GENOLA TOWN

2017 CULINARY WATER SYSTEM MASTER PLAN

Prepared by:

J-U-B ENGINEERS, INC.

240 West Center Street, Suite 200

Orem, Utah 84057

(801) 226-0393

www.jub.com

Adopted by Genola Town Council

on March 8th, 2017

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EXECUTIVE SUMMARY

The Genola Town Culinary Water Master Plan and Capital Facilities Plan presents the findings and recommendations resulting from a detailed study of Genola Town's culinary water system. The Town commissioned the study in an effort to better understand the current state of the water system and to plan for future infrastructure improvements. This report provides a review of the fundamental planning elements such as population, water source and storage, demand, and anticipated future development.

We established a level of service consistent with current Utah Division of Drinking Water administrative rules R309-510 (DDW Rules). DDW Rules require source and storage to be sized to meet both indoor and outdoor demand. Sources are required to provide 800 gallons per day (gpd) per equivalent residential unit (ERU) plus 3.39 gallons per minute (gpm) per irrigated acre for outdoor demands. Storage is to be sized to provide an indoor demand of 400 gallons per day per ERU plus an outdoor component of 2,528 gallons per irrigated acre. Based on a 4-year average source and 9-year average customer meter read data, Genola's culinary water system demand for indoor and outdoor use was 499 gpd per ERU. Using a standard peaking factor of 2.0, the source demand for indoor and outdoor use was 998 gpd per ERU.

This report identifies a 50-year horizon for planning purposes. We used a 50-year horizon to determine capital projects at a timeframe when the distribution pipes will be around 75 years old.

Although Genola's existing system can meet its source capacity level of service (LOS), 998 gpd per ERU, with its existing sources, the system does not have complete source redundancy, because if the Town well is not operational, demands exceed source capacity. Many water systems and regulating agencies recognize the need for source redundancy for events such as contamination, power outages, mechanical failures, etc. The Department of Drinking Water (DDW) requires community water systems without naturally flowing water sources to have one or more of the system's sources to be equipped for operation during power outages, whether by backup generators or a power supply service with coverage from two independent substations. Genola Town's well currently does not have backup power. We recommend installing a transfer switch and a power generator to meet this requirement. Another option is to procure and agreement with Santaquin to use their water to meet demands until the source can be brought back online.

Concerning contamination, mechanical failures and other events that cause a loss in source, the majority of systems with a redundancy LOS determined their LOS as being able to provide peak day demands with any source offline. Although DDW Rules do not require this level of redundancy, we recommend it to protect the welfare and safety of the public, thus Genola's LOS for redundancy is being able to provide peak day demands with any single source offline. Genola needs to construct an additional well with equal capacity to the existing Town well to meet the LOS now, and an additional 675 gpm (minimum) well by 1324 ERUs or about year 2049. If the redundancy level of service is continually met, the source level of service will always be met.

Based on growth estimates for the next 50 years, additional storage is required by 572 ERUs or about year 2021. We recommend constructing a 0.5 MG tank, which would provide storage until

1324 ERUs or about year 2053. At that point, we recommend an additional 0.5 MG tank which would provide sufficient storage beyond the 50-year planning horizon (2066).

Genola's level of service for treatment follows the DDW Rules for treatment, which requires treatment of surface water and recommends treatment of groundwater. Since Genola has not had a bacterial testing problem, they are not considering adding treatment at this time.

Genola Town's level of service for pressure is maintaining 20 psi with fire flow (1000 gpm) during peak day demand, 30 psi during peak instantaneous demand, and 40 psi during peak day demand. We created a computer model of the water system in order to identify what improvements would be needed when Genola is built out based on their level of service. Based on model results, the existing culinary water system does not meet Genola's fire flow and pressure level of service in two locations as shown on Figure B-1 in Appendix B. The area on 800 North and 1000 East is at the end of a long dead end 6-inch line. The area north of Lake Road and 2400 North is downstream of a 1900-foot, 4-inch pipeline. The small line size and lack of looping cause these two areas to have inadequate fire flow. A new pipeline will need to be constructed on 900 North between 800 East and 1000 East to resolve the fire flow issues in that area. Constructing the proposed 0.5 MG tank in about year 2021 will resolve the fire flow issue near Lake Road and 2400 North.

We make the following recommendations:

1. Plan for recommended improvement projects.
2. Maintain or replace aging or inadequate infrastructure.
3. Periodically review and update user rates.
4. Update the Master Plan/Capital Facilities Plan every 5 years or less, or when significant changes to planned land use, development or water use occur.

CULINARY WATER MASTER PLAN

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I. INTRODUCTION

A. Purpose

This document is an integrated master plan and capital facilities plan for Genola Town's culinary water system. It identifies the Town's current culinary water system as well as current and future infrastructure needs and provides direction as growth occurs. The recommendations herein are based on conclusions reached using growth projections and computer modeling of the Town's culinary water system.

B. Background

The Genola Town culinary water system has evolved over many years. The following historical information was provided by the Town.

"In 1935, Genola residents were not satisfied with their culinary water so they incorporated the Town and took steps to establish a municipal culinary system. The work began in September 1936 and was completed in May 1938. The total system cost was $72,500. Water was turned into the system in 1939.

In 1961, a well was drilled east of the Union Pacific Railroad. Originally the well produced one-half second foot. A larger pump was installed with a capacity of 285 gpm (gallons per minute). In 1962, a mass meeting was held to discuss water matters and it was unanimously voted to have water meters installed for better water control.

On May 24, 1980, a mass meeting was held regarding culinary water. The town members voted to build a new head house which was completed on July 17, 1982, with a capacity of 500,000 gallons. United public support was evidenced by the willing response of the volunteer labor."

Since that time, the well was upsized to a capacity of 750 gpm to meet the growing needs of the community.

Another item of historical importance is the connection between Santaquin's culinary water system and Genola's culinary water system. In the 1930's, Genola entered into an agreement with Santaquin to trade irrigation water for culinary water. The agreement guarantees a constant 100 gpm of culinary water from Santaquin to Genola, even if Santaquin cannot receive the traded Genola irrigation water due to drought. This agreement was soon after contested in court but ruled in Genola's favor. For informational purposes, a copy of this agreement is included in Appendix G.

C. Scope

This master plan includes a discussion of system modeling efforts and summary results and capital facilities planning for the Town's culinary water system from 2017 to buildout. The plan also includes an implementation plan for recommended capital improvement projects.

This plan provides direction for future growth, and the integrated capital facilities plan provides a plan for construction of culinary water system improvements to serve the residents of Genola Town. The capital improvement projects portion of the plan includes

planning level cost estimates as well as an estimated schedule for construction of the recommended improvements

D. Objectives

The objectives of this Culinary Water Master Plan & Capital Facilities Plan are listed below:

1. Model the 2016 culinary water system
2. Establish levels of service
3. Identify improvements needed to meet 2016 system deficiencies
4. Model the future water system required to service projected build-out conditions based on the Town's current General Plan
5. Identify improvements needed to meet build-out demand
6. Prioritize improvement projects
7. Estimate the cost of improvements
8. Identify potential sources of funding for needed improvements
9. Make recommendations for implementation of system improvements

II. APPROACH

A. Existing (2016) Conditions

1. 2016 Water System

The 2016 Genola Town Culinary Water System has 550 ERU's (equivalent residential units). Figure A-1 "Existing (2016) System" in Appendix A shows the Town's 2016 culinary water system. The system currently has one pressure zone, one 500,000 gallon tank, one culinary water well, and a connection with Santaquin that supplies the Town with constant low-flows.

2. Existing (2016) Land Use and Culinary Water Connections

Rather than using 2016 land use, estimated densities and estimated water use rates to approximate current demand, we used 2016's actual water use data and locations. This method bypasses the existing land use component traditionally integral to modeling. We also utilized well logs and meters to evaluate the following:

- Confirm average well pumping rates.
- Calculate unaccounted for water by comparing actual water consumed (from customer meters) and total water delivered to the system.
- Calculate average day and peak month system demand.

3. Existing (2016) Population

Genola Town's population increased from 965 in 2000 to 1370 in 2010, according to US Census data. According to the 2010 US Census, the average household size in Genola was 4.1 persons per household. Based on Census estimates and number of residential connections reported by the Town, the 2016 estimated population is 1429 residents.

B. Future Conditions

This report identifies a 50-year horizon for planning purposes. We used a 50-year horizon to determine capital projects at a timeframe when the distribution pipes will be around 75 years old.

This report identifies the number of ERUs at which each future capital project will be needed. Based upon growth projections we also included our approximation of the year that each project will be needed.

Genola Town will need to expand and upgrade the culinary water system in order to provide new users with the levels of service indicated herein.

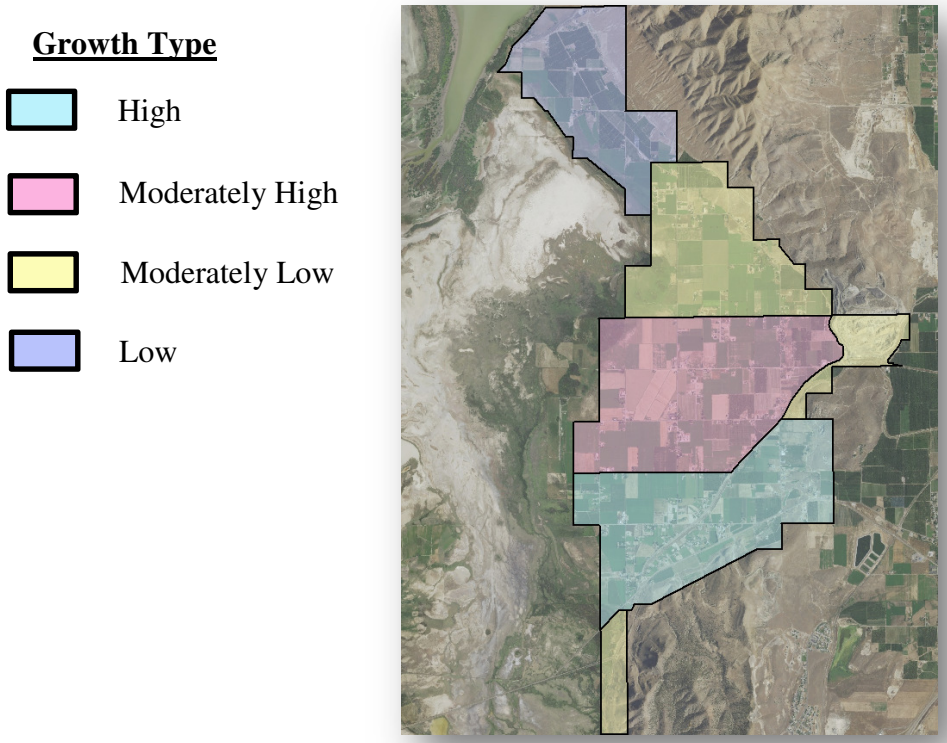
1. Future Land Use

Figure A-2 "General Plan Land Use" in Appendix A shows the current General Plan Land Use Map as published by Mountainland Association of Governments (MAG) with input from Town staff. This map is the basis of future land use projections and corresponding demand.

2. Future Growth

Genola Town estimated buildout to occur in 100 years, with 50 years being a reasonable planning horizon. Genola estimated that the majority of the growth over the next 50 years would occur in the center area of the Town between Highway 6 and 400 South (see Figure 1). The northern and southern parts of the Town are estimated to see low growth.

Figure 1: Growth Areas



C. Level of Service

Genola Town established levels of service standards that reflect 2016 conditions, and comply with Utah culinary water requirements. The level of service is in terms of source, treatment, storage, pressure, and fire flow.

D. Existing (2016) System Supply and Demand

We calculated the 2016 water system demand by using a combination of 2016 customer water meter reads, source flow meter readings and logs, general plan land use, and population projections. In determining 2016 demand, we used the following methodology:

- Summarize historical average and peak month demand using available customer and source meters, and source logs.

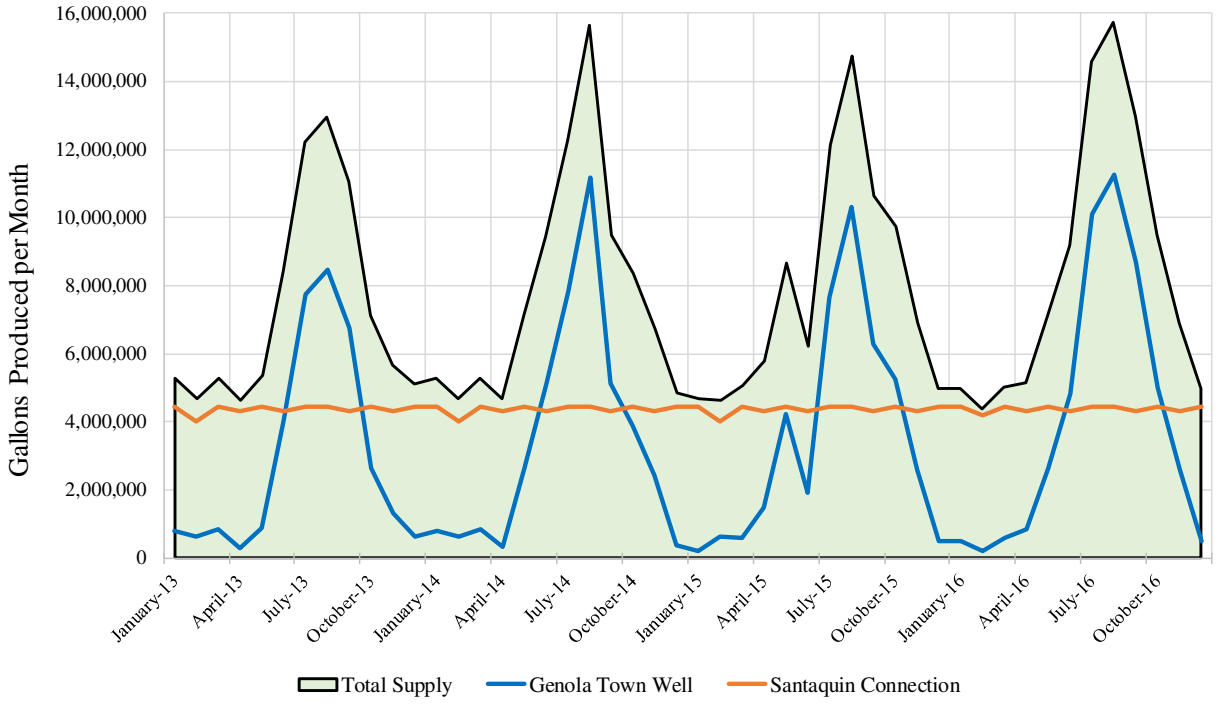
- Review water meter consumption data to quantify the unaccounted for water and quantify water usage per ERU.

- Utilize industry-standard peaking factors to estimate the peak day and peak hour demand, and develop a 24-hour demand pattern.

1. Well Production and Santaquin Connection

   The annual average day source demand was calculated using monthly well logs and an agreement of constant flow from Santaquin as recorded by Town staff for years 2013 - 2016, which is shown in Figure 2. Town staff reports that the Santaquin connection has been throttled to achieve a consistent 100 gallons per minute (gpm) per an agreement.

Figure 2: Production Data (2013 - 2016)



Genola Town had 374 culinary water connections in 2013 and increased to 395 by the end of 2016. The number of connections by year and the associated source production is reported in Table 1 to calculated the average gallons produced per connection per day.

Table 1: Gallons Produced per Connection per Day

Year	Total Connections	Average Day Source Demand (gpd)	Gallons Produced / Connection / Day
2013	374	240,284	642
2014	382	257,038	673
2015	387	257,919	666
2016	395	274,380	695
Average	385	257,405	669

2. Water Consumption and Loss

We analyzed Genola's individual meter database for 2008 through 2016 to determine the gallons consumed per day (metered sales). The unaccounted for water is the ratio between the gallons produced and the gallons consumed. The average unaccounted for water was 9.56%, which is very comparable to other similarly sized water systems.

Potential sources of unaccounted for water are water theft, well meter inaccuracies, unmetered water users, and leaky pipes, valves, hydrants, and services. Since well meter inaccuracies are the most common culprit of unaccounted for water, well meters should be tested on a yearly basis and replaced if needed.

Table 2: Gallons Consumed per Connection per Day

Year	Total Connections	Average Day Consumed Demand (gpd)	Gallons Consumed / Connection / Day	Unaccounted for Water
2008	359	249,078	694	Supply data unavailable
2009	360	239,967	667	
2010	363	219,663	605	
2011	364	215,696	593	
2012	369	233,923	634	
2013	374	218,677	585	9.0%
2014	382	232,845	610	9.4%
2015	387	240,593	622	6.7%
2016	395	238,403	604	13.1%
Average		**232,629**	**605**	**9.6%**

3. Average Day Water Usage per ERU

An equivalent residential connection is defined in DDW Rules to be the average of annual metered drinking water volumes delivered to true single family residential connections (R309-110). We calculated the daily demand per ERU by dividing the average residential daily demand by the number of residential connections.

Table 3: Demand per ERU Calculation based on Individual Water Meters

Year	Total Yearly Residential Demand (gallons)	Average Day Residential Demand (gpd)	# of Typical Residential Units	Demand / ERU / Day (gpd)
2008	69,705,246	190,451	329	579
2009	52,879,300	144,875	330	439
2010	51,804,221	141,929	332	427
2011	50,197,763	137,528	332	414
2012	56,133,075	153,369	337	455
2013	51,841,556	142,032	342	415
2014	54,386,945	149,005	349	427
2015	54,949,827	150,547	354	425
2016	57,437,324	156,933	362	434

4. Total Number of ERUs

We divided the average system daily demand by the daily demand per ERU to produce the number of ERUs.

Table 4: ERU Calculation based on Individual Water Meters

Year	Total Yearly System Demand (gallons)	Average Day System Demand (gpd)	Demand / ERU / Day (gpd)	ERUs
2008	91,162,519	249,078	579	430
2009	87,587,874	239,967	439	547
2010	80,176,960	219,663	427	514
2011	78,729,037	215,696	414	521
2012	85,615,649	233,923	455	514
2013	79,817,130	218,677	415	527
2014	84,988,519	232,845	428	544
2015	87,816,401	240,593	425	566
2016	87,255,398	238,403	434	550

5. Storage Requirement: Average Day Water Supplied (Including Water Loss) per ERU

   DDW Rule R309-510-8 requires equalization to match average day demand. In the absence of records establishing an average day demand, DDW Rules require storage to equal 400 gallons per ERU. We increased Genola's average demand/ERU/day shown in Table 6 to account for the unaccounted for water (see Table 5).

Table 5: Gallons Produced per ERU

Year	Demand / ERU / Day (gpd)	Unaccounted for Water	Demand + Loss / ERU / Day (gpd)
2013	415	8.99%	456
2014	428	9.41%	472
2015	425	6.72%	456
2016	434	13.11%	499
Average	**425**	**9.56%**	**471**

Table 5 shows Genola's 2016 average day demand including waterloss was 499 gpd/ERU, thus the DDW Rules require Genola to use 499 gpd/ERU for the equalization storage requirement rather than the 400 gpd/ERU standard requirement.

6. Source Requirement: Peak Day Water Supplied (Including Water Loss) per ERU

   DDW Rule R309-510-7 requires source capacity to meet peak day demand. In the absence of records establishing a peak day demand, DDW Rules require storage to equal 800 gallons per ERU.

   Since hourly and daily peak flow data is not available, Genola decided to use an industry standard peaking factor of 2.0 to convert average day demand (from existing records) into peak day and peak hour demand.

   We multiplied the required average day demand of 499 gpd per ERU by the peaking factor of 2.0, making the peak day demand 998 gpd per ERU (see Table 6).

Table 6: Peak Day and Peak Hour Calculations

Existing Average Day Demand (gpm)	Peaking Factor (rounded)[1]	Average Peak Day Demand (gpm)	Average Day Demand / ERU	Max Day Gallons Produced / ERU
191	2.0	381	499	998

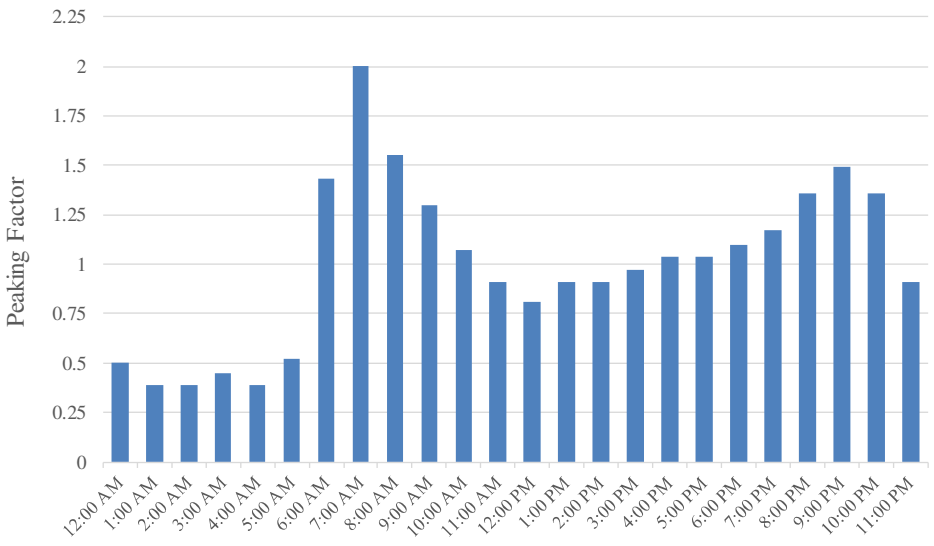
[1]Industry Standard

We assumed the same 2.0 peaking factors for all future scenarios.

7. Transmission/Distribution System Requirements: Average Day, Peak Day, and Peak Hour Demands

   Since daily and hourly flow data is not available, Genola decided to use a diurnal pattern similar to other surrounding water systems to estimate how demand fluctuates during any given day. We included the diurnal curve for reference (see Figure 4).

Figure 3: Typical 24-Hour Demand Pattern



8. ERUs and Demands by Land Use Type

   Using 2014 individual meter reads and source data, we calculated the number of 2016 ERUs for each 2016 Land Use type as shown in Table 7.

Table 7: 2016 Actual Land Use, ERUs, and Demand

Land Use Type	2016 ERUs	Total Average Day Demand (gpd)	Total ADD with 13.1% Waterloss (gpd)[1]	Total Peak Day Demand (gpd)[2]
Residential	362	156,933	180,611	361,221
Agricultural	107	46,245	53,222	106,444
Commercial	1	464	535	1,069
Public[3]	71	30,685	35,314	70,629
Institutional	9	4,077	4,692	9,383
Total	**550**	**238,403**	**274,373**	**548,746**

[1] 13.11% is calculated by comparing supply data vs. consumed data for 2016

[2] Assumes a standard peaking factor of 2.0

[3] Includes the cemetery, rodeo grounds, soccer fields, etc.

E. Planning Horizon System Demand

In order to project demand at the 50-year planning horizon year (2066), we made several key assumptions moving forward:

- Constant yearly growth rate.
- Study area doesn't change.
- General Plan Land Use stays the same.
- Demand per ERU stays at 499 gpd per ERU.
- Demand per land use type remains the same.
- Peak day factor and peak hour factor remains the same.

Based on the above assumptions, we calculated 1556 ERUs by year 2066, which is about 71% of the total ERUs estimated by buildout of the study area (2197 ERUs).

Table 8: 2016 and 2066 Combined ERU Counts

Existing Land Use	2016 ERUs	2066 ERUs
Residential	362	1,399
Agricultural	107	21
Commercial	1	30
Public	71	88
Institutional	9	18
Subtotal	550	1,556

Table 9 summarizes the demands based on our ERU projections. By 2066, the average day demand is estimated to reach 540 gpm.

Table 9: 2016 and 2066 Demand Summary

	Year	ERUs	Average Day Demand / ERU (gpd)*	Average Day		Peak Day Demand		Peaking Factor
				gpd	gpm	gpd	gpm	
Existing	2016	550	499	274,500	191	549,000	381	2.0
50-Year	2066	1,556	499	776,500	540	1,553,000	1,078	2.0

*Includes 13.11% waterloss

Table 10 shows estimated ERUs for each year between 2016 and 2066.

Table 10: ERU Growth Summary

Year	ERUs	Avg. Yearly Growth	Population
2000	CENSUS		965
2010	CENSUS		1,370
2011			1380
2012			1389
2013			1399
2014			1409
2015	CENSUS (ESTIMATE)		1419
2016	**550**	**0.70%**	**1,429**
2017	554	0.70%	1,439
2018	558	0.70%	1,449
2019	562	0.70%	1,459
2020	567	1.00%	1,473
2021	573	1.00%	1,488
2022	579	1.00%	1,503
2023	584	1.00%	1,518
2024	590	1.00%	1,533
2025	608	3.00%	1,579
2026	**626**	**3.00%**	**1,627**
2027	645	3.00%	1,675
2028	664	3.00%	1,726
2029	684	3.00%	1,777
2030	708	3.50%	1,840
2031	733	3.50%	1,904
2032	759	3.50%	1,971
2033	785	3.50%	2,040
2034	813	3.50%	2,111
2035	841	3.50%	2,185
2036	**871**	**3.50%**	**2,261**
2037	901	3.50%	2,340

Year	ERUs	Avg. Yearly ERU Growth	Estimated Population
2038	933	3.50%	2,422
2039	965	3.50%	2,507
2040	994	3.00%	2,582
2041	1,024	3.00%	2,660
2042	1,055	3.00%	2,740
2043	1,086	3.00%	2,822
2044	1,119	3.00%	2,906
2045	1,153	3.00%	2,994
2046	**1,173**	**1.75%**	**3,046**
2047	1,193	1.75%	3,099
2048	1,214	1.75%	3,154
2049	1,235	1.75%	3,209
2050	1,257	1.75%	3,265
2051	1,279	1.75%	3,322
2052	1,301	1.75%	3,380
2053	1,324	1.75%	3,439
2054	1,347	1.75%	3,500
2055	1,364	1.25%	3,543
2056	**1,381**	**1.25%**	**3,588**
2057	1,399	1.25%	3,632
2058	1,416	1.25%	3,678
2059	1,434	1.25%	3,724
2060	1,452	1.25%	3,770
2061	1,470	1.25%	3,818
2062	1,488	1.25%	3,865
2063	1,507	1.25%	3,914
2064	1,526	1.25%	3,962
2065	1,541	1.00%	4,002
2066	**1,556**	**1.00%**	**4,042**

F. Model

J-U-B Engineers Inc. (J-U-B) developed a computer model for the system using InfoWater®, a graphically-based water modeling software that runs within ArcGIS®. The model uses essential hydraulic data input to simulate the effect that input data has on the system under a specified scenario (i.e. peak day, peak instantaneous, average day, etc.). The data used for the model include the graphical layout and connectivity of the system, pipe lengths, pipe diameter, pipe roughness (a Hazen-Williams roughness coefficient of 140 was used for PVC pipes and 130 was used for ductile iron pipes in the model), demand at each node, and elevation of each node. Given the required data, the model determines the flow and velocity through each pipe and the pressure at each node that will result when the system meets a given demand at each node. The layout and connectivity of the system is shown in Figure A-1 in Appendix A. We calibrated the model using results from fire flow tests conducted during December of 2016 at five hydrants throughout the system.

We added additional demands for the 50-year planning horizon on their respective node.

We evaluated both existing (2016) conditions and the 50-year (2066) planning horizon conditions using the model to identify instances in which the 2016 system falls short of the established level of service (2016 deficiencies) and what improvements would be needed in order for the future system to provide the established level of service (future needs). These evaluations include various demand scenarios to account for all the conditions represented in the level of service criteria.

G. Capital Improvements

Capital improvements needed to correct 2016 deficiencies and to meet future needs are identified from the modeling and evaluation results. This plan identifies these as individual capital improvement projects and includes associated opinions of probable cost (see Section VI “Capital Improvements”).

H. Maintenance and Replacement

Genola Town instructed J-U-B Engineers to include certain maintenance and replacement projects as part of this plan. These projects are identified in Chapter VI.

III. LEVEL OF SERVICE

This plan identifies the specific level of service provided by the system. The necessary system improvements listed in this plan will allow the Town to provide new users with the same level of service that currently exists.

A. System Improvements vs. Project Improvements

Improvements are categorized according to their function as either system improvements or project improvements. All improvements, both existing and future, are intended to be either system improvements or project improvements, but not both.

Project improvements are existing or future facilities necessary to provide service to occupants or users resulting from a specific development activity or development proposal.

System improvements are existing or future facilities not fitting the definition of a project improvement that are identified as system improvements in the impact fee facilities plan analysis.

B. Level of Service Categories and Magnitude

The level of service criteria for the culinary water system is defined as follows:

1. Source

The level of service related to source is all three of the following:

a. Flow rate: provide a minimum of 998 gallons per day per ERU on the peak day
b. Volume: provide a minimum of 146,000 gallons per year per ERU
c. Redundancy: meet peak day demand with any single source offline and provide backup power at all future wells

DDW rule (R309-515-6) states that "water suppliers shall assess the capability of their system in the event of a power outage. If a community water system has no naturally flowing water sources such as springs or flowing wells, one or more of the system's sources shall be equipped for operation during power outages. In this event: to ensure continuous service when the primary power has been interrupted, a redundant power supply shall be provided. A redundant power supply may include a transfer switch for auxiliary power such as a generator or a power supply service with coverage from two independent substations."

Since Genola receives a constant supply through the Santaquin culinary water system by agreement, Genola meets this requirement. When the Town grows and requires additional wells, we recommend having backup power installed at those sites.

Concerning contamination, mechanical failures and other events that cause a loss in source, the majority of systems with a redundancy level of service (LOS) determined their LOS as being able to provide peak day demands with any source offline. Although DDW Rules do not require this level of redundancy, we recommend it to

protect the welfare and safety of the public, thus Genola's LOS for redundancy is being able to provide peak day demands with any single source offline. As shown on Table 11, the Town well provides 88% of the system source capacity. If the well ever became inoperable, the connection with Santaquin would be insufficient to meet demand unless an agreement with Santaquin could be reached where additional supply could be provided. Genola's emergency storage would be consumed quickly.

2. Treatment

The minimum level of service related to water quality and treatment is in compliance with the applicable "Primary" standards established by the Utah Administrative Code Section 309-200, Monitoring and Water Quality: Drinking Water Standards.

DDW Rule R309-200-5(7) recommends continuous disinfection for all water sources, and requires continuous disinfection of all ground water sources which do not consistently meet standards of bacteriologic quality. It also requires disinfection for ground water sources under direct influence of surface water. Genola's well has consistently met bacteriological quality standards and is not currently considered as being under the direct influence of surface water.

3. Storage

There are two minimum levels of service for culinary water storage is redundancy and the sum of the following three categories of storage:

a. Equalization Storage:

i. Indoor & Outdoor Use: 499 gallons per ERU

This volume meets the requirements set forth in the Utah Administrative Code R309-510-8(2), Facility Design and Operation: Minimum Sizing Requirements, Storage Sizing, and Equalization Storage.

b. Fire Storage: 120,000 gallons

This volume meets the requirements set forth in the Utah Administrative Code R309-510-8(3), Facility Design and Operation: Minimum Sizing Requirements, Storage Sizing, Fire Suppression Storage. It indicates that the engineer shall consult with the local fire suppression authority regarding needed fire flow, and that if no such authority exists, needed fire suppression storage shall be assumed to be 120,000 gallons (1,000 gpm for 2 hours). After consultation with William McMullin (local fire authority representative), the Town decided to use Mr. McMullin's recommendation for fire suppression storage of 1000 gpm for 2 hours, which equals a volume of 120,000 gallons.

c. Emergency Storage: 24 hours of average day demand

Utah Administrative Code R309-510-8(4), Facility Design and Operation: Minimum Sizing Requirements, Storage Sizing, Emergency Storage indicates that emergency storage shall be considered, and if deemed appropriate by the water supplier, provided to meet demand in the event of an unexpected emergency

situation. No specific volume is indicated, but rather is left up the local jurisdiction.

We worked with Genola Town staff to establish a level of emergency storage that fits within the risk tolerance of the community. The amount of emergency storage was determined to be 24 hours of average day demand.

For the purpose of calculating emergency storage, we used Genola's average day demand per ERU for 2016, 499 gpd/ERU. With 550 ERUs in 2015, the level of service for emergency storage is 274,500 gallons.

4. Pressure

The level of service related to pressure is each of the following:

a. Minimum of 20 psi with fire flow during peak day demand
b. Minimum of 30 psi during peak instantaneous demand
c. Minimum of 40 psi during peak day demand

These levels are consistent with the Utah Administrative Code Section 309-105-9, Minimum Water Pressure requirements.

5. Fire Flow

The Town of Genola determined that the minimum level of service related to fire flow is maintaining 20 psi system-wide while providing a minimum of 1000 gpm. This meets the Utah Administrative Code Section 309-550(5), Water System Design, Fire Protection.

IV. EXISTING (2016) CULINARY WATER SYSTEM

A. Overview

The Genola Town culinary water system consists of sources, treatment facilities, storage facilities and transmission/distribution lines. Existing (2016) supply, existing demand, existing deficiencies and reserve capacity of system improvements for each category of improvements is described later in this report.

B. Rights

A full evaluation and assessment of Genola Town's water rights is beyond the scope of this plan; however, we have identified the rights Genola Town currently has to determine if sufficient rights exist for the recommended source improvement projects in this plan. Genola's has two water rights with a point of diversion at the Town well (see Appendix F for water right documents). One is for 0.2 cfs (water right 53-1081; claim No. A31898), and the other is for 3.826 cfs (water right 53-1082; claim No. A31898a), for a combined 4.026 cfs (1807 gpm). Additional water rights will be needed once the 675 gpm well improvement project mentioned in Table 17 is constructed at about 1226 ERUs or about year 2049.

C. Sources

1. Existing (2016) Sources

Genola Town currently obtains culinary water from the Town well and a connection to Santaquin's culinary water system that provides a constant 100 gpm. The Town well and connection to Santaquin is located southeast of Genola on Lark Road, adjacent to the railroad tracks. Both of these sources are reliable and can be used year-round.

It is important to note that the homes on 715 South are fed solely by the Santaquin connection prior to the water passing through the throttled valve at the tank.

Table 11 shows the Town's 2016 culinary water sources and each of their capacities.

Table 11. Existing (2016) Culinary Water Source Capacities

Source	Source Capacity GPM	Daily Volume GPD	Annual Volume MG
Well #1	750	1,080,000	394
Santaquin Connection	100	144,000	53
Total	**850**	**1,224,000**	**447**
Total per ERU (at 550 ERUs)	**1.55**	**2,225**	**812,291**
Source Capacity with Well #1 Offline	**100**	**144,000**	**53**

The 2016 system provides the following:

a. Flow rate: 2225 gallons per day per ERU
b. Volume: 812,291 gallons per year per ERU
c. Redundancy: 144,000 gallons per day with the Town well offline

2. Demand on Existing (2016) Sources

The 2016 system source demands are as follows:

a. Flow rate: peak day demand is 998 gpd per ERU (548,830 gpd / 550 ERUs as shown in Table 9)
b. Volume: 182,168 gallons per year per ERU.
c. Redundancy: 548,830 gallons per day with the Town well offline.

Table 12. Existing (2016) Culinary Water Source Capacities vs. LOS

	Source Capacity	Daily Volume	Annual Volume
	GPM	GPD	MG
Existing Capacity	850	1,224,000	447
LOS Requirement (Year 2016)	381	548,900	100
Surplus	**469**	**675,100**	**347**
Surplus with the Well Offline	**-281**	**-404,900**	**-48**

3. Existing (2016) Source Deficiencies

Since Santaquin is the sole source for the homes on 715 South, not having an agreement with Santaquin could be risky since no other existing (2016) sources can serve this area due to elevation.

Although Genola's 2016 system can meet its source capacity level of service (LOS), 998 gpd per ERU, with its existing sources, the system does not have complete source redundancy, because if the Town well is not operational, demands exceed source capacity (281 gpm short). Many water systems and regulating agencies recognize the need for source redundancy for events such as contamination, power outages, mechanical failures, etc. The Department of Drinking Water (DDW) requires community water systems without naturally flowing water sources to have one or more of the system's sources to be equipped for operation during power outages, whether by backup generators or a power supply service with coverage from two independent substations. Genola Town's well currently does not have backup power.

4. Resolving Existing (2016) Source Deficiencies

   In order to meet the redundancy level of service, Genola could either increase its rights that are delivered through the Santaquin connection or construct a new well with at least 281 gpm capacity.

   In order to adequately plan for future growth, we recommend drilling an additional well with a capacity of at least 750 gpm near a future tank (see Chapter V Section E for more information on this tank). With this additional well, Genola's system would have two sources with the same capacity, so with one of them offline, the system would be able to meet the redundancy level service until 1226 ERUs, or about year 2048. By 1226 ERUs, we recommend having an additional well with a capacity of 675 gpm constructed and operational. Note that additional water rights will need to be acquired in order to utilize a well of this size.

   We recommend creating an agreement with Santaquin for the use of their pipes to convey water to Genola during fire flow events. The current agreement only allows up to 100 gpm.

D. Treatment Facilities

1. Existing (2016) Treatment Facilities

   Genola Town does not currently disinfect their culinary water. Santaquin does chlorinate their culinary water, but the chlorine concentration of the water that enters Genola's system through the connection is unknown.

2. Demand on Existing (2016) Treatment Facilities

   Genola's water from Santaquin is disinfected. Genola is not required to disinfect their well water because the well is classified as groundwater by DDW.

3. Existing (2016) Treatment Facility Deficiencies

   The Genola water system meets the established level of service.

E. Storage

1. Existing (2016) Storage

   Genola Town has one tank for culinary water storage with a capacity of 0.5 MG. An older tank is located adjacent to the 0.5 MG tank, but has not been used in years. The entire system is fed by the 0.5 MG tank.

   The 2016 system provides 0.5 MG of storage allocated as follows (see Table 13 for summary):

   a. Equalization Storage: 499 gallons per ERU x 550 ERUs = 274,500 gallons
   b. Fire Storage: 1000 gpm for 2 hours = 120,000 gallons
   c. Emergency Storage: 499 gallons per ERU x 550 ERUs x (9.25 hours / 24 hours) = 105,500 gallons

2. Demand on Existing (2016) Storage

The minimum levels of service established by Genola requires 0.669 MG of storage allocated as follows:

a. Equalization Storage: 499 gallons per ERU x 550 ERUs = 274,500 gallons
b. Fire Storage: 1000 gpm for 2 hours = 120,000 gallons
c. Emergency Storage (24 hours): 499 gallons per ERU x 550 ERUs = 274,500 gallons

Table 13. Existing (2016) Culinary Water Storage Capacities

2016 Storage	Gallons
Water Tank #1	500,000
Storage Level of Service	**MG**
Equalization	274,500
Fire Suppression	120,000
Emergency	274,500
Total Required	669,000
Surplus	**-169,000**

3. Existing (2016) Storage Deficiencies

Genola's existing storage capacity is 169,000 gallons short of its LOS.

4. Resolving Existing (2016) Storage Deficiencies

We recommend constructing an additional 0.5 MG storage tank so Genola can meet its storage LOS. The Town identified several potential sites for the tank. One of which was located at about 2400 North and 100 West on a property owned by a citizen who has previously offered it as a tank site. The site would be in close proximity to several large diameter transmission lines and could have an elevation identical to the existing tank. See Figure C-1 for a map of the site location.

F. Transmission/Distribution System

1. Existing (2016) Transmission/Distribution System

Genola Town has a widespread 2016 culinary water distribution system. There are approximately 30 miles of pipelines with associated valves, fittings and other related infrastructure. Table 14 summarizes the transmission/distribution system by pipe diameter, material, and length.

Table 14: 2016 Transmission/Distribution System Pipe Summary

Pipe Diameter [in]	Length by Pipe Material [ft]		Total Length		% of Total
	DI	PVC	feet	miles	
2"		5,237	5,237	0.99	3%
3"		556	556	0.11	0%
4"		1,914	1,914	0.36	1%
6"		51,204	51,204	9.70	33%
8"	5,168	58,600	63,768	12.08	41%
10"		25,339	25,339	4.80	16%
12"		6,745	6,745	1.28	4%
Total [ft]	5,168	149,595	154,763	29.31	100%
% of Total	3.3%	96.7%			

DI = Ductile Iron

PVC = Polyvinyl Chloride

Figure A-1 in Appendix A shows the extents and attributes of the 2016 transmission/distribution system.

The 2016 transmission system connects the well and Santaquin connection to the 0.5 MG tank, then connects the tank through a single 12-inch pipeline to 800 East where it connects to the main body of the distribution system.

Figures B-1, B-2, and B-3 in Appendix B show the 2016 system pressures or available fire flow under the following three conditions:

a. Fire flow during peak day demand
b. Peak instantaneous demand
c. Peak day demand

2. Demand on 2016 Transmission/Distribution System

The minimum levels of service established by Genola for pressure are:

a. Fire flow during peak day demand with a residual pressure of 20 psi or more at a fire flow rate of 1000 gpm
b. Peak instantaneous demand (minimum level of service is 30 psi residual)
c. Peak day demand (minimum level of service is 40 psi residual)

3. 2016 Transmission/Distribution System Deficiencies

As evident in Figure B-1, the available fire flow in two areas does not meet the level of service. The area on 800 North and 1000 East is at the end of a long dead end 6-inch line. The northern areas of Lake Road and 2400 North is downstream of a 1900-foot, 4-inch pipeline. The small line size and lack of looping cause these two areas to have inadequate fire flow.

As evident in Figure B-3, one node at the southeast of Genola does not meet the peak day LOS of 40 psi. However, the node has adequate fire flow and meets the peak instantaneous pressure LOS. We attribute this to the small elevation difference between the tank in relation to the node. Since increasing pipe size would not be effective and increasing the tank's elevation is not feasible, we do not recommend an improvement project to resolve the deficiency.

4. Resolving 2016 Transmission/Distribution System Deficiencies

   We recommend constructing an 8-inch pipeline 900 North between 800 East and 1000 East to resolve the fire flow issues in that area.

   We recommend constructing an 8-inch pipeline along Lake Road from 2200 North to 3000 North to resolve the fire flow issues in that area. While the pipeline could have been an 8-inch to meet the LOS, Town staff requested upsizing it to a 12-inch pipe for potential growth that may occur north of the study area boundary.

V. FUTURE CULINARY WATER SYSTEM IN 2066

A. Overview

Figure C-1 "Buildout System" in Appendix C shows the anticipated culinary water system at the 50-year planning horizon (2066).

The culinary system at 2066 will be comprised of the entire 2016 system infrastructure along with new development driven infrastructure, and the new improvements identified within this plan.

B. Rights

With 4.026 cfs (1807 gpm) of current water rights, Genola has sufficient water rights far beyond the 50-year planning horizon (2066).

C. Sources

1. Future Sources

Each of the Town's future culinary water source's capacities (after recommended improvements have been completed) are shown in Table 15.

Table 15: Future Culinary Water Source Capacity After Improvement Projects

Source	Pump Capacity GPM	Daily Volume GPD	Annual Volume MG
Well #1	750	1,080,000	394
Well #2 (improvement project)	750	1,080,000	394
Santaquin Connection	100	144,000	53
Total	**1,600**	**2,304,000**	**841**
50-Year Total per ERU (at 1556 ERUs)	**1.03**	**1,481**	**540,463**
Source Capacity with Well #1 Offline	**850**	**1,224,000**	**447**

The 50-year planning horizon (2066) system after 2016 recommended improvement projects are completed provides the following:

a. Flow rate: 1480 gallons per day per ERU
b. Volume: 540,375 gallons per year per ERU
c. Redundancy: 1,224,000 gallons per day with Well #1 offline

2. Demand on 2066 Sources

The 2066 system source demands are as follows:

a. Flow rate: peak day demand is 998 gpd per ERU (548,830 gpd / 550 ERUs as shown in Table 9)
b. Volume: 182,168 gallons per year per ERU.
c. Redundancy: 1,552,888 gallons per day with Well #1 offline.

See Table D-1 in Appendix D for a summary of future storage and source requirements by year.

3. Future Source Needs

Genola's existing system meets the source level of service and demand for flow and volume, but does not meet the redundancy level of service in 2066. It is about 329,000 gpd (229 gpm) short.

4. Solutions to Future Source Needs

If the recommendation shown in the "Resolving 2016 Source Deficiencies" section to install a new 750 gpm well to match the existing Town well, Genola's system would have adequate source capacity through buildout. However, in order to maintain source redundancy level of service, an additional 329,000 gpd or 229 gpm source is required by 1226 ERUs or about year 2049 to maintain the redundancy LOS through the 2066. Installing a well larger than 229 gpm is recommended so it will provide sufficient capacity through buildout, not just 2066. We recommend installing a 675 gpm minimum well.

D. Treatment Facilities

1. Future Treatment Facilities

Since Genola's existing well has consistently met bacteriological sampling requirements, the Town has elected to not pursue disinfection unless DDW Rules change and enforces or encourages it in the future.

2. Future Treatment Facility's Needs

There are no anticipated future treatment needs.

E. Storage

If the recommendation shown in the "Resolving 2016 Storage Deficiencies" section to install a new 1.0 MG tank is followed, the 2066 system would provide 1.0 MG of storage allocated as follows:

a. Equalization Storage: 499 gallons per ERU x 1556 ERUs = 776,444 gallons
b. Fire Storage: 1000 gpm for 2 hours = 120,000 gallons
c. Emergency Storage: 499 gallons per ERU x 1556 ERUs x (3.2 hours / 24 hours per day) = 103,500 gallons

3. Demand on 2066 Storage

The minimum levels of service established by Genola requires 1.67 MG of storage allocated as follows:

a. Equalization Storage: 499 gallons per ERU x 1556 ERUs = 776,444 gallons
b. Fire Storage: 1000 gpm for 2 hours = 120,000 gallons
c. Emergency Storage (24 hours): 499 gallons per ERU x 1556 ERUs = 776,444 gallons

Table 16: 2066 Culinary Water Storage Capacity

Storage	2066 (gallons)
Water Tank #1	1,000,000
Storage Level of Service	**MG**
Equalization	776,444
Fire Suppression	120,000
Emergency	776,444
Total Required	1,672,888
Surplus	**-672,888**

See Table D-1 in Appendix D for a summary of future storage and source requirements by year.

4. Future Storage Needs

Since Genola's storage facilities provide 1.0 MG of storage, there is a 0.67 MG shortfall by 2066.

5. Resolving Future Storage Needs

Based on Genola's LOS, the storage tank(s) will need to have a total volume of at least 1.67 MG to provide enough storage capacity to last through 2066. We recommend installing a 1.0 MG tank by 881 ERUs or by year 2036, for a total storage volume capacity of 2.0 MG spread between three tanks. A possible tank location is about 1750 North and 500 East because of its proximity to several larger diameter transmission lines. to at the same elevation as the other two tanks.

F. Transmission/Distribution System

1. Future Transmission/Distribution System

We anticipate that the future pipes in the transmission/distribution system will be built by land developers to serve future development as it occurs. Town projects will primarily consist of rehabilitation and replacement projects.

2. Future Demand on Transmission/Distribution System

The system is estimated to serve 1556 ERUs by 2066.

3. Future Transmission/Distribution System Modeling

A modeling engineer used a computer model to design a water system plan that will serve the needs of the community. The process is not one that lends itself to direct calculations, as is the case with water source and storage planning. Due to the finite nature of pipe sizing and the effect that changes in one pipe size have on a pressure pipe network, the process of resolving future network problems and inadequate pressures requires engineering judgment and skill.

The minimum size for new pipes is 8 inches in diameter. We plan pipes to transmit and distribute water to areas of future development, knowing that some of these lines may need to be larger than 8 inch in diameter.

In the process of developing the buildout model it becomes necessary to adjust line locations, connectivity, and sizes to find combinations that meet future needs while maintaining residual pressures under different demand scenarios. Through this process the modeling engineer establishes a buildout network that satisfies residual pressure requirements under the level of service criteria.

The modeling engineer also exercises judgment to plan the system in a way that employs best practices, such as avoiding high velocities and unnecessary pumping, and providing looping and redundancy in the system. There will be some internal looping created by development projects that will reduce pressure losses at buildout. The uncertainty of when and where the project-level looping will occur makes depending upon them unreliable, so we neglect their effect when planning future transmission/distribution lines. Including looping and redundancy (as is practical) reduces the extent of system disruptions when there are operational situations (such as breaks in a pipe) that require flow to a general area to be provided from more than one direction.

Figure C-1 in Appendix C shows the 2066 facilities that satisfy the established level of service for the 2066 condition. There will be additional pipes installed as land develops.

Figures C-2, C-3 and C-4 in Appendix C show the 2066 system pressures that result from pipe sizes shown in Figure C-1 under the following three conditions:

a. Fire flow during peak day demand (minimum LOS is 20 psi residual)
b. Peak instantaneous demand (minimum LOS is 30 psi residual)
c. Peak day demand (minimum LOS is 40 psi residual)

As is evident in the figures, the facilities shown on Figure C-1 satisfy level of service needs with regard to pressure in the 2066 condition.

For the purposes of estimating when pipes will be installed, we expect the construction timing to parallel the growth projections, since they will be constructed by future development.

4. Future Transmission/Distribution System Needs

There are no future transmission/distribution system needs in the culinary water system.

VI. CAPITAL IMPROVEMENTS

A. List of Projects and Priorities

Table 17 shows capital improvement projects necessary to resolve existing deficiencies or provide for future growth. It also indicates an approximate time frame when those projects will be needed. For source and storage projects the point at which projects are needed is shown in terms of ERUs and years. We determined the ERU numbers from the model, then applied anticipated growth rates to identify the estimated year when each project will likely be needed. Payment to land developers for upsizing from 8" pipes to larger pipes needed as system improvements will gradually occur as land develops from now until buildout.

The likely funding sources are based on project type (to resolve existing deficiency or meet future need) and anticipated year of need. More detailed information about each project and costs associated with each are found in Table E-1 in Appendix E.

Table 17: Culinary Water Improvement Projects

Project Name	Estimated Cost (Rounded)[1]	Point at Which Project is Needed	
		ERUs	Year
Source Project			
Construct 750 gpm Well	$ 1,579,000	Now	Now
Construct 675 gpm Well	$ 1,566,000	1,226	2049
Storage Projects			
Construct 0.5 MG Culinary Water Tank	$ 1,246,000	Now	Now
Construct 1.0 MG Culinary Water Tank	$ 1,933,000	881	2036
Transmission/Distribution Piping Projects			
Install a 8-inch Pipeline from on 900 N. from 800 E. to 1000 E.	$ 118,000	Now	Now
Install a 12-inch Pipeline along Lake Road from 2200 N. to 3000 N.	$ 715,000	Now	Now
	$ 5,591,000		

[1]Costs are in 2016 dollars

B. Funding Sources

Section 302 (2) of the Impact Fee Act requires the Town to "generally consider all revenue sources, including impact fees and anticipated dedication of system improvements, to finance the impacts on system improvements." By doing so, the Town ensures fair and equitable treatment among users and concludes whether impact fees are the most appropriate method to fund the growth.

There are a number of revenue sources available for managing Genola's culinary water system. They are listed below.

1. User Charges

   The Town collects user fees for water services. User fees pay for water that the Town purchases from various sources, as well as the value of water created by the Town's own water sources. User fees are the primary source of funding for the operation, maintenance, and replacement expenses of the Town's water system.

2. Grants, Low Interest Loans and donations

   Genola Town has had grants and low interest loans for water-related projects in the past. It is possible that it may get additional grants for future projects. Additionally, some infrastructure is donated, though this typically is at the project improvement level rather than at the system improvement level.

3. Special Assessment Areas

   This method of financing growth is acceptable and allocates the cost of the new development to the new development. However, special assessment areas can be expensive to establish and complicated to administer, especially if a large development is being considered. Moreover, the special assessments may not accurately reflect the true cost of the facilities.

4. General Obligation Bonds and Sales Tax Revenue Bonds

   The Town may elect to issue bonds to maintain a steady flow of funds to pay for needed facilities. The Town has issued bonds in the past, and may choose to use bonds in the future. However, they really aren't a funding source per se, but rather a financing mechanism. The Town may use the revenues from impact fees to pay debt service on bonds. In addition, the Town may use impact fees to pay for costs of issuance on future bonding. Bonds may be issued in addition to collecting impact fees.

5. Impact Fees

   This source is a common and equitable method of funding new system improvements because it imposes the cost of new growth upon that new growth. The detailed analysis required to impose impact fees accurately allocates the true impact of a system or facility to those creating the impact. Those creating the most impact, therefore, pay more. The speculative nature of these revenues, and their elasticity, however, make cash flows from impact fees unpredictable.

   The Town may, on a case by case basis, work directly with a developer to adjust the standard impact fee to respond to unusual circumstances in an effort to fairly impose impact fees. The Town may also, on a case by case basis, adjust the amount of the fee based upon studies and data submitted by a developer.

6. Developer Installed and Financed (Reimbursable by Impact Fees)

   This is another financing mechanism used to help fund infrastructure needs within specific development areas of the Town. This type of arrangement is typically accomplished with a development agreement between the Town and the developer.

   All of the above forms of funding and financing the expenses associated with a water system have a place and are needed. For instance, user rates are needed for ongoing operation and maintenance costs; grants, low interest loans and some bonds are necessary for major infrastructure improvements; special assessment bonds can work well where there is a deficiency in a particular area or as a tool to build infrastructure to spur development; impact fees are the equitable, appropriate, and needed means of funding system improvements to accommodate future growth; developer installed and financed improvements reimbursed by impact fees are effective when a developer is installing a line which will need to be upsized to accommodate future growth.

C. Funding Analysis for Capital Projects

There are three options for funding capital water projects. They are listed in the order of recommendation for least costly, quickest way to apply, and affordability rate requirements. The Board of Water Resources is by far the most cost effective way to fund the priority projects that the Town has listed within this plan.

1. Board of Water Resources: The Board of Water Resources (Board) administers three revolving construction funds: the Revolving Construction Fund, the Cities Water Loan Fund, and the Conservation and Development Fund. Funding is available for projects that conserve, protect, or more efficiently use present water supplies, develop new water, or provide flood control.

   The Board has a simple application process that will allow the Town to easily apply. The repayment of financial assistance has three requirements:

   1) The repayment period will generally be less than 25 years – you can ask for longer if necessary.
   2) The minimum annual cost of water for municipal projects will be 1.17% of the region or project area's annual Median Adjusted Gross Income (MAGI).
   3) When annual payments are to be made with revenues from the sale or use of project water, the Board may allow the sponsor one year's use of the project before the first payment is due.

   Affordability Rate: 1.17% of the MAGI. The Genola MAGI as of 2015 is $52,221. This would be a required a total water bill of $50.91 per month.

   Projects financed through the Cities Water Loan Fund or the Conservation and Development Fund will be secured either by a purchase agreement or by the sale of a bond.

   If project financing is secured by a purchase agreement, the following conditions apply:

a) The Board must take title to the project including water rights, easements, deeded land for project facilities, and other assets subject to security interest.
b) An opinion from the sponsor's attorney must be submitted stating the sponsor has complied with its articles and bylaws, state law, and the Board's contractual requirements.
c) Title to the project shall be returned to the sponsor upon successful completion of the purchase agreement.

If project financing is secured by the sale of a bond, the following conditions apply:

a) The procedures for bond approval will be substantially the same as required by the Utah Municipal Bond Act.
b) If the sponsor desires to issue a non-voted revenue bond, the sponsor will be required to:
    i. Hold a public meeting to describe the project and its need, cost, and effect on water rates.
    ii. Give written notice describing the proposed project to all water users in the sponsor's service area. The notice shall include a solicitation of response to the proposed project. A copy of all written responses received by the sponsor shall be forwarded to the Division. If the area Board member determines there is substantial opposition to the project, the Board may require the sponsor to hold a bond election before funds will be made available.

2. Division of Drinking Water: The Division of Drinking Water administers two financial assistance programs.

Federal State Revolving Fund: The national Drinking Water State Revolving Fund (DWSRF) program award capitalization grants to states, which in turn may provide low-cost loans and other types of assistance to eligible public water systems to finance the costs of infrastructure projects needed to achieve or maintain compliance with Safe Drinking Water Act (SDWA) requirements.

State Revolving Fund: The State of Utah established the State Revolving Fund program to provide low-interest loans (typically 2-4%, 20 years) and grants. Of all the funds allocated by this program, only approximately 8% are authorized as grants. All political subdivisions of the State of Utah (e.g. cities, towns, districts) are eligible.

Application process is available online and is somewhat easy to fill out. The application will be evaluated by DDW staff, assigned priority points, and placed on a Project Priority List. Systems whose projects have a high priority score are given the opportunity to be considered for financial assistance ahead of projects with lower scores. When all needed information is received, DDW staff will prepare a report to be presented to the Utah Drinking Water Board. At the board meeting, sponsors are given an opportunity to review the project and respond to the staff's recommendations. Before the authorized financial assistance can be obligated at a loan closing, several requirements must be met and appropriate documents submitted and found acceptable. These requirements include:

a) A Pre-Award Compliance Review Report must also be completed and submitted.
b) A Facilities Plan must be prepared by a professional engineer licensed in the State of Utah. That includes at least three alternative engineering solutions must be considered and evaluated for the project. A description of each alternative, its merits, and its liabilities must be provided. This will include the technical merits and benefits, cost effectiveness, impact on user fees, any other impacts on the public or water users, anticipated life of the project, etc. The "no action" alternative must be evaluated. The reasons for selecting the preferred alternative must be stated.
c) The Disadvantaged Business Enterprise (DBE) Procurement Requirements must be followed.
d) An environmental assessment must be completed and a "Finding of No Significant Impact" (FONSI) must be issued or the project must be reviewed and qualify for a Categorical Exclusion from Further Environmental Review (CatEx).

When a project is evaluated for funding, an attempt is made to determine the maximum affordable water bill for the water system. This is calculated as 1.75% of the local MAGI which is $52,221 (as of 2015). This would be an affordable water rate, of $76.15 per month. This rate would be a total water bill including secondary water fees and would need to be charged before any grant money could be brought to the project.

3. USDA: Provides funding for clean and reliable drinking water systems, sanitary sewage disposal, sanitary solid waste disposal, and storm water drainage to households and businesses in eligible rural areas. Rural areas and towns with fewer than 10,000 people are eligible. The funding available include long-term, low-interest loans between 1.00% – 3.75%. If funds are available, grants may be combined with a loan if necessary to keep user costs reasonable. Grant funds are only available if you meet the USDA affordability criteria. Which requires that the Town's Medium Household Income ($55,250) from the most recent census (2010) is at or below the State's Medium Household Income ($53,889).

   Up to 40-year payback period, based on the useful life of the facilities financed. They will have a fixed interest rate and the interest rate is based on the need for the project and the median household income of the area to be served.

   The application process is difficult and costly. It requires that an environmental assessment be completed and a "Finding of No Significant Impact" (FONSI) must be issued or the project must be reviewed and qualify for a Categorical Exclusion from Further Environmental Review (CatEx). The application process can take up to 18 months to complete. This is a difficult process and would require an update and possible rewrite of the Master Plan to satisfy all of the requirements of the agency based on the format required by USDA.

VII. MAINTENANCE AND REPLACEMENT ANALYSIS

A. Purpose

As infrastructure ages it often requires more maintenance, until it reaches the time that it must be replaced. Genola Town understands the need to prepare financially to be able to meet the maintenance and replacement demands of aging infrastructure. Predicting what it will cost to maintain and replace infrastructure as time passes requires knowledge of the infrastructure – knowledge such as when it will need maintenance, when it will need replacement, and the associated costs.

Genola Town requested that we perform an analysis to help the Town know the state of its culinary water system infrastructure and to be able to predict future funding needs to maintain it. J-U-B's objectives were to:

1. Identify the long-term cost of infrastructure management for funding planning purposes
2. Provide data to guide infrastructure maintenance and replacement activities

B. Analysis and Results

Our analysis consisted of the following activities:

a) Gather Infrastructure Data
   i. We obtained the infrastructure data for the tanks, pipes, and well from maps and though conversations with Town staff. This data included:
      i. Infrastructure Location
      ii. Tank Size
      iii. Pipe Diameter
      iv. Pipe Material Type
      v. Installation Year

b) Predict remaining service life, maintenance costs, and replacement costs for each element of infrastructure.
   i. We referenced maintenance costs, replacement costs, and typical service life used in similar studies we have performed. We used the installation year to calculate the remaining service life.

c) Aggregate costs and provide results.
   i. With maintenance and replacement costs assigned for each element in specific years, and with the data framework organizing it, it became a simple matter to aggregate the data. A spreadsheet summed the costs associated with each element, by year, under each category, feature, and type to give annual totals of each. It then aggregated the annual costs into periods of multiple years.

      We identified long-term costs through analysis of the maintenance and replacement costs until 2116, one hundred years into the future. This time frame is long enough to capture the likely replacement of all infrastructure. This analysis does not address operational needs, but estimates when and how much maintenance and replacement funding will be needed. We recognize

that it is impossible to predict with any precision the year that specific maintenance activities and replacement will be required. We therefore aggregate the costs into larger periods of time for which we could more reasonably make these predictions.

Since it is increasingly unreasonable in years further into the future to accurately predict when particular maintenance and replacement activities will be required, we grouped as follows, with shorter time periods in the near future and larger time periods in the far future:

This grouping provides a more reasonable estimation of how much infrastructure maintenance and replacement funding Genola Town should expect to need in the future.

Table 18: Yearly Cost for Maintenance and Replacement

Years	Duration	Average Yearly Maintenance and Replacement Cost[1]
2016-2020	5 Years	$ 11,762
2021-2030	10 Years	$ 14,365
2031-2040	10 Years	$ 31,063
2041-2065	25 Years	$ 104,256
2066-2115	50 Years	$ 210,926

[1] Includes maintenance and replacement of tank, well, and pipes

Note a few limitations to this information:

1. The variable nature of maintenance and replacement timing and costs means that the results are a reasonable estimation of actual future needs, with costs in earlier years being more reliable than costs in later years.

2. The costs identified in Table are for maintenance and replacement costs only, and do not include operating costs. They are generally the cost of hiring a contractor to perform work, or the cost of replacement materials purchased by Public Works Staff to perform maintenance (i.e. replacement parts to rebuild pressure reducing valves).

3. The inventory is of existing infrastructure, and does not account for additional infrastructure that will be constructed in the future.

4. All costs are in 2016 dollars, including future costs.

C. Conclusion and Recommendations

While the primary benefit of the evaluation is to provide Genola Town with knowledge that helps predict future maintenance and replacement costs, the process also provided very good data on the state of the culinary water infrastructure.

Generally speaking, Genola's infrastructure, most of which is in the younger or middle age of its service life, is in relatively good condition.

Since most of the infrastructure studied has not reached the age at which it needs to be replaced, Genola Town has not yet felt the full burden of infrastructure replacement. As is evident in Table 18, the average annual maintenance and replacement costs of the studied infrastructure is about $11,762 over the next 5 years, $14,365 over the following 10 years, and eventually up to $210,926 per year from year 2066-2115. In coming years, Genola Town will require much more funding than in the past to maintain and replace infrastructure. The cost of maintaining and replacing infrastructure will vary considerably from year to year. Raising funds to match costs requires either dramatically varying user fees from year to year, or looking years into the future to set user fees to cover the longer term average costs. A long term planning approach will be more palatable.

VIII. CONCLUSION & RECOMMENDATIONS

A. Conclusion

This master plan effort was undertaken to evaluate Genola Town's existing culinary water system, to identify existing deficiencies and future system needs related to demand due to growth. We provide the following recommendations in order to facilitate orderly and equitable management of the culinary water system.

B. Recommendations

1. Plan for the Recommended Improvement Projects

Whether needed to resolve existing deficiencies or to accommodate future growth we recommend that Genola Town allocate funds for and construct the recommended projects.

2. Maintain and Replace Aging or Inadequate Infrastructure

We recommend that the Town plan for replacement of aging or inadequate infrastructure. The Town may wish to complete an infrastructure management plan. It would include an inventory of existing Town infrastructure and an analysis to predict the timing and cost of future maintenance and replacement work. The Town could then use this to help set user rates on a schedule expected to generate the needed funding.

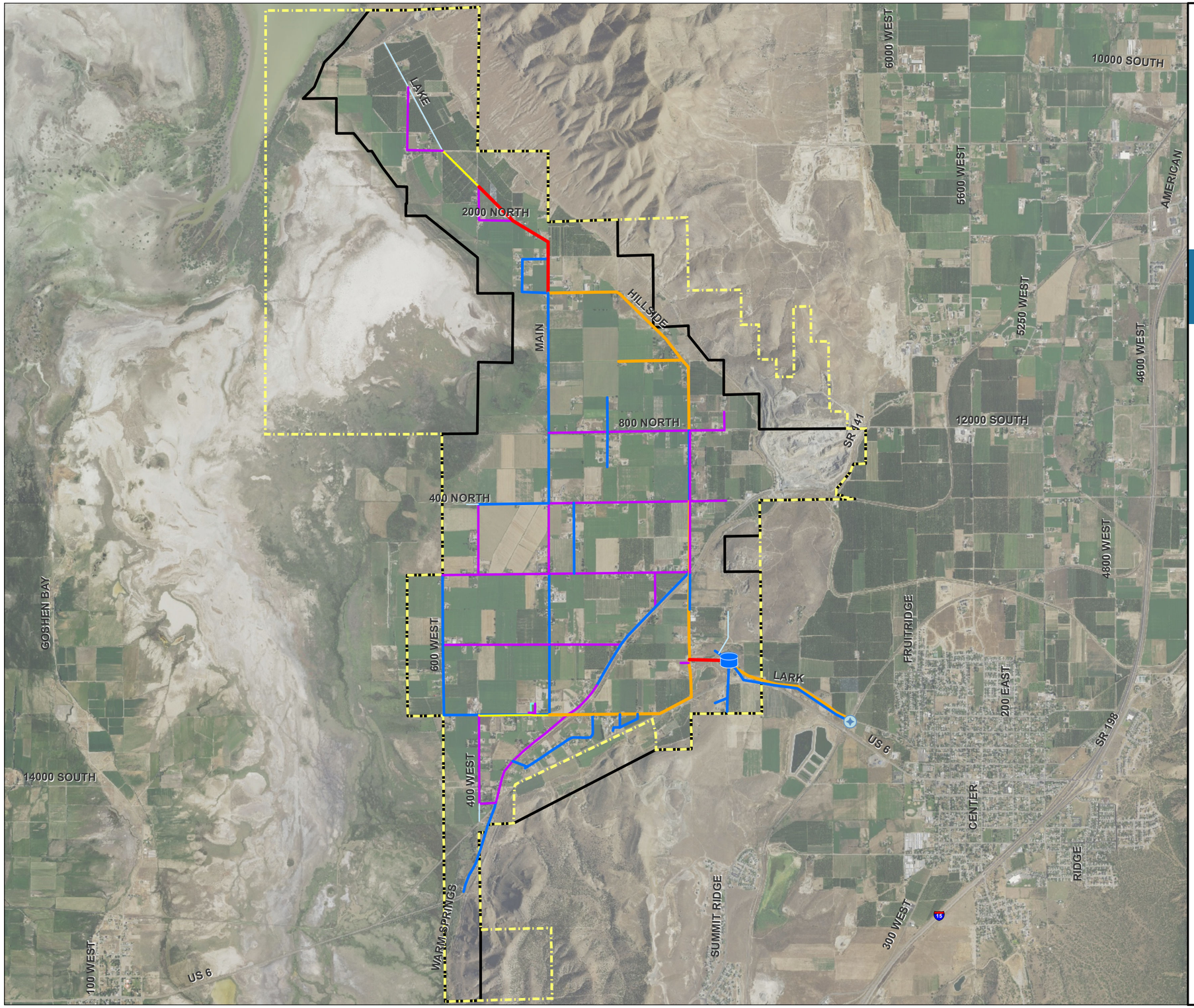
3. Periodic Review of User Rates

We recommend that Genola Town periodically review and update their water user rates. User rates cover operation, maintenance, and replacement of the system. As costs to maintain and operate the system will increase over time, user rates need be updated periodically to make sure that revenue generated can cover costs. More frequent smaller adjustments are more tolerable than infrequent large adjustments.

4. Updates to Master Plan and Capital Facilities Plan

We recommend that Genola Town update this plan as needed but at intervals of not more than every 5 years. An interim update may be needed if planned land uses change significantly.

APPENDIX A
EXISTING (2016) SYSTEM MAPS



Genola Culinary Water System Master Plan and Capital Facilities Plan

Existing System

FIGURE A-1

Well

Tank

Study Area

City Boundary

Water Main Diameter

2"

3"

4"

6"

8"

10"

12"

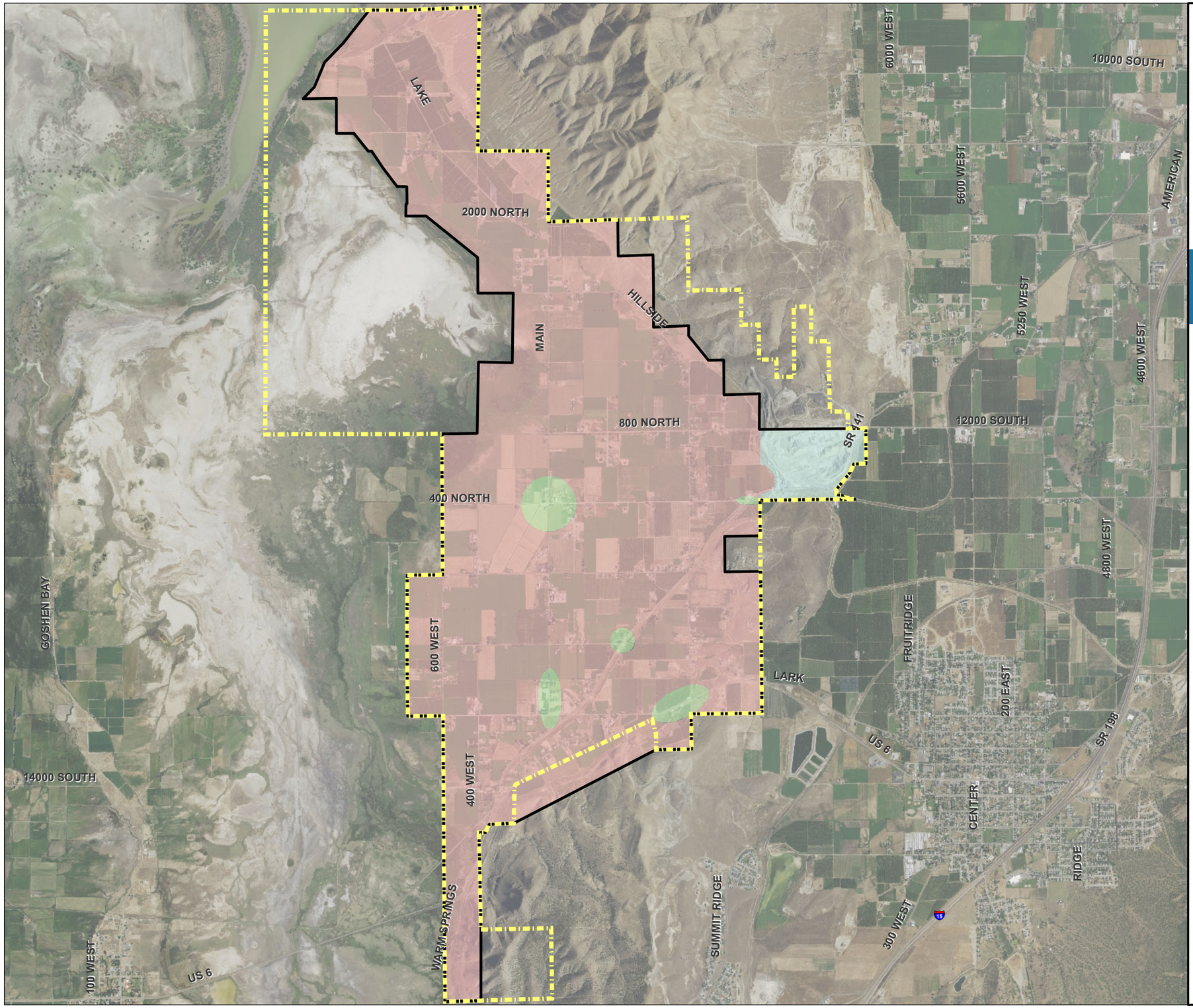
N

0 0.5 1 Miles

J-U-B | THE LANGDON GROUP | GATEWAY MAPPING INC.

OTHER J-U-B COMPANIES

Date: 5/19/2017



THE TOWN OF GENOLA U·T·A·H

Genola Culinary Water System Master Plan and Capital Facilities Plan

General Plan Land Use

FIGURE A-2

Study Area

City Boundary

General Plan Land Use

Commercial (Includes some Public)

Gravel Pit

Residential

N

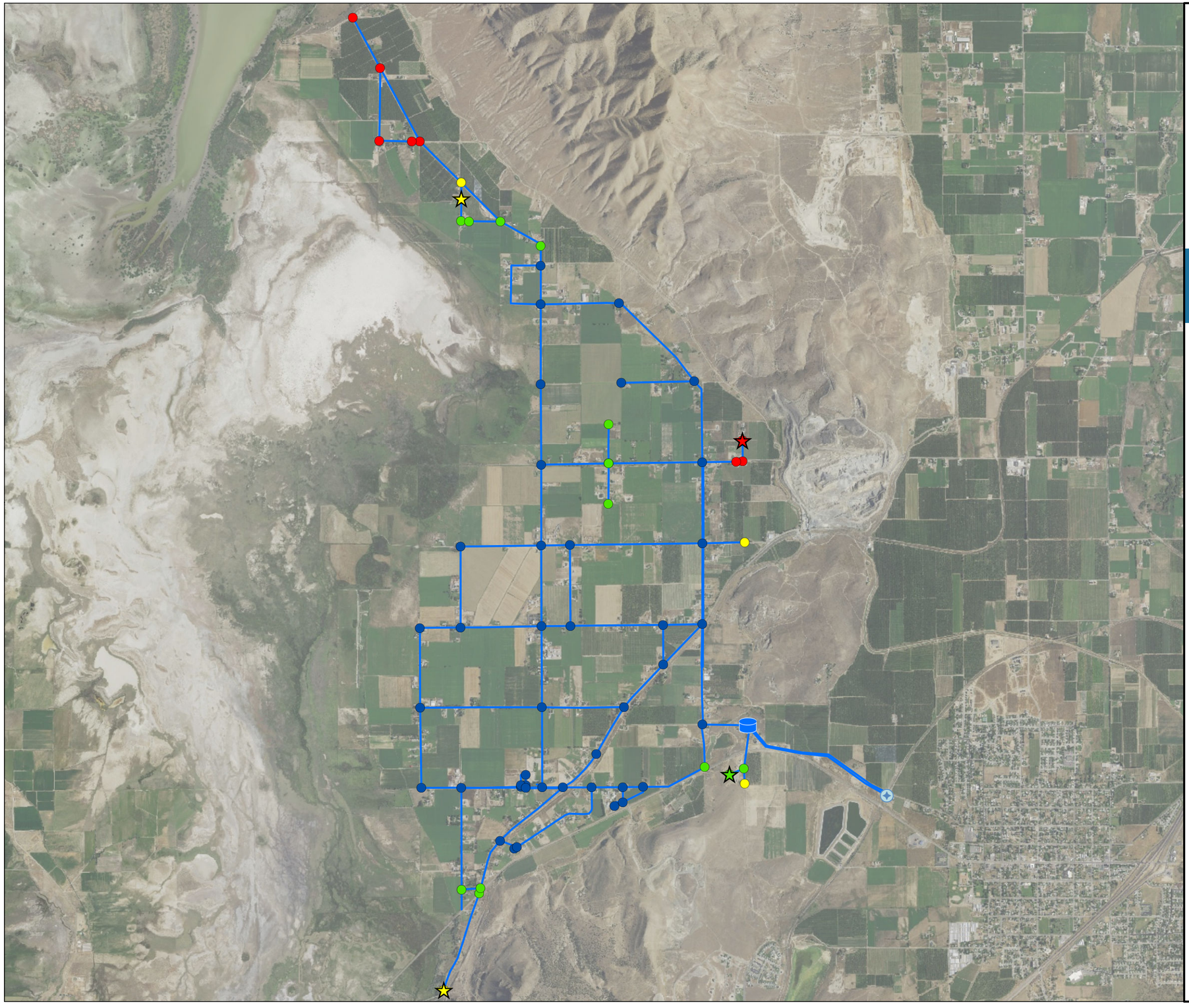
0 0.5 1 Miles

J-U-B | THE LANGDON GROUP | GATEWAY MAPPING INC.

OTHER J-U-B COMPANIES

Date: 2/15/2017

APPENDIX B
EXISTING (2016) MODEL RESULTS



THE TOWN OF GENOLA U·T·A·H

Genola Culinary Water System Master Plan and Capital Facilities Plan

Exsting Available Fire Flow on Peak Day

FIGURE B-1

- Well
- Tank
- Water Main
- Fire Flow Test Location

Available Fire Flow (gpm)

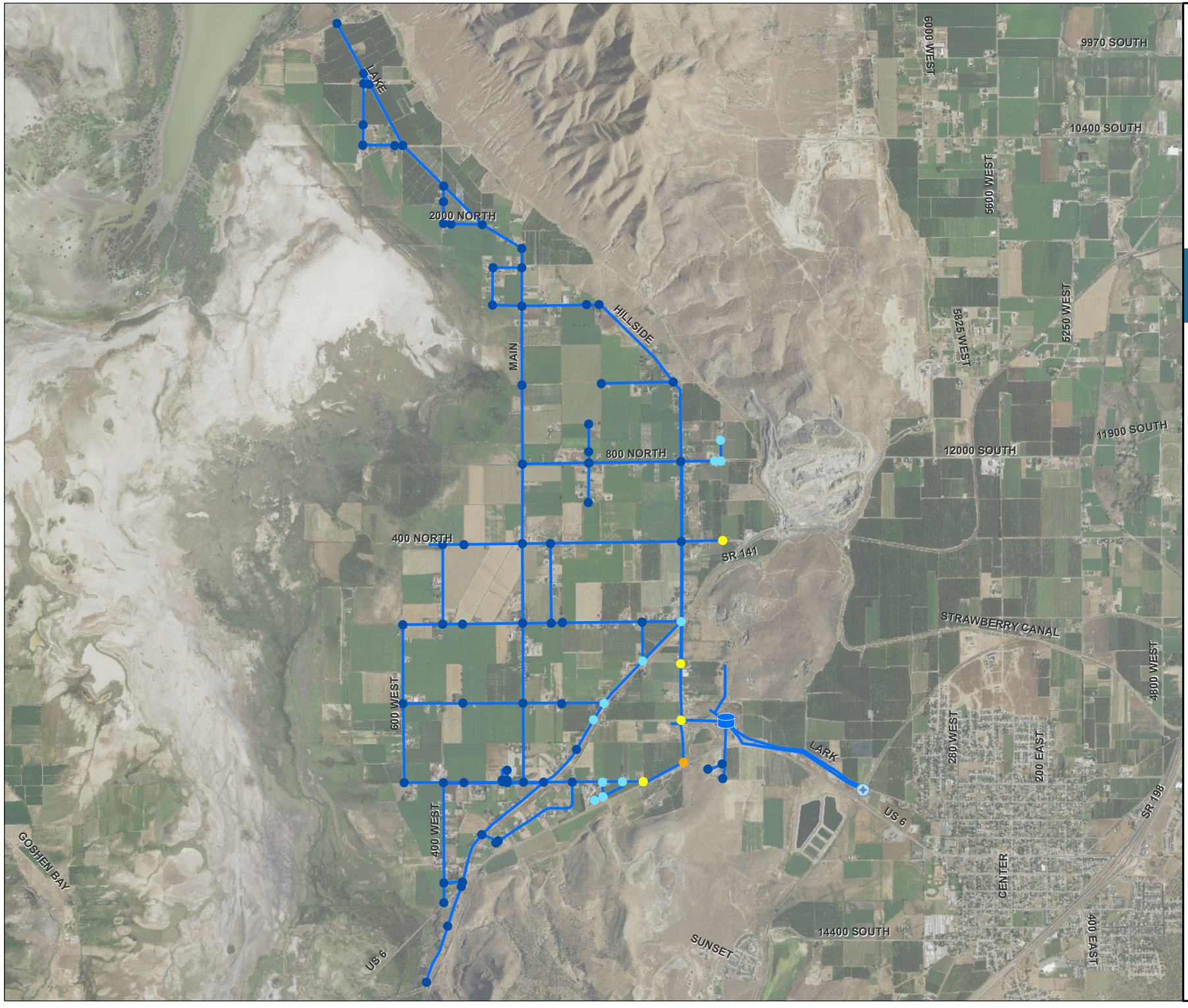
- 0 - 1000
- 1000 - 1500
- 1500 - 2000
- 2000+

N

0 0.5 1 Miles

J-U-B THE LANGDON GROUP GATEWAY MAPPING INC.
OTHER J-U-B COMPANIES

Date: 2/15/2017



Genola Culinary Water System Master Plan and Capital Facilities Plan

Existing Peak Instantaneous Pressures

FIGURE B-2

Well

Tank

Water Main

Peak Instantaneous Demand

Pressure (psi)

- 0 - 30
- 30 - 45
- 45 - 60
- 60 - 75
- 75+

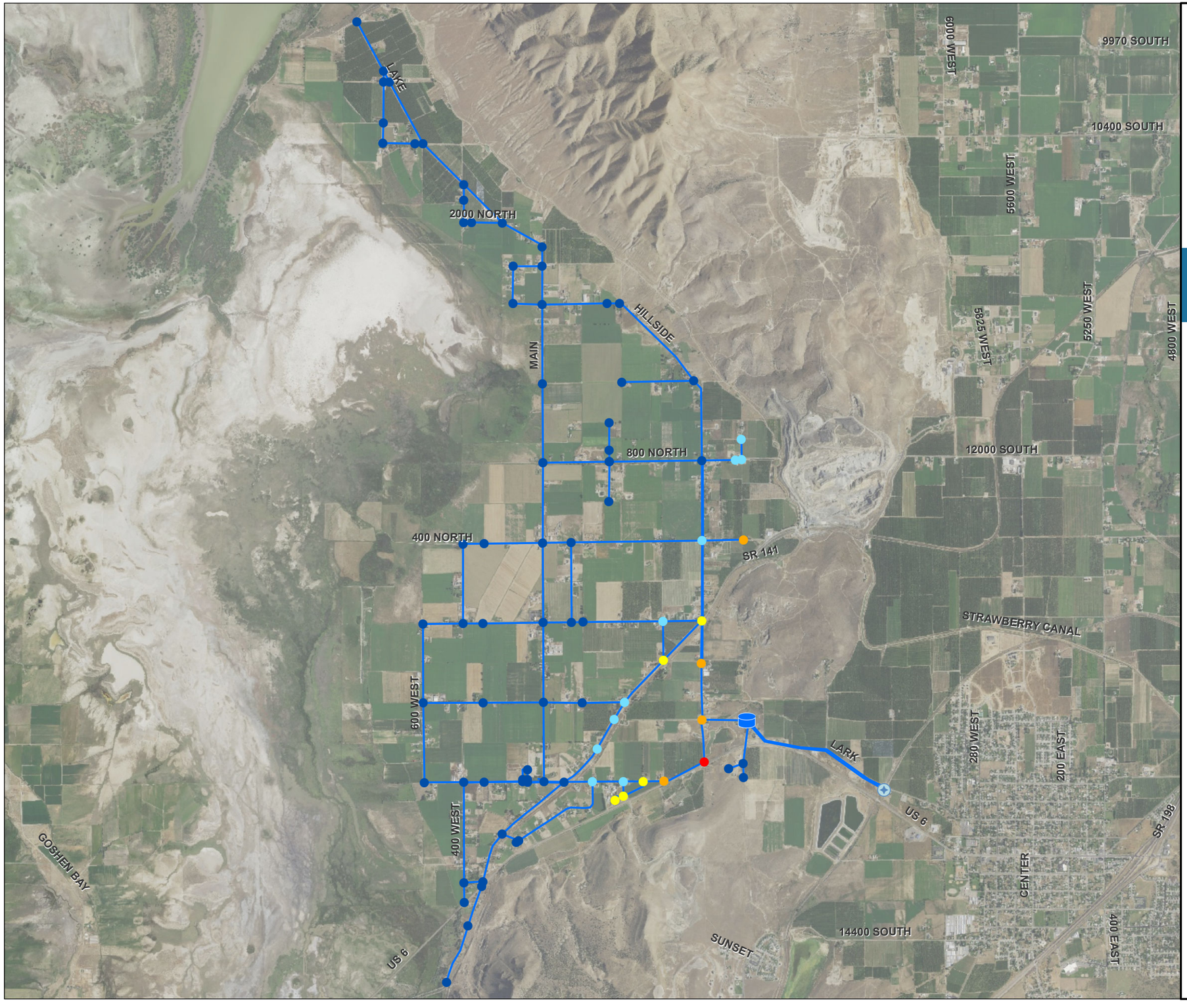
Note:
Min. Pressure >= **30 psi** to meet Genola level of service

N

0 0.5 1 Miles

J-U-B | THE LANGDON GROUP | GATEWAY MAPPING INC.
OTHER J-U-B COMPANIES

Date: 2/15/2017



THE TOWN OF GENOLA U·T·A·H

Genola Culinary Water System Master Plan and Capital Facilities Plan

Existing Peak Day Pressures

FIGURE B-3

Well

Tank

Water Main

Peak Day Demand

Pressure (psi)

- 0 - 40
- 40 - 55
- 55 - 70
- 70 - 85
- 85+

Note:
Min. Pressure >= **40 psi** to meet Genola level of service

N

0 0.5 1 Miles

J-U-B

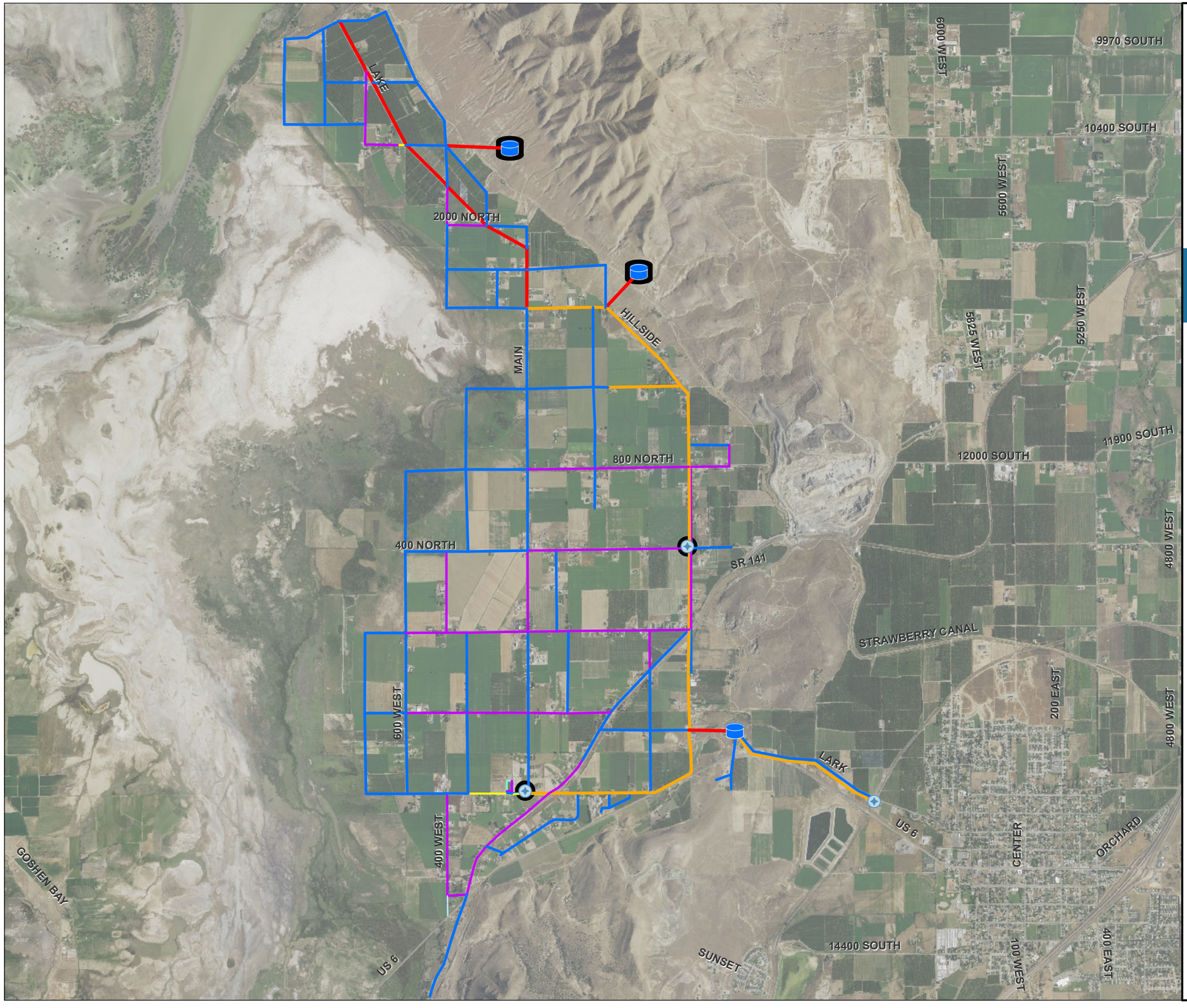
THE LANGDON GROUP

GATEWAY MAPPING INC.

OTHER J-U-B COMPANIES

Date: 2/15/2017

APPENDIX C
2066 SYSTEM MAPS AND MODEL RESULTS



THE TOWN OF GENOLA UTAH

Genola Culinary Water System Master Plan and Capital Facilities Plan

Buildout Master Plan System

FIGURE C-1

- Well
- Tank
- Future Well
- Future Tank

Water Main

Diameter

- 2"
- 3"
- 4"
- 6"
- 8"
- 10"
- 12"

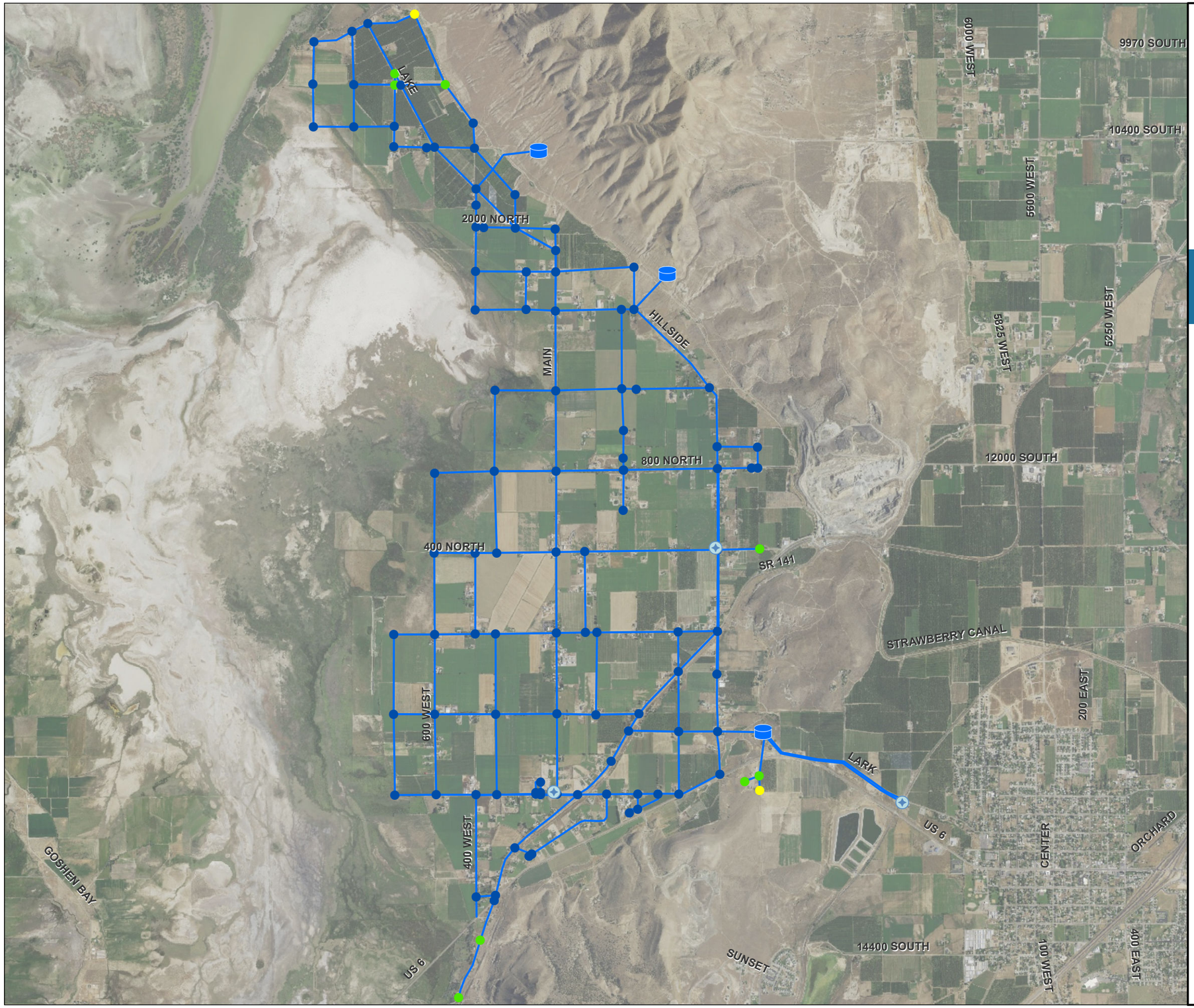
N

0 0.5 1 Miles

J-U-B | THE LANGDON GROUP | GATEWAY MAPPING INC.

OTHER J-U-B COMPANIES

Date: 5/19/2017



THE TOWN OF GENOLA U·T·A·H

Genola Culinary Water System Master Plan and Capital Facilities Plan

Buildout Available Fire Flow on Peak Day

FIGURE C-2

Well

Tank

Water Main

Available Fire Flow (gpm)

- 0 - 1000
- 1000 - 1500
- 1500 - 2000
- 2000+

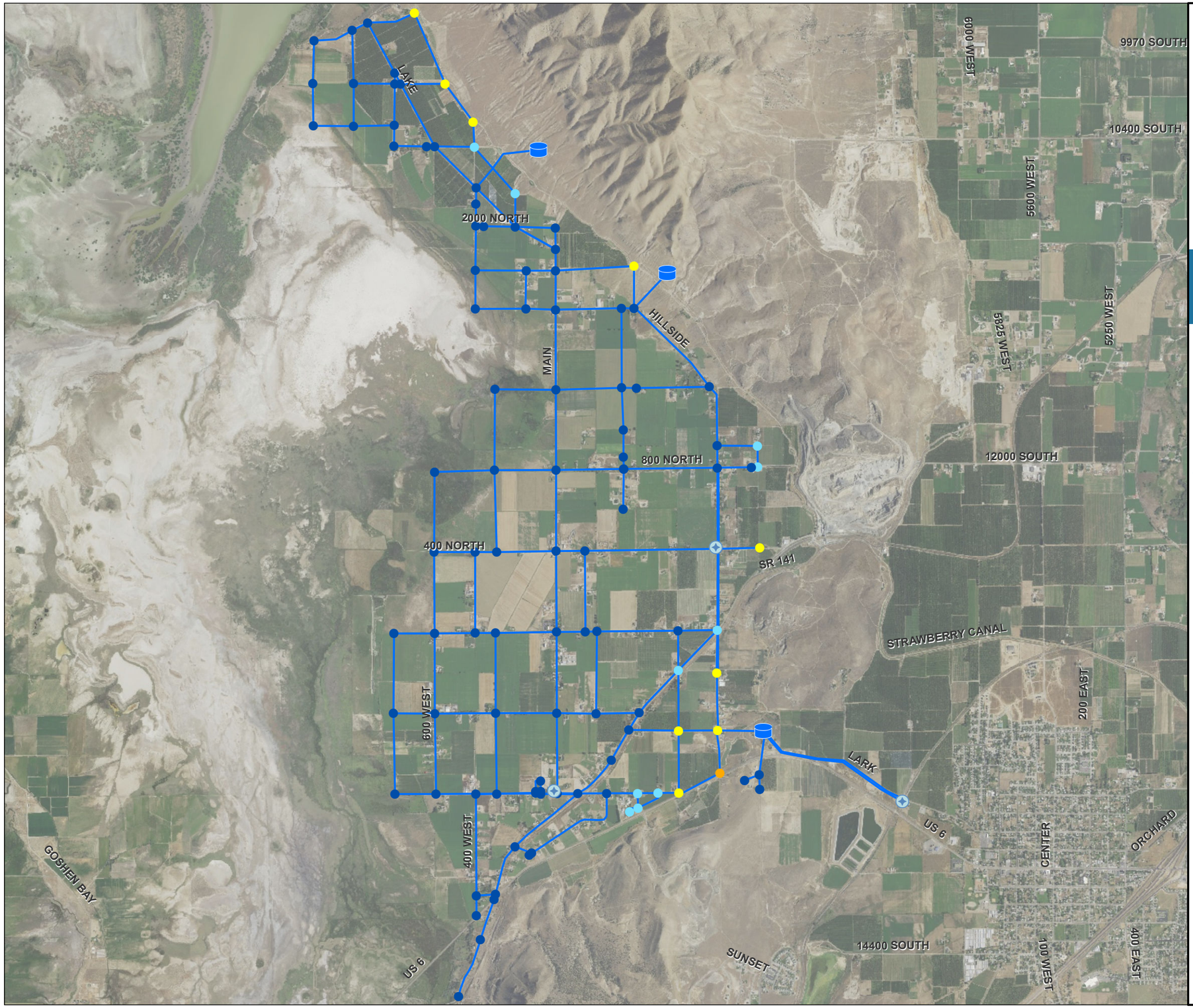
N

0 0.5 1 Miles

J-U-B | THE LANGDON GROUP | GATEWAY MAPPING INC.

OTHER J-U-B COMPANIES

Date: 2/15/2017



THE TOWN OF GENOLA U·T·A·H

Genola Culinary Water System Master Plan and Capital Facilities Plan

Buildout Peak Instantaneous Pressures

FIGURE C-3

Well

Tank

Water Main

Buildout Peak Instantaneous Pressure (psi)

- 0 - 30
- 30 - 45
- 45 - 60
- 60 - 75
- 75+

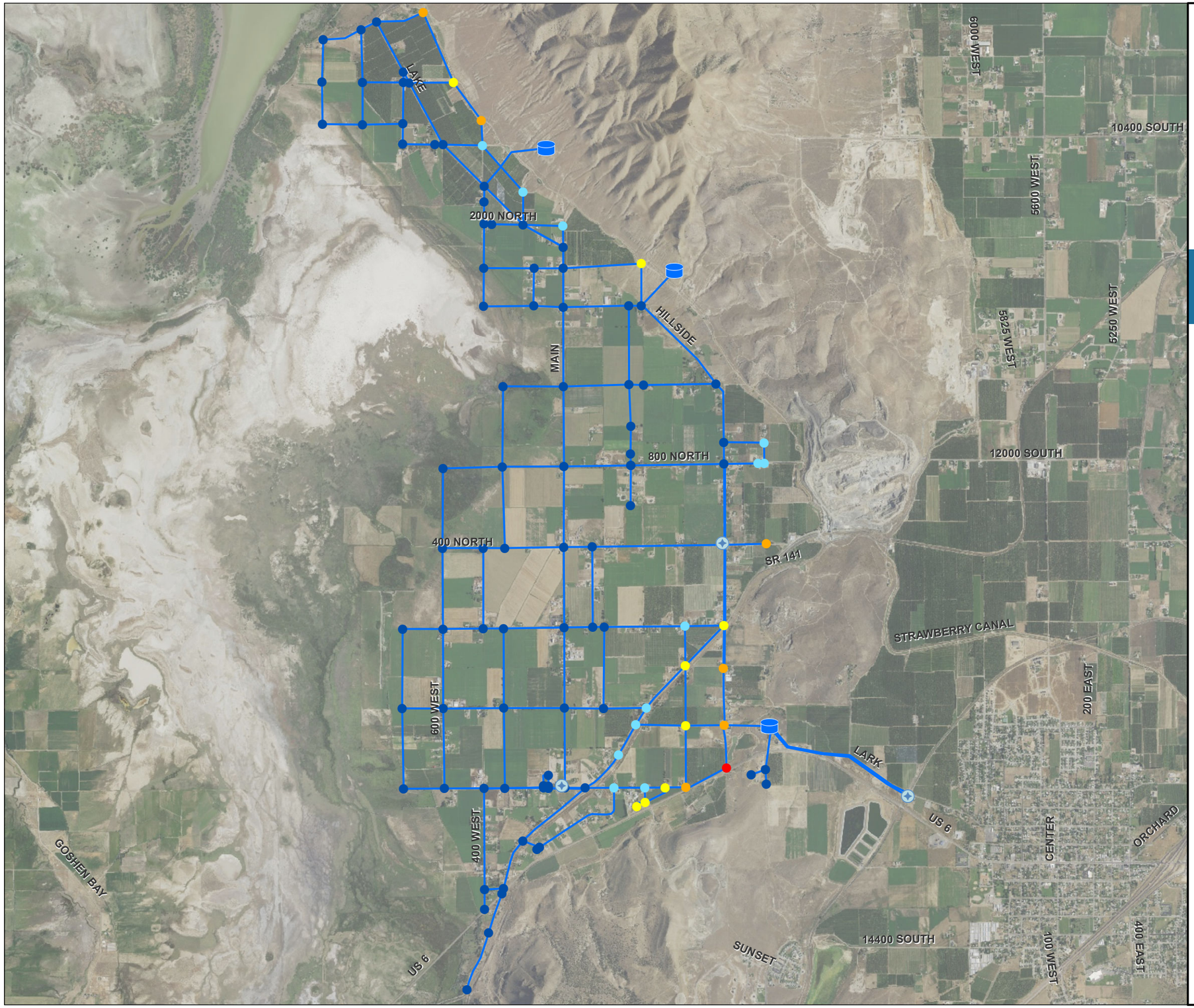
Note:
Min. Pressure >= **30 psi** to meet Genola level of service

N

0 0.5 1 Miles

J-U-B | THE LANGDON GROUP | GATEWAY MAPPING INC.
OTHER J-U-B COMPANIES

Date: 2/15/2017



THE TOWN OF GENOLA U·T·A·H

Genola Culinary Water System Master Plan and Capital Facilities Plan

Buildout Peak Day Pressures

FIGURE C-4

Well

Tank

Water Main

Buildout Peak Day

Pressure (psi)

- 0 - 40
- 40 - 55
- 55 - 70
- 70 - 85
- 85+

Note:
Min. Pressure >= **40 psi** to meet Genola level of service

N

0 0.5 1 Miles

JUB | THE LANGDON GROUP | GATEWAY MAPPING INC.

OTHER JUB COMPANIES

Date: 2/15/2017

APPENDIX D
YEARLY ERU GROWTH ESTIMATES WITH CORESPONDING SOURCE AND STORAGE REQUIREMENTS

Table D-1: Estimated ERU Growth Estimates with Corresponding Source and Storage Requirements

				Source			Storage				
Year	Estimated Population	Estmated ERUs	Average Annual Growth Rate	Total Source Req'd (MGD)	Total Source Available (MGD)	Total Redudnant Source Available (MGD)	Equalization Storage Req'd Indoor (MG)	Emergency Storage Req'd (MG)	Fire Flow Storage Req'd (MG)	Total Storage Req'd (MG)	Total Storage Available (MG)
2016	1,429	550	0.70%	**0.55**	**1.22**	**0.14**	0.27	0.27	0.12	**0.67**	**0.50**
2017	1,439	554	0.70%	**0.55**	**1.22**	**0.14**	0.28	0.28	0.12	**0.67**	**0.50**
2018	1,449	558	0.70%	**0.56**	**1.22**	**0.14**	0.28	0.28	0.12	**0.68**	**0.50**
Construct 750 gpm Capacity Well (Once Funding is Available)											
2019	1,459	562	0.70%	**0.56**	**2.30**	**1.22**	0.28	0.28	0.12	**0.68**	**0.50**
2020	1,473	567	1.00%	**0.57**	**2.30**	**1.22**	0.28	0.28	0.12	**0.69**	**0.50**
Costruct 0.5 MG Culinary Water Tank (Once Funding is Available)											
2021	1,488	573	1.00%	**0.57**	**2.30**	**1.22**	0.29	0.29	0.12	**0.69**	**1.00**
2022	1,503	579	1.00%	**0.58**	**2.30**	**1.22**	0.29	0.29	0.12	**0.70**	**1.00**
2023	1,518	584	1.00%	**0.58**	**2.30**	**1.22**	0.29	0.29	0.12	**0.70**	**1.00**
2024	1,533	590	1.00%	**0.59**	**2.30**	**1.22**	0.29	0.29	0.12	**0.71**	**1.00**
2025	1,579	608	3.00%	**0.61**	**2.30**	**1.22**	0.30	0.30	0.12	**0.73**	**1.00**
2026	1,627	626	3.00%	**0.62**	**2.30**	**1.22**	0.31	0.31	0.12	**0.74**	**1.00**
2027	1,675	645	3.00%	**0.64**	**2.30**	**1.22**	0.32	0.32	0.12	**0.76**	**1.00**
2028	1,726	664	3.00%	**0.66**	**2.30**	**1.22**	0.33	0.33	0.12	**0.78**	**1.00**
2029	1,777	684	3.00%	**0.68**	**2.30**	**1.22**	0.34	0.34	0.12	**0.80**	**1.00**
2030	1,840	708	3.50%	**0.71**	**2.30**	**1.22**	0.35	0.35	0.12	**0.83**	**1.00**
2031	1,904	733	3.50%	**0.73**	**2.30**	**1.22**	0.37	0.37	0.12	**0.85**	**1.00**
2032	1,971	759	3.50%	**0.76**	**2.30**	**1.22**	0.38	0.38	0.12	**0.88**	**1.00**
2033	2,040	785	3.50%	**0.78**	**2.30**	**1.22**	0.39	0.39	0.12	**0.90**	**1.00**
2034	2,111	813	3.50%	**0.81**	**2.30**	**1.22**	0.41	0.41	0.12	**0.93**	**1.00**
2035	2,185	841	3.50%	**0.84**	**2.30**	**1.22**	0.42	0.42	0.12	**0.96**	**1.00**
2036	2,261	871	3.50%	**0.87**	**2.30**	**1.22**	0.43	0.43	0.12	**0.99**	**1.00**
Costruct 1.0 MG Culinary Water Tank											
2037	2,340	901	3.50%	**0.90**	**2.30**	**1.22**	0.45	0.45	0.12	**1.02**	**1.00**
2038	2,422	933	3.50%	**0.93**	**2.30**	**1.22**	0.47	0.47	0.12	**1.05**	**1.00**
2039	2,507	965	3.50%	**0.96**	**2.30**	**1.22**	0.48	0.48	0.12	**1.08**	**1.00**
2040	2,582	994	3.00%	**0.99**	**2.30**	**1.22**	0.50	0.50	0.12	**1.11**	**1.00**
2041	2,660	1,024	3.00%	**1.02**	**2.30**	**1.22**	0.51	0.51	0.12	**1.14**	**1.00**
2042	2,740	1,055	3.00%	**1.05**	**2.30**	**1.22**	0.53	0.53	0.12	**1.17**	**1.00**
2043	2,822	1,086	3.00%	**1.08**	**2.30**	**1.22**	0.54	0.54	0.12	**1.20**	**1.00**
2044	2,906	1,119	3.00%	**1.12**	**2.30**	**1.22**	0.56	0.56	0.12	**1.24**	**1.00**
2045	2,994	1,153	3.00%	**1.15**	**2.30**	**1.22**	0.58	0.58	0.12	**1.27**	**1.00**
2046	3,046	1,173	1.75%	**1.17**	**2.30**	**1.22**	0.59	0.59	0.12	**1.29**	**1.00**
2047	3,099	1,193	1.75%	**1.19**	**2.30**	**1.22**	0.60	0.60	0.12	**1.31**	**1.00**
2048	3,154	1,214	1.75%	**1.21**	**2.30**	**1.22**	0.61	0.61	0.12	**1.33**	**1.00**
Construct 675 gpm Capacity Well											
2049	3,209	1,235	1.75%	**1.23**	**3.28**	**2.20**	0.62	0.62	0.12	**1.35**	**1.00**
2050	3,265	1,257	1.75%	**1.25**	**3.28**	**2.20**	0.63	0.63	0.12	**1.37**	**1.00**
2051	3,322	1,279	1.75%	**1.28**	**3.28**	**2.20**	0.64	0.64	0.12	**1.40**	**1.00**
2052	3,380	1,301	1.75%	**1.30**	**3.28**	**2.20**	0.65	0.65	0.12	**1.42**	**1.00**
2053	3,439	1,324	1.75%	**1.32**	**3.28**	**2.20**	0.66	0.66	0.12	**1.44**	**1.50**
2054	3,500	1,347	1.75%	**1.34**	**3.28**	**2.20**	0.67	0.67	0.12	**1.46**	**1.50**
2055	3,543	1,364	1.25%	**1.36**	**3.28**	**2.20**	0.68	0.68	0.12	**1.48**	**1.50**
2056	3,588	1,381	1.25%	**1.38**	**3.28**	**2.20**	0.69	0.69	0.12	**1.50**	**1.50**
2057	3,632	1,399	1.25%	**1.40**	**3.28**	**2.20**	0.70	0.70	0.12	**1.52**	**1.50**
2058	3,678	1,416	1.25%	**1.41**	**3.28**	**2.20**	0.71	0.71	0.12	**1.53**	**1.50**
2059	3,724	1,434	1.25%	**1.43**	**3.28**	**2.20**	0.72	0.72	0.12	**1.55**	**1.50**
2060	3,770	1,452	1.25%	**1.45**	**3.28**	**2.20**	0.72	0.72	0.12	**1.57**	**1.50**
2061	3,818	1,470	1.25%	**1.47**	**3.28**	**2.20**	0.73	0.73	0.12	**1.59**	**1.50**
2062	3,865	1,488	1.25%	**1.49**	**3.28**	**2.20**	0.74	0.74	0.12	**1.61**	**1.50**
2063	3,914	1,507	1.25%	**1.50**	**3.28**	**2.20**	0.75	0.75	0.12	**1.62**	**1.50**
2064	3,962	1,526	1.25%	**1.52**	**3.28**	**2.20**	0.76	0.76	0.12	**1.64**	**1.50**
2065	4,002	1,541	1.00%	**1.54**	**3.28**	**2.20**	0.77	0.77	0.12	**1.66**	**1.50**
2066	4,042	1,556	1.00%	**1.55**	**3.28**	**2.20**	0.78	0.78	0.12	**1.67**	**1.50**

APPENDIX E
OPINION OF CONCEPTUAL PROJECT COSTS

We estimated the present-day cost of projects based using established and accepted methods of providing our opinion of planning level construction project costs.

For payments made to a contractor this includes identifying the major items of work, estimating the quantity of each item that will be required, and estimating the unit price of each item. We identified the major items of work using engineering judgement and experience. We estimated the quantity of each item by measurement and estimates based on our concept of the project, as well as experience from past projects. Predicting the unit price of each item is based on our experience from previous bids and engineering judgement. Since there is no design for the project at this stage, we use a price that we believe would reasonably reflect what a contractor may bid for the item listed, including other related work that is not itemized in the schedule.

Land acquisition and easements are another expense associated with project that can be substantial. We estimate the quantity of land needed for the project and provide an opinion of the likely cost of the land based on its land use type and our experience with acquisition costs.

In addition to payments made to the contractor constructing improvements and land costs, there are other expenses required to complete the project. These include preliminary engineering, construction engineering, materials testing and inspection during construction. Projects such as is typical of system improvements may also include administrative costs related to the project such as refining the scope prior to design, negotiations with property owners, coordination with adjacent property owners, permitting, agreements, administration of engineering and construction contracts, coordinating among Town departments and elected officials, and addressing public concerns. There may also be legal costs related to agreements and legal documents, as well as bond counsel and bonding costs.

Our experience with the cost of engineering services, legal services, administrative costs, and financing costs suggests that the following ranges of costs (as a percentage of construction cost) are reasonable predictions for system improvement projects on average:

Preliminary Engineering:	7% - 12%
Construction Engineering:	5% - 9%
Materials Testing:	0.5% - 1%
Construction Inspection:	2% - 4%
Administrative:	1% - 4%
Legal:	0% - 3%
Bonding:	0% - 1%
Total:	**15.5% - 34%**

In our opinion it would be reasonable to estimate an average of 25% of costs other than those paid to a contractor and for land acquisition/easements.

Table E-1: Culinary Water Projects – Opinion of Conceptual Project Costs

Source Projects				
Construct 750 gpm Well				
Item Description	**Quantity**	**Unit**	**Unit Price**	**Amount**
Preliminary Evaluation Report and Drinking Water Source Protection Plan	1	LS	$ 75,000	$ 75,000
Well drilling 16" casing	1	LS	$ 500,000	$ 500,000
Well House	1	LS	$ 250,000	$ 250,000
750 gpm pump and 100 hp motor	1	LS	$ 75,000	$ 75,000
100 hp variable frequency drive	1	LS	$ 10,000	$ 10,000
Mechanical piping, fittings, valves, flow meter and appurtenances	1	LS	$ 75,000	$ 75,000
Yard piping	1	LS	$ 10,000	$ 10,000
Electrical service entrance and appurtenances	1	LS	$ 150,000	$ 150,000
Backup Power	1	LS	$ 40,000	$ 40,000
Telemetry and SCADA equipment	1	LS	$ 65,000	$ 65,000
Land acquisition	0.25	acre	$ 50,000	$ 12,500
Other Fees: Engineering, Legal, Administrative, Finance 25%				$ 315,625
			Total Cost (rounded)	$ 1,579,000
Construct 675 gpm Well				
Item Description	**Quantity**	**Unit**	**Unit Price**	**Amount**
Preliminary Evaluation Report and Drinking Water Source Protection Plan	1	LS	$ 75,000	$ 75,000
Well drilling 16" casing	1	LS	$ 500,000	$ 500,000
Well House	1	LS	$ 250,000	$ 250,000
675 gpm pump and 100 hp motor	1	LS	$ 65,000	$ 65,000
100 hp variable frequency drive	1	LS	$ 10,000	$ 10,000
Mechanical piping, fittings, valves, flow meter and appurtenances	1	LS	$ 75,000	$ 75,000
Yard piping	1	LS	$ 10,000	$ 10,000
Electrical service entrance and appurtenances	1	LS	$ 150,000	$ 150,000
Backup Power	1	LS	$ 40,000	$ 40,000
Telemetry and SCADA equipment	1	LS	$ 65,000	$ 65,000
Land acquisition	0.25	acre	$ 50,000	$ 12,500
Other Fees: Engineering, Legal, Administrative, Finance 25%				$ 313,125
			Total Cost (rounded)	$ 1,566,000
Storage Projects				
Construct 0.5 MG Culinary Water Tank				
Item Description	**Quantity**	**Unit**	**Unit Price**	**Amount**
Earthwork (Cut)	3,333	C.Y.	$ 12	$ 39,998
Earthwork (Fill)	1,667	C.Y.	$ 12	$ 19,999
0.5 Million Gallon Tank	1	each	$ 470,000	$ 470,000
Piping, Fittings, Valves, Meters, Etc.	1	each	$ 65,000	$ 65,000
Valve Vault	1	each	$ 65,000	$ 65,000
12-inch system connection pipeline	2,600	LF	$ 87	$ 226,200
Telemetry/Control/Monitoring	1	each	$ 40,000	$ 40,000
Land acquisition and easement	1	acre	$ 70,000	$ 70,000
Other Costs: Engineering, Legal, Administrative, 25%				$ 249,049
			Total Cost (rounded)	$ 1,246,000
Construct 1.0 MG Culinary Water Tank				
Item Description	**Quantity**	**Unit**	**Unit Price**	**Amount**
Earthwork (Cut)	10,800	C.Y.	$ 12	$ 129,600
Earthwork (Fill)	8,100	C.Y.	$ 12	$ 97,200
1.0 Million Gallon Tank	1	each	$ 940,000	$ 940,000
Piping, Fittings, Valves, Meters, Etc.	1	each	$ 65,000	$ 65,000
Valve Vault	1	each	$ 65,000	$ 65,000
12-inch system connection pipeline	1,600	LF	$ 87	$ 139,200
Telemetry/Control/Monitoring	1	each	$ 40,000	$ 40,000
Land acquisition and easement	1	acre	$ 70,000	$ 70,000
Other Costs: Engineering, Legal, Administrative, 25%				$ 386,500
			Total Cost (rounded)	$ 1,933,000

Table E-1: Culinary Water Projects – Opinion of Conceptual Project Costs (cont'd)

Distribution Projects				
Install a 8-inch Pipeline from on 900 N. from 800 E. to 1000 E.				
Item Description	**Quantity**	**Unit**	**Unit Price**	**Amount**
Install 8-inch PVC pipeline	1,330	LF	$ 62	$ 82,394
Connections at 800 East and 1000 East	1	LS	$ 5,000	$ 5,000
20 foot easement	1,330	LF	$ 5	$ 6,650
Other Costs: Engineering, Legal, Administrative, 25%				$ 23,511
			Total Cost (rounded)	$ 118,000
Install a 12-inch Pipeline along Lake Road from 2200 N. to 3000 N.				
Item Description	**Quantity**	**Unit**	**Unit Price**	**Amount**
Install 12-inch PVC pipeline	6,500	LF	$ 87	$ 565,500
Connections at 2200 N., 2400 N., and 2700 N.	1	LS	$ 6,000	$ 6,000
Other Costs: Engineering, Legal, Administrative, 25%				$ 142,875
			Total Cost (rounded)	$ 715,000

Table E-2: Culinary Water Unit Prices Used for Estimated Pipe Installation and Oversizing Reimbursement

Item	Unit	Unit Price
8" Water main	L.F.	$ 21
10" Water main	L.F.	$ 26
12" Water main	L.F.	$ 32
14" Water main	L.F.	$ 42
16" Water main	L.F.	$ 53
20" Water main	L.F.	$ 84
24" Water main	L.F.	$ 126
8" Gate valve	EA.	$ 1,575
10" Gate valve	EA.	$ 2,625
12" Butterfly valve	EA.	$ 3,150
14" Butterfly valve	EA.	$ 4,200
16" Butterfly valve	EA.	$ 5,250
20" Butterfly valve	EA.	$ 8,400
24" Butterfly valve	EA.	$ 12,600
8" Bend/Reducer	EA.	$ 525
10" Bend/Reducer	EA.	$ 683
12" Bend/Reducer	EA.	$ 840
14" Bend/Reducer	EA.	$ 1,050
16" Bend/Reducer	EA.	$ 1,260
20" Bend/Reducer	EA.	$ 2,100
24" Bend/Reducer	EA.	$ 2,625
8" Cross	EA.	$ 1,260
10" Cross	EA.	$ 1,575
12" Cross	EA.	$ 1,890
14" Cross	EA.	$ 2,310
16" Cross	EA.	$ 2,835
20" Cross	EA.	$ 3,675
24" Cross	EA.	$ 4,725
Culinary line bedding material	L.F.	$ 2.10
Culinary line backfill material	L.F.	$ 16.66

Table E-3: Sample of Detailed Culinary Water Pipe Costs Used for Estimated Pipe Installation and Oversizing Reimbursement

Item	Unit	Quantity	Unit Price	Cost
12" Water main	L.F.	10,000	$ 32	$ 315,000
10" Gate valve	EA.	50	$ 2,625	$ 131,250
12" Butterfly valve	EA.	20	$ 3,150	$ 63,000
12" Bend/Reducer	EA.	60	$ 840	$ 50,400
12" Cross	EA.	25	$ 1,890	$ 47,250
Culinary line bedding material	L.F.	10,000	$ 2.10	$ 21,021
Culinary line backfill material	L.F.	10,000	$ 16.66	$ 166,572
Incidentals	%	9%		$ 71,504

SUBTOTAL (per 10,000 ft of length): $ 865,997

SUBTOTAL (per 100 ft of length): $ 8,660

SUBTOTAL (per ft of length, rounded): $87

Table E-4: Culinary Water Pipe Costs Used for Estimated Pipe Installation and Oversizing Reimbursement

Item	Unit	Unit Price
8-inch Main Line	L.F.	$ 62
10-inch Main Line	L.F.	$ 72
12-inch Main Line	L.F.	$ 87
14-inch Main Line	L.F.	$ 106
16-inch Main Line	L.F.	$ 128
18-inch Main Line	L.F.	$ 155
20-inch Main Line	L.F.	$ 183
24-inch Main Line	L.F.	$ 261
Oversizing 8 to 10 inch Pipes	L.F.	$ 9
Oversizing 8 to 12 inch Pipes	L.F.	$ 24
Oversizing 8 to 14 inch Pipes	L.F.	$ 43
Oversizing 8 to 16 inch Pipes	L.F.	$ 66
Oversizing 8 to 20 inch Pipes	L.F.	$ 121

APPENDIX F
WATER RIGHTS

Select Related Information

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 01/23/2017

WATER RIGHT: **53-1081** APPLICATION/CLAIM NO.: **A31898** CERT. NO.: 6883

OWNERSHIP

NAME: Genola Town Corporation (Public Water Supplier)
ADDR: 74 West 800 South
Genola UT 84665
INTEREST: 100%

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:

FILED: 04/28/1960	PRIORITY: 04/28/1960	PUB BEGAN:	PUB ENDED:	NEWSPAPER:	
ProtestEnd:	PROTESTED: [No]	HEARNG HLD:	SE ACTION: [Approved]	ActionDate:11/18/1960	PROOF DUE:
EXTENSION:	ELEC/PROOF:[ ]	ELEC/PROOF:	CERT/WUC: 09/15/1982	LAP, ETC:	LAPS LETTER:
RUSH LETTR:	RENOVATE:	RECON REQ:	TYPE: [ ]		
PD BOOK: [53-1]	MAP: [77Eb]	PUB DATE:			

*TYPE -- DOCUMENT -- STATUS

Type of Right: Application to Appropriate Source of Info: Proposed Determination **Status: Water User's Claim**

LOCATION OF WATER RIGHT

(Points of Diversion: Click on Location to access PLAT Program.)******MAP VIEW ***********

FLOW: 0.2 cfs
SOURCE: Underground Water Well
COUNTY: Utah COMMON DESCRIPTION: 1/2 mi. East of Santaquin

POINT OF DIVERSION -- UNDERGROUND: (Click Well ID# link for more well data.)
(1) S 308 ft E 694 ft from NW cor, Sec 02, T 10S, R 1E, SLBM
DIAMETER OF WELL: 16 ins. DEPTH: 303 to ft. YEAR DRILLED: 1961 WELL LOG? Yes WELL ID#: 3293

USES OF WATER RIGHT

******** *ELU -- Equivalent Livestock Unit (cow, horse, etc.)* ******** *EDU -- Equivalent Domestic Unit or 1 Family*
(The Beneficial Use Amount is the quantity of Use that this Water Right contributes to the Group Total.)

SUPPLEMENTAL GROUP NO.: 233633. Water Rights Appurtenant to the following use(s):
53-1081(WUC),1082(WUC)

MUNICIPAL: Genola PERIOD OF USE: 01/01 TO 12/31
Acre Feet Contributed by this Right for this Use: Unevaluated

Storage from 01/01 to 12/31, inclusive, in Unnamed Reservoir with a maximum capacity of 0.405 acre-feet, located in:

	NORTH-WEST¼	NORTH-EAST¼	SOUTH-WEST¼	SOUTH-EAST¼
Height of Dam:	NW NE SW SE	NW NE SW SE	NW NE SW SE	NW NE SW SE
Area Inundated:	NW NE SW SE	NW NE SW SE	NW NE SW SE	NW NE SW SE
Sec 34 T 9S R 1E SLBM	* : : : *	* : : : *	* : X: : *	* : : : *

Small Dam Required?: No

DIVERSION & DEPLETION ESTIMATES

(All values in acre-feet, Growing Season in days)

	IRRIGATION	STOCK	DOMESTIC	MUNICIPAL	MINING	POWER	OTHER	MANUALLY EVALUATED	ACRE-FEET EXPORTED	DIVERSION DUTY	DEPLETION DUTY	GROWING SEASON	WATER-USE REPORTING
DIV:								Yes					
DEP:													

APPLICATIONS FOR NONUSE OF WATER

EXT NUMBER: 1875	REQUST TO: 04/01/2007	LAST USED: 03/31/2002	PRIOR FROM:	PRIOR TO:	
FILED: 04/08/2002	PUB BEGAN: 05/08/2002	PUB ENDED: 05/15/2002	NEWSPAPER: The Payson Chronicle		PROTEST END:06/04/2002
PROTESTED: [No]	HEARNG HLD:	SE ACTION: [Approved]	ActionDate:04/23/2003	PROOF DUE: 04/30/2008	PROOF SUB:
EXT NUMBER:	REQUST TO:	LAST USED: 13/ / 0	PRIOR FROM:	PRIOR TO:	
FILED: 08/27/2008	PUB BEGAN: 09/10/2008	PUB ENDED: 09/17/2008	NEWSPAPER: The Payson Chronicle		PROTEST END:10/07/2008
PROTESTED: [No]	HEARNG HLD:	SE ACTION: [Approved]	ActionDate:11/19/2008	PROOF DUE: 11/30/2015	PROOF SUB:
EXT NUMBER:	REQUST TO:	LAST USED: 13/ / 0	PRIOR FROM:	PRIOR TO:	
FILED: 05/20/2015	PUB BEGAN: 06/03/2015	PUB ENDED: 06/10/2015	NEWSPAPER: The Payson Chronicle		PROTEST END:06/30/2015
PROTESTED: [No]	HEARNG HLD:	SE ACTION: [Approved]	ActionDate:09/24/2015	PROOF DUE: 09/30/2022	PROOF SUB:

**********E N D O F D A T A**********
****

Select Related Information

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 01/23/2017

WATER RIGHT: **53-1082** APPLICATION/CLAIM NO.: **A31898a** CERT. NO.: 9001

OWNERSHIP

NAME: Genola Town (Public Water Supplier)
ADDR: 74 West 800 South
Genola UT 84665

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:

FILED: 04/29/1964	PRIORITY: 04/28/1960	PUB BEGAN:	PUB ENDED:	NEWSPAPER:	
ProtestEnd:	PROTESTED: [No]	HEARNG HLD:	SE ACTION: [Approved]	ActionDate:06/15/1964	PROOF DUE:
EXTENSION:	ELEC/PROOF:[ ]	ELEC/PROOF:	CERT/WUC: 09/15/1982	LAP, ETC:	LAPS LETTER:
RUSH LETTR:	RENOVATE: 06/11/2007	RECON REQ:	TYPE: [ ]		
PD BOOK: [53-1]	MAP: [77Eb]	PUB DATE:			

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Application to Appropriate Source of Info: Proposed Determination **Status: Water User's Claim**

LOCATION OF WATER RIGHT***(Points of Diversion: Click on Location to access PLAT Program.)*********MAP VIEW** **********

FLOW: 3.826 cfs
SOURCE: Underground Water Well
COUNTY: Utah COMMON DESCRIPTION: 1/2 mi. East of Santaquin

POINT OF DIVERSION -- UNDERGROUND: (Click Well ID# link for more well data.)
(1) S 308 ft E 694 ft from NW cor, Sec 02, T 10S, R 1E, SLBM
DIAMETER OF WELL: 16 ins. DEPTH: 528 to ft. YEAR DRILLED: 1968 WELL LOG? Yes WELL ID#: 3293

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family*
(The Beneficial Use Amount is the quantity of Use that this Water Right contributes to the Group Total.)

SUPPLEMENTAL GROUP NO.: 233633. Water Rights Appurtenant to the following use(s):
53-1081(WUC),**1082(WUC)**

MUNICIPAL: Genola PERIOD OF USE: 01/01 TO 12/31
Acre Feet Contributed by this Right for this Use: Unevaluated

Storage from 01/01 to 12/31, inclusive, in Unnamed Reservoir with a maximum capacity of 0.405 acre-feet, located in:

	NORTH-WEST¼	NORTH-EAST¼	SOUTH-WEST¼	SOUTH-EAST¼
Height of Dam:				
Area Inundated:	NW NE SW SE	NW NE SW SE	NW NE SW SE	NW NE SW SE
Sec 34 T 9S R 1E SLBM	* : : : *	* : : : *	* : X: : *	* : : : *

Small Dam Required?: No

DIVERSION & DEPLETION ESTIMATES

(All values in acre-feet, Growing Season in days)

	IRRIGATION	STOCK	DOMESTIC	MUNICIPAL	MINING	POWER	OTHER	MANUALLY EVALUATED	ACRE-FEET EXPORTED	DIVERSION DUTY	DEPLETION DUTY	GROWING SEASON	WATER-USE REPORTING
DIV:								Yes					
DEP:													

APPLICATIONS FOR NONUSE OF WATER

EXT NUMBER: 1874	REQUST TO: 04/01/2007	LAST USED: 03/31/2002	PRIOR FROM:	PRIOR TO:
FILED: 04/08/2002	PUB BEGAN: 05/08/2002	PUB ENDED: 05/15/2002	NEWSPAPER: The Payson Chronicle	PROTEST END:06/04/2002
PROTESTED: [No]	HEARNG HLD:	SE ACTION: [Approved]	ActionDate:04/23/2003	PROOF DUE: 04/30/2008 PROOF SUB:
EXT NUMBER:	REQUST TO:	LAST USED: 13/ / 0	PRIOR FROM:	PRIOR TO:
FILED: 08/27/2008	PUB BEGAN: 09/10/2008	PUB ENDED: 09/17/2008	NEWSPAPER: The Payson Chronicle	PROTEST END:10/07/2008
PROTESTED: [No]	HEARNG HLD:	SE ACTION: [Approved]	ActionDate:11/19/2008	PROOF DUE: 11/30/2015 PROOF SUB:
EXT NUMBER:	REQUST TO:	LAST USED: 13/ / 0	PRIOR FROM:	PRIOR TO:
FILED: 05/20/2015	PUB BEGAN: 06/03/2015	PUB ENDED: 06/10/2015	NEWSPAPER: The Payson Chronicle	PROTEST END:06/30/2015
PROTESTED: [No]	HEARNG HLD:	SE ACTION: [Approved]	ActionDate:09/24/2015	PROOF DUE: 09/30/2022 PROOF SUB:

**********E N D O F D A T A**********
****

APPENDIX G
SANTAQUIN CONNECTION DOCUMENTS

KEY LEGAL AND HISTORICAL FACTS CONCERNING SANTAQUIN/GENOLA WATER

1. During the years of 1935 and 1936 Genola was in the act of negotiating with Summit Creek Irrigation Co. for .28 of a second foot of water which was collected by and flowed through the collection system of Santaquin, but was dumped back into the Summit Creek flow prior to reaching the City headhouse. (Supreme Court Ruling, par. 4)

   The intent was to construct a pipeline from the Irrigation Co. weir box, approx. 500 feet above the City headhouse, to the Genola Headhouse. (.28 sec. ft. = 126 gpm)

2. During these negotiations the Santaquin mayor, E.C. Openshaw, and one city councilman, LaVere VanAusdal, approached the Trustees of the Town of Genola with the idea of connecting up with the City mains at the northwest corner of Santaquin and thus save 8,000' of parallel line and paying to Santaquin the amount of money such a line would cost. (Supreme Ct., par. 4) (Distr. Ct. par. 160, 163)

3. A contract to this effect was consummated 18 Aug. 1936. (Copy of contract Dist. Ct. transcript, par. 2) (also, Supr. Ct., par. 5)

4. On the basis of the agreement Genola began construction Sept. 17, 1936. (Supt. Ct. par. 5)

5. On June 11, 1937, Genola tendered to Santaquin $2500.00 and 60 Shares of Summit Creek water stock - for which it paid $3050, demanded the water be turned into the Genola system. (Supr. Ct. par. 6)

6. On June 14, 1937 Genola received a letter stating that the Council of Santaquin refused to accept the water stock and the $2500 and refused to deliver the water. (Supr. Ct. par. 6)

7. On June 29, 1937, a complaint was filed to compel Santaquin to perform its contract. (Supr. Ct. par. 6)

   It is interesting to note that the contract was finalized on Aug. 18, 1936. It was not until June 14, 1937 that Santaquin notified Genola they would not honor the contract. (Dist. Ct., 167)

8. On Sept. 13, 1937 the District Court ruled in favor of Genola and awarded costs and damages. (Damages of 93 dollars) (Findings, par. 4, Dist. Ct.)

   ("Plaintiff is the owner of a perpetual right to the use of a flow of one hundred gallons of water per minute...." (Dist. Ct. par.1)

9. Santaquin appealed to the Supreme Court same date.

10. Supreme Court upheld ruling of the District Court, awarded costs.

11. Key Background Information:

    a. It is apparent that during the negotiations the City and Town representatives looked to the State Constitution if and how Santaquin could legally furnish water to Genola. Testimony shows that Mayor Openshaw and Genola representatives were very aware that water could only be exchanged, not sold. (Dist. Ct., 169)

b. Genola does not/did not buy water from Santaquin. It traded/exchanged water (60 shares of Summit Creek stock) of equal value to 100 gpm. (Dist. Ct. par. 7 of Findings of Fact, also par. 17) Sup. Ct. par. 7)

c. Genola did not/does not lease the Santaquin system. To do so would violate the state constitution, Sec. 6. Art XI. (See Supr. Ct., bottom p.2, par. 7 and also par. 15)

c. Genola agreed to pay $30.00 per year. This figure was arrived at by computing the probable cost (computed by PWA officials) to Genola of maintaining the 8000' of parallel line from the weir box to 3rd west and 2nd north if the line had been built and put to use. (Dist. Ct. par. 239 and 241) (Dist. Ct. Conclusion, par. 3)

THEREFORE, the $30 is not meant to be a lease payment nor to be any given portion of the cost of maintaining the City lines through which the water might flow to Ganola, nor to be too much or too little, or just enough for that purpose. But, because Genola would not have the expense of maintaining the by-pass line, they would give that amount to Santaquin to use as they saw fit.

(Note: Genola did build a flow line from 3rd west, 2nd no. to their headhouse, a distance of 8550'. Maintenance of that line hasn't cost $30 for the more than 40 years it has served.)

d. Genola agreed to pay $2500.00 cash. This figure was arrived at by computing the amount of cash it would require for Genola to build the 8000' of the by-pass line, if they had built it. (Supr. Ct. par. 4,5) (Dist. Ct., 243)

The $2500 was to be used to improve the Santaquin lines. (Dist. Ct. 184, 163) (Sup. Ct. par. 5)

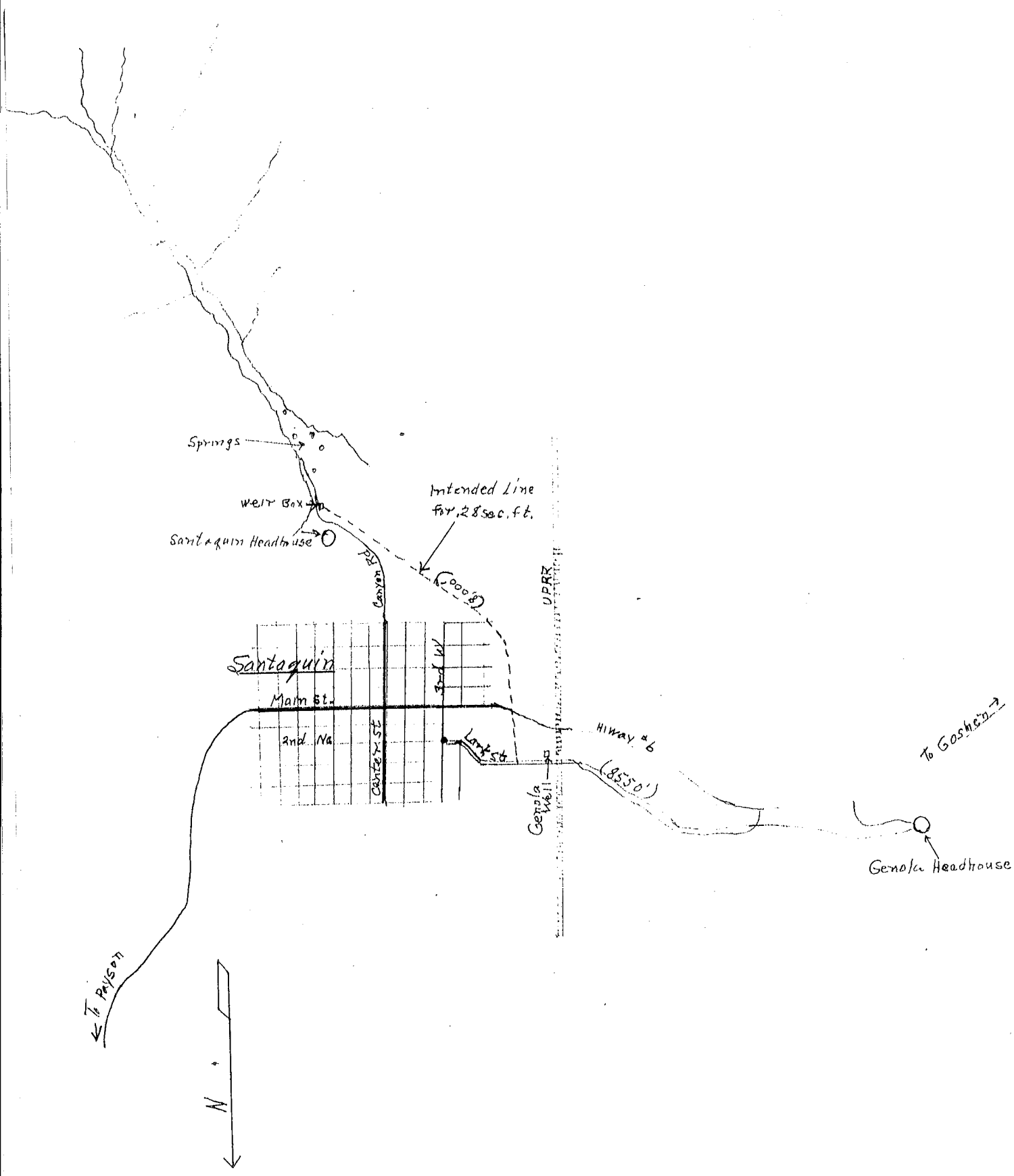
e. How long shall Santaquin provide 100 gpm? "So long as Summit Creek exceeds 6 second feet flow..." (Dist. Ct. Findings, par. 2.) Sup. Ct.,5,19)

f. Any conditions governing whether Santaquin need deliver? "....the City shall deliver to the town at all events water in the amounts specified..." (Sup. Ct. 14)

g. Where did the .28 sec. ft. of water come from? Why owned by Summit Creek eventhough it was in Santaquin City lines? (Dist. Ct. 263-267)

h. "Santaquin is carrying her own water and delivering it to Genola." (Sup. Ct. par. 7)

i. Par. 13 of Sup. Ct. quotes a paragraph of the Contract in which Genola agrees to join with Santaquin in a suit if necessary, to compel Summit Creek to provide a continuous flow. This portion of the contract was cancelled by court action 28 Dec. 1942 (See Dist. Ct. document dated Dec. 26, 1942. Also minutes of May2, 1942 meeting between Santaquin City and Genola Town boards in which the matter was discussed and a settlement agreed upon.)


Springs
Weir Box
Santaquin Headhouse
Intended Line for 28 sec. ft.
(6000')
Canyon Rd.
UPRR
Santaquin
Main St.
2nd No.
Center St.
3rd W.
Last St.
Highway 6
(8550')
Genola Well
To Goshen
Genola Headhouse
To Payson
N