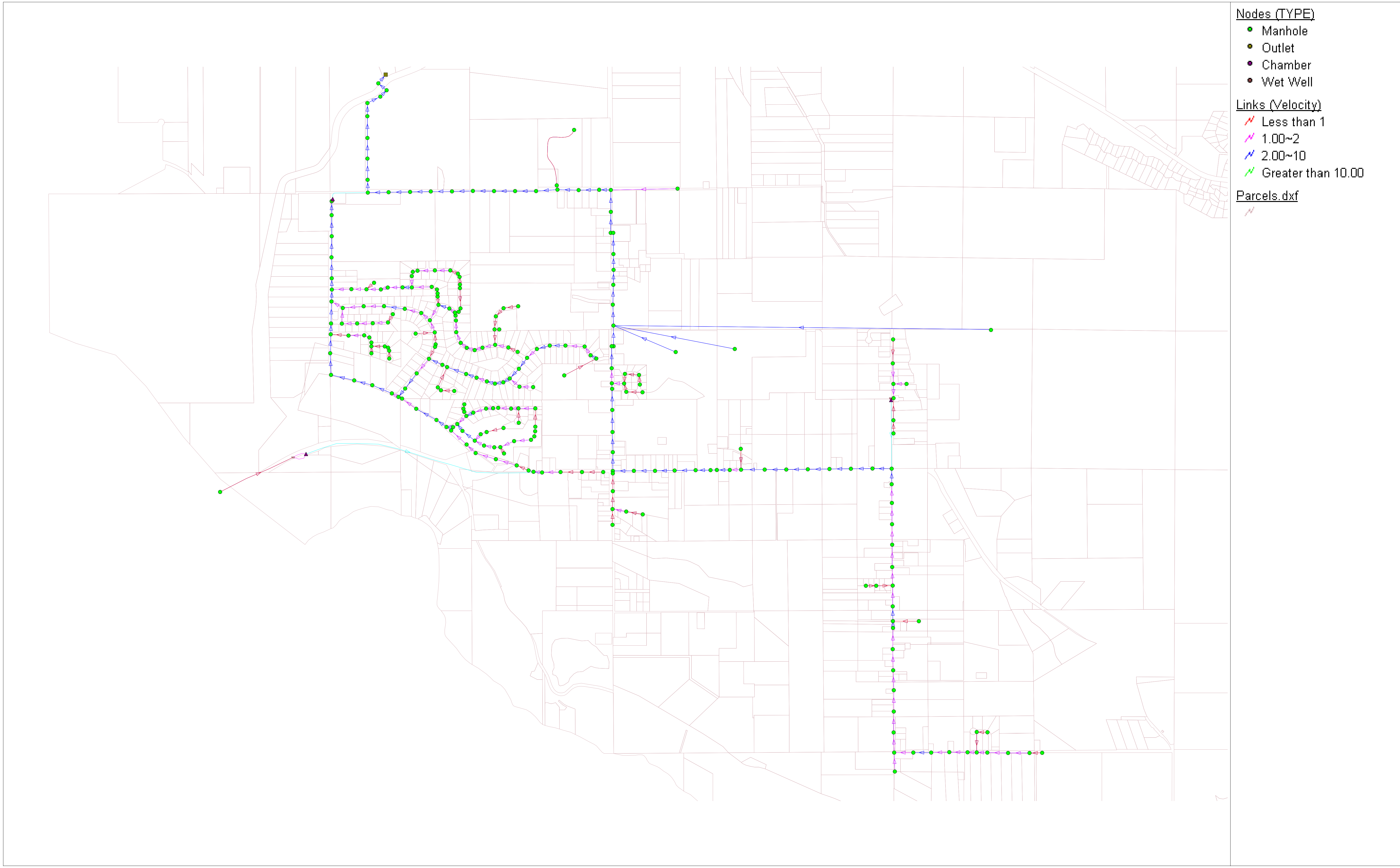
Total Flow (gpm)

25 Year Future Model




Nodes (TYPE)
Manhole
Outlet
Chamber
Wet Well
Links (d/D)
Less than 0.15
0.15~0.3
0.30~0.4
0.40~0.65
Greater than 0.65
Parcels.dxf

Pipe Velocity (ft/s) **25 Year Future Model**



Chapter 5 Appendix Items

1. Francis letter to UDWQ regarding possible new wastewater effluent permit to Provo or Weber Rivers

2. UDWQ response letter regarding possible new wastewater effluent permit to Provo or Weber Rivers

3. Shallow vs deep lagoon calculations

4. Treatment alternative costs estimates

Francis City

Home of Francis Frontier Days

March 23, 2012

Walt Baker, Director
Utah Department of Environmental Quality
P. O. Box 144870
Salt Lake City, UT 84114-4870

Subject: Francis City - Wastewater Capital Facilities Plan

Dear Mr. Baker:

Francis City is currently working on a Capital Facilities Plan for our wastewater treatment system. We are looking into the possibility of discharging as an option of disposing of the treated effluent. Francis is located on the divide between the Provo River and Weber River drainage areas and could discharge into either drainage area. We are requesting information from your office about the possibility of discharging into both drainage basins and the effluent requirements that we would need to meet to discharge into each basin. The project flows over the next 5, 25, and 50 year planning period is attached.

Please contact our engineer Scott Kettle at (435) 654-2226 with any questions or concerns.

Sincerely,
FRANCIS CITY

R. Lee Snelgrove
Mayor

cc: Scott Kettle, Horrocks Engineers
J. Clint Rodgers, Carollo Engineers
file

State of Utah
GARY R. HERBERT
Governor

GREG BELL
Lieutenant Governor

Department of
Environmental Quality

Amanda Smith
Executive Director

DIVISION OF WATER QUALITY
Walter L. Baker, P.E.
Director

Mayor R. Lee Snelgrove
Francis City
2317 South Springhollow Road
Francis, UT 84036

Mayor Snelgrove,

I am writing in response to your request for information about the possibility of discharging treated wastewater effluent from Francis City into either the Provo River or Weber River drainages.

Based on a number of factors which I will summarize below, it is my view that a discharging alternative to either drainage basin would be problematic and would not, in the end analysis, represent a cost effective wastewater disposal option for Francis City.

With regards to the Provo River drainage, the Mountainland Association of Governments 208 Water Quality Management plan specifically prohibits any new wastewater treatment discharges to the drainage. As you know, the Provo River drainage is a significant source of drinking water for the population of the Wasatch Front. Over the past 25 years, significant effort and funding has been applied to reduce nutrient loading into this critical watershed. Based on my own staff's recommendations as well as past experience with water district stakeholders and the Provo River Watershed Council, any attempt to amend the 208 plan to allow such a discharge would need to be accompanied by a comprehensive analysis of the potential impacts to water quality in the upper Provo River, Jordanelle and Deer Creek Reservoirs. Even if approval for a discharge were to be gained, it is highly likely that the very low nutrient effluent limits required for such a discharge would be cost-prohibitive when compared to the existing suite of alternatives being considered by Francis City.

With regards to the Weber River drainage, it is my understanding that Francis City would likely discharge to Beaver Creek, tributary to the Upper Weber River and Rockport Reservoir. Rockport Reservoir is on the 303(d) list of impaired waterbodies due to low dissolved oxygen. In addition, Beaver Creek is listed in the 2008 Integrated Report as having elevated levels of phosphorus. A Total Maximum Daily Load (TMDL) water quality study is currently underway to evaluate the cause of the impairment in Rockport Reservoir and develop a strategy to address it. Preliminary data shows that the impairment is caused by excessive nutrients. It is likely that the TMDL will require nutrient load reductions of all point source dischargers in the watershed, and that a higher level of treatment will be required for all dischargers.

It is unlikely that Francis would be able to achieve the required level of nutrient removal without upgrading to an expensive chemical or mechanical nutrient removal process.

Despite these technical and economic constraints to obtaining approval to discharge treated effluent, I encourage Francis City to actively participate as a stakeholder in ongoing water quality study and planning efforts to ensure your long term needs are represented and considered within the larger context of the Provo and Weber River watersheds. The points of contact for these efforts are Dave Wham for the Provo River Watershed at (801) 536-4337 and Kari Lundeen for the Weber River Watershed at (801) 536-4335. Please let me know if you need any additional information or would like to discuss any of these issues further.

Sincerely,

Walter L. Baker, P.E.
Director

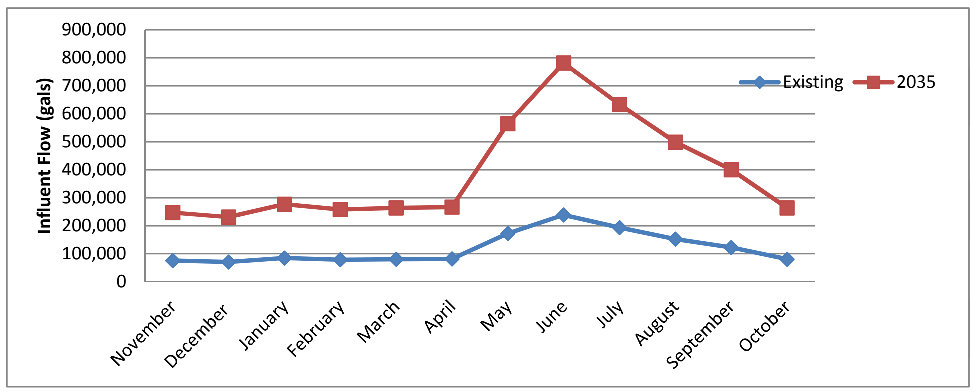
WLB:DW:dw

cc: Ed Macauley

FILE: f:dwham/wp/mayor_snelgrove.doc

	2010	2035	Shallow Lagoon Option
Max Month (gal/day) =	238,720	781,784	
Base Flow (gal/day) =	89,801	294,089	
Average Month (gal/day)=	108,821	356,378	
BOD5 loading (mg/L)=	200	200	

		Existing Inflow (gal/day)	Projected Inflow (gal/day)	Precipitation (inch/month)	Evaporation (inch/month)	Percolation (gal/day)	Total Percolation (gal)	Days	Total Volumes (gal)	HRT (days)	Winter Storage (gals)	Land Disposal (gals)	Winter Storage Req'd (gal)	Existing Winter Storage (gal)	New Winter Storage Req'd	Land Disposal Existing Land (acres)	Land Disposal Additional Land (acres)
Winter Storage	November	75,406	246,947	1.55	0	21,152	634,556	30	7,330,648	95	7,330,648		38,159,946	38,228,438	(68,492)	66.0	190
	December	70,573	231,120	1.46	0	21,152	655,708	31	7,033,458	102	14,364,106						
	January	84,622	277,129	1.60	0	21,152	655,708	31	8,510,030	85	22,874,135						
	February	78,842	258,200	1.54	0	21,152	592,252	28	7,190,537	91	30,064,672						
	March	80,572	263,865	1.59	0	21,152	655,708	31	8,095,274	89	38,159,946						
Summer Use	April	81,513	266,947	1.62	0	21,152	634,556	30	7,955,788	88		13,407,208					
	May	172,474	564,835	1.59	6.77	21,152	655,708	31	14,993,423	42		20,444,844					
	June	238,720	781,784	1.13	6.94	21,152	634,556	30	20,731,903	30		26,183,324					
	July	193,524	633,772	0.99	7.37	21,152	655,708	31	16,699,396	37		22,150,817					
	August	152,349	498,928	1.12	6.68	21,152	655,708	31	12,813,792	47		18,265,213					
	September	122,333	400,628	1.37	4.99	21,152	634,556	30	10,083,920	59		15,535,341					
	October	80,595	263,941	1.63	3.77	21,152	655,708	31	6,757,720	89		12,209,141					
	Annual Total =			17.19	36.52		7,720,429	365	128,195,887			128,195,887					



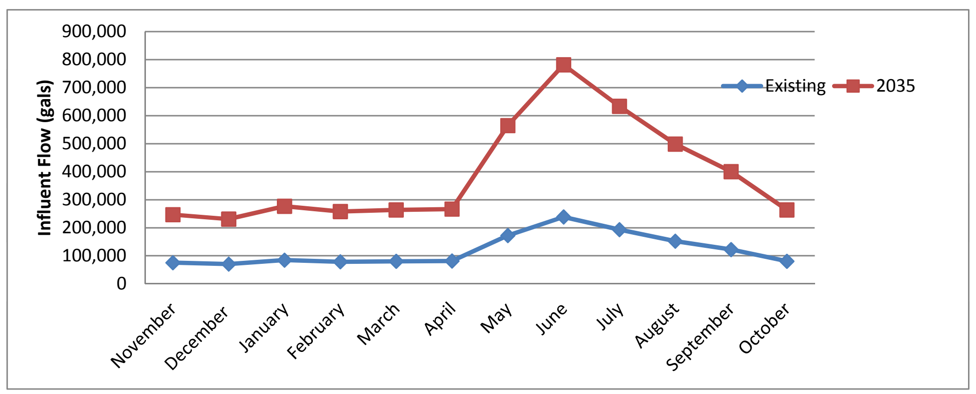
Pond Dimensions

		Surface Area (ft^2)	Floor Surface Area (ft^2)	Depth (ft)	Volume (ft^3)	Volume (gal)	Volume per inch (gal)
	Winter Storage						
	Pond 1	107,499	88,403	6	587,706	4,396,041	67,008
	Pond 2	43,727	31,404	6	225,393	1,685,940	27,256
	Pond 3	46,546	33,044	6	238,770	1,786,000	29,014
	Pond 4	135,823	96,269	11.5	1,334,529	9,982,277	84,663
New	Pond 5	270,400	203,401	11.5	2,724,356	20,378,181	168,549
	New Aerated Lagoons (Shallow)						
New	Pond 1	192,096	157,500	6	1,048,788	7,844,934	119,740
New	Pond 2	192,096	157,500	6	1,048,788	7,844,934	119,740
New	Pond 3	192,096	157,500	6	1,048,788	7,844,934	119,740
			10.85			23,534,803	

Precipitation: Data from Western Regional Climate Center for Kamas, UT
Evaporation: Pan Evaporation data from Western Regional Climate Center for Kamas, UT
Percolation Rate: Not to exceed 6500gal/acre/day. Assumed 30% of allowed based on shallow groundwater.
Land Disposal: Release inflows April 1-Oct 31, and release winter storage volume evenly over the 7 months
Land Disposal Area: Additional land recommended is based on a 500,000 gal per day disposal volume for nutrient and water balance of alfalfa crop

	2010	2035	Deep Cell Option
Max Month (gal/day) =	238,720	781,784	
Base Flow (gal/day) =	89,801	294,089	
Average Month (gal/day)=	108,821	356,378	
BOD5 loading (mg/L)=	200	200	

		Existing Inflow (gal/day)	Projected Inflow (gal/day)	Precipitation (inch/month)	Evaporation (inch/month)	Percolation (gal/day)	Total Percolation (gal)	Days	Total Volumes (gal)	HRT (days)	Winter Storage (gals)	Land Disposal (gals)	Winter Storage Req'd (gal)	Existing Winter Storage (gal)	New Winter Storage Req'd	Land Disposal Existing Land (acres)	Additional Land (acres)
Winter Storage	November	75,406	246,947	1.55	0	7,897	236,901	30	7,511,507	96	7,511,507		39,078,894	39,111,003	(32,110)	66.0	205
	December	70,573	231,120	1.46	0	7,897	244,798	31	7,240,160	103	14,751,666						
	January	84,622	277,129	1.60	0	7,897	244,798	31	8,697,150	86	23,448,817						
	February	78,842	258,200	1.54	0	7,897	221,107	28	7,346,284	92	30,795,101						
	March	80,572	263,865	1.59	0	7,897	244,798	31	8,283,793	90	39,078,894						
Summer Use	April	81,513	266,947	1.62	0	7,897	236,901	30	8,126,856	89		13,709,555					
	May	172,474	564,835	1.59	6.77	7,897	244,798	31	16,128,852	42		21,711,552					
	June	238,720	781,784	1.13	6.94	7,897	236,901	30	21,942,194	30		27,524,893					
	July	193,524	633,772	0.99	7.37	7,897	244,798	31	18,002,667	37		23,585,366					
	August	152,349	498,928	1.12	6.68	7,897	244,798	31	14,002,371	48		19,585,070					
	September	122,333	400,628	1.37	4.99	7,897	236,901	30	10,987,899	59		16,570,598					
	October	80,595	263,941	1.63	3.77	7,897	244,798	31	7,467,949	90		13,050,648					
	Annual Total =			17.19	36.52		2,882,293	365	135,737,681			135,737,681					



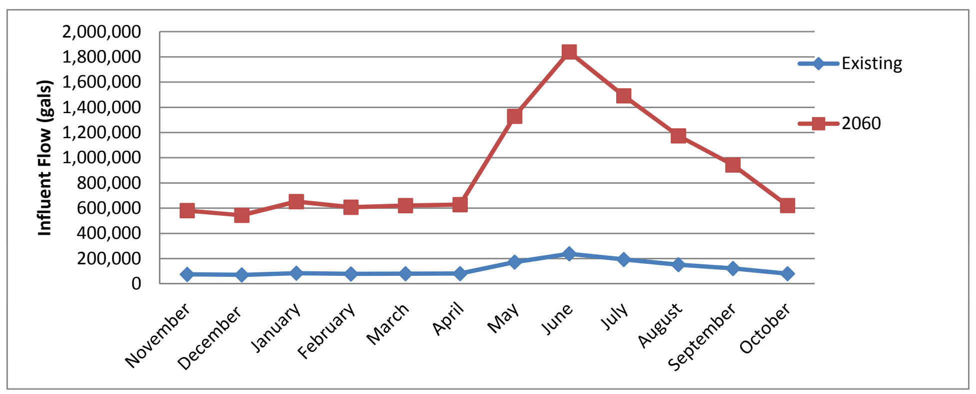
Pond Dimensions

		Surface Area (ft^2)	Floor Surface Area (ft^2)	Depth (ft)	Volume (ft^3)	Volume (gal)	Volume per inch (gal)
	Winter Storage						
	Pond 1	107,499	88,403	6	587,706	4,396,041	67,008
	Pond 2	43,727	31,404	6	225,393	1,685,940	27,256
	Pond 3	46,546	33,044	6	238,770	1,786,000	29,014
	Pond 4	135,823	96,269	11.5	1,334,529	9,982,277	84,663
New	Pond 5	287,296	207,025	11.5	2,842,346	21,260,746	179,081
	New Aerated Lagoons (Deep)						
New	Pond 1	117,300	58,800	12	1,056,600	7,903,368	73,117
New	Pond 2	117,300	58,800	12	1,056,600	7,903,368	73,117
New	Pond 3	117,300	58,800	12	1,056,600	7,903,368	73,117
			4.05				

Precipitation: Data from Western Regional Climate Center for Kamas, UT
Evaporation: Pan Evaporation data from Western Regional Climate Center for Kamas, UT
Percolation Rate: Not to exceed 6500gal/acre/day. Assumed 30% of allowed based on shallow groundwater.
Land Disposal: Release inflows April 1-Oct 31, and release winter storage volume evenly over the 7 months
Land Disposal Area: Additional land recommended is based on a 500,000 gal per day disposal volume for nutrient and water balance of alfalfa crop

	2010	2060	Shallow Lagoon Option
Max Month (gal/day) =	238,720	1,839,717	
Base Flow (gal/day) =	89,801	692,059	
Average Month (gal/day)=	108,821	838,639	
BOD5 loading (mg/L)=	200	200	

		Existing Inflow (gal/day)	Projected Inflow (gal/day)	Precipitation (inch/month)	Evaporation (inch/month)	Percolation (gal/day)	Total Percolation (gal)	Days	Total Volumes (gal)	HRT (days)	Winter Storage (gals)	Land Disposal (gals)	Winter Storage Req'd (gal)	Existing Winter Storage (gal)	New Winter Storage Req'd	Land Disposal Existing Land (acres)	Additional Land (acres)
Winter Storage	November	75,406	581,123	1.55	0	49,569	1,487,076	30	17,216,485	94	17,216,485		89,628,519	89,854,422	(225,903)	66.0	539
	December	70,573	543,877	1.46	0	49,569	1,536,646	31	16,519,680	100	33,736,165						
	January	84,622	652,147	1.60	0	49,569	1,536,646	31	19,990,744	83	53,726,909						
	February	78,842	607,603	1.54	0	49,569	1,387,938	28	16,886,620	89	70,613,529						
	March	80,572	620,935	1.59	0	49,569	1,536,646	31	19,014,989	88	89,628,519						
Summer Use	April	81,513	628,187	1.62	0	49,569	1,487,076	30	18,685,758	87		31,489,832					
	May	172,474	1,329,186	1.59	6.77	49,569	1,536,646	31	35,424,317	41		48,228,391					
	June	238,720	1,839,717	1.13	6.94	49,569	1,487,076	30	48,944,483	30		61,748,557					
	July	193,524	1,491,410	0.99	7.37	49,569	1,536,646	31	39,470,129	36		52,274,203					
	August	152,349	1,174,091	1.12	6.68	49,569	1,536,646	31	30,305,046	46		43,109,120					
	September	122,333	942,770	1.37	4.99	49,569	1,487,076	30	23,830,276	58		36,634,351					
	October	80,595	621,113	1.63	3.77	49,569	1,536,646	31	15,964,609	87		28,768,683					
	Annual Total =			17.19	36.52		18,092,763	365	302,253,137			302,253,137					



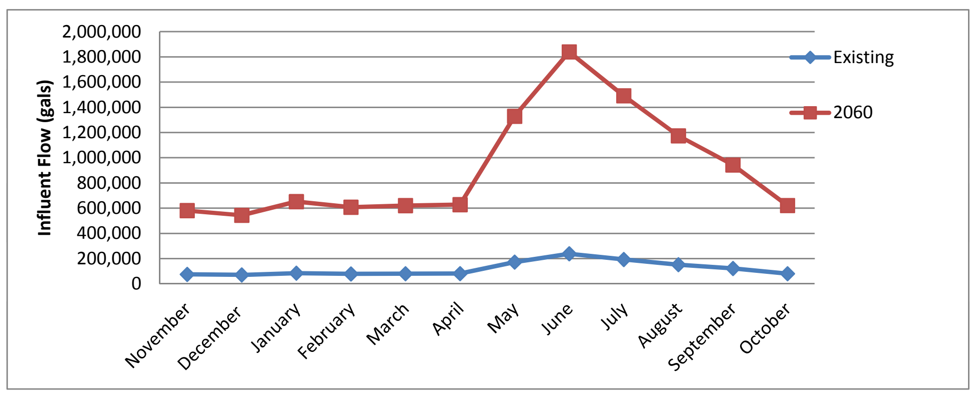
Precipitation: Data from Western Regional Climate Center for Kamas, UT
Evaporation: Pan Evaporation data from Western Regional Climate Center for Kamas, UT
Percolation Rate: Not to exceed 6500gal/acre/day. Assumed 30% of allowed based on shallow groundwater.
Land Disposal: Release inflows April 1-Oct 31, and release winter storage volume evenly over the 7 months
Land Disposal Area: Additional land recommended is based on a 500,000 gal per day disposal volume for nutrient and water balance of alfalfa crop

Pond Dimensions

		Surface Area (ft^2)	Floor Surface Area (ft^2)	Depth (ft)	Volume (ft^3)	Volume (gal)	Volume per inch (gal)
	Winter Storage						
	Pond 1	107,499	88,403	6	587,706	4,396,041	67,008
	Pond 2	43,727	31,404	6	225,393	1,685,940	27,256
	Pond 3	46,546	33,044	6	238,770	1,786,000	29,014
	Pond 4	135,823	96,269	11.5	1,334,529	9,982,277	84,663
	Pond 5	270,400	203,401	11.5	2,724,356	20,378,181	168,549
new	Pond 6	270,400	203,401	11.5	2,724,356	20,378,181	168,549
new	Pond 7	270,400	203,401	11.5	2,724,356	20,378,181	168,549
new	Pond 8	145,924	96,269	12	1,453,158	10,869,622	90,959
	New Aerated Lagoons (Shallow)						
	Pond 1	192,096	157,500	6	1,048,788	7,844,934	119,740
	Pond 2	192,096	157,500	6	1,048,788	7,844,934	119,740
	Pond 3	192,096	157,500	6	1,048,788	7,844,934	119,740
New	Pond 1	246,016	211,600	6	1,372,848	10,268,903	153,350
New	Pond 2	246,016	211,600	6	1,372,848	10,268,903	153,350
New	Pond 3	246,016	211,600	6	1,372,848	10,268,903	153,350
			25.42				

	2010	2060	Deep Cell Option
Max Month (gal/day) =	238,720	1,839,717	
Base Flow (gal/day) =	89,801	692,059	
Average Month (gal/day)=	108,821	838,639	
BOD5 loading (mg/L)=	200	200	

		Existing Inflow (gal/day)	Projected Inflow (gal/day)	Precipitation (inch/month)	Evaporation (inch/month)	Percolation (gal/day)	Total Percolation (gal)	Days	Total Volumes (gal)	HRT (days)	Winter Storage (gals)	Land Disposal (gals)	Winter Storage Req'd (gal)	Existing Winter Storage (gal)	New Winter Storage Req'd	Land Disposal Existing Land (acres)	Land Disposal Additional Land (acres)
Winter Storage	November	75,406	581,123	1.55	0	18,426	552,769	30	17,580,055	88	17,580,055		91,481,194	92,725,059	(1,243,864)	66.0	575
	December	70,573	543,877	1.46	0	18,426	571,194	31	16,947,533	94	34,527,588						
	January	84,622	652,147	1.60	0	18,426	571,194	31	20,367,047	78	54,894,635						
	February	78,842	607,603	1.54	0	18,426	515,917	28	17,191,585	84	72,086,220						
	March	80,572	620,935	1.59	0	18,426	571,194	31	19,394,974	82	91,481,194						
Summer Use	April	81,513	628,187	1.62	0	18,426	552,769	30	19,023,553	81		32,092,295					
	May	172,474	1,329,186	1.59	6.77	18,426	571,194	31	38,297,138	38		51,365,880					
	June	238,720	1,839,717	1.13	6.94	18,426	552,769	30	52,018,137	28		65,086,879					
	July	193,524	1,491,410	0.99	7.37	18,426	571,194	31	42,784,811	34		55,853,553					
	August	152,349	1,174,091	1.12	6.68	18,426	571,194	31	33,317,789	43		46,386,531					
	September	122,333	942,770	1.37	4.99	18,426	552,769	30	26,097,533	54		39,166,275					
	October	80,595	621,113	1.63	3.77	18,426	571,194	31	17,718,047	82		30,786,789					
	Annual Total =			17.19	36.52		6,725,351	365	320,738,203			320,738,203					



Pond Dimensions

		Surface Area (ft^2)	Floor Surface Area (ft^2)	Depth (ft)	Volume (ft^3)	Volume (gal)	Volume per inch (gal)
	Winter Storage						
	Pond 1	107,499	88,403	6	587,706	4,396,041	67,008
	Pond 2	43,727	31,404	6	225,393	1,685,940	27,256
	Pond 3	46,546	33,044	6	238,770	1,786,000	29,014
	Pond 4	135,823	96,269	11.5	1,334,529	9,982,277	84,663
	Pond 5	287,296	207,025	13.5	3,336,667	24,958,267	179,081
New	Pond 6	287,296	207,025	13.5	3,336,667	24,958,267	179,081
New	Pond 7	287,296	207,025	13.5	3,336,667	24,958,267	179,081
	New Aerated Lagoons (Deep)						
	Pond 1	117,300	58,800	12	1,056,600	7,903,368	73,117
	Pond 2	117,300	58,800	12	1,056,600	7,903,368	73,117
	Pond 3	117,300	58,800	12	1,056,600	7,903,368	73,117
New	Pond 1	123,904	78,400	12	1,213,824	9,079,404	77,233
New	Pond 2	123,904	78,400	12	1,213,824	9,079,404	77,233
New	Pond 3	123,904	78,400	12	1,213,824	9,079,404	77,233
			9.45				

Precipitation: Data from Western Regional Climate Center for Kamas, UT
Evaporation: Pan Evaporation data from Western Regional Climate Center for Kamas, UT
Percolation Rate: Not to exceed 6500gal/acre/day. Assumed 30% of allowed based on shallow groundwater.
Land Disposal: Release inflows April 1-Oct 31, and release winter storage volume evenly over the 7 months
Land Disposal Area: Additional land recommended is based on a 500,000 gal per day disposal volume for nutrient and water balance of alfalfa crop

Francis City

Treatment Alternative Cost Estimates

Summary of 2035 Treatment Alternatives

9-Nov-12

(Costs in 2012 dollars)

Treatment Alternative	Estimated Project Cost	Annual O&M	Life Cycle Cost
1) Lagoon Expansion (Convert to Aerated Lagoons)			
Shallow Treatment Cells	$7,074,000	$72,057	$8,053,282
Deep Treatment Cells	$7,886,000	$61,510	$8,721,942
2) Extended Aeration Process	$6,896,000	$142,998	$8,839,387
with Filter	$7,348,000	$146,264	$9,335,770
3) MBR	$8,786,000	$235,220	$11,982,719
with EDC treatment	$9,706,000	$258,320	$13,216,656
4) Regionalization Options	$5-7,000,000		

Life cycle costs based on 4%

Francis City

2035 Shallow Lagoon Treatment System

9-Nov-12

Capital Costs (2012 dollars)

Item	Unit	Quantity	Installation Multiplier	Unit Price	Total
Mobilization, O&P	LS	1	1	$200,000	$200,000
Lagoon Aeration	LS	1	1.6	$125,000	$200,000
Building (Elec/Blower)	SF	1,000	1	$100	$100,000
Earthwork (Shallow Cells)	CY	100,000	1	$15	$1,500,000
Earthwork (Winter Storage)	CY	90,000	1	$15	$1,350,000
Yard Piping	LS	1	1	$100,000	$100,000
Sitework	LS	1	1	$80,000	$80,000
Electrical	LS	1	1	$100,000	$100,000
Subtotal					**$3,630,000**
Contingency (30%)					$1,089,000
Estimated Total Construction Cost					**$4,719,000**
Engineering					$755,000
Land Acquisition	acre	32	1	$50,000	$1,600,000
Estimated Total Project Cost					**$7,074,000**

Francis City

Lagoon Expansion (Convert to Deep Aerated Lagoons)

9-Nov-12

Capital Costs (2012 dollars)

Item	Unit	Quantity	Installation Multiplier	Unit Price	Total
Mobilization, O&P	LS	1	1	$200,000	$200,000
Influent Pump Station	LS	1	1	$75,000	$75,000
Building (Elec/Blower)	SF	1,000	1	$100	$100,000
Lagoon Aeration	LS	1	1.6	$110,000	$176,000
Earthwork (Deep Cells)	CY	150,000	1	$15	$2,250,000
Earthwork (Winter Storage)	CY	90,000	1	$15	$1,350,000
Yard Piping	LS	1	1	$100,000	$100,000
Sitework	LS	1	1	$50,000	$50,000
Electrical	LS	1	1	$100,000	$100,000
Subtotal					**$4,401,000**
Contingency (30%)					$1,320,000
Estimated Total Construction Cost					**$5,721,000**
Engineering					$915,000
Land Acquisition	acre	25	1	$50,000	$1,250,000
Estimated Total Project Cost					**$7,886,000**

Francis City

Extended Aeration w/BNR

9-Nov-12

Capital Costs (2012 dollars)

Item	Unit	Quantity	Installation Multiplier	Unit Price	Total
Mobilization, O&P	LS	1	1	$250,000	$250,000
Concrete	CY	900	1	$600	$540,000
Building	Sf	3,500	1	$100	$350,000
Equipment	LS	1	1.6	$500,000	$800,000
Clarifiers with domes	EA	2	1	$200,000	$400,000
Disinfection	LS	1	1.6	$50,000	$80,000
Drying Beds	SF	3,000	1	$15	$45,000
Earthwork (Winter Storage)	CY	60,000	1	$15	$900,000
Yard Piping	LS	1	1	$30,000	$30,000
Sitework	LS	1	1	$30,000	$30,000
Electrical & Instrumentation	LS	1	1	$650,000	$650,000
Subtotal					**$4,075,000**
Contingency (30%)					$1,223,000
Estimated Total Construction Cost					**$5,298,000**
Engineering					$848,000
Land Acquisition	acre	15	1	$50,000	$750,000
Estimated Total Project Cost					**$6,896,000**

Francis City

Extended Aeration w/BNR and Filter

9-Nov-12

Capital Costs (2012 dollars)

Item	Unit	Quantity	Installation Multiplier	Unit Price	Total
Mobilization, O&P	LS	1	1	$100,000	$100,000
Concrete	CY	900	1	$600	$540,000
Building	SF	4,000	1	$100	$400,000
Equipment	LS	1	1.6	$500,000	$800,000
Clarifiers with domes	EA	2	1	$200,000	$400,000
Tertiary Filtration	LS	1	1	$350,000	$350,000
Disinfection	LS	1	1.6	$50,000	$80,000
Drying Beds	SF	3,000	1	$15	$45,000
Earthwork (Winter Storage)	CY	60,000	1	$15	$900,000
Yard Piping	LS	1	1	$30,000	$30,000
Sitework	LS	1	1	$30,000	$30,000
Electrical & Instrumentation	LS	1	1	$700,000	$700,000
Subtotal					**$4,375,000**
Contingency (30%)					$1,313,000
Estimated Total Construction Cost					**$5,688,000**
Engineering					$910,000
Land Acquisition	acre	15	1	$50,000	$750,000
Estimated Total Project Cost					**$7,348,000**

Francis City

MBR

9-Nov-12

Capital Costs (2012 dollars)

Item	Unit	Quantity	Installation Multiplier	Unit Price	Total
Screen	LS	1	1.6	$150,000	$240,000
MBR Equipment	LS	1	1.6	$900,000	$1,440,000
Disinfection	LS	1	1.6	$50,000	$80,000
Chem Feed	LS	1	1.6	$40,000	$64,000
Drying Beds	SF	3,000	1	$15	$45,000
Building	SF	7,000	1	$250	$1,750,000
Earthwork (Winter Storage)	CY	60,000	1	$15	$900,000
Yard Piping	LS	1	1	$30,000	$30,000
Sitework	LS	1	1	$30,000	$30,000
Electrical & Instrumentation	LS	1	1	$750,000	$750,000
Subtotal					**$5,329,000**
Contingency (30%)					$1,599,000
Estimated Total Construction Cost					**$6,928,000**
Engineering					$1,108,000
Land Acquisition	acre	15	1	$50,000	$750,000
Estimated Total Project Cost					**$8,786,000**

Francis City

MBR (with advanced treatment for PPCPs)

9-Nov-12

Capital Costs (2012 dollars)

Item	Unit	Quantity	Installation Multiplier	Unit Price	Total
Screen	LS	1	1.6	$150,000	$240,000
MBR Equipment	LS	1	1.6	$900,000	$1,440,000
Disinfection	LS	1	1.6	$50,000	$80,000
Chem Feed	LS	1	1.6	$40,000	$64,000
Drying Beds	SF	3,000	1	$15	$45,000
Building	SF	7,000	1	$250	$1,750,000
Advanced Oxidation	LS	1	1.6	$350,000	$560,000
Earthwork (Winter Storage)	CY	60,000	1	$15	$900,000
Yard Piping	LS	1	1	$30,000	$30,000
Sitework	LS	1	1	$30,000	$30,000
Electrical & Instrumentation	LS	1	1	$800,000	$800,000
Subtotal					**$5,939,000**
Contingency (30%)					$1,782,000
Estimated Total Construction Cost					**$7,721,000**
Engineering					$1,235,000
Land Acquisition	acre	15	1	$50,000	$750,000
Estimated Total Project Cost					**$9,706,000**

Francis City

Aerated Lagoon System
Shallow Ponds
O&M Cost Worksheet

9-Nov-12

O&M Costs (2012 dollars)

Item	Unit	Quantity	Multiplier	Unit Price	Total
2035 Shallow Pond Alternative					
Labor (salary with benefits)					
1/2 time operator	$/hr	20	52	$35	$36,400
Power Cost		Hp			
Aeration Blower	$/kW-hr	50		$0.10	$32,657
Materials (5% of capital costs annually)					
Diffusers	LS	1	0.05	$40,000	$2,000
Blower	LS	1	0.05	$20,000	$1,000
Chemical Addition	N/A				
Solids Disposal	N/A				
				Total	**$72,057**

Francis City

Aerated Lagoon System
Deep
O&M Cost Worksheet

9-Nov-12

O&M Costs (2012 dollars)

Item	Unit	Quantity	Multiplier	Unit Price	Total
2035 Deep Pond Treatment Option					
Labor (salary with benefits)					
1/2 time operator	$/hr	20	52	$35	$36,400
Power Cost		Hp			
Aeration Blower	$/kW-hr	35		$0.10	$22,860
Materials (5% of capital costs annually)					
Diffusers	LS	1	0.05	$30,000	$1,500
Blower	LS	1	0.05	$15,000	$750
Chemical Addition	N/A				
Solids Disposal	N/A				
				Total	**$61,510**

Francis City

Extended Aeration System

O&M Cost Worksheet

9-Nov-12

O&M Costs (2012 dollars)

Item	Unit	Quantity	Multiplier	Unit Price	Total
Labor (salary with benefits)					
full-time operator	$/hr	40	52	$35	$72,800
Power Cost		Hp			
Aeration Basin Blower	$/kW-hr	40		$0.10	$26,126
RAS Pump	$/kW-hr	5		$0.10	$3,266
Clarifier	$/kW-hr	1	2	$0.10	$1,306
Misc part-time motors		21	0.25	$0.10	$5,000
(Headworks, WAS, SHTs, Screw Press)					
Materials (5% of capital costs annually)					
Estimated equipment cost	LS	1	0.05	$500,000	$25,000
Chemical Addition					
Chlorine and sulfer dioxide	LS				$2,000
Polymer	LS				$3,000
Solids Disposal					
Private contractor, weekly bin pick-up	LS				$4,500
				Total	**$142,998**
With Filter					
RAS Pump	$/kW-hr	5		$0.10	$3,266
					$146,264

Francis City

MBR System

O&M Cost Worksheet

6-Mar-12

O&M Costs (2012 dollars)

Item	Unit	Quantity	Multiplier	Unit Price	Total
Labor (salary with benefits)					
full-time operator	$/hr	40	52	$35	$72,800
half-time operator	$/hr	20	52	$30	$31,200
Power Cost		Hp			
Aeration Basin Blower	$/kW-hr	40		$0.10	$26,126
Permeate Pump	$/kW-hr	10		$0.10	$6,531
Scour Blower	$/kW-hr	15		$0.10	$9,797
RAS Pump	$/kW-hr	5		$0.10	$3,266
Misc part-time motors		21	0.25	$0.10	$5,000
(Headworks, WAS, SHTs, Screw Press)					
Materials (5% of capital costs annually)					
Estimated equipment cost	LS	1	0.05	$500,000	$25,000
Membrane replacement	LS	1	0.1	$400,000	$40,000
(10 year replacement)					
Chemical Addition					
Chlorine and sulfer dioxide	LS				$2,000
Polymer	LS				$3,000
Membrane Cleaning Solutions	LS				$6,000
Solids Disposal					
Private contractor, weekly bin pick-up	LS				$4,500
				Total	**$235,220**
Ozone					
Elec and LOX costs	LS				$7,500
half-time operator	$/hr	10	52	$30	$15,600
					$258,320

Chapter 6 Appendix Items

1. Calculations and references for I&I peaking factor adjustment
2. Recommended alternative footprint adjusted for I&I
3. Cost estimates for recommended alternative
4. Letter to residents of Francis regarding sewer rate increase
5. Notice of Bond Hearing
6. Draft Environmental Assessment prepared by UDWQ staff

Year	Population	Avg. Month (gpd)	Max Month Straight Line P.F.	Straight Line Max Month (gpd)	Adjusted P.F. for Max Month	Adjusted Max Month (mgd)	Max Day Straight Line P.F.	Straight Line Max Day (gpd)	Adjusted P.F. for Max Day	Adjusted Max Day (mgd)
2010	1,077	108,821	2.2	238,720	1.4	0.24	2.8	300,000	1.5	0.30
2015	1,414	142,872	2.2	313,417	1.4	0.29	2.8	393,872	1.5	0.35
2035	3,524	356,068	2.2	781,104	1.4	0.57	2.8	981,616	1.5	0.66
2045	5,434	549,056	2.2	1,204,461	1.4	0.83	2.8	1,513,649	1.5	0.93
2060	8,300	838,639	2.2	1,839,718	1.3	1.21	2.8	2,311,978	1.4	1.34
					I&I =	85,362			I&I =	137,427

*Notes: P.F.2 was calculated using max month eq. on pg 3-25, WEF, 1998
I&I flows are included in the adjusted Max Month and Max Day flow.

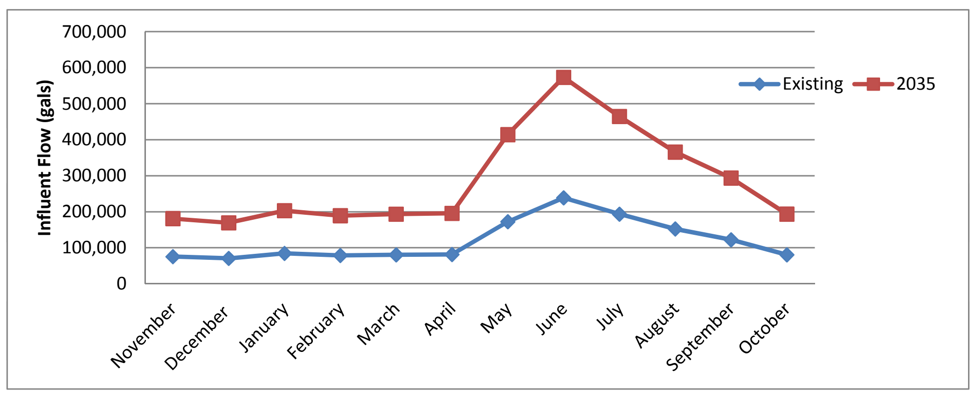
TABLE 3.5 Design peaking factor summary.

	Flow	BOD	TSS	TKN	Ammonia-nitrogen	Phosphorus
All data sets	60	57	54	16	33	16
Separate collection systems						
Number of valid data sets	40	33	32	6	15	6
Peaking factors*						
Minimum daily	$0.023\mathrm{Ln}(x) + 0.67$	$0.032\mathrm{Ln}(x) + 0.45$	$0.03\mathrm{Ln}(x) + 0.46$	0.74	0.70; or $0.048\mathrm{Ln}(x) + 0.55$	0.72
Maximum monthly	$-0.033\mathrm{Ln}(x) + 1.38$	$-0.050\mathrm{Ln}(x) + 1.44$	$-0.04\mathrm{Ln}(x) + 1.43$	1.13	1.22; or $-0.074\mathrm{Ln}(x) + 1.45$	1.14
Maximum daily	$-0.027\mathrm{Ln}(x) + 1.47$	$-0.051\mathrm{Ln}(x) + 1.68$	$-0.08\mathrm{Ln}(x) + 1.91$	1.27	1.34; or $-0.08\mathrm{Ln}(x) + 1.59$	1.26
Combined collection systems						
Number of valid data sets	20	19	18	2	11	3
Peaking factors*						
Minimum daily	0.68	0.60	0.53	0.67	0.66	0.73
Maximum monthly	1.32	1.26	1.31	1.24	1.21	1.20
Maximum daily	1.62	1.61	1.88	1.40	1.39	1.36

* Average values or equation of logarithmic regression lines shown in Figures 3.1, 3.2, 3.3, and 3.4, where x = flow in ML/d.

	2010	2035	
			Shallow Lagoon Option, adjusted for I&I
Max Month (gal/day) =	238,720	573,228	
Base Flow (gal/day) =	89,801	294,089	
Average Month (gal/day)=	108,821	356,378	
BOD5 loading (mg/L)=	200	200	

		Existing Inflow (gal/day)	Projected Inflow (gal/day)	Precipitation (inch/month)	Evaporation (inch/month)	Percolation (gal/day)	Total Percolation (gal)	Days	Total Volumes (gal)	HRT (days)	Winter Storage (gals)	Land Disposal (gals)	Winter Storage Req'd (gal)	Existing Winter Storage (gal)	New Winter Storage Req'd	Land Disposal Existing Land (acres)	Additional Land (acres)
Winter Storage	November	75,406	181,069	1.55	0	7,051	211,519	30	5,406,153	87	5,406,153		28,145,424	30,360,458	(2,215,034)	66.0	134
	December	70,573	169,464	1.46	0	7,051	218,569	31	5,209,632	93	10,615,785						
	January	84,622	203,199	1.60	0	7,051	218,569	31	6,272,188	77	16,887,973						
	February	78,842	189,320	1.54	0	7,051	197,417	28	5,287,939	83	22,175,911						
	March	80,572	193,474	1.59	0	7,051	218,569	31	5,969,513	81	28,145,424						
Summer Use	April	81,513	195,734	1.62	0	7,051	211,519	30	5,854,469	80		9,875,244					
	May	172,474	414,154	1.59	6.77	7,051	218,569	31	11,999,963	38		16,020,738					
	June	238,720	573,228	1.13	6.94	7,051	211,519	30	16,289,633	45		20,310,408					
	July	193,524	464,701	0.99	7.37	7,051	218,569	31	13,423,215	34		17,443,990					
	August	152,349	365,829	1.12	6.68	7,051	218,569	31	10,456,378	43		14,477,153					
	September	122,333	293,753	1.37	4.99	7,051	211,519	30	8,167,611	53		12,188,386					
	October	80,595	193,529	1.63	3.77	7,051	218,569	31	5,524,595	81		9,545,370					
	Annual Total =			17.19	36.52		2,573,476	365	99,861,289			99,861,289					



Pond Dimensions

		Surface Area (ft^2)	Floor Surface Area (ft^2)	Depth (ft)	Volume (ft^3)	Volume (gal)	Volume per inch (gal)
	Winter Storage						
	Pond 1	107,499	88,403	6	587,706	4,396,041	67,008
	Pond 2	43,727	31,404	6	225,393	1,685,940	27,256
	Pond 3	46,546	33,044	6	238,770	1,786,000	29,014
	Pond 4	135,823	96,269	11.5	1,334,529	9,982,277	84,663
New	Pond 5	270,400	203,401	11.5	2,724,356	20,378,181	168,549
	New Aerated Lagoons (Shallow)						
New	Pond 1	192,096	157,500	6	1,048,788	7,844,934	119,740
			3.62			7,844,934	

Precipitation: Data from Western Regional Climate Center for Kamas, UT
Evaporation: Pan Evaporation data from Western Regional Climate Center for Kamas, UT
Percolation Rate: Not to exceed 6500gal/acre/day. Assumed 30% of allowed based on shallow groundwater.
Land Disposal: Release inflows April 1-Oct 31, and release winter storage volume evenly over the 7 months
Land Disposal Area: Additional land recommended is based on a 500,000 gal per day disposal volume for nutrient and water balance of alfalfa crop

Treatment	25,695,191	Use Pond 4 as Swing ce
Storage	30,360,458	Use Pond 4 as Swing ce

ell
ell

Francis City

Shallow Lagoon Treatment System with I&I adjustment
(Build one treatment cell and new winter storage cell for capacity through 2035)

9-Nov-12

Capital Costs (2012 dollars)

Item	Unit	Quantity	Installation Multiplier	Unit Price	Total
Mobilization, O&P	LS	1	1	$100,000	$100,000
Lagoon Aeration	LS	1	1.6	$100,000	$160,000
Building (Elec/Blower)	Sf	1,000	1	$100	$100,000
Earthwork (Shallow Cell)	CY	30,000	1	$15	$450,000
Earthwork (Winter Storage)	CY	1,200,000	1	$15	$1,800,000
Yard Piping	LS	1	1	$75,000	$75,000
Sitework	LS	1	1	$50,000	$50,000
Electrical	LS	1	1	$90,000	$90,000
Subtotal					**$2,825,000**
Contingency (30%)					$848,000
Estimated Total Construction Cost					**$3,673,000**
Engineering					$588,000
Land Acquisition	acre	16	1	$50,000	$800,000
Estimated Total Project Cost					**$5,061,000**

Francis City

Aerated Lagoon System with I&I Adjustment

O&M Cost Worksheet

9-Nov-12

O&M Costs (2012 dollars)

Item	Unit	Quantity	Multiplier	Unit Price	Total
Labor (salary with benefits)					
1/2 time operator	$/hr	20	52	$35	$36,400
Power Cost		Hp			
Aeration Blower	$/kW-hr	30		$0.10	$19,594
Materials (5% of capital costs annually)					
Diffusers	LS	1	0.05	$40,000	$2,000
Blower	LS	1	0.05	$20,000	$1,000
Chemical Addition	N/A				
Solids Disposal	N/A				
				Total	**$58,994**

FRANCIS CITY

June 26, 2012

Dear Francis Citizens:

As your City Council we would like to take this opportunity to explain the reasons for upgrading our sewer system and dispel the rumors with facts.

In March 2011, the prior City Council approved conducting a capital facilities study of our sewer for two reasons. The first reason was to determine the maximum capacity of our current system, and how much capacity was remaining, and the second reason was to determine ways to expand the system if it was at capacity. Along with the Capital Facilities Plan, the Council approved performing an impact fee study so that we can be sure future development pays its fair share of the expenses.

The first draft reviewed by the Council in October 2011 showed that our system was not only at capacity, but also out of compliance with State regulations. The Council determined to approve a ten-year plan to expand the existing lagoons at an estimated cost of $1.4 million. Because the State of Utah is the regulatory agency in charge of all sewer systems in the State, we asked for their approval. The State did not approve the proposal and requested that Francis expand the ponds, add winter storage, provide aeration and develop a system that would meet the City's needs for twenty years. The estimated costs for these changes raised the total cost estimate to $4.4 million. All of these changes have been, and will continue to be discussed in open meetings.

We have made contact with lending agencies and discussed obtaining various loans or grants to build the project. The Community Impact Board (CIB) may consider a request; however, they are concerned about the City's commitment in light of the prior referendum. Our bank may help fund the project, however there will be higher interest charged due to the size of the loan. The State Water Quality Board may also be willing to fund the project, providing a sizable grant and 0% interest loan. The Council has determined that this is the most economical approach, and it is our intent to apply for funding later this month.

However, regardless of the funding source, sewer rates must be raised to pay back the loan. Last year, former Council member Adair stated that Francis sewer rates would need to be between $60 and $70 per month to qualify for state funding. That is still true today. The Division of Water Quality has told us that by the completion of the project in two years, the Francis sewer rates will need to be approximately $63 per month. To that end, at the City Council meeting last week, the Council voted to increase the Francis sewer rates by $10.00 per month, beginning July 1.

Because the State agency that regulates sewers is aware that Francis is out of compliance, the Council has been told, "if Francis does nothing, we will be fined and then required to fix the problem".

The City has considered a variety of options and chosen the least expensive one that meets the State requirements. All of the information is available to the public, and the draft Capital Facilities Plan has been posted on the City's website. As a Council, we are committed to providing full disclosure of all aspects of this project and would welcome your questions. Please do not hesitate to contact us.

Sincerely,

Mayor R. Lee Snelgrove
Mike Baldwin
Matt Crittenden

Jeremie Forman
Gio Melendez

2317 SOUTH SPRING HOLLOW ROAD FRANCIS, UTAH 84036
435 783-6236 FRANCISTOWN@ALLWEST.NET

10/10/2012

Francis City Council Meeting
October 11, 2012 7:00 p.m.
Francis City Community Center
AGENDA

1. **Public comment**

Comments will be taken on any item not scheduled for a public hearing, as well as on any other City business. Comments are limited to two minutes per speaker. The Council cannot act on items not listed on the agenda, and therefore, the Council may or may not respond to non-agenda issues brought up under Public Comment. Those wishing to comment should state their full name and address, whom they represent and the subject matter to be addressed. No person shall interrupt legislative proceedings. Total time allocated to public comments will be no more than 10 minutes.

2. **Reports from Council and Staff on items not on the Agenda.** (note: these items are informational only, and no action will be taken)
3. **Presentation: Pr**oposed 2013 Francis City Sewer Expansion Project
4. **Public Hearing:** "A public hearing to receive input from the public regarding the issuance of taxable sewer revenue bonds in one or more series (the "bonds") and the economic impact that the issuance of the bonds will have on the private sector. The bonds to be issued in the aggregate principal amount of not to exceed $5,500,000 to be used for the purpose of financing the construction of additions and improvements to the City's sewer system, and related improvements and sale of the bonds.
5. **Discuss and Possibly Approve Resolution 2012 :** A Resolution authorizing the issuance of $4,300,000 taxable sewer bonds, series 2013, for sewer improvements; and related matters.
6. **September Financial Report**
7. **Discussion and Possible Approval:** Open Invoice Register
8. **Discussion and Possible Approval**: September 13, 2012 Council Meeting Minutes
9. **Closed Executive Session to Discuss Pending or Reasonably Imminent Litigation**
10. **Adjourn**

I certify that this notice has been posted in three (3) public places and on the Utah State Public Notice Website. Attested by Alison Weyher.

In Compliance with the Americans Disabilities Act, individuals needing special accommodations during this hearing should notify Susan Moses at (435) 783-6236 at least three days prior to the hearing.

ENVIRONMENTAL ASSESSMENT REPORT

I. PROJECT IDENTIFICATION

Applicant: Francis City

Project: City of Francis Wastewater Treatment Facility

Address: 2317 South Spring Hollow Road
Francis, Utah 84036

Project Number: **SRF #197**

Contact Person: Scott Kettle, City Engineer
Consultant Engineer J. Clinton Rogers, P.E.
Carollo Engineers, Inc.

ABSTRACT

The City of Francis is a growing community located at the southern end of Kamas Valley in Summit County, Utah. As of the 2010 census, had a population of 1,077 residents up from 698 in 2000. Francis is a rural community that has a total land area of 1.8 square miles with many new lots platted but not yet developed.

The current wastewater system has reached the hydraulic capacity and has insufficient detention time for facultative treatment. To correct these deficiencies and in order to come in compliance with State wastewater regulations the City plans to upgrade its facultative lagoon wastewater system capacity from an existing influent daily average daily flow of 0.11 MGD to 0.36 MGD by adding two cells. The first new cell will be a aerated cell adjacent to cell #1 with 4.41 acre-feet hydraulic capacity and a new winter storage cell north of existing cell #4 with approximately 6.21 acre-feet hydraulic capacity. The advantage of this new construction technology when compared to constructing a new mechanical treatment plant is that it utilizes existing infrastructure, it has lower capital costs, and it has lower O&M costs, while at the same time improving water quality such that it will meet the permit standards.

The existing sewer ponds were designed to handle 292 ERU's. From the capital facilities plan, the new ponds would be designed to handle the 2035 population projections of 1,215 ERU's.

The total maximum project cost is $5,108,000. The Utah Water Quality Board has authorized a loan in the amount of $4,300,000 and an $808,000 grant. Currently, the monthly sewer user fees are $17.00 per equivalent residential user (ERU) and are expected to increase as high as $60.00 per ERU to pay for the project.

Comment Period

No administrative action will be taken for at least (30) days after the release of the Finding of No Significant Impact and the Environmental Assessment Report. Public Notice will be printed in the Summit County News on November 16 & 30, 2012. For more information regarding the preparation and content of these documents contact:

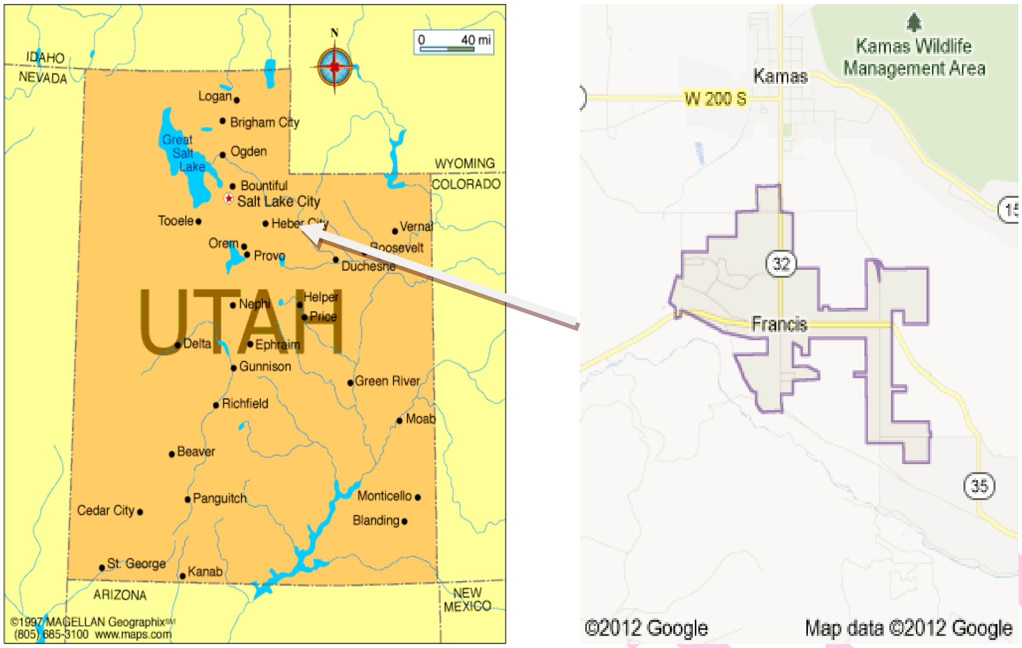
Bill Damery
Department of Environmental Quality
Division of Water Quality
P.O. Box 144870
Salt Lake City, Utah 84114-4870
(801) 536-4354

II. PURPOSE AND NEED FOR THE PROJECT

The existing facultative lagoon system has exceeded its design capacity for hydraulic and organic loading, and is close to exceeding its winter storage capacity. In addition, the City experienced rapid growth prior to the nationwide slowdown in the economy, and is concerned that growth may again accelerate, further stressing the overloaded treatment and disposal system. The wastewater treatment system upgrades needs to provide the existing and future residents of Francis with sewer service for the next 20 years, through the year 2035.

III. PROJECT PLANNING AREA

In December of 1939, the City of Francis was incorporated located in northern Summit County, Utah. With the completion of the Jordanelle Dam and reservoir in the mid-1990s the City of Francis is just a 50 minute ride east from Salt Lake City. The City currently provides sewer collection service to 371 connections. The wastewater water treatment system is located at an elevation of approximately 6560 feet above mean sea level and is a non-discharging four-cell facultative lagoon system approximately 7.6-acres in size. The first three cells provide treatment, while the fourth cell functions as a winter storage cell with land application disposal during the growing season. The application site totals 46 acres and is owned by the City. The Division of Water Quality issued a general permit for land disposal of municipal wastewater, #UTO00202, on November 3, 2011 with effective date of December 1, 2011 and expires at midnight, December 31, 2015.



IV. ENVIRONMENTAL IMPACTS OF THE PROPOSED PROJECT

Flood Plains – The existing and proposed facultative lagoon system will be constructed adjacent to the Weber-Provo Diversion Canal. At an average elevation of 6560, the lagoons walls will be elevated some 15-20 above the banks of the banks of the existing canal. Additionally, the existing project area is located in FIRM panel 49043C1175C. FEMA does not print floodplain information for this panel.

Wetlands – The U.S. Army Corps of Engineers has concurred with the Horrock's Engineers Wetland Delineation and Water of the U.S. Report submittal of Sept. 2012. If during the design phase of the project it is determined that impacts to the delineated wetlands are unavoidable the City of Francis will adhere to any CWA 404 requirements imposed by the US Army Corps prior to any construction. Refer to Appendix B for Corps Agency notification response letter.

Cultural Resources – Archeologist services have been contracted to conduct a Class III pedestrian archaeological survey in the delineated project area. Based on survey findings the City of Francis will agree to any DWQ requirements to meet Section 106 of the National Historic Preservation Act of 1966 (NHPA).

Endangered Species – The U.S. Fish and Wildlife Service has identified threatened or endangered species of animals that may reside in the planning area including:

Salt Lake County

Common Name	Scientific Name	Status
Brown (Grizzly) Bear	*Ursus arctos*	Threatened Extirpated
Canada Lynx	Lynx canadensis	Threatened
Greater Sage-grouse	Centrocercus urophasianus	Candidate

Grizzly Bear and Canada Lynx are not expected to be present within the boundaries of the City of Francis, a rural developed residential community. Any existing habitat for these species is not expected to be impacted by the proposed project.

Greater Sage-grouse inhabits sagebrush plans, foothills and mountain valleys. Since the lagoon expansion areas which are adjacent to the present facilities, have been actively farmed for the last thirty plus years no sagebrush, understory of grasses and forbs remains which is their primary habitat.

It is highly unlikely that the proposed project will have any long-term impacts on any of the listed species or their habitat. The construction will occur within the immediate adjacent boundaries of the existing treatment facility.

Aquatic and Terrestrial Wildlife – The Utah Division of Wildlife Resources had no comment as there are no adverse impacts to fish and wildlife expected as a result of the proposed project. The proposed municipal wastewater project will discharge finished effluent quality only to the land surface during the irrigation season. During the rest of the year the effluent will be stored in a winter storage lagoon.

Prime and Important Farmland – The Farmland Protection Policy Act of 1981 was intended to "minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses" (7 United States Code [U.S.C.] 4201(b)). Agricultural activity in the proposed project area consists mainly of pastures utilized for grazing for beef cattle. The project will cause a conversion of "important farmland resources" according to letter received on May 24, 2012 from the Natural Resources Conservation Service. This letter also indicates that the "soil map unit affected by this proposed project is *Kovish-Toddspan* loams, 0 to 3 percent slopes, which is classified as Farmland of Statewide Importance". The City of Francis has concluded, based on the necessity to utilize the existing lagoons system, that there is no practicable alternative to the proposed project expansion site. However, to decrease the size of the footprint and therefore to minimize the adverse effects or impacts to these farmlands within the Summit County limits, the City of Francis will utilize new aeration lagoon adjacent to cell #1. Lastly, Summit County is largely agricultural and this land has been long identified for wastewater treatment expansion, the proposed loss of this farmland would be minor and insignificant. Refer to Appendix A. for NRCS evaluation letter.

Air Quality – The Utah Division of Air Quality has determined that there will be no long-term impacts to air quality resulting from the project. Air quality will be very slightly degraded during construction due to exhaust from equipment. Fugitive dust will be controlled during the construction phase of the project.

Ground Water – The Utah Division of Water Quality has issued Francis Town General Permit No. UTOP00202 which ensures protection of the ground water resources in part through monitoring, BMPs and reporting requirements.

V. ALTERNATIVES EVALUATED INCLUDING THE PROPOSED ACTION

Several alternatives were considered during project planning:

1. No Action
2. Combination of an Aerated Lagoon System with Lagoon Expansion for agricultural reuse
3. Extended Aeration Mechanical Plant with Biological Nutrient Removal
4. Membrane Bioreactor (MBR)
5. Regionalization Options

The facility is in reasonable proximity to consider discharge to either the upper Weber River or the upper Provo River. Discharge into the upper Provo River would require a 208 Plan modification, and discharge into the upper Weber River would require participating in the TMDL process to secure a loading allocation for phosphorous. These alternatives were screened in the facility plan dated March 2012 and determined to be not feasible. Refer to Appendix B Francis Letter 8-7-2012.docx

Preferred Alternative: Based on several criteria used to evaluate each alternative and an economic analysis, the expansion of the existing facultative lagoon system including an aerated lagoon was selected as the preferred alternative.

Alternative 1: This alternative would consist of no new wastewater treatment for the City of Francis. Currently the City does not have adequate treatment or hydraulic capacity necessary to meet future growth demands. Alternatively, the City could declare a moratorium on growth, to slow or prevent it. The No-Action Alternative is not feasible because it does not meet the need of the project.

Alternative 2: In order to minimize the footprint of lagoon expansion area to adjacent wetlands and farmland, aeration was added. This was the selected preferred alternative, which is also less than half of the capital and O & M cost of the next cheapest alternative and require no surface water discharge permit.

Alternative 3: Mechanical plant alternative would require a surface discharge permit which was not deemed feasible by both DWQ and the City of Francis.

Alternative 4: Membrane Bio-Reactor (MBR) has a high capital cost and operation and maintenance costs. This alternative would have provided higher quality effluent, however both the capital costs and life cycle costs were prohibitively high. It was determined that this system is not deemed feasible by the City of Francis because of both costs and the necessity to obtain a surface water discharge permit from DWQ.

Alternative 5: Outsourcing treatment of the City's wastewater to an existing, nearby facility is a concept commonly referred to as regionalization. According City of Francis Mayor R. Lee Snelgrove conversations with neighboring communities relating to the regionalization of wastewater treatment have proven unsuccessful and have been exhausted based on water rights and costs.

VI. MEANS TO MITIGATE ADVERSE ENVIRONMENTAL IMPACTS

Direct and Indirect Impacts

Upgrading the existing lagoons will result in a wastewater treatment facility that will provide sufficient treatment capacity for the residents of City of Francis. Population growth and land use changes can be an indirect impact from the addition of a wastewater treatment expansion project within a community, making previously undeveloped areas available to be improved. The local planning and zoning officials should control growth in areas that may impact environmentally sensitive areas.

The intention of the project is to supply adequate wastewater treatment capacity for the City of Francis residents until the year 2035.

Unavoidable Adverse Environnemental Impacts

Although there are no significant environmental impacts anticipated from this project, several special conditions will be imposed as a condition of project funding through the Utah State Revolving Fund (SRF) Loan program. These conditions will reduce impacts associated with the project.

1. Plans and specifications will contain specific items to control dust, noise, erosion, and to minimize to maximum extinct possible the footprint of lagoon(s) size and overall project area.

2. If any archaeological artifacts are unearthed during construction, work will be immediately stopped as dictated by contract specifications. The District will promptly notify the State Historical Preservation Officer and the Division of Water Quality. These agencies will make a timely determination of steps necessary to mitigate adverse environmental impacts of the artifacts. Meet all DWQ conditions imposed in order to adhere to Section 106 of the National Historic Preservation Act of 1966 (NHPA).

3. Meet all DWQ requirements in order to meet CWA 404 requirements imposed by the US Army Corps of Engineers prior to any construction.

4. To actively participate as a stakeholder in ongoing water quality study and planning efforts to ensure your long term needs are represented and considered within the larger context of the Provo and Weber River watersheds.

VII. PUBLIC PARTICIPATION

A public meeting was held in City of Francis to address concerns and questions from citizens on October 11, 2012. This meeting was held to discuss the issuance of a taxable sewer revenue bonds and the economic impact that the issuance of the bonds will have on the private sector, additionally wastewater alternatives reviewed, the selection of the preferred alternative, the environmental impacts, financing and potential impacts on user charges. The consultant explained the need for and the benefit of the project. The public in attendance at the meeting actively participated with several rounds of questions asked during the public comment period. A resolution was passed authorizing the issuance of $4,300,00 taxable sewer bonds, series 2012, for sewer improvement and related matters.

VIII. REFERENCE DOCUMENTS

The following document was used in preparation of the Finding of No Significant Impact and Environmental Assessment Report:

City Francis City Council Meeting Minutes (Draft), October 11, 2012

City of Francis Wastewater Collection, Treatment , and Discharge System Capital Facilities Plan, March 2012, Carollo Engineers Salt Lake City, Utah.

NRCS Agency Response Letter To Proposed Project by Domier, Mike, May 24, 2012.

Wetland Delineation and Waters of the U.S. Report in support of Francis Wastewater Treatment Facility prepared by Horrocks Engineers, Sept. 2012

General Permit for Land Disposal of Municipal Wastewater, General Permit No. UTOP 00202.

IX. AGENCIES CONSULTED

The following agencies were consulted during the facility planning process:

1. U.S. Army Corps of Engineers –responded
2. Utah Division of Wildlife Resources – no response
3. U. S. Fish and Wildlife Service – no response
4. Utah Division of Air Quality – responded (by phone)
5. USDA Soil Conservation Service – responded
6. Utah Division of Emergency Services and Homeland Security – responded (by phone)
7. Utah Division of State History - responded

Refer to Appendix A for Agency response letters.

APPENDIX A

ENVIRONMENTAL INFORMATION DOCUMENT
CONTACT LIST

Cultural Resources
Lori Hunsaker
Compliance Archaeologist
Division of State History
300 Rio Grande
Salt Lake City, Utah 84101-1182
(801) 533-3555

Prime and Unique Farmlands
Mr. Mike Domeier &
Mr. Kent Sutcliffe
State Soil Scientist
USDA, Soil Conservation Service
125 South State, Room 4402
Salt Lake City, Utah 84138
(801) 524-4572

Endangered Species
Larry Crist, UT Filed Supervisor
U.S. Fish and Wildlife Service
2369 W. Orton Circle, Suite 50
West Valley City, Utah 84119
(801) 975-3330 ext.124

Wetlands
Jason Gipson, Chief
Corps of Engineers
Utah Regulatory Office
533 West 2600 South, Suite 150
Bountiful, Utah 84010
(801) 295-8380

Aquatic & Terrestrial Wildlife Concerns
Mr. Jim Karpowitz, Director
Utah Wildlife Resources
P.O. Box 146301
Salt Lake City, Utah 84114-6301
(801) 538-4700

Air Quality Issues
Derek Jones, Environmental Engineer
Utah Division of Air Quality
P.O. Box 144820
Salt Lake City, Utah 84114-4820
(801) 536-4435

Floodplain Maps*
John Crofts
State Floodplain Manager
Utah Division of Emergency Services and Homeland Security
1110 State Office Building
Salt Lake City, Utah 84114
(801) 538-3750

or

Dan Carlson
Flood Plain Manager
Federal Emergency Management Agency
Federal Center, Bldg. 710
P.O. Box 25267
Denver, Colorado 80225-0267
(303) 235-4830

- If maps are not available locally

Applicable American Indian Tribes

State of Utah

GARY R. HERBERT
Governor

GREG BELL
Lieutenant Governor

Department of Community and Culture

JULIE FISHER
Executive Director

State History

WILSON G. MARTIN
Acting Director

May 30, 2012

J. Clinton Rogers, P.E.
Project Engineer
Carollow Engineers
1265 E Fort Union Blvd, Suite 200
Salt Lake City Utah 84047

RE: Francis City Wastewater Treatment Project EIS

For future correspondence please reference Case No. 12-1085

Dear mr. Rogers:

The Utah State Historic Preservation Office received your report on May 23, 2012. We have not yet received a request for review of the undertaking from either a federal or state agency. We will await an agency letter regarding this undertaking. However, the report will be removed from our active case files in 90 calendar days.

This does not constitute formal consultation under §36CFR800.4 or U.A.C. 9-8-404. If you have questions, please contact me at 801-533-3555 or Jim Dykmann at 801-533-3523.

Sincerely,

Jim Dykmann
Archaeologist
USHPO
for Lori Hunsaker

Lori Hunsaker
Deputy State Historic Preservation Officer
Archaeology

UTAH STATE HISTORY

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
125 South State Street, Room 4010
Salt Lake City, UT 84138-1100
(801) 524-4550
FAX (801) 524-4403

May 24, 2012

Mr. J. Clinton Rogers, P.E.
Carollo Engineers, Inc.
1265 East Fort Union Boulevard, Suite 200
Salt Lake City, UT 84047

RE: Prime Farmland Status

Dear Mr. Rogers:

Please find attached Farmland Conversion Impact Rating (AD-1006) and Farmland Classification Report for the proposed project in Summit County, Utah.

The proposed Wastewater Treatment Project will impact important farmland resources in Utah. The soil map unit affected by this proposed project is *Kovich-Toddspan loams, 0 to 3 percent Slopes*, which is classified as Farmland of Statewide Importance. Based on project site information provided, approximately 16 acres will be converted in total.

I hope you find this information helpful. Please do not hesitate to call (801.524.4574) or email (mike.domeier@ut.usda.gov) with any further questions.

Sincerely,

Mike Domeier

Mike Domeier
State Soil Scientist, NRCS, Utah

Enclosure: Form AD-1006 and Farmland Classification Report

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 5/22/12	
Name Of Project Francis City Wastewater Treatment Project	Federal Agency Involved Rural Development	
Proposed Land Use Wastewater Treatment Facility Expansion	County And State Summit, UT	
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 5/23/12	
Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply -- do not complete additional parts of this form).* Yes ☑ No ☐	Acres Irrigated 28,332	Average Farm Size 674
Major Crop(s) Pasture Hay	Farmable Land In Govt. Jurisdiction Acres: 42830 % 4	Amount Of Farmland As Defined in FP Acres: 31,072
Name Of Land Evaluation System Used Utah NRCS LE	Name Of Local Site Assessment System None	Date Land Evaluation Returned By NR 5/23/12

PART III *(To be completed by Federal Agency)*	Maximum Points	Site A	Site B	Site C	Sit
		Alternative Site Rating			
A. Total Acres To Be Converted Directly		16.0			
B. Total Acres To Be Converted Indirectly					
C. Total Acres In Site		16.0	0.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information					
A. Total Acres Prime And Unique Farmland		0.0			
B. Total Acres Statewide And Local Important Farmland		16.0			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted		0.0			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value		3.0			
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*		100	0	0	0
PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS	160	0	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	100	0	0	0
Total Site Assessment *(From Part VI above or a local site assessment)*	160	0	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	100	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

Custom Soil Resource Report
Map—Farmland Classification

Map Scale: 1:6,380 if printed on A size (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Table—Farmland Classification

Farmland Classification— Summary by Map Unit — Summit Area, Utah, Parts of Summit, Salt Lake and Wasatch Counties (UT613)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
149	Kovich-Toddspan loams, 0 to 3 percent slopes	Farmland of statewide importance	152.6	100.0%
Totals for Area of Interest			**152.6**	**100.0%**

Rating Options—Farmland Classification

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

June 18, 2012

Regulatory Division (SPK-2012-00616-UO)

Mr. Clinton Rogers
Carollo Engineers, Inc.
1265 East Fort Union Boulevard, Suite 200
Midvale, Utah 84047

Dear Mr. Rogers:

We are responding to your May 22, 2012 request for comments on the Francis City Wastewater Treatment Project. The project is located in Section 18, Township 2 South, Range 6 East, Salt Lake Meridian, Latitude 40.6358°, Longitude -111.2980°, Summit County, Utah. Your Corps project identification number is SPK-2012-00616-UO. Please reference this number in all future correspondence with the Corps.

We offer the following comments based on review of the information provided in your letter (Enclosure 1), the national wetland inventory map (Enclosure 2), and project manager experience in the vicinity of the proposed project:

- The Corps of Engineers' jurisdiction within the study area is under the authority of Section 404 of the Clean Water Act for the discharge of dredged or fill material into waters of the United States. Waters of the United States include, but are not limited to, rivers, perennial or intermittent streams, lakes, ponds, wetlands, vernal pools, marshes, wet meadows, and seeps. Project features that result in the discharge of dredged or fill material into waters of the United States will require authorization from the Corps prior to starting work.

- To ascertain the extent of waters on the project site, the applicant should prepare a wetland delineation, in accordance with the "Minimum Standards for Acceptance of Preliminary Wetlands Delineations" document found on our District Program website at www.spk.usace.army.mil/Missions/Regulatory/Jurisdiction/WetlandDelineations.aspx. Our minimum standards document is found in the resource list at the bottom of the page. The delineation report should then be submitted to the Corps for verification at the Utah Regulatory Office address listed below. A list of consultants that prepare wetland delineations and permit application documents is also available on our website at the same location.

- The range of alternatives considered for this project should include alternatives that avoid impacts to wetlands or other waters of the United States. Every effort should be made to avoid project features which require the discharge of dredged or fill material into waters of the United States. In the event it can be clearly demonstrated there are no practicable alternatives to filling waters of the United States, mitigation plans should be developed to compensate for the unavoidable losses resulting from project implementation.

Please refer to identification number SPK-2012-00616-UO in any correspondence concerning this project. If you have any questions, please contact me by telephone at 801-295-8380 extension 17, by email at *Timothy.R.Witman@usace.army.mil*, or by mail at the Utah Regulatory Office, 533 West 2600 South, Suite 150, Bountiful, Utah 84010.

Sincerely,

Timothy Witman
Regulatory Project Manager

Enclosures

U.S. Fish and Wildlife Service

National Wetlands Inventory

Jun 18, 2012

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

User Remarks:

For General Reference. The Corps will verify wetland boundary and jurisdiction based on wetland delineation report.

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~~http://per2.nwp.usace.army.mil/survey.html~~

Thank you!

Michael Jewell
Chief, Regulatory Division

APPENDIX B

State of Utah

GARY R. HERBERT
Governor

GREG BELL
Lieutenant Governor

Department of
Environmental Quality

Amanda Smith
Executive Director

DIVISION OF WATER QUALITY
Walter L. Baker, P.E.
Director

Mayor R. Lee Snelgrove
Francis City
2317 South Springhollow Road
Francis, UT 84036

Mayor Snelgrove,

I am writing in response to your request for information about the possibility of discharging treated wastewater effluent from Francis City into either the Provo River or Weber River drainages.

Based on a number of factors which I will summarize below, it is my view that a discharging alternative to either drainage basin would be problematic and would not, in the end analysis, represent a cost effective wastewater disposal option for Francis City.

With regards to the Provo River drainage, the Mountainland Association of Governments 208 Water Quality Management plan specifically prohibits any new wastewater treatment discharges to the drainage. As you know, the Provo River drainage is a significant source of drinking water for the population of the Wasatch Front. Over the past 25 years, significant effort and funding has been applied to reduce nutrient loading into this critical watershed. Based on my own staff's recommendations as well as past experience with water district stakeholders and the Provo River Watershed Council, any attempt to amend the 208 plan to allow such a discharge would need to be accompanied by a comprehensive analysis of the potential impacts to water quality in the upper Provo River, Jordanelle and Deer Creek Reservoirs. Even if approval for a discharge were to be gained, it is highly likely that the very low nutrient effluent limits required for such a discharge would be cost-prohibitive when compared to the existing suite of alternatives being considered by the Francis City.

With regards to the Weber River drainage, it is my understanding that Francis City would likely discharge to Beaver Creek, tributary to the Upper Weber River and Rockport Reservoir. Rockport Reservoir is on the 303(d) list of impaired water bodies due to low dissolved oxygen. In addition, Beaver Creek is listed in the 2008 Integrated Report as having elevated levels of phosphorus. A Total Maximum Daily Load (TMDL) water quality study is currently underway to evaluate the cause of the impairment in Rockport Reservoir and develop a strategy to address it. Preliminary data shows that the impairment is caused by excessive nutrients. It is likely that the TMDL will require nutrient load reductions of all point source dischargers in the watershed, and that a higher level of treatment will be required for all dischargers. It is unlikely that Francis would be able to achieve the required level of nutrient removal without upgrading to an expensive chemical or mechanical nutrient removal process.

Despite these technical and economic constraints to obtaining approval to discharge treated effluent, I encourage Francis City to actively participate as a stakeholder in ongoing water quality study and planning efforts to ensure your long term needs are represented and considered within the larger context of the Provo and Weber River watersheds. The points of contact for these efforts are Dave Wham for the Provo River Watershed at (801) 536-4337 and Kari Lundeen for the Weber River Watershed at (801) 536-4335. Please let me know if you need any additional information or would like to discuss any of these issues further.

Sincerely,

Walter L. Baker, P.E.
Director

WLB:DW:dw

cc:

FILE: f:dwham/wp/mayor_snelgrove.doc