PREPARED FOR:

TIMBER LAKES WATER SSD

PREPARED BY:

BOWEN COLLINS & ASSOCIATES

TIMBER LAKES WATER
SPECIAL SERVICE DISTRICT

MAY 2025

2025 CULINARY WATER SYSTEM MASTER PLAN

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CHAPTER 1
INTRODUCTION AND BACKGROUND

INTRODUCTION

Timber Lakes Water Special Service District (TLWSSD or District) contracted the services of Bowen, Collins & Associates (BC&A) to complete a Culinary Water System Master Plan. The purpose of this study is to provide TLWSSD with an updated plan to maintain a viable and efficient water system capable of meeting reasonable future demands of its service areas and be able to satisfy customer expectations.

TLWSSD is currently experiencing slow and steady growth and TLWSSD will need to continue to meet the demands of future growth. This master plan will provide an inventory of the existing system and recommend improvements that will allow the TLWSSD system to continue to serve development in the future.

SCOPE OF SERVICES

BC&A was retained to complete the following tasks as part of this 2024 Culinary Water System Master Plan:

- Task 1: Develop Growth Projections
- Task 2: Evaluate Demand for Indoor Use
- Task 3: Update Hydraulic Model
- Task 4: Identify Existing Operating Deficiencies
- Task 5: Identify Projected Future Operating Deficiencies
- Task 6: Evaluate Improvements to Resolve Identified Operating Deficiencies
- Task 7: Develop Water System Capital Facilities Plan
- Task 8: Document Results

PROJECT STAFF

The project work was performed by the BC&A team members listed below. Team members' roles on the project are also listed. The project was completed in BC&A's Draper, Utah office. Questions may be addressed to Wyatt Andersen, Project Manager at (801) 495-2224.

Keith Larson	Principal-In-Charge
Justin Dietrich	Senior Engineer
Wyatt Andersen	Project Manager
Rachel Valek	Project Engineer

CHAPTER 2
DEMAND PROJECTIONS

INTRODUCTION

To plan for the future, it is necessary to project future increases in water demand. The TLWSSD service area has experienced steady growth in the last decade. Expected growth consists of filling in within the active service area; the District does not expect development and growth outside of the active service area. It is important to note that the District does not have any outdoor water use and that there is a mix of full-time and part-time residents in the District. The purpose of this chapter is to summarize the work that was performed to estimate the water needed to meet both existing and future customer demands. Water production necessary to satisfy capacity requirements during peak periods of use and to meet volumetric requirements on an annual basis have been estimated.

DEMAND PROJECTION METHODOLOGY

There are several methods that can be used to estimate future water needs. This study develops demand projections based on observations and planning efforts by the District. The methodology used in this study is as follows:

1. Define the service area.
2. Project the growth of the number of full-time and part-time residential connections for indoor use only for the study area through build-out.
3. Convert projections of system wide growth to a water system production requirement.
4. Consider the effect of State Water Conservation Goals on future demands.

Each step of this process is summarized in the sections that follow.

SERVICE AREAS

The existing TLWSSD service area is shown in Figure 2-1. This Culinary Water System Master Plan focuses on indoor water use only, since outdoor water use is not present in the District.

CONNECTIONS

Connections in TLWSSD are currently and projected to all be residential single-family connections. It is estimated that about 35% of the existing connections are full-time residents and 65% are part-time residents. BC&A used billing data from the District and consulted with the District to estimate this. There are a handful of current connections that operate as short-term rentals. None of the connections currently have outdoor water use.

SYSTEM GROWTH

System growth was estimated using data provided by the District, recent land development planning, and from the District's previous water master plan. The following conditions and projections were included in the system growth curve.

- **Existing Conditions:** There are approximately 995 connections being serviced by the District at the end of the year 2024. Approximately 35% of the existing connections are full-time residents.
- **Build-Out Conditions**: Projected growth for the District's water system were prepared for a build-out scenario based on projected densities in the previous District water master plan

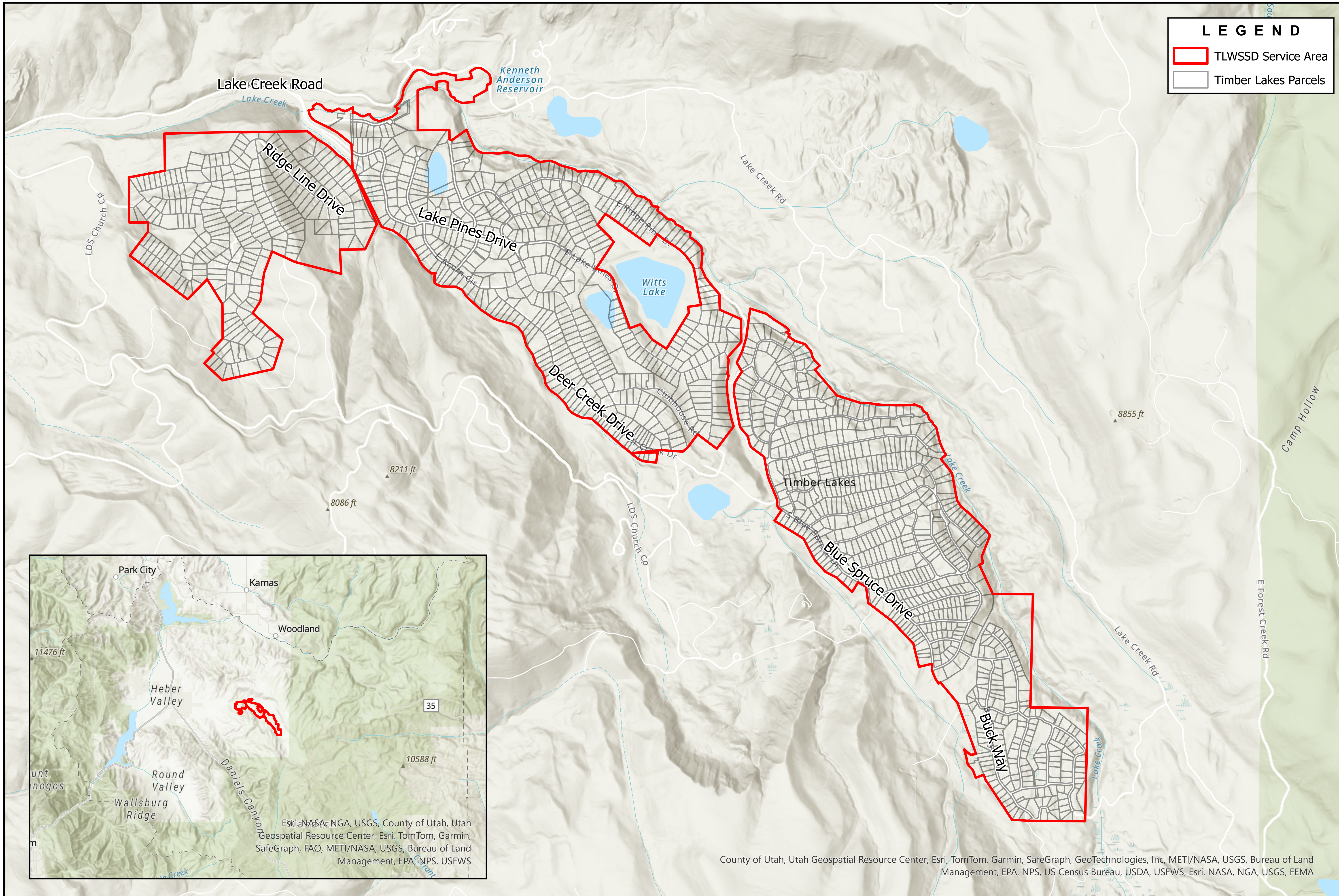
and other data provided by the District. With the projected build-out connections, the District could service 1,297 residential connections. Since it is difficult to predict what the ratio of full-time residential connections to part-time residential connections will be at buildout, we have proceeded with two buildout scenarios, which are 35% full-time residential connections at buildout and 60% full-time residential connections at buildout.

Using the conditions described above, a projected system growth curve for the District was developed. The growth curve was based on the existing conditions and buildout conditions values above and growth curves for surrounding areas in Wasatch County. Table 2-1 summarizes the growth projections for the study area. It should be noted that the values in Table 2-1 are at the end of each year. There are two full-time connections columns in the table which represent 35% of the total connections being full-time at buildout and 60% of the total connections being full-time at buildout.

Table 2-1
Summary of Indoor Growth Projections

Year	Residential Connections	Full-Time Connections – 35% at Buildout	Full-Time Connections – 60% at Buildout
2020	916	321	321
2021	938	328	328
2022	962	337	337
2023	976	342	347
2024	995	348	360
2025	1,012	354	372
2026	1,027	359	383
2027	1,039	364	394
2028	1,051	368	404
2029	1,061	371	415
2030	1,070	375	424
2031	1,079	378	434
2032	1,087	380	444
2033	1,095	383	453
2035	1,111	389	473
2040	1,152	403	524
2045	1,193	418	577
2050	1,231	431	631
2055	1,262	442	684
2060	1,285	450	734
2065	1,297	454	778

The observed trend elsewhere in Wasatch County in communities similar to Timber Lakes where there is higher part-time occupancy than full-time occupancy is that the community usually starts out with mostly part-time occupancy and then trends towards more full-time occupancy as the development ages and as the region continues to grow in population.



SCALE: 1 in = 2,000 ft

NORTH: NORTH

SERVICE AREA

TIMBER LAKES WATER SPECIAL SERVICE DISTRICT
WATER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO. 2-1

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WATER DEMAND PROJECTIONS

The next step in projecting water production requirements is to estimate the conversion of indoor connections to water demand using metered billing data that was provided by the District for all accounts in the system. Several different demand scenarios were considered as part of this study, which are described below:

- **Average Water Use** – The water distribution system average demand refers to the amount of water consumed each year by TLWSSD consumers averaged over 365 days. The water sizing standard for indoor use within the District is currently 132 GPD per connection for the average day demand in the water distribution system for full-time residential connections and 16 GPD per connection for part-time residential connections. The overall average day demand including part-time and full-time residential connections is 57 GPD per connection. Both the full-time and part-time average day demands per connection are very low compared to a typical single family home connection, which is presumably due to very low occupancy throughout the year.
- **Peak Day Water Use** – For planning purposes, it is necessary to have an estimate of not only the average day demand of the system, but also the maximum day demand of the system. Peak day demand is the highest daily water demand during the year. Similar to historic average day demands, the peak day demand was estimated based on historic master plan projections, consistent with the values used for dedicating capacity during the initial construction of the District. This equates to a peak day indoor water demand of 165 GPD per connection for existing conditions. The peaking factor (the ratio of peak day demand to average day demand) for the water system is 1.25 for full-time residential connections and 10.24 for part-time residential connections. This is consistent with systems of similar size and nature to TLWSSD.
- **Peak Hour Water Use** – The final demand needed for the water system is the peak hour water demand. This will be used for sizing conveyance facilities to maintain adequate pressures during periods of peak demand. Based on data from other similar systems, peak hour demands have been estimated to be 2.1 times peak day demands, which equates to a peak hour indoor demand of 347 GPD per connection for existing conditions.
- **Average and Peak Day Water Use with Supply Buffer** – For planning purposes it is valuable to have an estimate of not only the average day demand and the peak day demand, but also the average day demand and peak day demand with supply buffers. Supply buffers are necessary to account for potential interruptions to supply such as earthquakes, source contamination, wildfire, mechanical failure, or long-term environmental changes. When an interruption occurs, the buffer supply is intended to step in and keep service going. The supply buffers for TLWSSD at buildout were calculated as 10% of demand for average day demand and peak day demand.

The actual water use in the District will vary over time. As a result, it is important that TLWSSD continue to monitor water usage. If demands change over time, the recommended improvements contained in this plan may need to be adjusted accordingly.

Table 2-2 and Table 2-3 show a summary of the projected average day water demand, peak day water demand, and peak hour water demand with and without supply buffers. The difference between these two tables is the assumed number of full-time residential connections at buildout. The first table assumes that 35% of the connections at buildout are full-time and the second table assumes that 60% of the connections at buildout are full-time.

Table 2-2
Projected Water Demand – 35% Full-Time at Buildout

Year	Average Annual (AF/yr)	Average Annual (GPD)	Peak Day (GPD)	Peak Hour (GPD)	Average Day with Supply Buffer (AF/yr)	Peak Day with Supply Buffer (GPD)
2023	62	55,305	161,001	338,102	68	177,101
2024	63	56,376	164,120	344,653	69	180,532
2025	64	57,318	166,862	350,410	71	183,548
2030	68	60,612	176,450	370,545	75	194,095
2034	70	62,458	181,823	381,829	77	200,006
2040	73	65,264	189,994	398,987	80	208,993
2050	78	69,696	202,897	426,083	86	223,187
2055	80	71,481	208,093	436,995	88	228,902
2060	82	72,778	211,868	444,923	90	233,055
2065	82	73,436	213,784	448,947	90	235,163

Table 2-3
Projected Water Demand – 60% Full-Time at Buildout

Year	Average Annual (AF/yr)	Average Annual (GPD)	Peak Day (GPD)	Peak Hour (GPD)	Average Day with Supply Buffer (AF/yr)	Peak Day with Supply Buffer (GPD)
2023	63	55,962	161,001	338,102	69	177,101
2024	65	57,717	164,120	344,653	71	180,532
2025	66	59,362	166,862	350,410	73	183,548
2030	74	66,376	176,450	370,545	82	194,095
2034	80	71,366	181,823	381,829	88	200,006
2040	89	79,228	189,994	398,987	98	208,993
2050	104	92,893	202,897	426,083	114	223,187
2055	111	99,521	208,093	436,995	123	228,902
2060	118	105,651	211,868	444,923	130	233,055
2065	124	110,971	213,784	448,947	137	235,163

In Tables 2-2 and 2-3, the Average Annual values are different between the two tables, but the Peak Day and Peak Hour values match. The Peak Day and Peak Hour values match between the two tables because we believe that the actual Peak Day or Peak Hour scenario will be when there is higher occupancy no matter what happens with occupancy during the remainder of the year. This high occupancy date could be on Thanksgiving Day, Christmas Day, or New Years Eve Day, etc.

WATER SUPPLY

A critical question for TLWSSD (and any water system) is whether their supplies are sufficient for their needs. Unfortunately, the District does not have reliable flow meter data from the springs that supply water to the distribution system. Thus, comparing the projected demands above with available supply isn't possible at this time.

However, when the Water System Capital Project (described in Chapter 6) is completed, the District will have reliable flow meter data from all of the springs that supply the District's connections. We recommend that the District start analyzing the supply using the new flow meter data after there has been consistent data gathering for about one year.

CONSERVATION

The State of Utah recently adopted regional conservation goals that focus on regions primarily matching dominant river drainages. The District aims to meet the State of Utah's conservation targets (Utah's Regional M&I Conservation Goals, November 2019). The adopted goals establish 2015 as the baseline year for setting conservation targets. Table 2-4 below shows target per capita indoor use goals for Wasatch County, which is the county in which TLWSSD is located. With the adoption of the Conservation Plan, the District has selected to adopt the sate conservation goals as its own.

Table 2-4
Conservation Goal with Milestones Through 2065 (Sales)

Year	State Conservation Goal (Indoor Use Component)	TLWSSD Per Capita Conservation Goal – Full-Time Population Only (gpcd)	TLWSSD Per Capita Conservation Goal – Considering All Occupancy (gpcd)
2015	0%	72.0	58.6
2030	14.1%	61.8	50.3
2040	18.7%	58.5	47.6
2065	22.3%	55.9	45.5

We would recommend that TLWSSD conservatively use the current demand numbers without further conservation for planning purposes since the per connection water usage is so low. In future years, TLWSSD should monitor water use to see if any additional conservation is being achieved. If water is being conserved, such that actual water use is lower than projected, capital improvement projects can be adjusted accordingly.

CHAPTER 3
EXISTING WATER SYSTEM

EXISTING FACILITIES

The purpose of this chapter is to summarize the characteristics of the existing facilities within the TLWSSD culinary water distribution system. It is intended to be used as a quick reference for TLWSSD personnel regarding information on the system.

Water Sources

The District's culinary water sources consist of nine springs, which are:

- Lone Pine Springs 1-6
- Cove Springs East and West
- Look Out Mountain Spring

Pipelines

The TLWSSD distribution system is composed of distribution and transmission pipelines up to 12 inches in diameter. Figure 3-1 shows the distribution piping and Table 3-1 summarizes the total length of pipe in the system. Pipe material is not expressly documented for TLWSSD infrastructure. However, based on historic design standards, we expect that most of the pipelines are made of PVC, with some pipes being ductile iron and HDPE.

Table 3-1
Summary of Pipeline Data

Pipe Diameter (inches)	Total Length (feet)	Total Length (miles)	Percentage of Network
< 6	1,433	0.27	0.8%
6	49,388	9.35	26.5%
7	12,490	2.37	6.7%
8	104,465	19.79	56.1%
10	16,387	3.10	8.8%
12	2,025	0.38	1.1%
Totals	**186,188**	**35.26**	**100.0%**

Booster Stations

There are currently two existing booster stations in the TLWSSD culinary water system, which can be seen in Figure 3-1. Table 3-2 shows a summary of the booster stations and their respective parameters.

Table 3-2
Booster Stations

Name	Design Flow (gpm)	Design TDH (feet)	Backup Power (Y/N)	Number of Pumps
Cove	119	150	No	1
Racoon	42	254	No	1

Storage Facilities

There are currently five existing storage tanks in the TLWSSD culinary water system, which can be seen in Figure 3-1. The following are the existing District storage tanks:

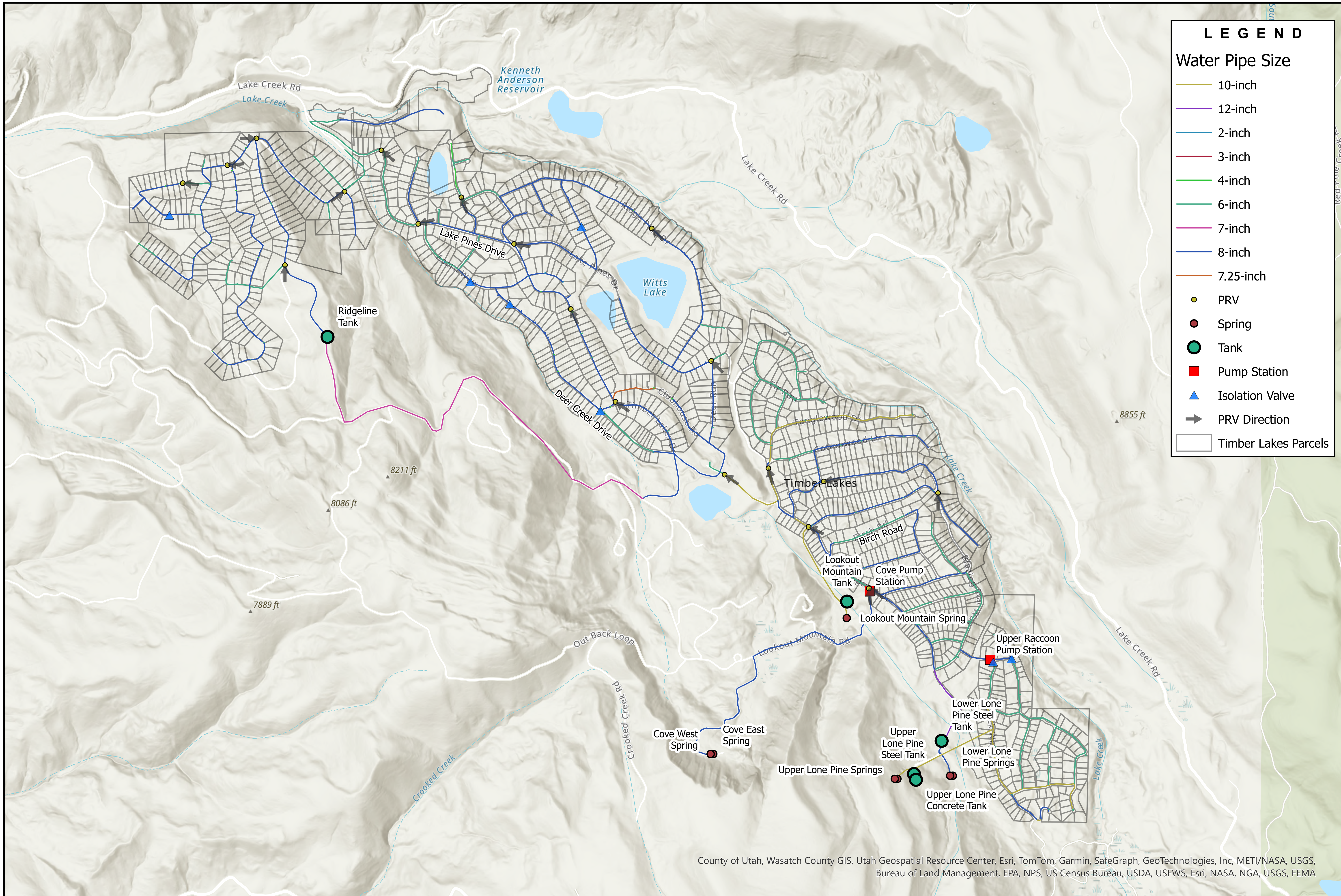
- Upper Lone Pine Concrete Tank – 300,000 gallons (Tank Full Elevation: 8,679 feet)
- Upper Lone Pine Steel Tank – 108,000 gallons (Tank Full Elevation: 8,627 feet)
- Lower Lone Pine Steel Tank – 400,000 gallons (Tank Full Elevation: 8,441 feet)
- Lookout Mountain Concrete Tank – 500,000 gallons (Tank Full Elevation: 8,021 feet)
- Ridgeline Steel Tank – 200,000 gallons (Tank Full Elevation: 7,506 feet)

Pressure Regulating Valves

Pressure zones in the distribution system are separated by pressure reducing valves (PRVs). Figure 3-1 shows the locations of pressure regulating valves in the system. Table 3-3 shows a summary of the PRVs and their settings for existing conditions.

Table 3-3
Summary of PRVs

Identifier	PRV Elevation (ft)	To HGL (ft)	PRV Setting (psi)
Cove PRV from; Blue Spruce	8,131	8,316	80
Aspen Green Briar PRV; Cla-Valve	8,026	8,165	60
Deer Creek PRV ; Cla-Valve	7,767	7,887	52
Deer Run Lake Pines PRV; Cla-Valve	7,501	7,628	55
Blue Spruce/Aspen PRV	7,948	7,992	19
Cedar Bark Lake Pines Drive PRV	7,075	7,179	45
Clyde Lake PRV	7,090	7,206	50
Cottonwood Blue Spruce PRV	7,717	7,856	60
Green Briar Way/Green Briar Road	7,882	7,991	47
Lake Pines PRV-Lower	6,794	6,910	50
Lake Pines Drive/ Tree Top Lane	7,268	7,407	60
Oakview PRV	6,763	6,913	65
Ridgeline-Drive Cotton Wood CT	6,783	6,956	75
Ridgeline-Westview PRV	7,002	7,164	70
Ridgeline PRV	7,287	7,414	55
Timber Lakes Drive Shortcut	7,563	7,725	70
West View Beaver Bench	6,965	7,150	80
Ridge Line Tank PRV	7,257	7,338	35
Shop PRV	7,392	7,508	50
Ridge Pine PRV	7,287	7,414	55



SCALE: 1 in = 2,000 ft

NORTH:

EXISTING CULINARY WATER SYSTEM

TIMBER LAKES WATER SPECIAL SERVICE DISTRICT

WATER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO. 3-1

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CHAPTER 4
STORAGE CAPACITY EVALUATION

INTRODUCTION

The purpose of this chapter is to evaluate the TLWSSD storage capacity. As part of this evaluation, a storage analysis was completed to determine TLWSSD needs to meet equalization, emergency, and fire flow storage requirements adequately.

EXISTING SYSTEM CHARACTERISTICS

The District currently has five storage tanks, as mentioned in Chapter 3 of this report.

STORAGE EVALUATION CRITERIA

Water systems must have storage facilities sufficient to provide:

- Equalization storage
- Emergency Storage
- Fire suppression storage

Each of these storage components is discussed below.

Equalization Storage

Equalization storage is the volume of water needed to supply the system for periods when demands (usually peak hour demands) exceed the supply (peak day supply). Based on historic water use patterns, it is recommended that the equalization storage for the TLWSSD equals six hours of peak day demands, or 25% of peak day demand. It is also important to remember that because equalization storage is used on a daily basis during the summer, the equalization storage needs to have a source that can fill the tank every 24 hours. Because emergency and fire flow storage are not used on a regular basis, they do not have the same source restriction as the equalization storage.

Emergency Storage

Emergency storage is the volume of water required to meet water demand during an emergency. There are many potential emergencies but are typically things such as an extended power outage that prevents the water being treated at or delivered from one of the system sources. While the most effective method of ensuring adequate water delivery during a power outage is to provide auxiliary power to selected water system facilities, it is also wise to include some additional emergency water at storage reservoirs. This also gives system operators the benefit of a little extra buffer for system operations. An emergency could also be a line break needing repair or a similar failure. It is recommended that TLWSSD facilities include sufficient emergency storage be able to supply the system during a six-hour power outage during peak day demands.

Fire Suppression Storage

Fire suppression storage is the volume of water needed to provide a required fire flow for a specified period. The State standard indicates that fire suppression shall meet the volume specified by the local fire authority. The Wasatch County Fire Marshall has required that fire suppression storage meet international fire code flow standards, which are based on building square footage and building material type. For master planning purposes in TLWSSD, the fire suppression storage volume is 1,500 gpm for 2 hours (180,000 gallons).

ESTIMATED STORAGE REQUIREMENTS

An evaluation of the needed TLWSSD culinary water storage facilities for projected demands was completed. Table 4-1 shows the existing culinary storage for TLWSSD and Table 4-2 shows the culinary storage for TLWSSD at buildout. See Figure 3-1 for the location of the existing storage tanks and see Figure 6-2 for the location of the proposed storage tanks.

Table 4-1
Existing TLWSSD Culinary Storage

Tank	Required Equalization & Emergency Storage (gallons)	Required Fire Storage (gallons)	Total Required Storage (gallons)	Existing Storage (gallons)	Remaining Storage (gallons)
Upper Lone Pine Concrete Tank	17,050	180,000	197,050	300,000	102,950
Upper Lone Pine Steel Tank	5,683	-	5,683	108,000	102,317
Lower Lone Pine Steel Tank	23,253	180,000	203,253	400,000	196,747
Lookout Mountain Concrete Tank	23,253	180,000	203,253	500,000	296,747
Ridgeline Tank	11,262	180,000	191,262	200,000	8,738
Total	**80,501**	**720,000**	**800,501**	**1,508,000**	**707,499**

The table above shows that the District has adequate storage capacity for existing demands in the service area.

Upper Lone Pine Steel Tank Considerations

The District's Upper Lone Pine Steel Tank gets inflow from the Upper Lone Pine Concrete Tank's overflow. Water leaves the steel tank from its overflow and goes to the Lower Lone Pine Steel Tank. Therefore, the Upper Lone Pine Steel Tank acts as a wide spot in the overflow from upper to lower lone pine rather than acting as its own storage tank.

After the District constructed the Upper Lone Pine Concrete Tank, they contemplated the need for the Upper Lone Pine Steel Tank. The table shows that the Upper Lone Pine Concrete Tank could handle the demands from the Upper Lone Pine Steel Tank if the District decided to remove the steel tank from service. The District has decided to continue to keep the Upper Lone Pine Steel Tank in service and continually assess the maintenance needs and costs of the tank before making a decision to remove the tank from their system. If the District decides to remove the steel tank from service in the future, the District would need to reconfigure some of the piping that goes from the concrete tank to the steel tank so that the system operates correctly.

Table 4-2
Proposed TLWSSD Culinary Storage

Tank	Required Equalization & Emergency Storage (gallons)	Required Fire Storage (gallons)	Total Required Storage (gallons)	Storage (gallons)	Remaining Storage (gallons)
Upper Lone Pine Concrete Tank	22,640	180,000	202,640	300,000	97,360
Upper Lone Pine Steel Tank	7,547	-	7,547	108,000	100,453
Lower Lone Pine Steel Tank	30,876	180,000	210,876	400,000	189,124
Lookout Mountain Concrete Tank	30,876	180,000	210,876	500,000	289,124
Ridgeline Tank	14,954	180,000	194,954	200,000	5,046
Total	**106,892**	**720,000**	**826,892**	**1,508,000**	**681,108**

The District initially indicated the need to add the Cove Tank near the existing cove springs in the future since the cove springs are the only springs in the District's sources that don't flow to a storage tank at this time. After reviewing the storage analysis in the tables above, the District decided that the Cove Tank is not needed.

The District has considered using their existing storage tanks (or future storage tanks if needed) to supplement the late season supply when the springs are producing less in the fall than what they would in the spring when the flows are high. This would entail storing water in the tanks until the fall when production is lower. Without reliable source production data, it is not possible to conclude whether this is needed or even possible. Once the Water System Capital Project is completed and the District has obtained reliable data for at least one year, this can be analyzed. However, even without such an analysis, we can identify two typical hurdles to this approach. First, keeping water in storage for multiple months can be a water quality problem. And second, typically sized storage tanks are designed to hold enough water for a peak day demand, not to store enough water for the full late summer and early fall.

The only existing tank that has disinfection is the Lower Lone Pine Steel Tank.

CHAPTER 5
DISTRIBUTION SYSTEM EVALUATION

INTRODUCTION

To evaluate the ability of the TLWSSD water distribution system to serve the needs of its existing and future customers, a hydraulic model was created using TLWSSD Geographic Information System (GIS) data, information provided by TLWSSD staff, and the demand analysis discussed in Chapter 2 of this report. The purpose of this model is to simulate existing and future demands on the distribution piping. Based on the results of the model simulations, improvements can then be evaluated to remedy any identified deficiencies. The purpose of this chapter is to document the results of the distribution system evaluation based on hydraulic modeling.

HYDRAULIC MODEL

The operating characteristics of the existing distribution system were evaluated as part of this study using a hydraulic model. A hydraulic computer model is a digital representation of physical features and characteristics of the water system, including pipes, valves, storage tanks, and pumps. Key physical components of a water system are represented by a set of user defined parameters that represent the characteristics of the system. The computer model utilizes the digital representation of physical system characteristics to mathematically simulate operating conditions of a water distribution system. Computer model output includes pressures at each node and a flow rate and velocity for each pipe in the model.

Computer models are excellent tools that can be used to evaluate operating conditions in water systems. Models can identify where deficiencies in the system are located and can be used to evaluate alternatives to correct identified problems. Computer models are valuable in examining future operating conditions. They also help to evaluate operating conditions during extreme events such as fires or power failures. There are several different computer programs used for modeling water distribution systems. The program InfoWater by Innovyze was used for this study.

Geometric Model Data

There are two major types of data required to create a hydraulic model of a water system: geometric data and flow data. Geometric data consists of information on the location and size of system facilities including pipes, storage reservoirs, sources, pump stations, etc. It also includes the physical characteristics of the facilities including pipe roughness, delivery point elevations, pump settings, and tank levels. This information is generally collected from system inventory data or through direct field measurement. The following sections describe how geometric data was assembled and is used in the hydraulic model.

Pipe and Demand Nodes

- Pipe sizes were taken from TLWSSD GIS data.
- Node elevations were taken from a 10-meter Digital Elevation Model (DEM) provided by the Utah Geospatial Resource Center (UGRC) website.
- Pipe roughness was conservatively set at a Hazen-Williams coefficient of 110 for all sizes of pipe, which accounts for pipe roughness and local losses which occur at bends, valves, size changes, and other system locations.

Source Connections

- Sources in the TLWSSD water model were modeled at the following locations:

- Cove Springs (east and west)
- Lookout Mountain Spring
- Lower Lone Pine Springs
- Upper Lone Pine Springs

Pressure Regulating Valves

- All the existing pressure regulating valves in the system have been modeled in InfoWater as PRVs. This means they are controlled by downstream pressures and open only as necessary to maintain a maximum pressure on the downstream side. Valve settings were set based on existing settings (existing condition model) and optimized downstream hydraulic grade lines (future condition model). Pressure regulating valve settings are outlined in Chapter 3.

Flow Data

Once all required geometric data is collected and a physical model of the system is created, the second type of data needed to model the system is flow data. For the purposes of this study, BC&A looked at flow for two scenarios: existing and buildout. Two basic types of flow information are required for hydraulic modeling: flow out of the system (demand) and flow into the system (supply).

Demand. Demand for hydraulic modeling must be defined in at least two ways: total demand (production requirement) and distribution demand across the TLWSSD service area.

- **Total Production Requirement** – Production projections for the TLWSSD service area have been presented in detail in Chapter 2. The primary purpose of the model was to estimate the distribution piping improvements that are going to be needed, and then approximate a time frame for each of those improvements.
- **Distribution of Demand** – Demand was distributed through the TLWSSD area based on current development distribution and projected development patterns. Since not every individual connection can be represented in the model, nodes must represent the demand for a number of connections. For existing demands, the total demand for the node varies based on the number of connections it represents and was approximated based a recent digital aerial photo. As defined in Chapter 2, future demand was estimated based on development area projections.

Supply. Each of the years modeled had the following supply scenarios:

1. **Existing –** The sources available in the existing model are the ten existing springs.
2. **Buildout** – The sources available at buildout will be the ten existing springs and the proposed springs.

Recommended Future Model Improvements

The model prepared for this report has been developed using the best available data from TLWSSD. To increase the model accuracy and facilitate future modeling efforts, the following actions are recommended.

- **Verification of PRV Elevations/Settings** – It is recommended that PRV settings be monitored periodically to ensure that valves are operating as needed and the model correctly reflects what is occurring in the field.
- **Increased Detail in Demand Distribution** – It is recommended that the demand be distributed to represent actual conditions more accurately. Because the demands are approximated by large zones, the model can only effectively simulate the transmission and main distribution pipes. Once sufficient GIS water meter data is available for the water system, we would recommend updating the model with the water meter data.

- **Periodic Model Updates** – The model should be updated on a continual basis to reflect improvements made to the distribution network. A periodic review of demand distribution is also recommended. An analysis of demand distribution will allow model users to capture any shift in population density that may occur.

EVALUATION CRITERIA

The computer model was used to simulate operating conditions of the water distribution system using current and future water system production requirements. For both existing and future production requirements, the performance of the system was evaluated using the following criteria.

1. **Culinary pressure within the system during peak demands** – A distribution system should provide adequate delivery pressure across the system. The District Level of Service Standards require that distribution pressures be greater than 50 psi during peak day production requirements and 40 psi during peak hour production requirements. District standards meet the State of Utah requirements.
2. **Pressure within the system during peak day demands with fire flow** – The State of Utah requires that a public water system be capable of conveying required fire flow with a residual pressure of 20 psi. Any node in a residential area incapable of supplying 1,000 gpm with a 20 psi residual was identified as deficient.
3. **Pipe Velocity** – Flow velocities in distribution pipes should typically be limited to less than 7.0 feet per second (ft/s). Transmission pipes can have velocities that are higher than distribution pipes, but typically should be less than 10 ft/s.

SYSTEM EVALUATION RESULTS

Based on the results of the computer model evaluation, several conclusions can be made regarding the TLWSSD water transmission and distribution system:

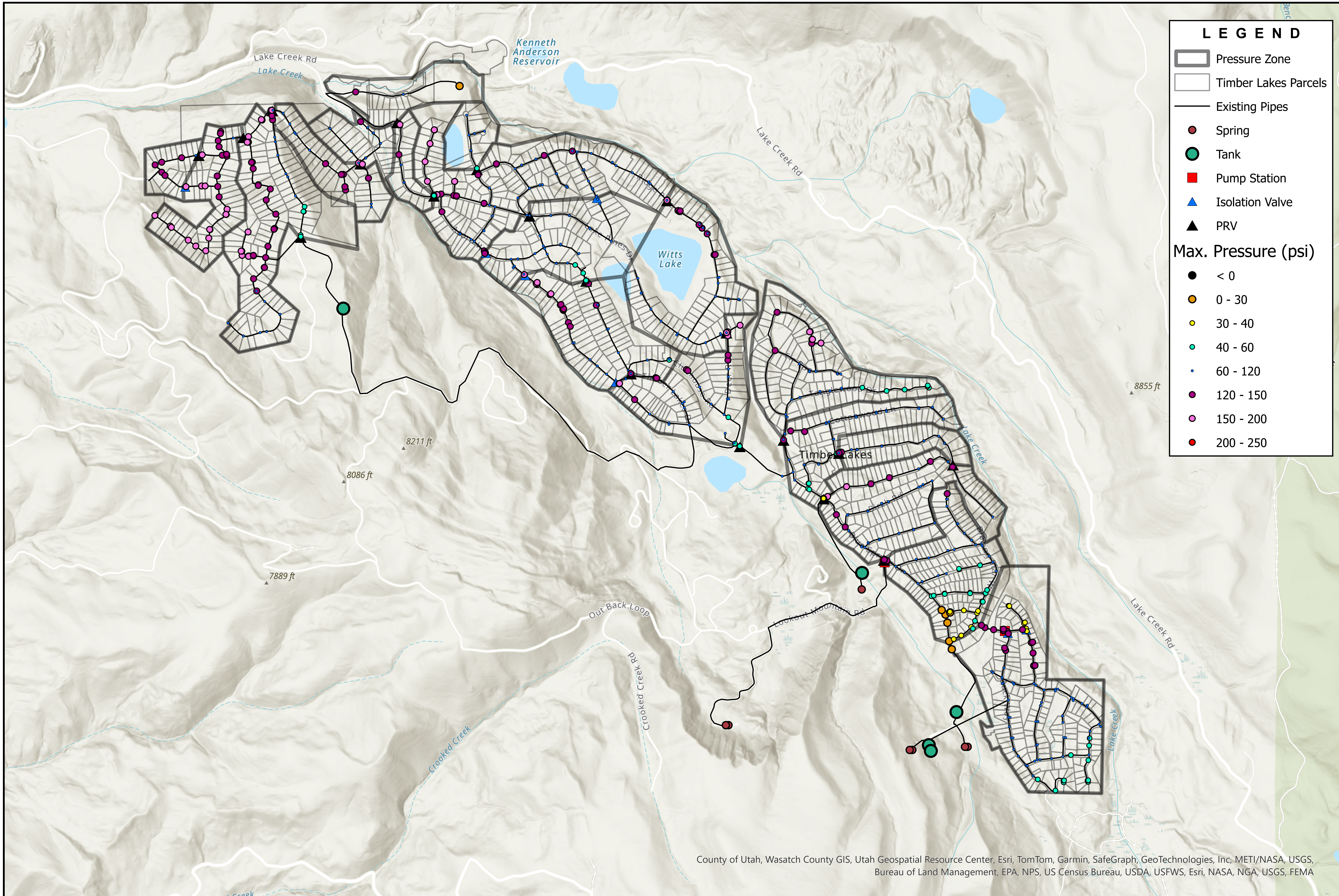
1. **Existing/Future Facilities** – It appears that existing/future facilities have been adequately sized to meet existing and projected future demands. BC&A did not identify any existing deficiencies or pipes that need to upsized in order to meet future demand.
2. **System Pressures** – The system meets the recommended system criteria during peak day production and during peak hour production, with a few exceptions scattered throughout the system. There are areas that have maximum pressures that are between 150 psi and 200 psi at the lower elevations in some of the pressure zones. Figure 5-1 identifies the maximum pressure at each of the junctions in the District's model in the buildout conditions scenario. The District is aware that there are maximum pressures in the system that are between 150 psi and 200 psi. The pressures have been operating there for some time and because the system and homes were constructed with those pressures, we have not identified them as a deficiency and have not proposed projects to bring those pressures down.

   Figure 5-2 identifies the minimum pressure at each of the junctions in the District's model in the buildout conditions scenario. There are junctions at the south end of PZ 18 that have maximum and minimum pressures that are just below 30 psi, but this master plan does not propose any improvements to fix these low pressures because these junctions are tied directly to the Lower Lone Pine Steel Tank and that tank can't be raised very easily.

   The northwest part of the system has a more difficult time meeting peak day demands with fire flow that the rest of the system. Figure 5-3 identifies the available hydrant flow with a pressure at 20 psi and identifies the areas that have a difficult time meeting the required pressure of 20 psi with fire flow demands of 1,000 gpm. Chapter 6 of this master plan outlines projects that will help relieve some of these fire flow deficiencies. Going forward, new development must have fire sprinklers in the zones that only have 1,000 gpm of fire flow available.

Figures 5-4 and 5-5 identify the maximum pressure and minimum pressure at each of the junctions in the District's model in the buildout improved scenario, respectively. Figure 5-6 identifies the available hydrant flow with a pressure at 20 psi for the buildout improved scenario.

3. **Flow Velocities** – The flow velocities in the transmission and modeled distribution pipes are within a reasonable range.



SCALE: 1 in = 2,000 ft

NORTH: NORTH

BUILDOUT SYSTEM PERFORMANCE MAX. PRESSURES

TIMBER LAKES WATER SPECIAL SERVICE DISTRICT

WATER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO. 5-1

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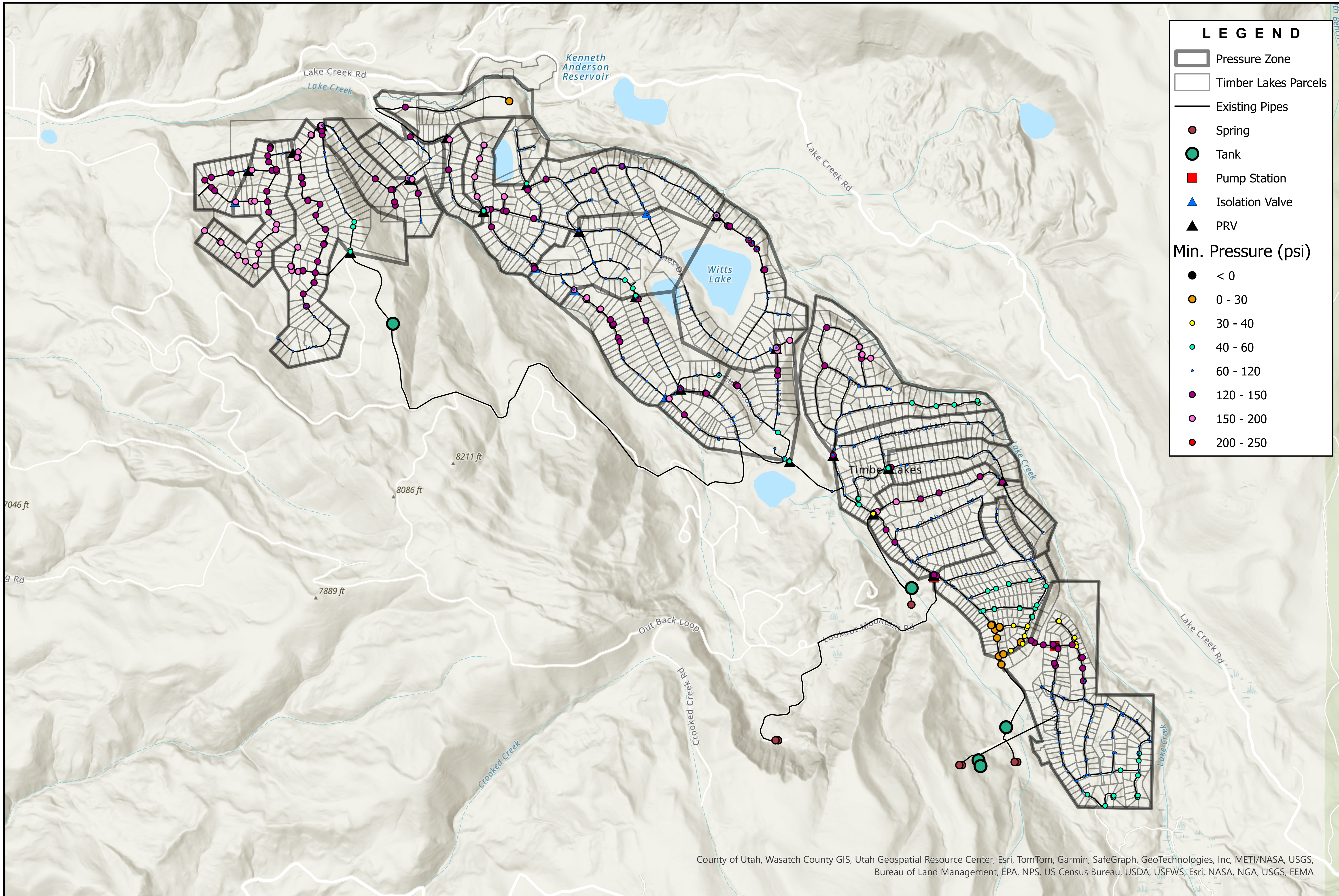

SCALE: 1 in = 2,000 ft

NORTH: NORTH

BUILDOUT SYSTEM PERFORMANCE MIN. PRESSURES

TIMBER LAKES WATER SPECIAL SERVICE DISTRICT

WATER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO.

5-2

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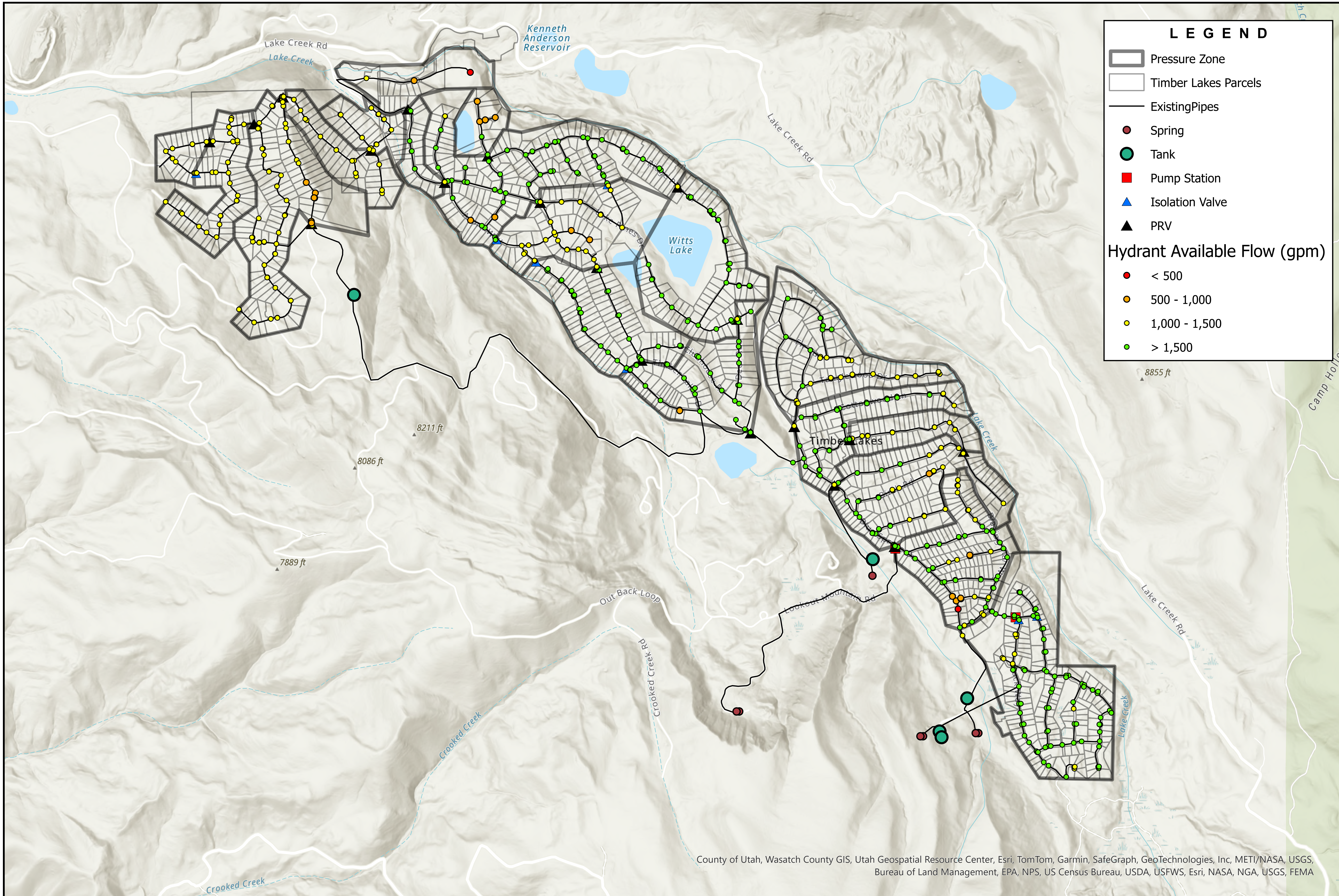

SCALE: 1 in = 2,000 ft

NORTH:

BUILDOUT FIRE FLOW PERFORMANCE

TIMBER LAKES WATER SPECIAL SERVICE DISTRICT

WATER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO. 5-3

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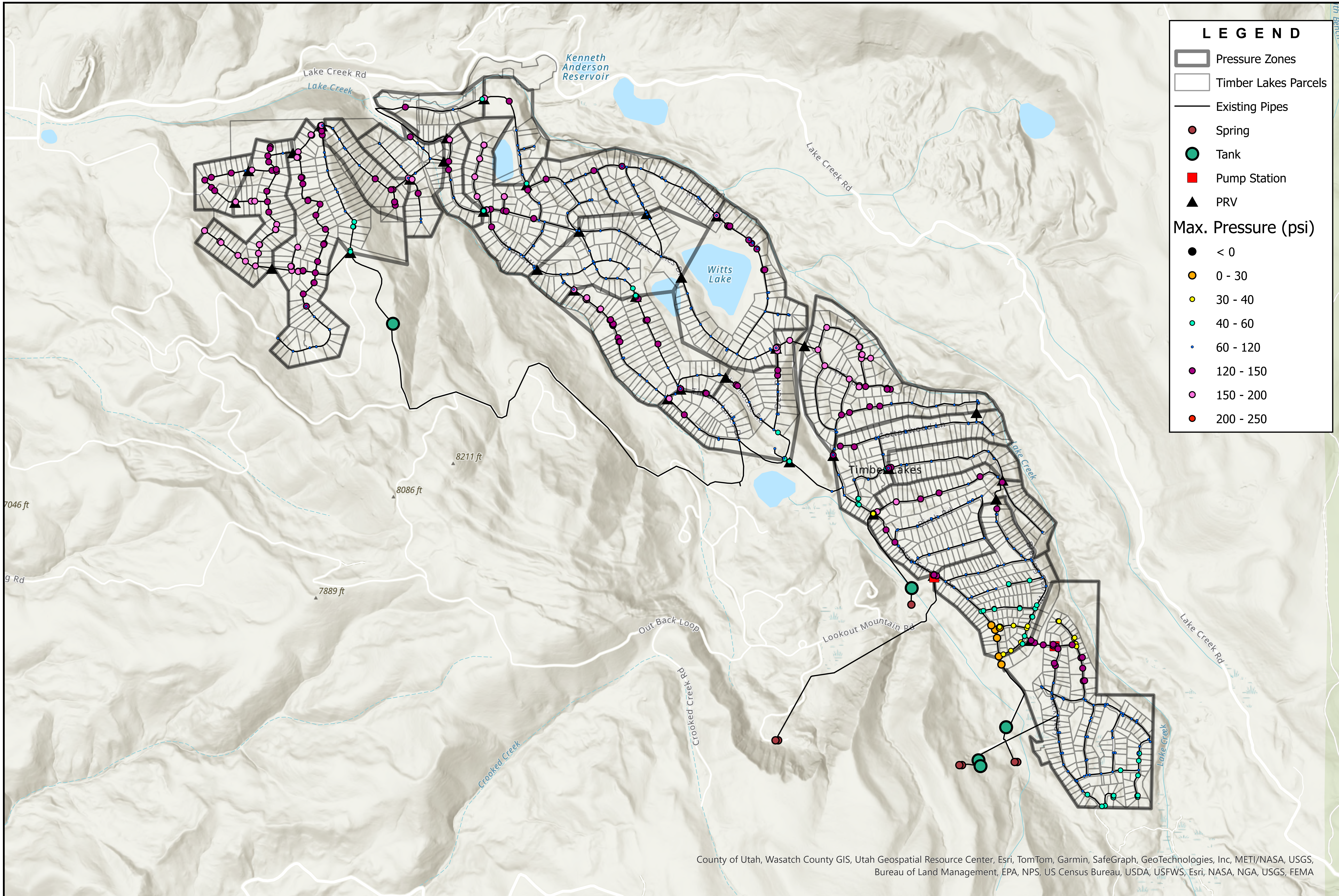

SCALE: 1 in = 2,000 ft

NORTH:

IMPROVED BUILDOUT SYSTEM PERFORMANCE MAX. PRESSURES

TIMBER LAKES WATER SPECIAL SERVICE DISTRICT

WATER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO.

5-4

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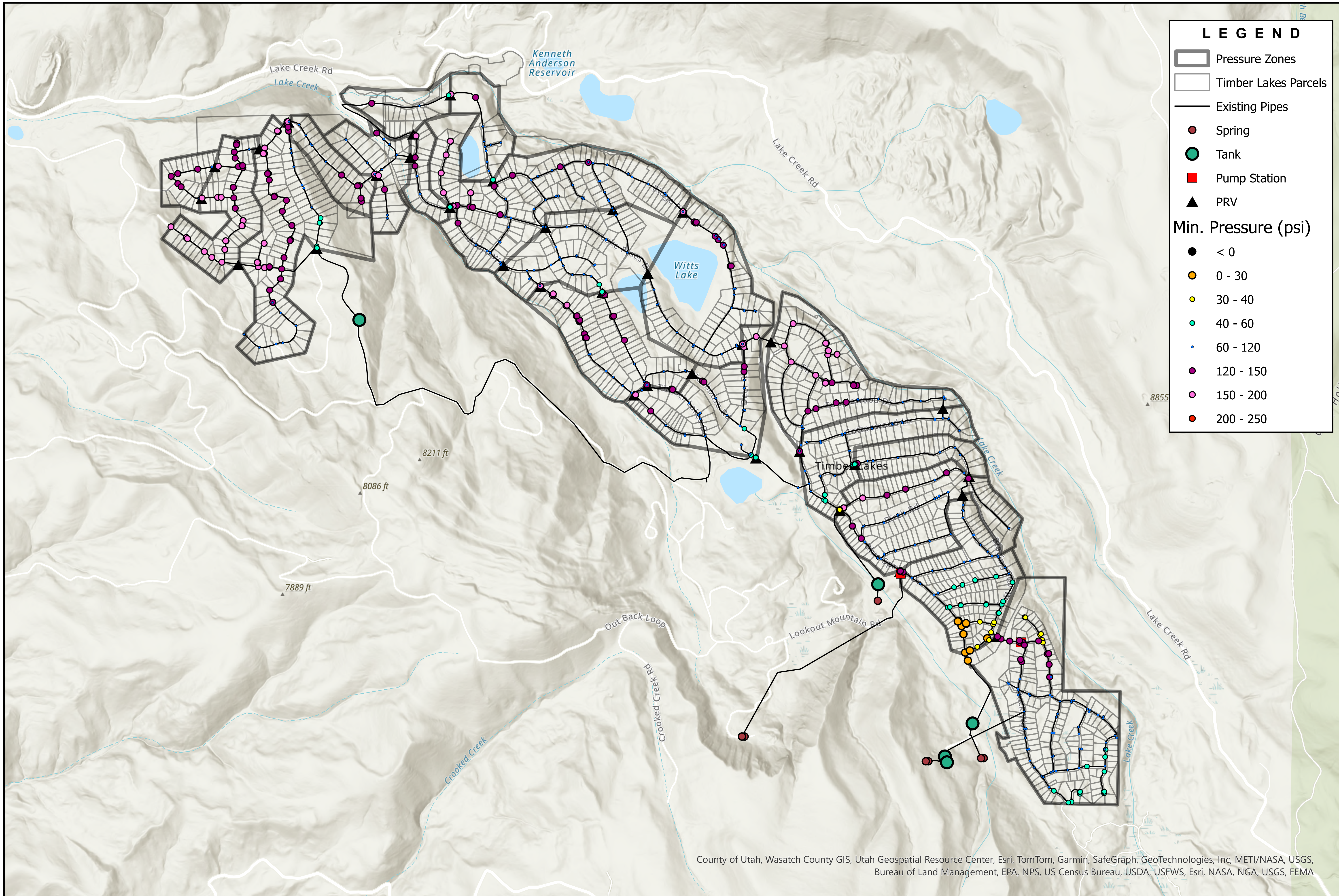

SCALE: 1 in = 2,000 ft

NORTH: NORTH

IMPROVED BUILDOUT SYSTEM PERFORMANCE MIN. PRESSURES

TIMBER LAKES WATER SPECIAL SERVICE DISTRICT

WATER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO.

5-5

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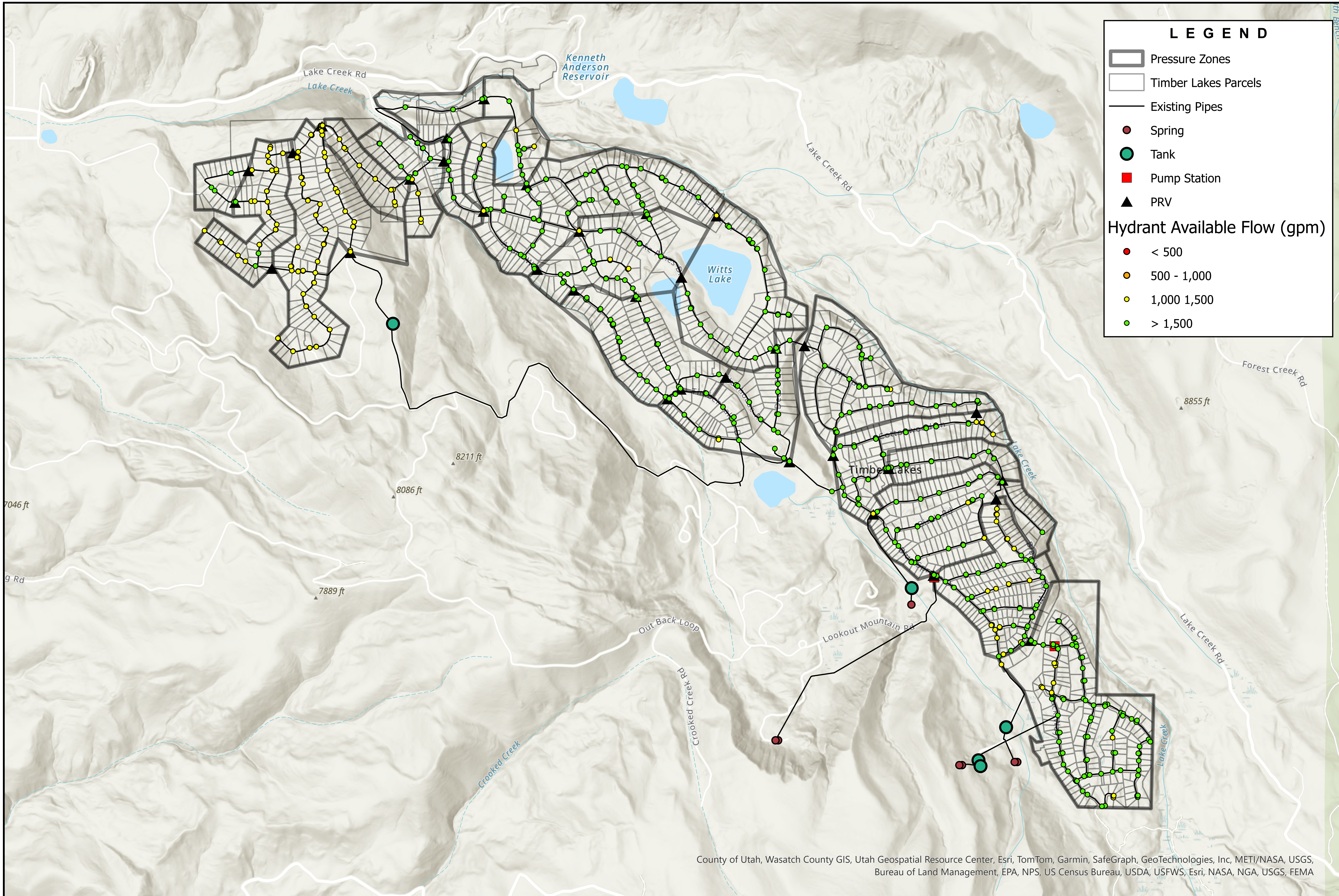

SCALE: 1 in = 2,000 ft

NORTH:

IMPROVED BUILDOUT FIRE FLOW PERFORMANCE

TIMBER LAKES WATER SPECIAL SERVICE DISTRICT

WATER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO.

5-6

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CHAPTER 6
CAPITAL FACILITIES PLAN

INTRODUCTION

The purpose of this chapter is to summarize recommended TLWSSD culinary water distribution system improvements and present a cost estimate for all the recommended improvements discussed in this report.

PRESSURE ZONE DEVELOPMENT

BC&A worked with District staff to develop pressure zone concepts for the District's service area. Figure 6-1 shows the planned buildout pressure zones and their respective parameters.

RECOMMENDED IMPROVEMENTS

Figure 6-2 shows the approximate location of improvements recommended to meet future growth in TLWSSD's service area through buildout. Detailed lists of identified capital projects and related information such as preliminary sizing, lengths, and elevations, as well as other appropriate details have been identified and summarized in this chapter. The projects are organized by project type.

Booster Station Improvements

Table 6-1 summarizes the booster station improvements.

Table 6-1
Booster Station Improvements

Project Identifier	Project Name	Design Capacity (gpm)
B-1	West Side Booster	100

B-1. This project includes a new booster station to pump water from a new spring (S-3) to the existing Ridgeline Tank.

Distribution System Improvements

Table 6-2 summarizes the distribution system improvements, along with design parameters of each project.

Table 6-2
Distribution System Improvements

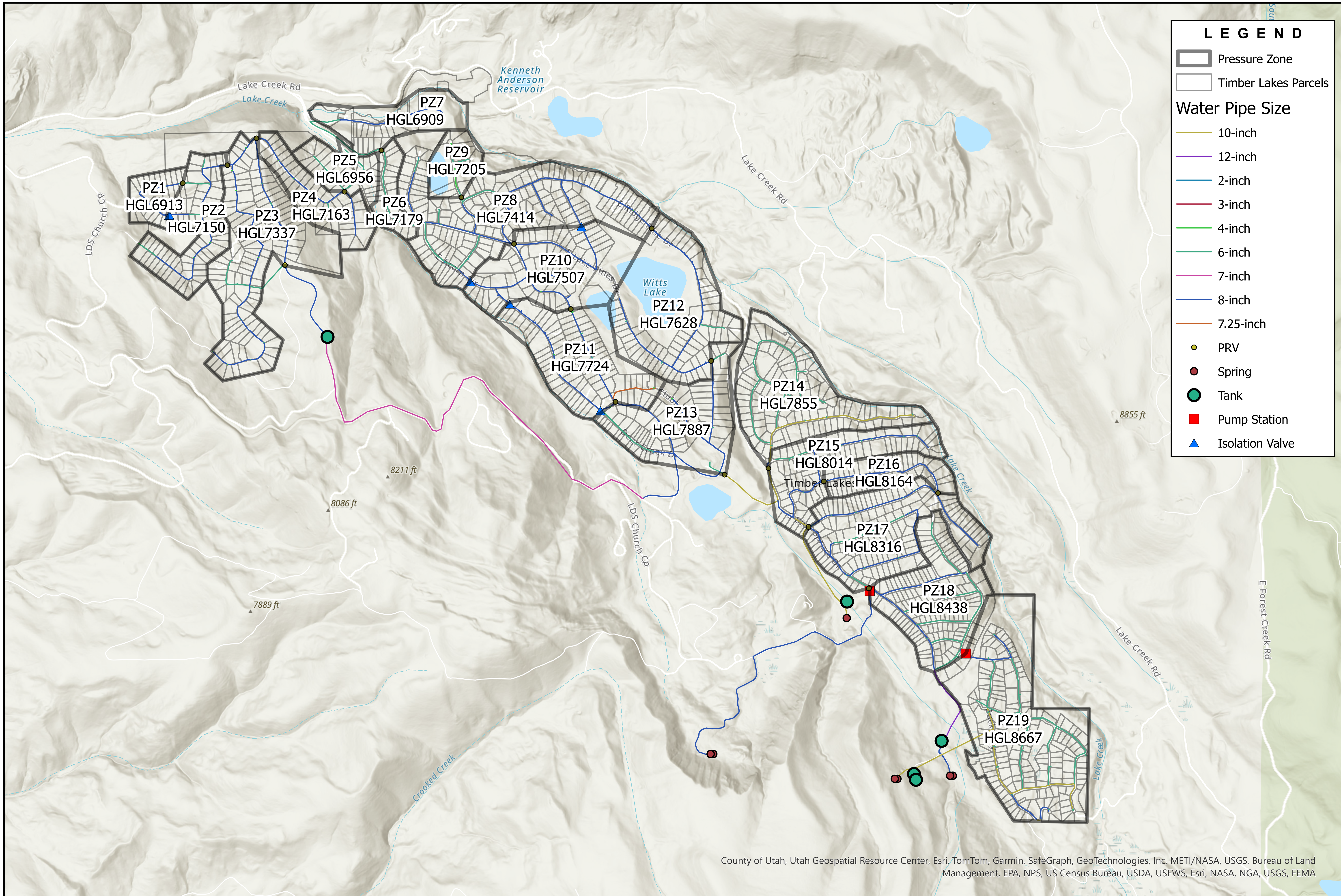
Project Identifier	Project Name	Approximate Length (feet)	Diameter (inches)
P-1	Upper Lone Pine Feed Line and Overflow Line	3,320	10 and 12
P-2	Distribution Piping	5,00	8
P-3	West Side Pump Line	2,670	8
P-4	Cove Springs to Lookout Mountain Connection	500	8

P-1. This project includes two new HDPE water pipelines to replace existing water pipelines. The first water pipeline is a new 12-inch pipeline from the Upper Lone Pine Concrete Tank to the system at Buck Way. The second water pipeline is a new 10-inch pipeline from the Upper Lone Pine Concrete Tank to the Lower Lone Pine Steel Tank.

P-2. This project includes replacing existing pipe throughout the service area due to lack of cover or the pipeline needing to be upsized. The pipelines that are upsized as part of this project will help with relieving the fire flow deficiencies throughout the service area.

P-3. This project includes a new water pipeline from a future spring (S-3) and future booster station (B-1) to the existing Ridgeline Tank.

P-4. This project includes a new water pipeline from the existing Cove Springs distribution pipeline to the Lookout Mountain springs pipeline. This project will need a new vault where the new pipeline connects to the existing Cove Springs pipeline and will need a Pressure Sustaining Valve to control overflow. The purpose of this project is to send water from the Cove Springs to the Lookout Mountain tank so that the water from Cove Springs can be chlorinated.



SCALE: 1 in = 2,000 ft

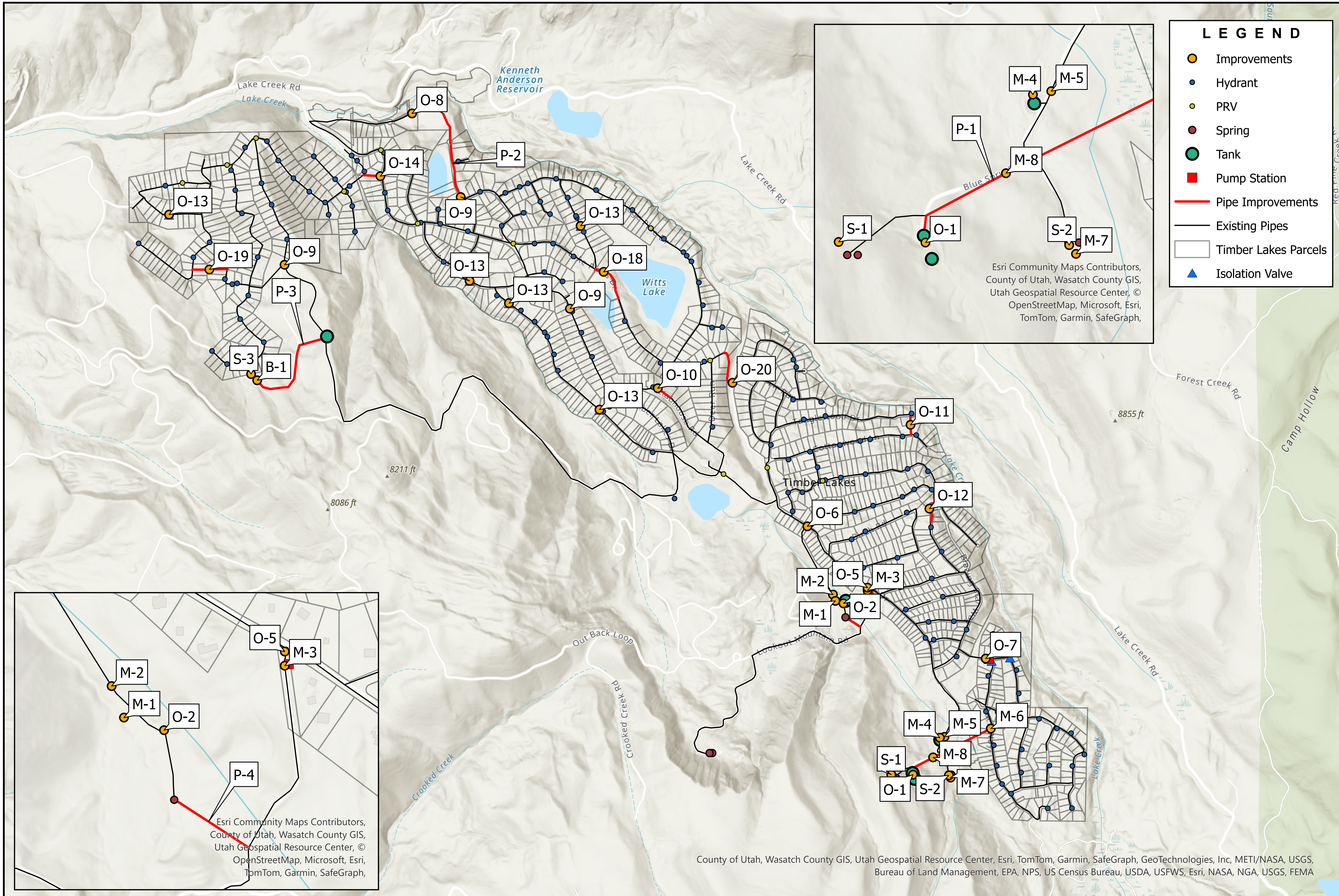
NORTH:

CULINARY PRESSURE ZONES

TIMBER LAKES WATER SPECIAL SERVICE DISTRICT
WATER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO.
6-1



SCALE: 1 in = 2,000 ft

NORTH:

CULINARY SYSTEM IMPROVEMENTS

TIMBER LAKES WATER SPECIAL SERVICE DISTRICT

WATER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO. 6-2

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Meter Improvements

Table 6-3 summarizes the meter improvements, along with design parameters of each project.

Table 6-3
Meter Improvements

Project Identifier	Project Name	Meter Type
M-1	Lookout Mountain Overflow Meter	Magnetic
M-2	Lookout Mountain Distribution Meter	Magnetic
M-3	Cove Distribution Meter	Magnetic
M-4	Lower Lone Pine Overflow Meter	Magnetic
M-5	Lower Lone Pine Distribution Meter	Magnetic
M-6	Upper Lone Pine Distribution Meter	Magnetic
M-7	Lone Pine Church Meter	Magnetic
M-8	Lone Pine Chlorination Meter	Magnetic

M-1. This project includes a new meter vault to replace the existing meter vault at the Lookout Mountain Tank overflow.

M-2. This project includes a new meter vault to replace the existing meter vault that is between the Lookout Mountain Tank and the distribution system.

M-3. This project includes a new meter vault to replace the existing meter vault that is between the cove springs and the distribution system.

M-4. This project includes a new meter vault to replace the existing meter vault at the Lower Lone Pine Tank overflow.

M-5. This project includes a new meter vault to replace the existing meter vault that is between the Lower Lone Pine Tank and the distribution system.

M-6. This project includes a new meter vault to replace the existing meter vault that is between the Upper Lone Pine Tanks and the distribution system.

M-7. This project includes a new meter vault to replace the existing meter vault that is between the church's springs and the Lower Lone Pine Tank.

M-8. This project includes a new meter vault to replace the existing meter vault that is between the Upper Lone Pine Tanks and the Lower Lone Pine Tank.

Source Improvements

Table 6-4 summarizes the source improvements.

Table 6-4
Source Improvements

Project Identifier	Project Name
S-1	Lone Pine Spring #7 Development
S-2	Lone Pine Spring #2 Rehabilitation
S-3	West Side Spring Development
S-4	Spring Development

S-1. This project includes a new spring box and spring development near the Upper Lone Pine Concrete Tank. The development of a new spring will provide another source for the District that they know is available to capture.

S-2. This project includes rehabilitating an existing spring near the existing Lower Lone Pine chlorination building. The existing spring is producing far less water than when it was originally developed, so the District would like to make improvements to the production of this spring.

S-3. This project includes a new spring box and spring development near the Ridgeline Tank. The development of a new spring will provide another source for the District that they know is available to capture.

S-4. This project includes a new spring box and spring development near the Upper Lone Pine Concrete Tank. The development of a new spring will provide another source for the District that they know is available to capture.

Other System Improvements

There are additional system level improvements that are included in this culinary water master plan, which are shown in Table 6-5.

Table 6-5
Other System Improvements

Project Identifier	Project Name
O-1	Upper Lone Pine Chlorination Building
O-2	Lookout Mountain Chlorination Building
O-3	Telemetry
O-4	Cove/Lookout Mountain Supply Capture Study
O-5	Cove Springs PRV to PSV
O-6	Lookout Mountain Spring PRV to PSV
O-7	Racoon Pump Station PRV
O-8	Pressure Zone 9 to 7 PRV
O-9	PRV Adjustments
O-10	Pressure Zone 13 to 11 PRV
O-11	Pressure Zone 15 to 14 PRV

Project Identifier	Project Name
O-12	Pressure Zone 18 to 17 PRV
O-13	Replace Isolation Valves with PRVs
O-14	Pressure Zone 5 to 6 PRV
O-15	Flow Meters at Existing PRVs
O-16	Racoon Pump Station Backup Generator
O-17	Cove Pump Station Backup Generator
O-18	Pressure Zone 10 to 12 PRV
O-19	Pressure Zone 2 to 3 PRV
O-20	Pressure Zone 13 to 14 PRV

O-1. This project includes a new gas chlorination building at the outlet of the Upper Lone Pine Concrete Tank. This project is necessary for proper disinfection of the untreated spring water that flows to this tank.

O-2. This project includes a new gas chlorination building at the outlet of the Lookout Mountain Tank. This project is necessary for proper disinfection of the untreated spring water that flows to this tank.

O-3. This project includes new telemetry and SCADA throughout the service area. This project would improve the data that is being gathered by the District from the infrastructure in their system.

O-4. This project includes a study to better understand the supply capture at the Cove and Lookout Mountain springs. As part of projects O-5 and O-6, all water that is produced from the Cove springs will flow to the Lookout Mountain Tank rather than spilling at the springs, so it is important for the District to understand the production from the Cove springs and Lookout Mountain spring. This project should get started after the District has obtained about one years' worth of data from the Water System Capital Project meters.

O-5. This project includes converting the existing Cove springs PRV to a Pressure Sustaining Valve (PSV). The existing PRV vault has one small PRV (2-inch) and one large PRV (6-inch). The small PRV would be converted to a PSV and the vault will still have the large PRV. This will allow the District to not have to replace the existing overflow meters and vaults at the existing Cove Springs. The water from the Cove Springs will be sent to the Lookout Mountain Tank and the overflow will be metered there. The CLA-VAL PSV model number is 50-90. This project must be done in conjunction with project O-6.

O-6. This project includes converting the existing Lookout Mountain springs PRV to a PSV. The existing PRV vault has one small PRV (2-inch) and one large PRV (6-inch). The small PRV would be converted to a PSV and the vault still needs to have an emergency PRV so that if PZ 15 has really low pressures then water can be supplied to this zone. This will allow the District to not have to replace the existing overflow meters and vaults at the existing Cove Springs. The water from the Cove Springs will be sent to the Lookout Mountain Tank and the overflow will be metered there. The CLA-VAL PSV model number is 50-90. This project must be done in conjunction with project O-5.

O-7. This project includes a new PRV vault at the existing Racoon Pump Station. This will allow water to bleed down from PZ 19 to PZ 18, which allows the District to send any extra water from the highest zone in the system down to lower zones in a fire flow event. This PRV will need to be set so that it opens when the PZ 18 HGL drops much below the normal conditions HGL.

O-8. This project includes a new PRV vault from PZ 9 to PZ 7 and the necessary piping that goes from the two zones. This will allow a secondary connection into pressure zone 7 from pressure zone 9 and allow for better fire flow delivery.

O-9. This project includes adjusting the setting up at the PRV between PZ 11 and 10, at the PRV between PZ 9 and 8, and at the PRV between the Ridgeline Tank and PZ 3. Targeting the right setting will be an iterative process in the field. This project will make it so that a few junctions in each of these pressure zones can have better fire flow.

O-10. This project includes a new PRV vault from PZ 13 to PZ 11 and the necessary piping that goes from the two zones. This would allow a secondary connection between the two pressure zones and allow for better fire flow delivery.

O-11. This project includes a new PRV vault from PZ 15 to PZ 14 and the necessary piping that goes from the two zones. This would allow a secondary connection between the two pressure zones and allow for better fire flow delivery.

O-12. This project includes a new PRV vault from PZ 18 to PZ 17 and the necessary piping that goes from the two zones. This would allow a secondary connection between the two pressure zones and allow for better fire flow delivery.

O-13. This project includes replacing all of the isolation valves in the system with PRV vaults. This would allow a secondary connection between the two pressure zones and allow for better fire flow delivery.

O-14. This project includes a new PRV vault from PZ 5 to PZ 6 and the necessary piping that goes from the two zones. This would allow a secondary connection between the two pressure zones and allow for better fire flow delivery.

O-15. This project includes new flow meter vaults at all of the existing PRVs in the service area. This would allow the District to monitor flows at each of the system PRVs.

O-16. This project includes a new backup generator at the existing Racoon Pump Station. The existing pump station does not have backup power and it is crucial that this pump station can still operate when the power is shut off.

O-17. This project includes a new backup generator at the existing Cove Pump Station. The existing pump station does not have backup power and it is crucial that this pump station can still operate when the power is shut off.

O-18. This project includes a new PRV vault from PZ 10 to PZ 12 and the necessary piping that goes from the two zones. This would allow a secondary connection between the two pressure zones and allow for better fire flow delivery.

O-19. This project includes a new PRV vault from PZ 2 to PZ 3 and the necessary piping that goes from the two zones. This would allow a secondary connection between the two pressure zones and allow for better fire flow delivery.

O-20. This project includes a new PRV vault from PZ 13 to PZ 14 and the necessary piping that goes from the two zones. This would allow a secondary connection between the two pressure zones and allow for better fire flow delivery.

Water System Capital Project

The District has designed and selected a contractor through the bidding process for a project called the Water System Capital Project. This project includes the following projects that are listed above:

- P-1
- M-1 through M-8
- O-5 and O-6

This project will begin construction in late spring and summer of 2025. This project's design and construction is being funded by a Utah Division of Drinking Water State SRF Loan that has 0% interest.

PROJECT COSTS AND IMPROVEMENTS SUMMARY

The anticipated cost and the expected timing of each recommended project for TLWSSD's culinary water system have been summarized in Table 6-6. Costs were estimated in 2025 dollars. We also recommend that an update to this master plan and its associated analyses be completed every three to five years to keep up with actual development patterns during the expected period of rapid growth.

Table 6-6
Culinary Water System Project Costs

Project Identifier	Project Name	Estimated Construction Timing	Total Project Cost
Booster Station Improvements			
B-1	West Side Booster	>10 years	$600,000
		Subtotal	**$600,000**
Distribution System Improvements			
P-1*	Upper Lone Pine Feed Line and Overflow Line	0-5 years	$1,640,000
P-2	Distribution Piping	5-10 years	$200,000
P-3	West Side Pump Line	>10 years	$750,000
P-4	Cove Springs to Lookout Mountain Connection	5-10 years	$350,000
		Subtotal	**$2,940,000**
Meter Improvements			
M-1*	Lookout Mountain Overflow Meter	0-5 years	$65,000
M-2*	Lookout Mountain Distribution Meter	0-5 years	$70,000
M-3*	Cove Distribution Meter	0-5 years	$70,000
M-4*	Lower Lone Pine Overflow Meter	0-5 years	$65,000
M-5*	Lower Lone Pine Distribution Meter	0-5 years	$80,000
M-6*	Upper Lone Pine Distribution Meter	0-5 years	$70,000

Project Identifier	Project Name	Estimated Construction Timing	Total Project Cost
M-7*	Lone Pine Church Meter	0-5 years	$70,000
M-8*	Lone Pine Chlorination Meter	0-5 years	$70,000
		Subtotal	**$560,000**
Source Improvements			
S-1	Lone Pine Spring #7 Development	0-5 years	$450,000
S-2	Lone Pine Spring #2 Rehabilitation	0-5 years	$350,000
S-3	West Side Spring Development	>10 years	$500,000
S-4	Spring Development	>10 years	$500,000
		Subtotal	**$1,800,000**
Other System Improvements			
O-1	Upper Lone Pine Chlorination Building	5-10 years	$600,000
O-2	Lookout Mountain Chlorination Building	5-10 years	$600,000
O-3	Telemetry	0-5 years	$200,000
O-4	Cove/Lookout Mountain Supply Capture Study	0-5 years	$50,000
O-5*	Cove Springs PRV to PSV	0-5 years	$20,000
O-6*	Lookout Mountain Spring PRV to PSV	0-5 years	$20,000
O-7	Racoon Pump Station PRV	5-10 years	$100,000
O-8	Pressure Zone 9 to 7 PRV	5-10 years	$450,000
O-9	PRV Adjustments	0-5 years	$50,000
O-10	Pressure Zone 13 to 11 PRV	5-10 years	$300,000
O-11	Pressure Zone 15 to 14 PRV	5-10 years	$350,000
O-12	Pressure Zone 18 to 17 PRV	5-10 years	$400,000
O-13	Replace Isolation Valves with PRVs	5-10 years	$600,000
O-14	Pressure Zone 5 to 6 PRV	5-10 years	$350,000
O-15	Flow Meters at Existing PRVs	>10 years	$2,500,000
O-16	Racoon Pump Station Backup Generator	>10 years	$200,000
O-17	Cove Pump Station Backup Generator	>10 years	$200,000
O-18	Pressure Zone 10 to 12 PRV	5-10 years	$450,000
O-19	Pressure Zone 2 to 3 PRV	5-10 years	$400,000
O-20	Pressure Zone 13 to 14 PRV	5-10 years	$600,000
		Subtotal	**$8,440,000**
		Total	**$14,340,000**

*Indicates a project that is part of the Water System Capital Project. The total loan amount is $2.2 million.

IMPLEMENTATION PLAN

It is important for the District to implement the projects that are recommended in this master plan that the District deems are necessary to operate and maintain their water system. The following are items that are important for the District's implementation of the recommended master plan projects:

- **Water System Capital Project.** The District has selected a contractor to construct the recommended Water System Capital Project. The District decided to raise rates as part of taking on the zero interest state SRF loan to fund this project. Once construction has commenced on this project, the District will need to allocate resources for staffing and keeping this project on schedule to be completed in 2025. This is the first step in the right direction for the implementation of projects.
- **Funding Sources.** The District's most reliable and direct source of income for funding the recommended projects in this master plan are water rates. The District adopted a rate study in the early months of 2023, which recommended raising water rates to fund the Water System Capital Project through a zero interest state SRF loan. The District will need to continually update their rate study, which will include raising rates so that the District can fund the recommended projects. The District will need to stay on top of applying for grants and loans that they are qualified for to fund the recommended projects. It may be beneficial for the District to lump a handful of projects together when obtaining grants or loans to complete more projects with the funding that becomes available.
- **Administration.** The District will need to have adequate staffing for managing the design, bidding, and construction of the recommended projects in this master plan. The District will need to plan ahead to hire the correct amount of staff to adequately manage and complete these projects. It is recommended that the District complete a budgetary schedule showing year by year which projects will be active and how much funding will need to go towards those projects. This budgetary schedule should include at least ten years of scheduling and it will help the District plan ahead with their budget to get these projects completed.

CONCLUSIONS AND RECOMMENDATIONS

With the analysis underlying this master plan complete, the following are a summary of the principal conclusions and recommendations.

- **Adopt Master Plan with Capital Improvement Plan.** The capital improvement plan summarized in Table 6-6 represents the best available assessment of District capital needs in the upcoming years. It is recommended that this plan be adopted for budgeting, staffing, and financial planning purposes.
- **Improve Data Gathering and Organization.** Currently the District is relatively limited in its historical production data, and this adds an additional level of uncertainty to the projections shown in this master plan. Therefore, the District should pursue its current initiatives to gather, consolidate, organize, and make visible its source data as part of the Water System Capital Project. Doing so will support greater accuracy in District sizing standards and in future updates to this master plan. This will also allow for better prioritization of projects intended to increase source capacity.
- **Water System Capital Project Completion.** Once the Water System Capital Project has completed construction at the end of 2025, the District will be able to better understand the annual production from their springs. Once this project is completed, the District will need to gather meter data from the springs and keep organized records of this data. It is recommended that the District conduct a supply analysis after one year of data collection. The supply analysis should compare the water demand projections in this master plan with the available supply (including the need for a supply buffer).
- **System Performance.** The District's distribution system is performing well for existing conditions and buildout conditions according to the hydraulic model that was created as part

of this master plan. There are some areas that have maximum pressures above 150 psi scattered through the service area. There are isolated areas of the service area can't meet the fire flow requirements of 20 psi pressure at 1,000 gpm. Therefore, it is recommended that the District prioritize the completion of the following projects to improve the fire flow conditions within the service area: P-2, P-3, S-3, S-4, O-7, O-8, O-10, O-11, O-12, O-13, O-14, O-18, O-19, and O-20.

- **Prepare to Adequately Fund Projects.** To facilitate the completion of the proposed projects, the District will need to budget accordingly. The District will need to continually manage budgets and water rates to ensure adequate funding. Also, the District should be on the lookout for alternative funding opportunities such as advantageous loans and grants to help fund these proposed projects (just like they did on the Water System Capital Project).
- **Update This Master Plan Regularly.** This water master plan should be viewed as a living document. The conclusions contained herein are based on several assumptions that will assuredly change from time to time. As changes occur in these areas, the conclusions and recommendations in this report may need to be revised. For this reason, it is recommended that this study be updated every 3-5 years during this time of steady growth. Doing so will capture changes in growth patterns, costs, and system construction.

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