



CITY COUNCIL REGULAR MEETING

Tuesday, January 19, 2021, at 7:00 PM
Court Room/Council Chambers (2nd Floor) and Online

MEETINGS HELD ONLINE ONLY

Pursuant to recent updates from the Utah State Department of Health regarding the number of people allowed to gather physically for a public meeting, there will be no in-person participation. The public is invited to participate electronically as outlined below:

- **YouTube Live** – Public meetings will be shown live on the Santaquin City YouTube Channel, which can be found at https://www.youtube.com/channel/UCTzZT_yW2H2Hd-58M2_ddSw or by searching for Santaquin City Channel on YouTube.

PUBLIC COMMENT & PUBLIC HEARING PARTICIPATION

As with all City Council and Planning Commission Meetings, we will continue to invite the public to provide “Public Comment” (30-minute duration, maximum of 5-minutes per comment). We will also continue to hold Public Hearings, as needed, and required on specific issues. We invite the public to provide comment in the following ways:

- **By Email** – Comments will be accepted by email up to 5:00 P.M. on the date of the meeting. Comments will be read during the meeting and made part of the official record of the city. Comments should be submitted to PublicComment@Santaquin.org
- **By Telephone** – For those who would like to have their own voice heard during the Public Comment or Public Hearing periods, please submit an email to PublicComment@Santaquin.org providing us your Telephone Number.

ADA NOTICE

If you are planning to attend this Public Meeting and, due to a disability, need assistance in understanding or participating in the meeting, please notify the City Office ten or more hours in advance and we will, within reason, provide what assistance may be required.

AGENDA

ROLL CALL

PLEDGE OF ALLEGIANCE

INVOCATION / INSPIRATIONAL THOUGHT

DECLARATION OF ANY CONFLICT OF INTEREST

CONSENT AGENDA (MINUTES, BILLS, ITEMS)

Minutes

- [1.](#) January 5th, 2021 - Council Work Session Minutes
- [2.](#) January 5th, 2021 - Council Regular Meeting Minutes

Bills

- [3.](#) Invoice Register - 01/02/2021 - 01/15/2021 - \$808,110.63

Items

- [4.](#) Resolution 01-02-2021, "A Resolution Approving an Infrastructure Deferral Agreement for the Sorenson 2-Lot Subdivision"
- [5.](#) Resolution 01-04-2021, "A Resolution Approving a Board Member to the South Utah Valley Animal Shelter to Represent Santaquin City"
- [6.](#) Resolution 01-05-2021, "A Resolution Approving a Technical Planning Assistance Program Funds Cooperative Agreement with the Utah Department of Transportation (UDOT)"

PUBLIC FORUM, BID OPENINGS, AWARDS, AND APPOINTMENTS

Public Forum

Awards

FORMAL PUBLIC HEARING

7. PUBLIC HEARING REGARDING AN ORDINANCE ADOPTING THE CITY DRINKING WATER MASTER PLAN AND CAPITAL FACILITY PLAN; ADOPTING THE CITY DRINKING WATER IMPACT FEE FACILITIES PLAN AND IMPACT FEE ANALYSIS; ADOPTING DRINKING WATER IMPACT FEES; ADOPTING CERTAIN POLICIES RELATED TO IMPACT FEES; AND ESTABLISHING A SERVICE AREA FOR PURPOSES OF IMPACT FEES
8. PUBLIC HEARING REGARDING AN ORDINANCE ADOPTING THE CITY PRESSURE IRRIGATION MASTER PLAN AND CAPITAL FACILITY PLAN; ADOPTING THE CITY PRESSURE IRRIGATION IMPACT FEE FACILITIES PLAN AND IMPACT FEE ANALYSIS; ADOPTING PRESSURE IRRIGATION IMPACT FEES; ADOPTING CERTAIN POLICIES RELATED TO IMPACT FEES; AND ESTABLISHING A SERVICE AREA FOR PURPOSES OF IMPACT FEES

BUILDING PERMIT & BUSINESS LICENSE REPORT

NEW BUSINESS

Resolutions

- [9.](#) Resolution 01-03-2021, "A Resolution Approving the Consolidated Fee Schedule for Santaquin City"

Ordinances

- [10.](#) Ordinance 01-01-2021, "AN ORDINANCE ADOPTING THE CITY DRINKING WATER MASTER PLAN AND CAPITAL FACILITY PLAN; ADOPTING THE CITY DRINKING WATER IMPACT FEE FACILITIES PLAN AND IMPACT FEE ANALYSIS; ADOPTING DRINKING WATER IMPACT FEES; ADOPTING CERTAIN POLICIES RELATED TO IMPACT FEES; AND ESTABLISHING A SERVICE AREA FOR PURPOSES OF IMPACT FEES"
- [11.](#) Ordinance 01-02-2021 "AN ORDINANCE ADOPTING THE CITY PRESSURE IRRIGATION MASTER PLAN AND CAPITAL FACILITY PLAN; ADOPTING THE CITY PRESSURE IRRIGATION IMPACT FEE FACILITIES PLAN AND IMPACT FEE ANALYSIS; ADOPTING PRESSURE IRRIGATION IMPACT FEES; ADOPTING CERTAIN POLICIES RELATED TO IMPACT FEES; AND ESTABLISHING A SERVICE AREA FOR PURPOSES OF IMPACT FEES"
- [12.](#) Ordinance 01-03-2021, "AN ORDINANCE GRANTING A FRANCHISE TO QWEST COMMUNICATIONS D/B/A CENTURYLINK QC ON BEHALF OF ITSELF AND ITS OPERATING AFFILIATES ("CENTURYLINK") TO OPERATE AND MAINTAIN A

TELECOMMUNICATIONS SYSTEM ("THE SYSTEM") IN THE CITY OF SANTAQUIN, UTAH ("THE CITY")."

Discussion & Possible Action

REPORTS OF OFFICERS, STAFF, BOARDS, AND COMMITTEES

City Manager Benjamin Reeves

Assistant City Manager Norm Beagley

Community Development Director Jason Bond

REPORTS BY MAYOR AND COUNCIL MEMBERS

Mayor Hunsaker

Council Member Miller

Council Member Montoya

Council Member Mecham

Council Member Hathaway

Council Member Bowman

EXECUTIVE SESSION (May be called to discuss the character, professional competence, or physical or mental health of an individual)

EXECUTIVE SESSION (May be called to discuss the pending or reasonably imminent litigation, and/or purchase, exchange, or lease of real property)

ADJOURNMENT

CERTIFICATE OF MAILING/POSTING

The undersigned duly appointed City Recorder for the municipality of Santaquin City hereby certifies that a copy of the foregoing Notice and Agenda was e-mailed to the Payson Chronicle, Payson, UT, 84651, posted on www.santaquin.org, as well as posted on the State of Utah's Public Website.

BY: 
K. Aaron Shirley, City Recorder



CITY COUNCIL WORK SESSION MEETING

Tuesday, January 05, 2021, at 5:30 PM
Court Room/Council Chambers (2nd Floor) and Online

Minutes

ROLL CALL

PRESENT

Mayor Kirk Hunsaker
Council Member Nick Miller
Council Member Betsy Montoya
Council Member Lynn Mecham
Council Member David Hathaway
Council Member Jennifer Bowman

INVOCATION/INSPIRATIONAL THOUGHT

Offered by Council Member Lynn Mecham.

DISCUSSION ITEMS

Discussion Regarding Future Cemetery Expansion - Wade Eva & Jason Callaway

Public Works Director Jason Callaway gave a presentation on the needs for cemetery expansion and the proposed plans which included sections designated for upright headstones and flush headstones to allow for easier access for maintenance by the public works employees. Council gave their approval for the designs and plans.

Discussion Regarding FY2021-2022 Budget Planning Schedule - Ben Reeves

City Manager Reeves asked the Council if Saturday February 6th, 2021 worked for the Annual Staff-Council Budget Planning Meeting. Council gave approval for February 6th and the use of the Public Safety Training room for the meeting.

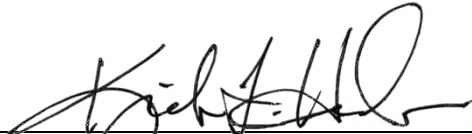
Annual City Council Training

City Manager Reeves shared concepts that he learned from a video from the Utah League of Cities and Towns about the role of City Council's in the City budget planning process. The values a City Council has, as a whole and as individuals, are reflected in the dollars spent in the City Budget and in Santaquin those values are expressed in the importance of Public Safety and Public Works. Reeves went over the Budget Book and the importance of understanding the decisions made by the city in the context of the whole budget to understand why those decisions were made. Council Member Montoya asked if the meeting could be stretched to Friday night and Saturday morning/afternoon to allow for time of the Council to digest the information presented by the department directors and it was agreed that it would be done that way.


ADJOURNMENT

Meeting adjourned at 6:28 p.m. by Mayor Hunsaker.

ATTEST:



Kirk Hunsaker, Mayor



K. Aaron Shirley, City Recorder



CITY COUNCIL REGULAR MEETING

Tuesday, January 05, 2021, at 7:00 PM
Court Room/Council Chambers (2nd Floor) and Online

Minutes

ROLL CALL

PRESENT

Mayor Kirk Hunsaker
Council Member Nick Miller
Council Member Betsy Montoya
Council Member Lynn Mecham
Council Member David Hathaway
Council Member Jennifer Bowman

PLEDGE OF ALLEGIANCE

Led by Jason Bond.

INVOCATION / INSPIRATIONAL THOUGHT

Invocation offered by Mayor Kirk Hunsaker.

1. State of the City Address - Mayor Kirk F. Hunsaker
Mayor Kirk Hunsaker gave his State of the City Address.

CONSENT AGENDA (MINUTES, BILLS, ITEMS)

Minutes

2. December 15, 2020 - Council Work Session Minutes
3. December 15, 2020 - Council Regular Meeting Minutes

Bills

4. Invoice Register - 12/12/2020 - 01/01/2021 - \$282,293.44

Motion made by Council Member Miller to approve the consent agenda.

Seconded by Council Member Mecham.

Voting Yea: Council Member Miller, Council Member Montoya, Council Member Mecham,
Council Member Hathaway, Council Member Bowman

PUBLIC FORUM, BID OPENINGS, AWARDS, AND APPOINTMENTS

Public Forum

Name: Jeffrey Siddoway

Comment:

Esteemed Council Members:

Last month there was, yet again, a presentation in a City Council meeting regarding why Ranked Choice Voting should be used in Santaquin. This was presented once back in July, and I find it disappointing that it's been presented once again without a presentation providing the counter arguments on this issue. As such, I have felt compelled to provide the counter points to you and City residents. Below is an update to the points made against RCV back in July.

1) Proponents of RCV claim that with RCV "you would never ever not have 50% or higher" in voting. Regardless of the blatant double negative, that is actually not true. In 2014 political scientists Craig Burnett and Vladimir Kogan analyzed RCV ballots from four elections in California and Washington - making up around 600,000 ballots. They found that in those four races, not once did the winner receive a majority of votes cast. His "never ever" scenario can ONLY occur if every ballot ranks every single candidate, but many voters don't want to give some candidates any ranking at all, thus RCV often results in a winner with less than 50%.

2) Proponents claim that there "never ever is an opportunity for your ballot to not count in a meaningful way." Again, that simply isn't true based on the study mentioned above. This is for the same reasoning that winners don't always achieve 50%. It's called Ballot Exhaustion. If there are 5 candidates and I only rank my top three, because the last two are not viable options from my political position, in the 4th and 5th rounds of counting, I don't have a vote. That happens very often; in those four elections mentioned above, between 9.6 and 27% of first round ballots didn't make it through all of the rounds of counting. This concept is also based on the idea that if your candidate doesn't win, your vote didn't count in a meaningful way, which is an erroneous view of the democratic process in our Republic.

3) Australia, where RCV has been used for nearly a century, is a great example to actually see how RCV will work here. Nearly 90% of the candidates who win the first round go on to winning the election. Very rarely are end results much different than the first round. Why revamp an entire system just to get the same result? Beyond that, a closer look at the Australian political system, that supposed 10% improvement, isn't really an improvement. Australia does not have the two party system we have. They have multiple parties, but ultimately all of the parties fall under one of two larger umbrellas. Essentially, they ONLY have the illusion of more choices, and when the first round winner doesn't win the overall election, it is ALWAYS a candidate under the same overall umbrella as the first round winner. You get the exact same result, ideologically, just with a different face.

4) Proponents state that no primaries means a cheaper election. Well, possibly in the long run, but every new system comes with costs to educate the voters how it works, new ballots designs, with new machines and software to effectively count the ballots and votes in this system. Also, keeping track of these ballots naturally infuses the process to the follies of human error. I personally know people who's recent mail-in and in-person ballots have not been recorded by the State. We have enough human error in these elections as it is, we shouldn't add elements that would exploit that more than resolve it. Let's not forget the quagmire that this last election. The requirement of new devices and software is not something I will trust without question.

5) Finally, the idea that this will remove negative campaigning might be a good argument for State and National elections (though Australia proves that isn't the case,) but that is not a problem with small municipalities. When was the last time anyone in Santaquin witnessed a negative campaign from one candidate to another? I've seen only respect between candidates, whereas negativity only comes when addressing issues, which is an election aspect that we need to remain in place so that we fully understand the position of our candidates.

To be clear, regardless of whether or not Santaquin adapts RCV as the system of choice, I will continue to vote in every election and do all I can to promote voting among my neighbors. However, from my point of view here, it seems RCV is a solution looking for a problem, and the problems it has found are not solved by the solution it has proposed. We don't need a shiny new object to distract us, we need government officials to work with us for the betterment of our community.

Thank you.

Awards

5. Planning Commission: Jessica Tolman & Kyle Francom
 Museum Board: Jenny Fernelius, Keela Goudy, Elizabeth Robertson,
 Jake Kester & Kim Bahr
 Recreation Board: Jessica Tolman, Chad Finch, David Harris, Sara Olson,
 Spencer Hintze & Erin Jarrett

Mayor Hunsaker thanked those whose terms expired for their service on the various boards and commissions.

Appointments

6. Planning Commission:
 Commissioner Kylie Lance – (3-Year Term - Renewal)
 Commissioner Drew Hoffman – (3-Year Term - New Appointment)
 Commissioner BreAnna Nixon – (3-Year Term - New Appointment)
 Alternate Board Member – Brad Gunnell - (3-Year Term - New Position)
 Community Services Board:(Newly Formed Board with Staggered Terms)
 Board Chair – Kyle Vincent – (3-Year Term)
 Board Member – Sarah Olson – (3-Year Term)
 Board Member – David Harris – (2-Year Term)
 Board Member – Stephanie Taylor – (2-Year Term)
 Board Member – Jessica Tolman – (1-Year Term)
 Board Member – Keela Goudy – (1-Year Term)
 Board Member – Nick Miller – (Elected Representative)

Historic Preservation Committee:

- Alternate Board Member – Max Mitchell – (3-Year Term)

Mayor Hunsaker announced his new appointments to the various commissions and boards and looked to the Council for their approval.

Motion made by Council Member Bowman to approve the appointments.

Seconded by Council Member Montoya.

Voting Yea: Council Member Miller, Council Member Montoya, Council Member Mecham, Council Member Hathaway, Council Member Bowman

BUILDING PERMIT & BUSINESS LICENSE REPORT

Community Development Director Jason Bond showed the two new business licenses and the record number of total building permits for the year 2020.

NEW BUSINESS

Discussion & Possible Action

7. Construction Manager/General Contractor (CM/GC) Bid Award for the New City Office Building

Assistant City Manager Beagley described the process of selecting a general contractor and after 20 hours of deliberation Ellsworth-Paulsen Construction was chosen.

Motion made by Council Member Mecham to award the CM/GC Services for the new City Hall construction to Ellsworth-Paulsen Construction in an amount not to exceed \$337,898.

Seconded by Council Member Hathaway.

Voting Yea: Council Member Miller, Council Member Montoya, Council Member Mecham, Council Member Hathaway, Council Member Bowman

Resolutions

8. Resolution 01-01-2021 Consolidated Fee Schedule

City Manager Reeves explained that the changes to the Transportation Impact Fees in the Consolidated Fee Schedule were in connection to the updates to the Transportation Master Plan Update process after going through the public notice and hearing process given by state code.

Motion made by Council Member Montoya to approve Resolution 01-01-2021 Consolidated Fee Schedule.

Seconded by Council Member Miller.

Voting Yea: Council Member Miller, Council Member Montoya, Council Member Mecham, Council Member Hathaway, Council Member Bowman

REPORTS OF OFFICERS, STAFF, BOARDS, AND COMMITTEES

City Manager Benjamin Reeves

City Manager Reeves wanted to extend his appreciation to staff and especially public works crews who worked over holidays and weekends to ensure the roads around the city are clean and safe for residents.

Assistant City Manager Norm Beagley

Nothing to report.

Community Development Director Jason Bond

Nothing to report.

REPORTS BY MAYOR AND COUNCIL MEMBERS

Mayor Hunsaker

Echoed statements by Council Member Hathaway in thanking city staff for all of their work in 2020.

Council Member Miller

Getting ready to hire for another recreation position.

Council Member Montoya

Nothing to report.

Council Member Mecham

Nothing to report.

Council Member Hathaway

Wanted to thank city staff for all of their hard work during this interesting year of 2020.

Council Member Bowman

Nothing to report.

EXECUTIVE SESSION (May be called to discuss the character, professional competence, or physical or mental health of an individual)

Motion made by Council Member Miller to enter into an Executive Session to discuss the character, professional competence, or physical or mental health of an individual.

Seconded by Council Member Bowman.

Voting Yea: Council Member Miller, Council Member Montoya, Council Member Mecham, Council Member Hathaway, Council Member Bowman

EXECUTIVE SESSION (May be called to discuss the pending or reasonably imminent litigation, and/or purchase, exchange, or lease of real property)


ADJOURNMENT


Motion made by Council Member Bowman at 8:20 p.m. to leave the executive session and adjourn the City Council Meeting.

Seconded by Council Member Montoya.

Voting Yea: Council Member Miller, Council Member Montoya, Council Member Mecham, Council Member Hathaway, Council Member Bowman

ATTEST:



Kirk Hunsaker, Mayor

K. Aaron Shirley, City Recorder

SANTAQUIN CITY CORPORATION
Invoice Register - 1/2/2021 to 1/15/2021 - All Invoices

1/14/2021

<u>Invoice No.</u>	<u>Vendor</u>	<u>Check No.</u>	<u>Ledger Date</u>	<u>Due Date</u>	<u>Amount</u>	<u>Account No.</u>	<u>Account Name.</u>	<u>Description</u>
000102	ACE HARDWARE - SANTAQUIN	82590	1/11/2021	1/11/2021	\$13.18			
					13.18	7657240	FIRE - SUPPLIES	SUPPLIES
000104	ACE HARDWARE - SANTAQUIN	82590	1/11/2021	1/11/2021	\$4.59			
					4.59	7657240	FIRE - SUPPLIES	VELCRO
000117/1	ACE HARDWARE - SANTAQUIN	82491	1/4/2021	1/4/2021	\$232.29			
					232.29	1051300	BUILDINGS & GROUND MAIN	TOOLS
000118/1	ACE HARDWARE - SANTAQUIN	82551	1/5/2021	1/5/2021	\$21.99			
					21.99	5240240	SUPPLIES	8 PIECE SAWZALL BLADE SET
000119/1	ACE HARDWARE - SANTAQUIN	82590	1/11/2021	1/11/2021	\$15.99			
					15.99	7657247	COVID-19 RELATED EXPENDI	LAUNDRY ROOM SUPPLIES
000120/1	ACE HARDWARE - SANTAQUIN	82551	1/5/2021	1/5/2021	\$25.99			
					25.99	5140240	SUPPLIES	CM PEAR HD RATCHET
000121/1	ACE HARDWARE - SANTAQUIN	82551	1/5/2021	1/5/2021	\$50.93			
					50.93	5140240	SUPPLIES	STRING BEAD WIRE/HEX PLUGS/ CUP BRUSH 3"
000122/1	ACE HARDWARE - SANTAQUIN	82551	1/5/2021	1/5/2021	\$10.58			
					10.58	5140240	SUPPLIES	PUSH THR ADAPTER
000123/1	ACE HARDWARE - SANTAQUIN	82590	1/11/2021	1/11/2021	\$9.99			
					9.99	7657247	COVID-19 RELATED EXPENDI	LAUNDRY ROOM SUPPLIES
123/1	ACE HARDWARE - SANTAQUIN	82551	1/5/2021	1/5/2021	\$9.99			
					9.99	1043240	SUPPLIES	DOORBELL BATTERY
	Vendor Total:				\$395.52			
20-IV-4662	APPARATUS EQUIPMENT & SERVICE	82592	1/11/2021	1/11/2021	\$493.18			
					493.18	7657250	FIRE - EQUIPMENT MAINTEN	2020 DODGE BRUSH TRUCK - PUMP UPGRADE
20-IV-4695	APPARATUS EQUIPMENT & SERVICE	82552	1/5/2021	1/5/2021	\$776.00			
					776.00	7657240	FIRE - SUPPLIES	AXE/PRO BAR 30"
20-IV-4697	APPARATUS EQUIPMENT & SERVICE	82592	1/11/2021	1/11/2021	\$426.00			
					426.00	7657242	EMS - SUPPLIES	RAE TOXIRAY 3 CO METER
	Vendor Total:				\$1,695.18			
139454	APPLICANTPRO	82593	1/6/2021	1/6/2021	\$209.00			
					209.00	4340500	SOFTWARE EXPENSE	DECEMBER
141709	APPLICANTPRO	82593	1/6/2021	1/6/2021	\$209.00			
					209.00	4340500	SOFTWARE EXPENSE	JANUARY
	Vendor Total:				\$418.00			
13799	ARCHIVESOCIAL, INC.	82492	1/4/2021	1/4/2021	\$657.64			
					657.64	4340114	SOCIAL MEDIA ARCHIVE SER	SOCIAL MEDIA ARCHIVING
SI-1701013	AXON ENTERPRISES, INC	82493	1/4/2021	1/4/2021	\$173.50			
					173.50	1054740	CAPITAL-VEHICLES & EQUIP	25 FT STANDARD CARTRIDGE/HOLSTER
XC01042021-152	BAIRD, SALLY	82490	1/4/2021	1/4/2021	\$203.02			
					203.02	6640720	RAP TAX EXPENSE	STORY TELLING EVENT
5 - 2018 Excise T	BANK OF UTAH - ATTN: JARED ANDE	82489	1/4/2021	1/4/2021	\$42,809.41			
					42,809.41	4540882	2018 ROAD BOND - INTEREST	Interest - 2018 Excise Tax Rev Bonds
5 - 2018 Excise T	BANK OF UTAH - ATTN: JARED ANDE	82489	1/4/2021	1/4/2021	\$10,562.34			
					10,562.34	4540882	2018 ROAD BOND - INTEREST	Interest - 2018 Excise Tax Rev Bonds

SANTAQUIN CITY CORPORATION
Invoice Register - 1/2/2021 to 1/15/2021 - All Invoices

1/14/2021

<u>Invoice No.</u>	<u>Vendor</u>	<u>Check No.</u>	<u>Ledger Date</u>	<u>Due Date</u>	<u>Amount</u>	<u>Account No.</u>	<u>Account Name.</u>	<u>Description</u>
	Vendor Total:				\$53,371.75			
REIMBURSE-01	BEAGLEY, NORM	82494	1/4/2021	1/4/2021	\$5,041.93 5,041.93	1048230	EDUCATION, TRAINING, TRAV	BYU EMPA 2020 FALL SEMESTER EXPENSES
10011722-00	BEST DEAL SPRINGS	82495	1/4/2021	1/4/2021	\$34.04 34.04	1060250	EQUIPMENT MAINTENANCE	MULTI PURPOSE LAMP
10011734-00	BEST DEAL SPRINGS	82495	1/4/2021	1/4/2021	\$402.78 402.78	1060250	EQUIPMENT MAINTENANCE	FRONT COILSPRINGS - VIN: 36547
	Vendor Total:				\$436.82			
044242-18872	BIG O' TIRES - SANTAQUIN	82589	1/6/2021	1/6/2021	\$72.92 72.92	1043250	EQUIPMENT MAINTENANCE	OIL CHANGE - VIN: 74963
044242-20632	BIG O' TIRES - SANTAQUIN	82589	1/6/2021	1/6/2021	\$72.92 72.92	1043250	EQUIPMENT MAINTENANCE	OIL CHANGE - VIN: 46060
044242-21027	BIG O' TIRES - SANTAQUIN	82589	1/6/2021	1/6/2021	\$16.99 16.99	1070250	EQUIPMENT MAINTENANCE	FLAT TIRE REPAIR - VIN: 33541
044242-21768	BIG O' TIRES - SANTAQUIN	82589	1/6/2021	1/6/2021	\$129.99 129.99	1043250	EQUIPMENT MAINTENANCE	BATTERY - VIN: 46061
044242-21798	BIG O' TIRES - SANTAQUIN	82589	1/6/2021	1/6/2021	\$159.88 159.88	1043250	EQUIPMENT MAINTENANCE	TIRE
044242-22000	BIG O' TIRES - SANTAQUIN	82589	1/6/2021	1/6/2021	\$42.92 42.92	1048250	EQUIPMENT MAINTENANCE	OIL CHANGE - VIN: 46058
044242-23074	BIG O' TIRES - SANTAQUIN	82496	1/4/2021	1/4/2021	\$16.99 16.99	1054250	EQUIPMENT MAINTENANCE	FLAT REPAIR - VIN: 62866
	Vendor Total:				\$512.61			
JAN21196	BLOMQUIST HALE CONSULTING	82594	1/11/2021	1/11/2021	\$190.40 190.40	1022506	EAP	EMPLOYEE ASSISTANCE COVERAGE
1344	BLU LINE DESIGNS	82497	1/4/2021	1/4/2021	\$2,620.00 2,620.00	5740720	IMPACT FEE	PLANNING & DESIGN - AHLIN PARK/HARVEST VIEW PARK
UT202003674	BLUE STAKES	82595	1/11/2021	1/11/2021	\$157.17 157.17	5240210	BOOKS, SUBSCRIPT, MEMBE	BILLABLE EMAIL NOTIFICATIONS
52115	BLUELINE BACKGROUND SCREEN	82596	1/6/2021	1/6/2021	\$916.00 916.00	1043310	PROFESSIONAL & TECHNICA	EMPLOYMENT DRUG SCREENING
REIMBURSE-01	BOND, JASON	82498	1/4/2021	1/4/2021	\$5,126.54 5,126.54	1078230	EDUCATION, TRAINING & TRA	BYU EMPA 2020 FALL SEMESTER EXPENSES
1638186	BONNEVILLE INDUSTRIAL SUPPLY C	82499	1/4/2021	1/4/2021	\$439.69 439.69	5240520	WRF - SUPPLIES	ION BATTERY/TOOLS
1638740	BONNEVILLE INDUSTRIAL SUPPLY C	82499	1/4/2021	1/4/2021	\$289.63 289.63	5240250	EQUIPMENT MAINTENANCE	BATTERIES/SAFETY GLASSES
	Vendor Total:				\$729.32			
1544-382748	CARQUEST AUTO PARTS (ADVANCE	82500	1/4/2021	1/4/2021	\$45.97 45.97	5140250	EQUIPMENT MAINTENANCE	WINDSHIELD WIPERS

SANTAQUIN CITY CORPORATION
Invoice Register - 1/2/2021 to 1/15/2021 - All Invoices

1/14/2021

<u>Invoice No.</u>	<u>Vendor</u>	<u>Check No.</u>	<u>Ledger Date</u>	<u>Due Date</u>	<u>Amount</u>	<u>Account No.</u>	<u>Account Name.</u>	<u>Description</u>
1544-383152	CARQUEST AUTO PARTS (ADVANCE	82500	1/4/2021	1/4/2021	\$8.88 8.88	5240250	EQUIPMENT MAINTENANCE	LAMP
	Vendor Total:				\$54.85			
011121	CENTRACOM INTERACTIVE	82597	1/11/2021	1/11/2021	\$3,203.36 3,203.36	1051280	TELEPHONE	DECEMBER
479	CENTRAL UTAH 911	82598	1/11/2021	1/11/2021	\$21,876.30 21,876.30	1054340	CENTRAL DISPATCH FEES	OCTOBER-DECEMBER: FIXED COSTS & PAYROLL
UP30701	CENTURY EQUIPMENT COMP	82501	1/4/2021	1/4/2021	\$654.47 654.47	5440250	EQUIPMENT MAINTENANCE	GASKET/O-RING/CORE/REMAN-TURBO
20L0604	CHEMTECH-FORD, INC	82555	1/5/2021	1/5/2021	\$80.00 80.00	5240510	WRF - CHEMICAL SUPPLIES	WRF
20L0997	CHEMTECH-FORD, INC	82555	1/5/2021	1/5/2021	\$80.00 80.00	5240510	WRF - CHEMICAL SUPPLIES	WRF
20L0998	CHEMTECH-FORD, INC	82555	1/5/2021	1/5/2021	\$100.00 100.00	5140310	PROFESSIONAL & TECHNICA	WATER
20L1270	CHEMTECH-FORD, INC	82555	1/5/2021	1/5/2021	\$80.00 80.00	5240510	WRF - CHEMICAL SUPPLIES	WRF
	Vendor Total:				\$340.00			
PR010221-7171	CHILD SUPPORT SERVICES/ORS	82584	1/8/2021	1/8/2021	\$140.31 140.31	1022420	GARNISHMENTS	Garnishment - Child Support
0388910	CHRISTENSEN OIL	82503	1/4/2021	1/4/2021	\$192.11 192.11	1060250	EQUIPMENT MAINTENANCE	CASTROL AUTRAN SYN
1638186	CHRISTENSEN OIL	82503	1/4/2021	1/4/2021	\$439.69 439.69	5240520	WRF - SUPPLIES	CASTROL SYNTHETIC OIL
	Vendor Total:				\$631.80			
E7327083-01162	COLONIAL LIFE &	82504	1/4/2021	1/4/2021	\$126.09 126.09	1022505	SUPPLEMENTAL	LIFE INSURANCE PREMIUM
010421A	COMMUNITY DEVELOPMENT & REN	82505	1/4/2021	1/4/2021	\$213,110.77 213,110.77	4540900	TRANSFER TO CDA FUND	400 EAST PLAZA WORK - CDA TRANSFER
Refund: 5001582	CORBETT, CARSO & LEISHA ANNE *	82599	1/6/2021	1/6/2021	\$166.63 166.63	5113110	ACCOUNTS RECEIVABLE	Refund: 5001582 - CORBETT, CARSO & LEISHA ANNE *
9436	CREATIVE CULTURE INSIGNIA, LLC	82506	1/4/2021	1/4/2021	\$757.50 757.50	1054240	SUPPLIES	POLICE SHOULDER PATCH
010421	CYNDEE PROBERT	82507	1/4/2021	1/4/2021	\$600.00 600.00	1042310	PROFESSIONAL & TECHNICA	JUDGE FEES - SANTAQUIN/GENOLA JC
17-215	DAHLQUIST, DAVID	82508	1/4/2021	1/4/2021	\$544.00 544.00	1042310	PROFESSIONAL & TECHNICA	JUDGE FEES
6241	DAILY HERALD, THE	82509	1/4/2021	1/4/2021	\$50.82 50.82	1078220	NOTICE, ORDINANCES & PUB	PUBLIC NOTICE - CODE AMENDMENT
6657	DAILY HERALD, THE	82600	1/11/2021	1/11/2021	\$328.02 328.02	1043220	NOTICES,ORDINANCES,PUBL	PUBLIC HEARING NOTICE - WATER/PI MASTER PLAN UPDATES

SANTAQUIN CITY CORPORATION
Invoice Register - 1/2/2021 to 1/15/2021 - All Invoices

1/14/2021

<u>Invoice No.</u>	<u>Vendor</u>	<u>Check No.</u>	<u>Ledger Date</u>	<u>Due Date</u>	<u>Amount</u>	<u>Account No.</u>	<u>Account Name.</u>	<u>Description</u>
	Vendor Total:				\$378.84			
010421	DOMINION ENERGY INC.	82510	1/4/2021	1/4/2021	\$3,450.84			
					844.48	1051270	UTILITIES	1205 N CENTER STREET
					266.06	1051270	UTILITIES	200 S 400 W
					696.79	1051270	UTILITIES	275 W MAIN STREET
					880.84	1051270	UTILITIES	45 W 100 S
					521.66	1051270	UTILITIES	55 W 100 S
					215.96	1051270	UTILITIES	98 S CENTER STREET
					25.05	5240500	WRF - UTILITIES	1215 N CENTER STREET
COMM38752021	EDUCATORS HEALTH PLANS LIFE, A	9999	1/12/2021	1/12/2021	\$55,013.72			
					50,283.72	1022500	HEALTH INSURANCE	Health Insurance Premium - January 2021
					4,354.20	1022501	DENTAL	Dental Insurance Premium - January 2021
					375.80	1022501	DENTAL	Vision Insurance Premium - January 2021
PR010221-383	EFTPS	9999	1/8/2021	1/8/2021	\$34,876.82			
					19,888.08	1022210	FICA PAYABLE	Social Security Tax
					4,651.36	1022210	FICA PAYABLE	Medicare Tax
					10,337.38	1022220	FEDERAL WITHHOLDING PAY	Federal Income Tax
22133	EKR	82556	1/5/2021	1/5/2021	\$1,400.00			
					1,400.00	6640720	RAP TAX EXPENSE	50% DOWN - MUSEUM TRAVEL POSTER DESIGN
41548	EMPIRE WEST	82512	1/4/2021	1/4/2021	\$704.07			
					704.07	5140240	SUPPLIES	WATER VALVES
20121538	EPIC ENGINEERING	82557	1/5/2021	1/5/2021	\$1,544.50			
					1,544.50	1022450-296	(INSP)[Plat A]SUMMIT RIDGE	QUALITY ASSURANCE
20121839	EPIC ENGINEERING	82513	1/4/2021	1/4/2021	\$261.00			
					261.00	1022450-211	(INSP) HIGH PARK NORTH TO	QUALITY ASSURANCE
20121840	EPIC ENGINEERING	82513	1/4/2021	1/4/2021	\$1,320.00			
					1,320.00	1022450-284	(INSP)[Plat I]FOOTHILL VILLA	QUALITY ASSURANCE
20121841	EPIC ENGINEERING	82513	1/4/2021	1/4/2021	\$1,019.50			
					1,019.50	1022450-284	(INSP)[Plat I]FOOTHILL VILLA	QUALITY ASSURANCE
20121842	EPIC ENGINEERING	82513	1/4/2021	1/4/2021	\$2,060.50			
					2,060.50	5740513	400 E MAIN URBAN PLAZA	QUALITY ASSURANCE
20121843	EPIC ENGINEERING	82513	1/4/2021	1/4/2021	\$778.50			
					778.50	1022450-291	(INSP)[Plat A-13]THE ORCHAR	QUALITY ASSURANCE
20121844	EPIC ENGINEERING	82513	1/4/2021	1/4/2021	\$1,417.00			
					1,417.00	1022450-304	(INSP)[Plat A-14 AH]THE ORC	QUALITY ASSURANCE
20121845	EPIC ENGINEERING	82513	1/4/2021	1/4/2021	\$2,902.00			
					2,902.00	1022450-296	(INSP)[Plat A]SUMMIT RIDGE	QUALITY ASSURANCE
20121846	EPIC ENGINEERING	82513	1/4/2021	1/4/2021	\$2,163.00			
					2,163.00	4540200	ROAD MAINTENANCE	QUALITY ASSURANCE
20121848	EPIC ENGINEERING	82513	1/4/2021	1/4/2021	\$1,703.00			
					1,703.00	1022450-308	(INSP) BYLUND COMMERCIAL	QUALITY ASSURANCE
20121849	EPIC ENGINEERING	82513	1/4/2021	1/4/2021	\$1,107.50			
					1,107.50	1022450-299	(INSP) COUNTRY SIDE ESTAT	QUALITY ASSURANCE

SANTAQUIN CITY CORPORATION
Invoice Register - 1/2/2021 to 1/15/2021 - All Invoices

1/14/2021

<u>Invoice No.</u>	<u>Vendor</u>	<u>Check No.</u>	<u>Ledger Date</u>	<u>Due Date</u>	<u>Amount</u>	<u>Account No.</u>	<u>Account Name.</u>	<u>Description</u>
20121850	EPIC ENGINEERING	82513	1/4/2021	1/4/2021	\$2,787.00	1022450-292	(INSP)[Plat C]THE HILLS	QUALITY ASSURANCE
	Vendor Total:				\$19,063.50			
13253707	EWING IRRIGATION PRODUCTS INC	82558	1/5/2021	1/5/2021	\$78.29	6140310	BALLFIELD MAINTENANCE	BCN FENCE CROWN INSTALL TOOL
1341	FACIL HR	82559	1/5/2021	1/5/2021	\$2,500.00	1042310	PROFESSIONAL & TECHNICA	EMPLOYEE HANDBOOK EDIT & REWRITE
001-1499657	FORCE AMERICA	82560	1/5/2021	1/5/2021	\$2,470.57	1060250	EQUIPMENT MAINTENANCE	PRESSURE LUBE/STYLE SOLENOID REPLACES
20-394	FORENSIC NURSING SERVICES, INC	82561	1/5/2021	1/5/2021	\$130.00	1054311	PROFESSIONAL & TECHNICA	CASE NO. 20SQ03410
39607	FREEDOM MAILING SERVICES, INC	82514	1/4/2021	1/4/2021	\$2,091.23	5440240	SUPPLIES	DECEMBER
INV-1038	GAUSE SERVICES LLC	82515	1/4/2021	1/4/2021	\$390.00	5240550	WRF - EQUIPMENT MAINTEN	PUBLIC WORKS FRIDGE REPAIRS
5108	GREENHALGH CONSTRUCTION	82601	1/11/2021	1/11/2021	\$3,155.64	1060240	SUPPLIES	HAULING SALT
DEC-14-2020	GREG'S DISTINCTIVE DECORATING	82517	1/4/2021	1/4/2021	\$2,117.94	1051480	CHRISTMAS LIGHTS	PLAZA CHRISTMAS LIGHTS
12242541	HACH COMPANY	82563	1/5/2021	1/5/2021	\$344.30	5240510	WRF - CHEMICAL SUPPLIES	CHEMCIALS
43189	HANSEN, ALLEN & LUCE, INC	82518	1/4/2021	1/4/2021	\$1,344.49	5540730	CAPITAL FACILITY PLAN UPD	PROFESSIONAL SERVICES - 10-16-2020 TO 11-15-2020
43190	HANSEN, ALLEN & LUCE, INC	82518	1/4/2021	1/4/2021	\$2,315.71	6040730	CAPITAL FACILITY PLAN UPD	PROFESSIONAL SERVICES - 10-16-2020 TO 11-15-2020
43395	HANSEN, ALLEN & LUCE, INC	82518	1/4/2021	1/4/2021	\$1,790.37	5540730	CAPITAL FACILITY PLAN UPD	PROFESSIONAL SERVICES - 10-16-2020 TO 11-15-2020
43412	HANSEN, ALLEN & LUCE, INC	82518	1/4/2021	1/4/2021	\$4,848.26	6040730	CAPITAL FACILITY PLAN UPD	PROFESSIONAL SERVICES - 11-16-2020 TO 12-15-2020
	Vendor Total:				\$10,298.83			
87683015	HENRY SCHEIN	82602	1/11/2021	1/11/2021	\$279.00	7657242	EMS - SUPPLIES	FIRST CALL BAG
0551865165	HONEY BUCKET	82519	1/4/2021	1/4/2021	\$80.00	1070300	BUILDINGS & GROUNDS MAI	R0094124
0551865166	HONEY BUCKET	82519	1/4/2021	1/4/2021	\$80.00	1070300	BUILDINGS & GROUNDS MAI	R0021364
0551891786	HONEY BUCKET	82603	1/6/2021	1/6/2021	\$75.00	1070300	BUILDINGS & GROUNDS MAI	R0024145
	Vendor Total:				\$235.00			
56863	HORROCKS ENGINEERS, INC	82520	1/4/2021	1/4/2021	\$100.00	4140816	NRCS - DEBRIS BASIN STUDY	Santaquin Debris Basin P

SANTAQUIN CITY CORPORATION
Invoice Register - 1/2/2021 to 1/15/2021 - All Invoices

1/14/2021

<u>Invoice No.</u>	<u>Vendor</u>	<u>Check No.</u>	<u>Ledger Date</u>	<u>Due Date</u>	<u>Amount</u>	<u>Account No.</u>	<u>Account Name.</u>	<u>Description</u>
57315	HORROCKS ENGINEERS, INC	82520	1/4/2021	1/4/2021	\$1,573.50	4140816	NRCS - DEBRIS BASIN STUDY	Santaquin Debris Basin Plan EA
57952	HORROCKS ENGINEERS, INC	82520	1/4/2021	1/4/2021	\$270.00	4140816	NRCS - DEBRIS BASIN STUDY	Santaquin Debris Basin Plan EA
	Vendor Total:				\$1,943.50			
8104662-01	INDUSTRIAL SUPPLY	82564	1/5/2021	1/5/2021	\$123.84	5240240	SUPPLIES	GLOVES
17-214	JACQUELYN JARVIS	82522	1/4/2021	1/4/2021	\$250.00	1042310	PROFESSIONAL & TECHNICA	BAIL REFUND
75613	JMART PRINTING	82604	1/11/2021	1/11/2021	\$40.00	6140335	MISC SUPPLIES	ERIC HOLT - BUSINESS CARDS
60964	JOHNSON TIRE SERVICE	82523	1/4/2021	1/4/2021	\$852.23	5140250	EQUIPMENT MAINTENANCE	TIRES - VIN: 07694
0123890	JONES & DEMILLE ENGINEERING	82524	1/4/2021	1/4/2021	\$1,134.25	5940751	HIGHLAND DRIVE (FOOTHILL	PROFESSIONAL SERVICES - NOVEMBER
010421	K. SHAWN PATTEN, ATT. AT LAW	82525	1/4/2021	1/4/2021	\$2,274.98	1042331	LEGAL	ATTORNEY FEES
17-149	LARA, PEGGIE	82605	1/11/2021	1/11/2021	\$175.00	1042310	PROFESSIONAL & TECHNICA	INTERPRETER @ 25/HOUR
22447021	LARSON & COMPANY	82606	1/6/2021	1/6/2021	\$500.00	1043311	ACCOUNTING & AUDITING	BOND COMPLIANCE
011121	LEHI CITY POLICE DEPARTMENT	82638	1/11/2021	1/11/2021	\$650.00	1054230	EDUCATION, TRAINING & TRA	VIRTRA @ \$50 PER OFFICER
EA978330	LES OLSON COMPANY	82608	1/11/2021	1/11/2021	\$511.89	4340300	COPIER CONTRACT	MPS SERVICE & SUPPLY BILLING
INV9584	LEXIPOL LLC	82526	1/4/2021	1/4/2021	\$5,471.10	4340613	FIRE DEPARTMENT SOFTWA	ANNUAL POLICY MANUAL & DAILY TRAINING BULLETINS
01-107025	MACEYS - SANTAQUIN	82609	1/11/2021	1/11/2021	\$16.40	7540480	FOOD	SENIORS FOOD
02-117549	MACEYS - SANTAQUIN	82527	1/4/2021	1/4/2021	\$7.00	7540480	FOOD	SENIORS FOOD
04-82276	MACEYS - SANTAQUIN	82609	1/11/2021	1/11/2021	\$60.53	7540480	FOOD	SENIORS FOOD
04-89303	MACEYS - SANTAQUIN	82527	1/4/2021	1/4/2021	\$198.75	7540480	FOOD	SENIORS FOOD
	Vendor Total:				\$282.68			
10	MARK N. BAIR, MD	82529	1/4/2021	1/4/2021	\$1,000.00	7657620	MEDICAL SERVICES (SHOTS)	OFF LINE MEDICAL DIRECTOR SERVICES
1472	MHC SIGN AND DESIGN	82530	1/4/2021	1/4/2021	\$1,850.00	7657740	FIRE - CAPITAL-VEHICLES &	TRAILER GRAPHICS - STRIPES AND LOGOS

SANTAQUIN CITY CORPORATION
Invoice Register - 1/2/2021 to 1/15/2021 - All Invoices

1/14/2021

<u>Invoice No.</u>	<u>Vendor</u>	<u>Check No.</u>	<u>Ledger Date</u>	<u>Due Date</u>	<u>Amount</u>	<u>Account No.</u>	<u>Account Name.</u>	<u>Description</u>
AO2563	MOUNTAINLAND ASSOCIATIONS OF	82610	1/11/2021	1/11/2021	\$4,961.00 4,961.00	1043210	BOOKS,SUBSCRIPTIONS,ME	2020-2021 GENERAL ASSESSMENT
S103878749.002	MOUNTAINLAND SUPPLY	82565	1/5/2021	1/5/2021	\$712.05 712.05	5140240	SUPPLIES	SUPPLIES
S103885402.001	MOUNTAINLAND SUPPLY	82565	1/5/2021	1/5/2021	\$120.63 120.63	5140240	SUPPLIES	SUPPLIES
S103885855.001	MOUNTAINLAND SUPPLY	82565	1/5/2021	1/5/2021	\$190.32 190.32	5140240	SUPPLIES	SUPPLIES
S103885860.001	MOUNTAINLAND SUPPLY	82565	1/5/2021	1/5/2021	\$466.67 466.67	5140240	SUPPLIES	SUPPLIES
S103898309.001	MOUNTAINLAND SUPPLY	82565	1/5/2021	1/5/2021	\$178.37 178.37	5140240	SUPPLIES	SUPPLIES
S103901078.001	MOUNTAINLAND SUPPLY	82611	1/11/2021	1/11/2021	\$1,622.91 1,622.91	5240240	SUPPLIES	SUPPLIES
S103901700.001	MOUNTAINLAND SUPPLY	82565	1/5/2021	1/5/2021	\$8.04 8.04	5140240	SUPPLIES	SUPPLIES
	Vendor Total:				\$3,298.99			
IN1532921	MUNICIPAL EMERGENCY SERVICES	82612	1/11/2021	1/11/2021	\$1,222.96 1,222.96	7657244	UNIFORMS	SHIRTS
PR010221-13093	NEBO LODGE #45	82585	1/8/2021	1/8/2021	\$18.00 18.00	1022425	FOP DUES	FOP Dues (Nebo Lodge #45)
24179	NIELSEN & SENIOR, ATTORNEYS	82531	1/4/2021	1/4/2021	\$18,375.00 18,375.00	1042331	LEGAL	CRIMINAL
24180	NIELSEN & SENIOR, ATTORNEYS	82531	1/4/2021	1/4/2021	\$8,311.45 8,311.45	1043331	LEGAL	CIVIL
	Vendor Total:				\$26,686.45			
073571	NORTHWEST FENCE & SUPPLY	82532	1/4/2021	1/4/2021	\$38.75 38.75	5240240	SUPPLIES	FULCRUM DD IND LATCH
85680A	NORTHWEST FENCE & SUPPLY	82566	1/5/2021	1/5/2021	\$38.75 38.75	5240240	SUPPLIES	FULCRUM DD IND LATCH
	Vendor Total:				\$77.50			
367233/367457/3	PAYSON AUTO SUPPLY - NAPA	82614	1/11/2021	1/11/2021	\$172.89 172.89	6140310	BALLFIELD MAINTENANCE	NAPA
372819	PAYSON AUTO SUPPLY - NAPA	82533	1/4/2021	1/4/2021	\$31.08 31.08	5140250	EQUIPMENT MAINTENANCE	BRAKE CLEAN
	Vendor Total:				\$203.97			
2418	PAYSON CHRONICLE	82534	1/4/2021	1/4/2021	\$244.20 244.20	1043220	NOTICES,ORDINANCES,PUBL	NEW CITY HALL RFP - GENERAL CONTRACTOR SERVICES
4200	PAYSON CITY SOLID WASTE	82615	1/11/2021	1/11/2021	\$21,231.22 15,309.22 5,922.00	1062311 5240530	WASTE PICKUP CHARGES WRF - SOLID WASTE DISPOS	DECEMBER DECEMBER
07-967966	PAYSON MARKET	82535	1/4/2021	1/4/2021	\$259.31 259.31	7540480	FOOD	SENIORS FOOD

SANTAQUIN CITY CORPORATION
Invoice Register - 1/2/2021 to 1/15/2021 - All Invoices

1/14/2021

<u>Invoice No.</u>	<u>Vendor</u>	<u>Check No.</u>	<u>Ledger Date</u>	<u>Due Date</u>	<u>Amount</u>	<u>Account No.</u>	<u>Account Name.</u>	<u>Description</u>
07-970475	PAYSON MARKET	82568	1/5/2021	1/5/2021	\$155.66			
					30.98	1041670	YOUTH CITY COUNCIL EXPE	DRINKS/TREATS FOR
								CHRISTMAS PARTY
					124.68	1043240	SUPPLIES	SUPPLIES/DRINKS
	Vendor Total:				\$414.97			
81	PEN & WEB COMMUNICATIONS c/o P	82569	1/5/2021	1/5/2021	\$1,845.00			
					1,477.50	4340113	WEBSITE CONTENT MGT - PE	REGULAR WORK
					90.00	4340113	WEBSITE CONTENT MGT - PE	NEW WEBSITE WORK
					277.50	7657247	COVID-19 RELATED EXPENDI	COVID-19 RELATED WORK
2526773	PETERSON PLUMBING SUPPLY	82570	1/5/2021	1/5/2021	\$750.00			
					750.00	7657247	COVID-19 RELATED EXPENDI	TOILET FLUSH VALVE
								AUTOMATIC
1503882	POLYDYNE INC.	82536	1/4/2021	1/4/2021	\$3,213.79			
					3,213.79	5240510	WRF - CHEMICAL SUPPLIES	CLARIFLOC WE-1950
0001160	PYE-BARKER FIRE & SAFETY	82617	1/11/2021	1/11/2021	\$1,225.00			
					1,225.00	5140240	SUPPLIES	FIRE ALARM SERVICE &
								INSPECTION
308562	REDMOND MINERALS, INC	82537	1/4/2021	1/4/2021	\$1,137.40			
					1,137.40	1060240	SUPPLIES	SALT SUPPLIES FOR WINTER
0864-001539262	REPUBLIC SERVICES LLC	82538	1/4/2021	1/4/2021	\$117.77			
					117.77	1062311	WASTE PICKUP CHARGES	DECEMBER
0864-001540894	REPUBLIC SERVICES LLC	82618	1/11/2021	1/11/2021	\$440.30			
					440.30	1062311	WASTE PICKUP CHARGES	DECEMBER
0864-001542298	REPUBLIC SERVICES LLC	82618	1/11/2021	1/11/2021	\$32,064.85			
					22,753.60	1062311	WASTE PICKUP CHARGES	DECEMBER
					9,311.25	1062312	RECYCLING PICKUP CHARGE	DECEMBER
	Vendor Total:				\$32,622.92			
589400	REVCO	82619	1/11/2021	1/11/2021	\$1,030.76			
					1,030.76	4340300	COPIER CONTRACT	COPIERS
FC1995	ROBERT NELSON CONSTRUCTION L	82620	1/6/2021	1/6/2021	\$6.32			
					6.32	6140310	BALLFIELD MAINTENANCE	SUPPLIES
RMP-010421A	ROCKY MOUNTAIN POWER	82539	1/4/2021	1/4/2021	\$12,966.64			
					173.80	1070270	UTILITIES	1213 N CENTER ST - PUBLIC
								WORKS BLDG SITE
					426.56	1070270	UTILITIES	1213 N CENTER ST - PUBLIC
								WORKS BLDG
					24.46	1070270	UTILITIES	1000 N CENTER PARK
					11,722.00	5240500	WRF - UTILITIES	1215 N CENTER
					619.82	5440110	SALARIES AND WAGES	10 W GINGER GOLD RD
RMP-010421B	ROCKY MOUNTAIN POWER	82539	1/4/2021	1/4/2021	\$39.64			
					39.64	1060270	UTILITIES - STREET LIGHTS	115 W 860 N STRONGBOX
RMP-010421C	ROCKY MOUNTAIN POWER	82539	1/4/2021	1/4/2021	\$439.17			
					439.17	5440273	UTILITIES	1100 S CANYON ROAD
	Vendor Total:				\$13,445.45			
P25369	ROCKY MOUNTAIN TURF - RMT EQUI	82572	1/5/2021	1/5/2021	\$80.00			
					80.00	1070250	EQUIPMENT MAINTENANCE	RIB F6I/KENDA RIBBED
275391	RON GORDON TIRE PROS	82621	1/11/2021	1/11/2021	\$588.00			
					588.00	1078250	EQUIPMENT MAINT	TIRES - VIN: 72097

SANTAQUIN CITY CORPORATION
Invoice Register - 1/2/2021 to 1/15/2021 - All Invoices

1/14/2021

<u>Invoice No.</u>	<u>Vendor</u>	<u>Check No.</u>	<u>Ledger Date</u>	<u>Due Date</u>	<u>Amount</u>	<u>Account No.</u>	<u>Account Name.</u>	<u>Description</u>
5555-447436	ROYAL WHOLESALE ELECTRIC	82622	1/11/2021	1/11/2021	\$47.29			
					47.29	7657247	COVID-19 RELATED EXPENDI	LAUNDRY ROOM SUPPLIES
SAMS-011121	SAM'S CLUB	82623	1/11/2021	1/11/2021	\$823.99			
					20.87	1043240	SUPPLIES	CANDY & DRINK SUPPLIES
					76.30	1043240	SUPPLIES	CANDY & DRINK SUPPLIES
					62.92	1043240	SUPPLIES	CANDY
					53.98	1043240	SUPPLIES	GIFT CARD
					39.99	1043240	SUPPLIES	SUPPLIES
					18.05	1043240	SUPPLIES	SUPPLIES
					7.58	1043240	SUPPLIES	SUPPLIES
					200.72	7540480	FOOD	SENIOR CENTER FOOD
					97.74	7540480	FOOD	SENIOR CENTER FOOD
					77.06	7540480	FOOD	SENIOR CENTER FOOD
					103.68	7540480	FOOD	SENIOR CENTER FOOD
					17.88	7540480	FOOD	SENIOR CENTER FOOD
					47.22	7540480	FOOD	SENIOR CENTER FOOD
PR010221-266	SANTAQUIN CITY UTILITIES	82586	1/8/2021	1/8/2021	\$721.00			
					665.00	1022350	UTILITIES PAYABLE	Utilities
					56.00	1022350	UTILITIES PAYABLE	Cemetery
450_A_04062_2	SKAGGS PUBLIC SAFETY UNIFORM	82624	1/11/2021	1/11/2021	\$825.27			
					825.27	1054240	SUPPLIES	BECKSTEAD
450_A_33748_5	SKAGGS PUBLIC SAFETY UNIFORM	82624	1/11/2021	1/11/2021	\$28.00			
					28.00	1054240	SUPPLIES	MIKE WALL - UNIFORMS
450_A_43674_2	SKAGGS PUBLIC SAFETY UNIFORM	82624	1/11/2021	1/11/2021	\$276.85			
					276.85	1054240	SUPPLIES	BECKSTEAD
450_A_46073_6	SKAGGS PUBLIC SAFETY UNIFORM	82541	1/4/2021	1/4/2021	\$18.84			
					18.84	1054240	SUPPLIES	UNIFORM - WALL/TIPLER C.
450_A_46073_7	SKAGGS PUBLIC SAFETY UNIFORM	82541	1/4/2021	1/4/2021	\$106.85			
					106.85	1054240	SUPPLIES	UNIFORMS - TIPLER C.
450_A_46073_8	SKAGGS PUBLIC SAFETY UNIFORM	82624	1/11/2021	1/11/2021	\$11.84			
					11.84	1054240	SUPPLIES	WALL/ TIPLER C.
450_A_49176_1	SKAGGS PUBLIC SAFETY UNIFORM	82541	1/4/2021	1/4/2021	\$106.85			
					106.85	1054240	SUPPLIES	UNIFORMS - MILLER, JUSTIN
450_A_56090_3	SKAGGS PUBLIC SAFETY UNIFORM	82541	1/4/2021	1/4/2021	\$340.85			
					340.85	1054240	SUPPLIES	UNIFORM - RUSSELL WOODLAND
	Vendor Total:				\$1,715.35			
19141	SKM INC	82575	1/5/2021	1/5/2021	\$47.50			
					47.50	5140310	PROFESSIONAL & TECHNICA	SCADA MAINTENANCE
20317	SKM INC	82575	1/5/2021	1/5/2021	\$251.25			
					251.25	5240310	PROFESSIONAL & TECHNICA	SCADA MAINTENANCE
	Vendor Total:				\$298.75			
LYR253	SPRINKLER WORLD - PAY STANDAR	82542	1/4/2021	1/4/2021	\$210.30			
					210.30	7657247	COVID-19 RELATED EXPENDI	CARES GRANT - ?
3464230779	STAPLES	82543	1/4/2021	1/4/2021	\$67.98			
					67.98	1043240	SUPPLIES	ADMIN - OFFICE SUPPLIES
3464625652	STAPLES	82576	1/5/2021	1/5/2021	\$3,560.63			
					3,560.63	1043240	SUPPLIES	AVY LSR LABELS 3000 PACK

SANTAQUIN CITY CORPORATION
Invoice Register - 1/2/2021 to 1/15/2021 - All Invoices

1/14/2021

<u>Invoice No.</u>	<u>Vendor</u>	<u>Check No.</u>	<u>Ledger Date</u>	<u>Due Date</u>	<u>Amount</u>	<u>Account No.</u>	<u>Account Name.</u>	<u>Description</u>
3464689400	STAPLES	82543	1/4/2021	1/4/2021	\$73.38	1043240	SUPPLIES	ADMIN - OFFICE SUPPLIES
					73.38			
3464689401	STAPLES	82543	1/4/2021	1/4/2021	\$87.39	1043240	SUPPLIES	ADMIN - OFFICE SUPPLIES
					87.39			
3464765674	STAPLES	82543	1/4/2021	1/4/2021	\$64.79	1043240	SUPPLIES	ADMIN - OFFICE SUPPLIES
					64.79			
346476576	STAPLES	82543	1/4/2021	1/4/2021	\$24.52	1043240	SUPPLIES	ADMIN - OFFICE SUPPLIES
					24.52			
	Vendor Total:				\$3,878.69			
W24664	STOTZ EQUIPMENT CO, LLC - ARIZO	82544	1/4/2021	1/4/2021	\$103.62	1070250	EQUIPMENT MAINTENANCE	HYDRAULIC FILTER
					103.62			
010521	STRINGHAM'S HARDWARE	82577	1/5/2021	1/5/2021	\$2,488.80			
					150.00	1043480	EMPLOYEE RECOGNITIONS	DECEMBER
					251.59	1051300	BUILDINGS & GROUND MAIN	DECEMBER
					43.04	1051480	CHRISTMAS LIGHTS	DECEMBER
					133.74	1070300	BUILDINGS & GROUNDS MAI	DECEMBER
					17.56	1077300	BUILDINGS & GROUND MAIN	DECEMBER
					420.58	5140240	SUPPLIES	DECEMBER
					184.79	5240520	WRF - SUPPLIES	DECEMBER
					93.14	5440240	SUPPLIES	DECEMBER
					3.68	6140335	MISC SUPPLIES	DECEMBER
					48.97	6340240	SUPPLIES	DECEMBER
					137.46	6740640	UTAH COUNTY GRANT	DECEMBER
					76.13	7240240	SUPPLIES	DECEMBER
					67.97	7657246	EMERGENCY MANAGEMENT	DECEMBER
					286.07	7657247	COVID-19 RELATED EXPENDI	DECEMBER
					574.08	7657250	FIRE - EQUIPMENT MAINTEN	DECEMBER
REIMBURSE-011	STUBBS, SAMUEL & ASHLEY	82627	1/11/2021	1/11/2021	\$101.21	6834803	ARTS & CRAFTS	CULTURAL ARTS CLASSES
					101.21			
XC01112021-152	SUNROC	82635	1/11/2021	1/11/2021	\$35.00	1032100	BUSINESS LICENSES AND PE	BUSINESS LICENSE
					35.00			RENEWAL REFUND
1510033	THATCHER COMPANY	82545	1/4/2021	1/4/2021	\$2,061.50	5240510	WRF - CHEMICAL SUPPLIES	T-CHLOR 12.5/CONTAINER
					2,061.50			DEPOSIT/HYDROCHOLORIC
								ACID
843641633	THOMSON REUTERS - WEST	82628	1/6/2021	1/6/2021	\$214.00	1054311	PROFESSIONAL & TECHNICA	WEST INFORMATION
					214.00			CHARGES
011121	TISCHNER FORD SALES, INC	82636	1/11/2021	1/11/2021	\$161,351.84	4241058	VEHICLE PURCHASES	FOUR 2021 FORD POLICE
					161,351.84			RESPONDERS
16580	UPPER CASE PRINTING	82546	1/4/2021	1/4/2021	\$550.52	5440240	SUPPLIES	RECREATION FLYER & CITY
					550.52			NEWSLETTER
BF041908AB040	USDA FOREST SERVICE	82631	1/11/2021	1/11/2021	\$1,181.53	5140240	SUPPLIES	USDA FOREST SERVICE
					1,181.53			
INV-628	UTAH COMMUNICATIONS AUTHORIT	82632	1/11/2021	1/11/2021	\$400.00	7657247	COVID-19 RELATED EXPENDI	UCA RADIOS - 40APX600,
					400.00			APX600XE, XTS2500

SANTAQUIN CITY CORPORATION
Invoice Register - 1/2/2021 to 1/15/2021 - All Invoices

1/14/2021

<u>Invoice No.</u>	<u>Vendor</u>	<u>Check No.</u>	<u>Ledger Date</u>	<u>Due Date</u>	<u>Amount</u>	<u>Account No.</u>	<u>Account Name.</u>	<u>Description</u>
PR010221-7076	UTAH COUNTY LODGE #31	82587	1/8/2021	1/8/2021	\$162.00			
					162.00	1022425	FOP DUES	FOP Dues (Ut County Lodge #31)
010421	UTAH DEPT OF COMMERCE	82547	1/4/2021	1/4/2021	\$2,248.44			
					2,248.44	1068310	PROFESSIONAL & TECHNICA	1ST QUARTER - FY2020-21
96 - 2011A-2 Se	UTAH STATE DIVISION OF FINANCE	01042128	1/4/2021	1/4/2021	\$10,571.00			
					4,161.59	562540.2	2011A-2 Sewer Revenue Bond r	Principal - 2011A-2 Sewer Revenue
					6,409.41	5640860	DEBT SERVICE - INTEREST	Interest - 2011A-2 Sewer Revenue
PR010221-382	UTAH STATE RETIREMENT	9999	1/8/2021	1/8/2021	\$27,128.96			
					626.50	1022300	RETIREMENT PAYABLE	Roth IRA
					761.71	1022300	RETIREMENT PAYABLE	457
					3,655.21	1022300	RETIREMENT PAYABLE	401K
					20,658.73	1022300	RETIREMENT PAYABLE	Retirement
					659.77	1022300	RETIREMENT PAYABLE	401K - Tier 1 Parity
					767.04	1022325	RETIREMENT LOAN PAYMEN	Retirement Loan Payment
PR010221-361	UTAH STATE TAX COMMISSION		1/8/2021	1/8/2021	\$6,531.95			
					6,531.95	1022230	STATE WITHHOLDING PAYAB	State Income Tax
9869972235	VERIZON WIRELESS	82548	1/4/2021	1/4/2021	\$91.45			
					91.45	1048280	TELEPHONE	ENGINEERING

Total: \$808,110.63

GL Account Summary

24,539.44	1022210	FICA PAYABLE
10,337.38	1022220	FEDERAL WITHHOLDING PAY
6,531.95	1022230	STATE WITHHOLDING PAYAB
26,361.92	1022300	RETIREMENT PAYABLE
767.04	1022325	RETIREMENT LOAN PAYMEN
721.00	1022350	UTILITIES PAYABLE
140.31	1022420	GARNISHMENTS
180.00	1022425	FOP DUES
261.00	1022450-211	(INSP) HIGH PARK NORTH TO
2,339.50	1022450-284	(INSP)[Plat I]FOOTHILL VILLA
778.50	1022450-291	(INSP)[Plat A-13]THE ORCHAR
2,787.00	1022450-292	(INSP)[Plat C]THE HILLS
4,446.50	1022450-296	(INSP)[Plat A]SUMMIT RIDGE
1,107.50	1022450-299	(INSP) COUNTRY SIDE ESTAT
1,417.00	1022450-304	(INSP)[Plat A-14 AH]THE ORC
1,703.00	1022450-308	(INSP) BYLUND COMMERCIAL
50,283.72	1022500	HEALTH INSURANCE
4,730.00	1022501	DENTAL
126.09	1022505	SUPPLEMENTAL
190.40	1022506	EAP
35.00	1032100	BUSINESS LICENSES AND PE
30.98	1041670	YOUTH CITY COUNCIL EXPE
4,069.00	1042310	PROFESSIONAL & TECHNICA
20,649.98	1042331	LEGAL
4,961.00	1043210	BOOKS,SUBSCRIPTIONS,ME
572.22	1043220	NOTICES,ORDINANCES,PUBL
4,293.05	1043240	SUPPLIES
435.71	1043250	EQUIPMENT MAINTENANCE
916.00	1043310	PROFESSIONAL & TECHNICA
500.00	1043311	ACCOUNTING & AUDITING

SANTAQUIN CITY CORPORATION
Invoice Register - 1/2/2021 to 1/15/2021 - All Invoices

1/14/2021

<u>Invoice No.</u>	<u>Vendor</u>	<u>Check No.</u>	<u>Ledger Date</u>	<u>Due Date</u>	<u>Amount</u>	<u>Account No.</u>	<u>Account Name.</u>	<u>Description</u>
					8,311.45	1043331	LEGAL	
					150.00	1043480	EMPLOYEE RECOGNITIONS	
					5,041.93	1048230	EDUCATION, TRAINING, TRAV	
					42.92	1048250	EQUIPMENT MAINTENANCE	
					91.45	1048280	TELEPHONE	
					3,425.79	1051270	UTILITIES	
					3,203.36	1051280	TELEPHONE	
					483.88	1051300	BUILDINGS & GROUND MAIN	
					2,160.98	1051480	CHRISTMAS LIGHTS	
					650.00	1054230	EDUCATION, TRAINING & TRA	
					2,472.85	1054240	SUPPLIES	
					16.99	1054250	EQUIPMENT MAINTENANCE	
					344.00	1054311	PROFESSIONAL & TECHNICA	
					21,876.30	1054340	CENTRAL DISPATCH FEES	
					173.50	1054740	CAPITAL-VEHICLES & EQUIP	
					4,293.04	1060240	SUPPLIES	
					3,099.50	1060250	EQUIPMENT MAINTENANCE	
					39.64	1060270	UTILITIES - STREET LIGHTS	
					38,620.89	1062311	WASTE PICKUP CHARGES	
					9,311.25	1062312	RECYCLING PICKUP CHARGE	
					2,248.44	1068310	PROFESSIONAL & TECHNICA	
					200.61	1070250	EQUIPMENT MAINTENANCE	
					624.82	1070270	UTILITIES	
					368.74	1070300	BUILDINGS & GROUNDS MAI	
					17.56	1077300	BUILDINGS & GROUND MAIN	
					50.82	1078220	NOTICE, ORDINANCES & PUB	
					5,126.54	1078230	EDUCATION, TRAINING & TRA	
					588.00	1078250	EQUIPMENT MAINT	
					289,247.44		Total	
					1,943.50	4140816	NRCS - DEBRIS BASIN STUDY	
					161,351.84	4241058	VEHICLE PURCHASES	
					1,567.50	4340113	WEBSITE CONTENT MGT - PE	
					657.64	4340114	SOCIAL MEDIA ARCHIVE SER	
					1,542.65	4340300	COPIER CONTRACT	
					418.00	4340500	SOFTWARE EXPENSE	
					5,471.10	4340613	FIRE DEPARTMENT SOFTWA	
					9,656.89		Total	
					2,163.00	4540200	ROAD MAINTENANCE	
					53,371.75	4540882	2018 ROAD BOND - INTEREST	
					213,110.77	4540900	TRANSFER TO CDA FUND	
					268,645.52		Total	
					166.63	5113110	ACCOUNTS RECEIVABLE	
					5,294.76	5140240	SUPPLIES	
					929.28	5140250	EQUIPMENT MAINTENANCE	
					147.50	5140310	PROFESSIONAL & TECHNICA	
					6,538.17		Total	
					157.17	5240210	BOOKS, SUBSCRIPT, MEMBE	
					1,846.24	5240240	SUPPLIES	
					298.51	5240250	EQUIPMENT MAINTENANCE	
					251.25	5240310	PROFESSIONAL & TECHNICA	
					11,747.05	5240500	WRF - UTILITIES	

SANTAQUIN CITY CORPORATION
Invoice Register - 1/2/2021 to 1/15/2021 - All Invoices

1/14/2021

<u>Invoice No.</u>	<u>Vendor</u>	<u>Check No.</u>	<u>Ledger Date</u>	<u>Due Date</u>	<u>Amount</u>	<u>Account No.</u>	<u>Account Name.</u>	<u>Description</u>
					5,859.59	5240510	WRF - CHEMICAL SUPPLIES	
					1,064.17	5240520	WRF - SUPPLIES	
					5,922.00	5240530	WRF - SOLID WASTE DISPOS	
					390.00	5240550	WRF - EQUIPMENT MAINTEN	
					27,535.98		Total	
					619.82	5440110	SALARIES AND WAGES	
					2,734.89	5440240	SUPPLIES	
					654.47	5440250	EQUIPMENT MAINTENANCE	
					439.17	5440273	UTILITIES	
					4,448.35		Total	
					3,134.86	5540730	CAPITAL FACILITY PLAN UPD	
					4,161.59	562540.2	2011A-2 Sewer Revenue Bond r	
					6,409.41	5640860	DEBT SERVICE - INTEREST	
					10,571.00		Total	
					2,060.50	5740513	400 E MAIN URBAN PLAZA	
					2,620.00	5740720	IMPACT FEE	
					4,680.50		Total	
					1,134.25	5940751	HIGHLAND DRIVE (FOOTHILL	
					7,163.97	6040730	CAPITAL FACILITY PLAN UPD	
					257.50	6140310	BALLFIELD MAINTENANCE	
					43.68	6140335	MISC SUPPLIES	
					301.18		Total	
					48.97	6340240	SUPPLIES	
					1,603.02	6640720	RAP TAX EXPENSE	
					137.46	6740640	UTAH COUNTY GRANT	
					101.21	6834803	ARTS & CRAFTS	
					76.13	7240240	SUPPLIES	
					1,086.29	7540480	FOOD	
					793.77	7657240	FIRE - SUPPLIES	
					705.00	7657242	EMS - SUPPLIES	
					1,222.96	7657244	UNIFORMS	
					67.97	7657246	EMERGENCY MANAGEMENT	
					1,997.14	7657247	COVID-19 RELATED EXPENDI	
					1,067.26	7657250	FIRE - EQUIPMENT MAINTEN	
					1,000.00	7657620	MEDICAL SERVICES (SHOTS)	
					1,850.00	7657740	FIRE - CAPITAL-VEHICLES &	
					8,704.10		Total	
					\$808,110.63		GL Account Summary Total	



RESOLUTION 01-02-2021
A RESOLUTION APPROVING AN INFRASTRUCTURE
DEFERRAL AGREEMENT FOR THE SORENSON 2-LOT
SUBDIVISION

BE IT HEREBY RESOLVED:

SECTION 1: The attached document represents the Infrastructure Deferral Agreement for the Sorenson 2-lot Subdivision.

SECTION 2: This Resolution shall become effective upon passage.

Approved on this 19th day of January, 2021.

Kirk F. Hunsaker, Mayor

K. Aaron Shirley, City Recorder

INFRASTRUCTURE DEFERRAL AGREEMENT

THIS AGREEMENT, is made and entered into, effective as of the _____ day of _____, 2021, by and between the City of Santaquin, Utah, a municipality and political subdivision of the State of Utah, hereinafter (“City”) and Dale D and Kelly Sorenson, hereinafter referred to as (“Property Owners”).

WITNESSETH:

WHEREAS, Santaquin City is a municipality and political subdivision of the State of Utah; and

WHEREAS, the City has adopted certain land use ordinances, which govern the uses of real property and the construction of building and infrastructure improvements on real property within the municipal boundaries; and

WHEREAS, Property Owners own certain real property located in the City, which real property is more particularly described in Exhibit A hereto (the “Property”), and has submitted an application to subdivide the Property in order to create new lots for single family homes on the Property (the “Application”); and

WHEREAS, City land use ordinances require the completion of infrastructure improvements along City streets and connection to City infrastructure in connection with the approval of any subdivision within the City; and

WHEREAS, Property Owners has requested that its obligation to complete certain infrastructure improvements be deferred pursuant to Santaquin City Ordinance No. 09-01-2015, which provides for deferral of the obligation to complete certain infrastructure improvements prior to final inspection or a certificate of occupancy, on lots or parcels meeting the criteria established in said ordinance; and

WHEREAS, the parties agree that the property proposed for subdivision by Property Owners meets the criteria set forth in Ordinance No. 09-01-2015; and

WHEREAS, the parties now desire to enter into this Agreement in order to establish the terms and conditions of their agreement.

NOW, THEREFORE, in consideration of mutual covenants, agreements and other valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties agree as follows:

1. City shall review the Application in a timely manner and, upon the City’s determination that the Application meets all of the requirements for a subdivision and that all appropriate fees have been paid, shall approve the Application and record the related subdivision plat, which was submitted with the Application, a copy of which is attached hereto as Exhibit B, (the “Plat”), in final form after review and approval.

2. Upon recordation of the Plat the City shall grant Property Owners’ request for a deferral of the obligation to complete the following infrastructure improvements associated with the Sorenson Subdivision (properties at 88 N and 68 N 300 East (the “Deferred Improvements”):

- a. Curb and Gutter along 300 East and 100 North Streets;
- b. Sidewalk along 300 East and 100 North Streets;
- c. ADA ramp at the southeast corner of 300 East and 100 North Streets;
- d. Extension of road base and asphalt paving between the curb and gutter and the existing paved surface of 300 East and 100 North Streets; and

- e. Landscaping within the public right-of-way along 300 East and 100 North Streets.

3. City shall defer Property Owners' requirement to post an infrastructure performance guarantee bond for the completion of the Deferred Improvements until such time as notice is sent to Property Owners demanding installation and/or completion of any or all improvements; or, to reimburse the CITY for CITY'S installation and/or completion of the improvements at such time as CITY, through written notice to Property Owner, demands reimbursement.

4. Within ten years of the recording of this agreement, the City shall adopt a plan for the construction of infrastructure improvements adjacent to the Property and shall notify Property Owners to commence construction of the Deferred Improvements.

5. Property Owners agrees and commits to the following terms and conditions regarding the construction of the Deferred Improvements:

- a. Property Owners shall commence construction of the Deferred Improvements within 30 days of the notice described in paragraph 3 above, and shall complete the Deferred Improvements within 90 days of said notice.

- b. Deferred Improvements shall be constructed in accordance with the Santaquin City Development Standards in place at the time of construction of the improvements.

- c. Property Owners shall assure that all Deferred Improvements are inspected and approved by the City in accordance with the City's requirements.

- d. All costs and expenses associated with the Deferred Improvements shall be borne solely by Property Owners.

6. CITY may require any or all of the improvements to be partially or wholly completed, in any order or pursuant to any timetable deemed appropriate by CITY.

7. Property Owners shall not be relieved of the obligation to install the improvements until such installation has been performed to the satisfaction of CITY.

8. Notwithstanding the provisions set forth above, if prior to the deferred time period set out in paragraphs 1 and 4 above, an applicant applies to CITY for approval to develop the property adjacent to the property described above, CITY may require said Deferred Improvements to be installed at the same time as the improvements on the adjacent property.

9. If Property Owners sells or leases the Property or any property adjacent thereto and the buyer or lessee applies to CITY for approval to develop all or any portion of said property, the CITY may require the Deferred Improvements to be installed at the same time as the improvements on said adjacent properties.

10. Notwithstanding the provisions of this Agreement, the parties expressly agree that CITY may at any time, at its option, install and/or complete the Deferred Improvements. Should CITY exercise such option, Property Owners shall reimburse the City, within 30 days of an invoice from the City, for all costs resulting from said installation and/or completion.

11. Should Property Owners fail to install and complete the improvements as required by CITY pursuant to the terms of this Agreement or reimburse CITY as herein agreed, or otherwise fail to perform its obligation pursuant to the terms of this Agreement, Property Owners recognizes City's right to recover the costs necessary to install the improvements or obtain reimbursement therefore through foreclosure proceedings on the property described above, and shall not contest the same.

12. If an improvement district is proposed, which district would in whole or in part finance the installation of any or of all the improvements required under this Agreement, Property Owners expressly agrees not to oppose the forming of the improvement district or any of the costs thereof. Property Owners expressly acknowledges that its obligation for completion of or reimbursement for any improvements which are the subject of this Agreement, but which are not or will not be installed as part of the improvement district, shall not be affected by the said installation of improvements by the improvement district.

13. Property Owners shall have the right to satisfy its responsibilities under the Agreement for guarantee of the Deferred Improvements by delivering to the City a bond that will assure the completion of and payment for all Deferred Improvements, which bond shall be in an amount equal to no less than 125% of the City Engineer's estimated cost of said Deferred Improvements, and which shall be held and released by the City in accordance with development guarantee ordinances adopted by the City.

14. Property Owners expressly acknowledges that nothing in this Agreement shall be deemed to relieve Property Owner from its obligations to comply with all applicable requirements of the City necessary for any use of the Property including payment of fees, the approval of all building permits and construction permits, and compliance with all applicable ordinances, resolutions, policies and procedures of the City. Furthermore, this Agreement does not imply nor guarantee that the City will approve a building permit on or development of the Property, except where provided by law.

15. Any and all of the obligations of Property Owners as outlined in this Agreement shall run with the land described above and shall constitute an encumbrance thereon. The rights, duties and obligations herein shall inure to the benefit of and be binding upon the heirs, successors-in-interest, assigns, transferees, and any subsequent purchaser of the parties.

16. This Agreement has been reviewed and revised by legal counsel for Property Owners and the City, and no presumption or rule that ambiguities shall be construed against the drafting Party shall apply to the interpretation or enforcement of this Agreement.

17. Each of the parties hereto agrees to cooperate in good faith with the other, and to execute and deliver such further documents, and to take all further actions reasonably necessary in order to carry out the intent and purposes of this Agreement and the actions contemplated hereby. All provisions and requirements of this Agreement shall be carried out by each party as allowed by law.

18. Any notice or communication required hereunder between the Parties must be in writing, and may be given either personally or by registered or certified mail, return receipt requested or by facsimile. If given by registered or certified mail, the same shall be deemed to have been given and received on the first to occur of (i) actual receipt by any of the addressees designated below as the Party to whom notices are to be sent, or (ii) five (5) days after a registered or certified letter containing such notice, properly addressed, with postage prepaid, is deposited in the United States mail. If personally delivered, a notice is

given when delivered to the Party to whom it is addressed. If given by facsimile to the address and number for such party set forth below (provided, however, that the notice is not effective unless a duplicate copy of the facsimile notice is promptly given by one of the other methods permitted under this paragraph), the notice is deemed to have been given upon receipt by the other Party. Any Party hereto may at any time, by giving ten (10) days written notice to other Parties hereto, designate any other address in substitution of the address to which such notice or communication shall be given. Such notices or communications shall be given to the Parties at the addresses set forth below:

If to City to:

Santaquin City
c/o Benjamin Reeves, City Manager
275 West Main Street
Santaquin, UT 84655

Copy to:

Brett B. Rich, Esq. Nielsen & Senior
15 W. South Temple, Suite 1700
Salt Lake City, Utah 84101

If to Property Owners to:

Dale D and Kelly Sorenson
88 N 300 E
Santaquin, UT 84655

19. This Agreement is executed in two (2) duplicate counterparts, each of which is deemed to be an original. This Agreement consists of six (6) pages, including notary acknowledgment forms, and an additional one (1) exhibits, which constitute the entire understanding and agreement of the Parties to this Agreement. The following exhibits are attached to this Agreement and incorporated herein for all purposes:

Exhibit A Legal description of the Property

20. This Agreement shall continue in force and effect until all obligations hereunder have been satisfied, or for a period of 12 years from the execution hereof, whichever is later.

21. In the event CITY commences legal action to enforce or interpret any term of this Agreement, CITY shall be entitled to recover from APPLICANT reasonable attorney's fees, court costs, and any other costs in connection with said action.

22. This Agreement contains the complete Agreement concerning the arrangement between the parties with respect to the posting of an infrastructure performance guarantee, and shall supersede all other agreements between the parties, written or oral. This Agreement does not waive other conditions of approval for the subdivision.

23. Any modification of this Agreement or additional obligations assumed by either party in connection with this Agreement shall be binding only if evidenced in writing and signed by each party.

24. The invalidity of any portion of this Agreement will not and shall not be deemed to affect the validity of any other provision of this Agreement. In the event that any provision of

this Agreement is held to be invalid, the parties agree that the remaining provisions shall remain in full force and effect.

25. This Agreement, performance hereunder and enforcement of the terms contained herein shall be construed in accordance with and pursuant to the laws of the State of Utah.

26. The failure of either party to this Agreement to insist upon the performance of any of the terms and conditions contained herein, or the waiver of any breach of any of the term and conditions contained herein, shall not be construed as thereafter waiving any such terms and conditions, but the same shall continue and remain in full force and effect as if no such forbearance or waiver has occurred.

27. In the event that any person challenges this Agreement or any of the provisions herein, Property Owners agrees to indemnify the City for all legal fees, including attorneys' fees, expenses, and/or court costs incurred by the City upon presentation of an itemized list of costs, expenses, and fees.

28. A Notice of Agreement shall be filed in the office of the Utah County Recorder.

IN WITNESS THEREOF, this Agreement has been executed by a person duly authorized by PROPERTY OWNERS to execute the same and by the duly elected Mayor of the City of Santaquin, with the approval of the Santaquin City Council as of the _____ day of _____, 2021

CITY OF SANTAQUIN

KIRK F. HUNSAKER, Mayor

ATTEST:

, City Recorder

STATE OF UTAH)
 :SS
COUNTY OF UTAH)

On this _____ day of _____ 2021, personally appeared before me, Kirk F. Hunsaker who, after being duly sworn, acknowledged to me that he is authorized to execute this document and who executed the same.

Notary Public

PROPERTY OWNERS

STATE OF UTAH)
 :SS
COUNTY OF UTAH)

On this day of _____2021, personally appeared before me, _____,
who, after being duly sworn, acknowledged to me that he is authorized to execute this document and who
executed the same.

Notary Public

STATE OF UTAH)
 :SS
COUNTY OF UTAH)

On this day of _____2021, personally appeared before me, _____,
who, after being duly sworn, acknowledged to me that he is authorized to execute this document and who
executed the same.

Notary Public

STATE OF UTAH)
 :SS
COUNTY OF UTAH)

On this day of _____, 2021, personally appeared before me, _____,
who, after being duly sworn, acknowledged to me that he is authorized to execute this document and who
executed the same.

Notary Public

SORENSEN RECORD OF SURVEY AND TOPOGRAPHY

[illegible]

SORENSEN SUBDIVISION PRELIMINARY PLAT

STATE PLAT CONVEYANCES (ORDINANCE)

LOT/PLAT	SECTION	TOWNSHIP	RANGE	PLAT
LOT 100	100	100	100	100
LOT 101	101	101	101	101
LOT 102	102	102	102	102
LOT 103	103	103	103	103
LOT 104	104	104	104	104
LOT 105	105	105	105	105
LOT 106	106	106	106	106
LOT 107	107	107	107	107
LOT 108	108	108	108	108
LOT 109	109	109	109	109
LOT 110	110	110	110	110

SORENSEN SUBDIVISION

LOCATED IN:
BLOCK 17, PLAT "W" SANTIQUIN CITY TOWNSHIP
SOUTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 1,
TOWNSHIP 10 SOUTH, RANGE 10 EAST, SALT LAKE BASIN AND HERONS
SANTIQUIN CITY, UTAH COUNTY, UTAH

CONDITIONS OF APPROVAL

1. APPROVAL OF THIS SUBDIVISION IS CONDITIONED UPON THE SUBMITTER'S AGREEMENT TO THE FOLLOWING:
2. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:
3. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:
4. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:
5. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:
6. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:
7. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:
8. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:
9. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:
10. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:

SORENSEN SUBDIVISION LEGAL DESCRIPTION

ALL OF LOT 4, BLOCK 17, PLAT "W" SANTIQUIN TOWNSHIP, ACCORDING TO THE OFFICIAL PLAT THEREON ON FILE AND OF RECORD IN THE UTAH COUNTY RECORDS OFFICE.

GENERAL PLAT NOTES

1. A SUBDIVISION OF LOT 4, BLOCK 17, PLAT "W" SANTIQUIN TOWNSHIP, ACCORDING TO THE OFFICIAL PLAT THEREON ON FILE AND OF RECORD IN THE UTAH COUNTY RECORDS OFFICE.
2. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:
3. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:
4. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:
5. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:
6. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:
7. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:
8. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:
9. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:
10. THE SUBDIVISION SHALL BE SUBJECT TO THE FOLLOWING:

SORENSEN SUBDIVISION

LOCATED IN:
BLOCK 17, PLAT "W" SANTIQUIN CITY TOWNSHIP
SOUTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 1,
TOWNSHIP 10 SOUTH, RANGE 10 EAST, SALT LAKE BASIN AND HERONS
SANTIQUIN CITY, UTAH COUNTY, UTAH

SORENSEN SUBDIVISION LEGAL DESCRIPTION

ALL OF LOT 4, BLOCK 17, PLAT "W" SANTIQUIN TOWNSHIP, ACCORDING TO THE OFFICIAL PLAT THEREON ON FILE AND OF RECORD IN THE UTAH COUNTY RECORDS OFFICE.

SORENSEN SUBDIVISION

LOCATED IN:
BLOCK 17, PLAT "W" SANTIQUIN CITY TOWNSHIP
SOUTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 1,
TOWNSHIP 10 SOUTH, RANGE 10 EAST, SALT LAKE BASIN AND HERONS
SANTIQUIN CITY, UTAH COUNTY, UTAH

SORENSEN SUBDIVISION LEGAL DESCRIPTION

ALL OF LOT 4, BLOCK 17, PLAT "W" SANTIQUIN TOWNSHIP, ACCORDING TO THE OFFICIAL PLAT THEREON ON FILE AND OF RECORD IN THE UTAH COUNTY RECORDS OFFICE.

The Property is identified by Utah County Recorder PARCEL NO. 09:092:006, ENTRY NO. 42867:2015, 41,441 S.F. / 0.95 ACRES +/- as depicted in the above figure.

Legal Description: LOT 4, BLOCK 27, PLAT "B" SANTAQUIN TOWNSHIP SURVEY

4824-3714-8457.SA605.004

Santaquin City Resolution 01-04-2021

A RESOLUTION APPROVING A BOARD MEMBER TO THE SOUTH UTAH VALLEY ANIMAL SHELTER TO REPRESENT SANTAQUIN CITY

WHEREAS, the City of Santaquin is a four class city in the State of Utah with the responsibility of providing animal shelter services for its residents; and

WHEREAS, the City of Santaquin joined the South Utah Valley Animal Shelter as a means of providing animal shelter services to its residents; and

WHEREAS, to provide governance to the South Utah Valley Animal Shelter Board each community appoints a representative to participate on the board; and

WHEREAS, the South Utah Valley Animal Shelter Board desires to have the appointment of a representative from Santaquin City passed by a Resolution of the Santaquin City Council;

NOW THEREFORE, be it resolved by the City Council of Santaquin City to accept Mayor Hunsaker's appointment of Police Chief, Rodney Hurst, as the voting board member and Police Corporal Mike Wall as the alternate voting board member of the South Utah Valley Animal Shelter.

ADOPTED AND PASSED by the City Council of Santaquin City, Utah, this 19th day of January 2021.

SANTAQUIN CITY

Kirk F. Hunsaker, Mayor

Attest

K. Aaron Shirley, City Recorder

RESOLUTION 01-05-2021

A RESOLUTION APPROVING A TECHNICAL PLANNING ASSISTANCE PROGRAM FUNDS COOPERATIVE AGREEMENT WITH THE UTAH DEPARTMENT OF TRANSPORTATION (UDOT)

WHEREAS, the Utah Legislature has appropriated money for the Technical Planning Assistance Program ("Program") administered by UDOT. The funding is intended to help local governments plan for future land use and transportation; and

WHEREAS, Santaquin City was awarded grant funds from this Program and will utilize said funding pursuant to the terms of the attached Agreement;

NOW THEREFORE, be it resolved by the City Council of Santaquin City to authorize the Mayor to execute the attached Technical Planning Assistance Program with the Utah Department of Transportation.

ADOPTED AND PASSED by the City Council of Santaquin City, Utah, this 19th day of January 2021.

SANTAQUIN CITY

Kirk F. Hunsaker, Mayor

Attest

K. Aaron Shirley, City Recorder

TECHNICAL PLANNING ASSISTANCE PROGRAM FUNDS COOPERATIVE AGREEMENT

This Cooperative Agreement (the “Agreement”) is entered into on _____, by and between Utah Department of Transportation (“UDOT”), an agency of the State of Utah, and Santaquin City (“Local Government”), a political subdivision of the State of Utah. UDOT and Local Government are collectively referred to as “parties” and each may be referred to individually as “party.”

RECITALS

WHEREAS, the Utah Legislature has appropriated money for the Technical Planning Assistance Program (“Program”). The funding is intended to help local governments plan for future land use and transportation; and

WHEREAS, funds from this Program will be used to pay for costs for approved scope of work; and

WHEREAS, the Local Government has committed a local match amount in order to receive Program funding from UDOT; and

WHEREAS, this Agreement describes the amount of the funds that will be used for approved scope of work for a plan or study addressing future land use and transportation.

AGREEMENT

NOW, THEREFORE, on the stated Recitals, which are incorporated herein by reference, and for and in consideration of the mutual covenants and agreements hereafter set forth, the mutual benefits to the parties to be derived, and for other valuable consideration, the receipt and sufficiency of which the parties acknowledge, it is hereby agreed as follows:

1. Initial Scope of Work. UDOT must approve the initial scope of work and any material modifications thereto during the development of the plan or study.
2. Local Match Amount. Local Government commits to match the amount of \$25,000 in order to receive the eligible Program fund amount of \$25,000. UDOT will deliver the Program funds in one lump-sum payment no later than 60 days after the agreement is signed by both parties.
3. Progress Report. Local Government will submit to UDOT a brief, one-page progress report for each quarter of the calendar year. The progress report will be submitted within 30 days after the end of each quarter and shall include the following:
 - a. A brief description of the progress and tasks completed for the approved scope of work for the plan or study.
 - b. A summary of the funds expended and budget remaining.

4. Additional Information. The Local Government will cooperate with any of UDOT's requests for information or status concerning the plan or study.
5. Adoption of Plan or Study. After the project is complete, the Local Government will adopt or start the process to adopt the results of the plan or study.
6. No Additional Funds. Unless specifically agreed to in writing, UDOT and Local Government will not be required to contribute additional funds unless specifically described in an amendment to this Agreement. However, if Local Government decides to cancel or abandon the project described in the approved scope before it is complete, UDOT may require Local Government to return all or a portion of the awarded Program funds.
7. Term. The Parties agree that this Agreement shall remain in full force and effect for a period of five (5) years unless agreed to by the Parties in an amendment to this Agreement.
8. Termination. In the event the Local Government does not comply with the requirements of this Agreement, UDOT will provide written notice of the non-compliance. If the Local Government does not remedy the breach within a reasonable time period, UDOT may terminate the Agreement. In the event of termination for non-compliance, UDOT may require all or a portion of the Program funds to be returned.
9. Amendment/Waiver. No waiver, termination, amendment or other modification of any provision to this Agreement shall be effective unless the same shall be in writing and signed by all parties, and then such waiver, termination, amendment or modification shall be effective only in the specific instance and for the specific purpose for which it is given.
10. Entire Agreement. This Agreement constitutes the entire Agreement by and between the Parties with respect to the subject matter of this Agreement and supersedes all prior agreements, understandings and negotiations, both written and oral, with respect to the subject matter of this Agreement. No representation, warranty, inducement, promise, understanding or condition which is not set forth in this Agreement has been made or relied upon by either of the parties hereto.
11. Dispute Resolution. The Parties agree to make a good faith effort to resolve any dispute regarding the construction or interpretation of any provision of this Agreement, or regarding any policy matter or the determination of any issue of fact, at the lowest appropriate level.
12. Authority. The individuals executing this Agreement each represent and warrant (i) that he or she is authorized to do so on behalf of the respective parties hereto, (ii) that he or she has full legal power and authority to bind the respective parties hereto, and if necessary, has obtained all required consents or delegations of such power and authority, and (iii) that the execution, delivery and performance by the respective parties hereto of this document will not constitute a default under any agreement to which it is a party.

IN WITNESS WHEREOF, the Parties have entered into this Agreement effective the date first set forth herein.

UTAH DEPARTMENT OF TRANSPORTATION

By: _____

Title: Program Development Director

Date: _____

SANTAQUIN CITY

By: _____

Title: _____

Date: _____

Approved as to form:

RESOLUTION No. 01-03-2021

A RESOLUTION ESTABLISHING THE FEE SCHEDULE FOR SANTAQUIN CITY

WHEREAS, the governing body of the City of Santaquin, Utah, acknowledges that the fees required of various developers, subdividers, property owners, and citizenry of the city necessitate period review; and

WHEREAS, review of these fees has been found to be warranted in certain areas as they have gone without update or alteration for an extended period of time; and

WHEREAS, the City Council of Santaquin desires to make adjustments where necessary to the Santaquin City Fee Schedule in order to ensure proper and adequate service to the citizens of Santaquin;

NOW THEREFORE, BE IT RESOLVED by the City Council of Santaquin, Utah, that the following fees shall be established for various development projects and services rendered by employees and volunteers of the City, and shall be collected by the City Recorder at the submittal of an application or request for action for which the fee has been designated herein:



FEE SCHEDULE

January 19, 2021 ~~January 5, 2021~~

A. The fees charged by the City for services rendered to the community shall be as follows:

Development

Annexation Application¹⁰

- 4.99 acres or less - \$525.00 (\$125.00 Utah County Review)
- 5.00 acres or more - \$525.00 (\$125.00 Utah County Fee) + \$65 per acre over 5.00

Concept Review - \$400.00

Subdivisions

Preliminary (up to 2 reviews)

- Core Area Infill (1-10 Lots) - \$1000 x (# of lots)^{0.500}
- 1-10 lot Subdivision - \$1,600 x (# of lots)^{0.385}
- 11-100 lot Subdivision - \$2,075 x (# of lots)^{0.273}
- 100+ lot Subdivision - \$4,025 x (# of lots)^{0.130}

Final (up to 2 reviews)

- Core Area Infill (1-10 Lots) - \$1000 x (# of lots)^{0.400}
- 1-10 lot Subdivision - \$1,500 x (# of lots)^{0.327}
- 11-100 lot Subdivision - \$2,300 x (# of lots)^{0.148}
- 100+ lot Subdivision - \$3,325 x (# of lots)^{0.068}

Additional DRC / Modified Final Plat Review – Varies (based on staff time spent & current hourly rates)

Lot Line Adjustment Review - \$150.00

Recording Fees - According to Utah County fee schedule. (Checks made out to Utah County Recorder's Office)

Plat approval extension request - \$200.00

Condominium Plat Review - \$1,000

Site Plan Review (two reviews)

Commercial & Industrial Development Applications

Site Plan Review - \$600.00

Multi Family Residential Site Plan Review - \$600.00

Additional Site Plan Reviews Fee - Varies (based on staff time spent & current hourly rates)

Modified Site Plan Review Fee - Varies (based on staff time spent & current hourly rates) Modified plans include built developments making alterations to site features requiring review by staff. Appeals Authority

Application - \$200.00

Street Vacation⁸ - \$800.00

Gravel, Sand, Earth Extraction, and Mass Grading Permit

Request - \$350.00

Prepayment of Inspection Costs Fee¹⁷ – 4% of City Engineer's Cost Estimate of Development Bond

Street Lights

General Fees

- Wire installation - \$100.00 per light (assumes 100 feet of wire to be installed. Differences based on actual installation will be refunded or billed to the developer.
- Trenching (where none provided) - \$4.00 per ft

Local / Collector Streets

- Lights - \$1,934.00 each
- Installation - \$850.00 each
- 6/3 TC Wire – current market price
- 1½" Conduit– \$2.00 per ft

Arterial Streets

- Lights - \$4,108.00 each

- Basic installation - \$1,150.00
- Installation (UDOT Right-a-way) - \$1,250.00
- 6/3 TC wire – current market price
- 1½" Conduit– \$2.00 per ft
- Sweeps - \$250.00 each
- Banner Arms - \$53.00
- 120-volt receptacle - \$35.00
- Plant Hanger Rod - \$40.00
- Flag Holder - \$52.00
- Breakaway Hardware (UDOT Street) – \$450.00
- Tunneling for any street light service - \$15.00 per ft
- Strong Box & installation - \$3,100.00
- 3" pvc Strong Box conduit installation - \$4.00 per ft

Street Signage

- Residential Combo (street/stop sign) - \$650.00 each
- Oversized Combo (street/stop sign) - \$675.00 each
- Street or Stop Sign only - \$450.00 each
- Oversized Street or Stop sign only - \$550.00 each
- Specialty Sign (Spd Limit, Child @ Play, etc.) - \$200.00 each

Zoning

- Rezoning Request - \$400.00
- Agriculture Protection Request - \$300.00
- Conditional Use Permit Request - \$175.00
- Ordinance Text Change Request - \$400.00
- Special Event Permit Request - \$25.00
- Permanent Sign Permit – as per Building fees
- Temporary Sign Permit - \$30.00

Business Licenses

- Initial Commercial License - \$75.00
- Initial Home Occupation License - \$50.00
- Temporary Business License - \$50.00
- Annual Liquor License - \$100.00
- Annual License Renewal Fee - \$35.00
- Renewal Late Fee Penalty¹² – \$20.00
- Annual Hobby Kennel Fee - \$50.00
- Annual Residential Kennel Fee - \$100.00
- Annual Commercial Kennel Fee - \$250.00
- Solicitor Licenses - \$15.00 per Solicitor (must have a Santaquin City Business License)

Building

- Permit Tracking Fee - \$70.00
- Building Permit & Inspection Fees – Determined by Structure
- Plan review deposit – \$500.00 (new construction only -paid up front & applied to 65% plan check fee)
- Plan Check Fee – 65% of building permit fee
- State Building Fee - Equal to 1% of Building Permit Fee
- Water Impact Fee¹⁹

Units of Measure	Equivalency	Impact Fee
Residential		
¾" Meter	1.00	\$656.00
Non-Residential		
¾" Meter	2.00	\$1,311

Item # 9.

1"	3.34	\$2,190.00
1 1/2"	6.66	\$4,366.00
2"	10.66	\$6,988.00
3"	21.34	\$13,990.00
4"	33.34	\$21,856.00
6"	66.66	\$43,699.00
8"	106.66	\$69,922.00

Money In Lieu of Water Dedication Fee - \$4,750.00/AF

Pressurized Irrigation Impact Fee¹⁸ - \$3388.00

Storm Drain Impact Fee - \$770.00²³

Sewer Impact Fee:

Standard User Fee – \$4,416.00 per residential dwelling or unit

Non-Standard User Fee – (Average Gallons per Day/200) x \$4,416.00

Multi-Family/Non-Residential Fee - \$4,416.00 per 16 Fixture Units based on the 2015 International Residential Code.

Park/Recreation Impact Fee - Single-Family Dwelling or Connection \$3,817.00

Multi-Family Dwelling Unit or Connection - \$3,095.00

Transportation Impact Fee²⁴ – Single-Family Detached

Housing = \$768.60/Unit

Public Safety Impact Fees

EMS/Fire

Residential Impact Fee = \$495.43/Unit

Non-Residential Impact Fee = ~~\$0.43/s.f. (Unit)~~
~~\$0.16/s.f. (Vehicle)~~
\$0.59/s.f. (Total)

Police

Residential Impact Fee = \$35.72/Unit

Non-Residential Impact Fee = \$0.05/s.f.

Meter Fee (PI or Culinary Water)

3/4" service - \$300.00 (not available for PI)

1" service - \$400.00

1 1/2" service - \$670.00

2" service - \$770.00

Pressurized Irrigation Meter Install - \$250.00 per connection

Water Meter Install - \$200.00 per connection

Temporary Construction Water - \$50.00

Lot Identification Sign for new Construction - \$10.00

Installing or Removing Grade Ring - \$50.00

Demolition Permit Fee - \$35.00

Reinspection fee - \$65.00 (for each building inspection over 2 for required items)

Landscaping Bonds

10,000 SF Lot or Less - \$5,000.00

10,001-15,000 SF Lot - \$8,000.00

15,001 SF Lot or Greater - \$10,000.00

Water for Construction

Project within City boundaries - \$2.50 per 1,000 gallons

Project outside City boundaries - \$5.00 per 1,000 gallons

Water Hydrant Meter Deposit - \$1,000.00¹⁶

Construction in City Right-of-Way⁴

0-2 Years since Resurfacing

Summer Permit Fee - \$2,000.00, plus \$20

Per Square Foot

Winter Permit - Summer Permit Fee + \$500.00

2-5 Years since Resurfacing

Summer Permit Fee - \$1,500.00, plus \$15

Per Square Foot

Winter Permit - Summer Permit Fee + \$500.00

5+ Years since Resurfacing

Summer Permit Fee - \$1,000.00, plus \$10

Per Square Foot

Winter Permit - Summer Permit Fee + \$500.00

Water Rates with or without PI Available²¹

Base Rate¹³ - \$22.47 per month

0 – 4,000 gallons¹³ - \$0.58 per thousand gallons

4,001 – 8,000 gallons¹³ - \$0.88 per thousand gallons

8,001 – 12,000 gallons¹³ - \$1.16 per thousand gallons

12,001 + gallons¹³ - \$2.15 per thousand gallons

Pressurized Irrigation Rates²¹

Base Rate¹³ per month \$16.37 (1")

\$23.40 (1.5" or larger)

Usage Rate per 1,000 gallons¹³ - \$.74 per thousand gallons

1 1/2" meter - \$650.00

2" meter - \$750.00

Separate MXU - \$170.00

Sewer Rates²¹

Base Rate¹³ - \$40.03 per month

Per 1000 gallons¹³ - \$0.83 (based on actual usage)

Utilities

Account Setup - \$25.00.

Customer Deposit¹⁴ - \$200.00

Past Due Tag - \$25.00

Disconnection/Lockout Service - \$150.00

Reconnection Fee - \$75.00

Addressing Services - \$0.70

Unpaid Utility Account Balances will be assessed 10% per month

Utility Service Order (service disconnected & reconnected for repairs, move meter, etc) - \$75.00

Storm Drainage Monthly Rates¹³ \$1.08

Waste Removal

Monthly Rates¹³ \$14.09 per container

Recycling Rates \$6.77 per container²²

Non-Resident – Services provided by private contractor

Commercial – Services provided by private contractor

Landfill Rates

Contractors Disposing of Construction Site Materials

6-wheeled vehicle - \$60.00 per load for materials originating within the City Limits

6-wheeler vehicle - \$150.00 per load for materials originating outside the City Limits

10-wheeled vehicle - \$80.00 per load for materials originating within the City Limits

10-wheeled vehicle - \$400.00 per load for materials originating outside the City Limits

Larger than 10-wheeled vehicle - \$160.00 per load for materials originating within the City Limits

Larger than 10-wheeled vehicle - \$600.00 per load for materials originating outside the City Limits

Cemetery²⁰

Plot Sales

Flush Mount Monument:

Resident - \$500.00 per plot¹

Non-Resident - \$1,000.00 per plot¹

Raised/Upright Monument:

Resident - \$600.00 per plot¹

Non-Resident - \$1,200.00 per plot¹

½ – Size or Infant Locations³

Resident - \$250.00

Non-Resident - \$500.00

¼ – Size or Cremation Locations

Resident - \$200.00

Non-Resident - \$400.00

Opening and Closing Fees

Resident

Single Depth - \$350.00

Double Depth 1st Burial - \$700.00

2nd Burial - \$350.00

Non-Resident

Single Depth - \$700.00

Double Depth - 1st Burial - \$1,400.00

2nd Burial - \$700.00

Infant³

Resident - \$200.00

Non-Resident - \$400.00

Cremation³

Resident - \$150.00

Non-Resident - \$300.00

Weekend, Holiday or After Hours in addition to the Opening and Closing Fees

Full Size - \$200.00

Infant - \$100.00

Cremation - \$100.00

Disinterment²

Resident - \$1,200.00 minimum

Infant - \$800.00 minimum

Cremation - \$400.00 minimum

Non-Resident - \$1,200.00 minimum

Infant - \$800.00 minimum

Cremation - \$400.00 minimum

Less than 8-hour notice - \$50.00 additional

Burial Right Transfers for residents - \$25.00

Burial Right Transfers for non-resident - \$500.00 (if less than 10 years)

Duplicate Copy of Deed - \$25.00

Removal & Resetting of a Headstone to Accommodate an Opening or Closing - \$100.00

If Cemetery is not vacated by 4:00 pm an additional charge of \$50.00 will be charged

Animal Licensing

Licensing Fees shall follow the current South Utah Valley Animal Shelter Fee Schedule

Miscellaneous Fees

Return Check Fee - Maximum allowed by law

Notary Fees

First Document - \$5.00

Each Additional Document - \$1.00

Checks for services must be made for the amount of purchase/fee only. No change will be given.

Cashier will not accept more the \$10.00 in change per transaction.

Facility Rental⁵

East Side Park Pavilion

Squash Head Park Pavilion

Residents - \$25.00 per day time slot

Non-Resident - \$50.00 per day time slot

(Time slots are 7a.m. to 2 p.m. and 3 p.m. to 10 p.m. are day time slots)

Sunset Trails Park Large Pavilion

Residents - \$30.00 per day time slot

Non-Resident - \$60.00 per day time slot

(Time slots are 7a.m. to 2 p.m. and 3 p.m. to 10 p.m. are day time slots)

Centennial Park⁶

Residents - \$50.00 per day time slot

Non-Resident - \$75.00 per day time slot

(Time slots are 7a.m. to 2 p.m. and 3 p.m. to 10 p.m. are day time slots)

Orchard Cove Park

Residents - \$50.00 per day time slot

Non-Resident - \$75.00 per day time slot

(Time slots are 7a.m. to 2 p.m. and 3 p.m. to 10 p.m. are day time slots)

Residents - Overnight time slot (10 p.m. to 7 a.m.)

\$100.00 per night includes up to 10 tents and/or trailer spaces

Non-Residents - Overnight time slot (10 p.m. to 7 a.m.)

\$150.00 per night includes up to 10 tents and/or trailer spaces

Arena⁹

Single Use

Commercial Use

All Day (7am to dark) - \$200.00

Refundable Security Deposit - \$200.00

Non Resident

All Day (7am to dark) - \$100.00

Refundable Security Deposit - \$100.00

Resident

Half Day (7am to 2pm or 3pm to dark) - \$25.00

All Day (7am to dark) - \$50.00

Refundable Security Deposit - \$100.00

Annual Use – includes 1 day per week during season

Half Day (7am to 2pm or 3pm to dark) - \$500.00

All Day (7am to dark) - \$750.00

Land Lease for cows - \$100 per season

Announcer Stand with sound - \$25.00

Grooming - \$25.00 per “work”

Lighting - \$25.00

Baseball/Softball Fields¹⁵

Field #1, #2, & #3 Baseball Fields

\$15.00 per hour, \$75.00 per day

Callaway Baseball Field

\$20.00 per hour, \$75.00 per day

\$20.00 additional per hour for lighting

Orchard Hills Softball Field

\$15.00 per hour, \$75.00 per day

City Center Soccer Field

\$10.00 per hour (min 2-hour rental)

\$50.00 per day

\$35.00 additional for field paint/prep

Refundable Security Deposit

Police Department GRAMA Requests

Research Fee - \$15.00/hour, minimum 1 hour

Copy of Report - \$5.00 initial report up to 5 pages
 \$0.75 per page more than 5
 Supplemental Report - \$5.00 additional charge
 Accident Form⁷ - \$10.00
 Photographs - \$5.00 each photo
 Tape Duplication - \$25.00/hour, minimum 1 hour
 \$10.00 per VHS tape or DVD, client may provide own tape
 \$5.00 per cassette tape, client provides own tape
 \$10.00 per tape postage & handling
 Fingerprints
 Santaquin – No Charge
 Non-Residents - \$10.00 up to 2 cards
 Utah Criminal History Reports - \$25.00 (Santaquin/Genola Residents only)
 Junk Permits
 Santaquin – No Charge
 Non-Residents - Service no longer available
 Contract Services - \$70.00 per Officer/per hour
 Driving Privilege Verification - \$25.00

Copies

Land Use & Development Management Code - \$35.00
 Subdivision Code - \$25.00
 General Plan - \$2.00 (CD) \$75.00 (Hard Copy)
 City Construction Standards & Drawings - \$40.00
 Zoning Map (11X17) - \$3.00
 Custom Maps - To Be Determined
 Official City Maps (up to 36" x 48") - \$15.00
 Miscellaneous Copies - \$0.50 per page

Fire/EMS Department

Personnel:

EMT Stand-by \$30.00
 Paramedic Stand-by \$37.50
 Firefighter Stand-by \$30.00
 Fire/EMS Officer Stand-by \$50.00
 Chief Officer Stand-by \$75.00

Resources:

Ambulance, EMT \$130.00
 Ambulance, Medic \$160.00
 Fire/Rescue - UTV \$70.00
 Bicycle - EMS \$40.00
 Motorcycle/ATV \$50.00
 Ladder Truck – Stand-by \$150.00 Response \$257.00
 Engine – Stand-by \$125.00 Response \$257.00
 Rescue/Squad – Stand-by 50.00 Response \$100.00
 Tender – Stand-by \$90.00 Response \$148.00
 Brush Truck (Type 6) – Stand-by \$93.00 Response \$152.00
 Extrication Unit (min) – Stand-by 75.00 Response \$200.00
 Smoke Removal - \$50.00
 Haz Mat Mitigation – Stand-by \$150.00 Response \$200.00
 Confined Space Entry – Stand-by \$150.00 Response \$200.00
 Foam, Class A or B – Current Market Value
 Absorbent – Current Market Value
 Permit Fees:
 Fireworks Sales/Display - \$60.00

Fuel Storage Installation – Per Tank
 Above Ground \$50.00
 Below Ground \$250.00
 Fuel Storage Tank Removal – Per Tank
 Above Ground \$50.00
 Below Ground \$250.00
 LPG Installation Per Tank- \$60.00
 Tents/Canopies (>400 sqft) –
 Residential \$25.00
 Commercial \$60.00
 Fire Flow Test (per hydrant) - \$25.00
 Fire Report Copying - \$6.00 Per Sheet
 Medical Gas Storage Installation/removal, fixed - \$50.00
 Others Fees as adopted by IFC - \$50.00
 Inspections/Plan Review Fees:
 Special/Follow-up Inspections - \$50.00
 Fire Sprinkler Systems Installation, New/Renovated –
 10-100 Heads - \$100.00
 101-200 Heads - \$150.00
 201-300 Heads - \$200.00
 >301 Heads \$250.00 plus .50 per sprinkler head
 Commercial Cooking Fire Suppression System - \$100.00
 Fire Alarm System Installation –
 \$100 < 6,000 Sq Ft
 \$150 > 6,000 Sq Ft
 Paint Booth - \$100.00
 Care Facilities Annual Inspections –
 Exempt Child Care \$20.00
 Daycare/Preschool - \$20.00
 Care Center/Assisted living - \$50.00
 Final Inspections, Commercial \$50.00

GRAMA Requests

Research/compilation Fee - \$40.00 per hour after the first 15 minutes
 Copies - \$0.25 per black/white page
 \$0.75 per color page
 \$5.00 per Certified Copy

Special Events¹¹

Special Events License - \$50.00

Library

Library Cards – Free for Residents
 \$40.00 non-residents
 All Replacement Cards - \$2.00
 Special Inter Library Loans per item - \$1.00
 Fines - \$0.10 per day for over due books
 \$1.00 per day for overdue DVD's or Kindle Devices
 Fees for damage to media placed in the Drop Box \$5.00
 Fees for damage to books and other materials will be assessed by Library Staff up to the replacement cost
 Interlibrary Loan - \$3.00 + extra postage
 Copies - \$0.10 per black/white page
 \$0.20 per pre-printed page
 \$0.50 per color page

- ¹ Cemetery plots which are purchased on an extended pay contract are subject to an additional interest charge of 1.5% monthly or 18% annually. [Flush Mount headstones are only permitted in designated areas.](#)
- ² Additional disinterment fees could be assessed depending on the location of the grave and will be reviewed on a case by case bases.
- ³ A baby is determined to be a child before their 3rd birthday. Children 3 years of age or older shall be considered adults. All Infant and cremations must have a flush headstone unless using a full size grave.
- ⁴ All fees for construction in a City right-of-way shall double for work done without a permit or for work commencing prior to a permit being issued.
- ⁵ Verification of residency is required at the time of reservation/payment.
- ⁶ Reservations will not be taken for the following year until January 1st. In case of inclement weather, reservation may be rescheduled and deposits may be refunded, however, rental fees are not subject to refunds. Reservations must be canceled at least 2 weeks prior to the reservation date in order to receive a full refund, reservation fees will not be refunded if cancelled less than 2 weeks prior to the reservation date.
- ⁷ Only state forms will be copied with requests for accident reports.
- ⁸ This amount is an estimated amount of actual City costs associated with uncontested proposals. Additional fees may be negotiated and assessed based on applications requiring City staff time beyond that reasonably anticipated for such an application. The City may credit this fee toward an applicant's purchase of vacated street area.
- ⁹ All scheduling for the arena will be done through the City Recreation Department. The season runs from the first day in April to the last day in September. Annual fees are based on one day per week. If person/organization/group wants to reserve facilities for two day a week, fees would be double, three days; fees would be triple, and so on. Lessee may lease area, not to exceed five-hundred (500) square feet; maximum 15 cattle per pen and no more than two (2) pens may be leased at the facilities. **No other** livestock is permitted. Livestock owners must receive approval for use and location from the city prior to setting up temporary fencing. Livestock owners must provide their own temporary fencing and feed.
- ¹⁰ Acreage of properties owned by a government entity are excluded from fee calculations. Existing public roads adjacent to annexation boundaries should be included with such petitions in accordance with City policies and planning purposes. Where non-petitioning properties are more than 30% of the annexing area, those fees which would be required for non-petitioning properties may be deferred for up to one year of the annexation becoming effective under the following requirements:
 1. A bond in a form acceptable to the City is posted for the remainder fees. Such bond shall be forfeited to the City if the remaining fees are not paid within the allowed 12-month time frame.
 2. Petitioners can not receive final approval on a plat until all required annexation fees, including non-petitioned property fees, are paid.
- ¹¹ Any additional Public Safety costs necessary for the event will be assessed to the applicant. If events are held in a public park, appropriate park fees apply.
- ¹² Annual renewal fees are due February 1st. If payment is not received by March 1st of the same renewal year, the license shall be considered null and void and a new license must be applied for with all associated new licensing fees. Persons operating a business without a renewed and/or current business license shall be subject to all penalties applicable under City and State law.
- ¹³ Base and Usage rates will be adjusted each July 1st to reflect the Consumer Price Index change from the preceding calendar year.
- ¹⁴ Deposits may be applied to customer's billings or may be returned when all billings are current.
- ¹⁵ City Sponsored activities/sports will have first priority when scheduling of the fields.
- ¹⁶ Deposit for Water Hydrant Meter Deposit will be refunded when meter is returned.
- ¹⁷ Pre-paid fees will be placed into an escrow account and drawn upon as inspection costs are incurred by the City. If costs for inspections and testing exceed the amount in the escrow account, they will be the responsibility of the developer and paid for prior to receiving final approvals at the end of the development warranty period. At the conclusion of a final walk through and city acceptance of the improvements, the developer may be reimbursed any amount remaining in the escrow account in accordance with reimbursement procedures found in city ordinances.
- ¹⁸ One ERU is equivalent to .25 acres of single family development. For all other types of development, the following formula will be utilized Step 1: Divide 10,890 (total sf in .25 acres) by impact fee per ERU (\$3,388) = \$0.31 per sf. Step 2: Multiply irrigable area (sf lot size minus sf of hardscape on lot) by Impact Fee per sf (\$0.31) to arrive at impact fee.

¹⁹ Per Equivalent Residential Unit: Impact Fee is \$656

²⁰ Fees for Cemetery Service not listed on the Consolidated Fee Schedule will be reviewed and charged on a case by case basis.

²¹ Culinary Water, Pressurized Irrigation, and Sewer base and usage rates are double the current rates for unincorporated areas.

²² An opt-out period established during the February/March billing cycle each year. Opt-out fees are only applied to existing recycling customers. It is required to schedule the pickup/return of the customers recycling can. Missing recycling cans will be assessed a fee equivalent to the cost of a replacement recycling can.

²³ The base impact fee is \$468.00, Regional Pond fee is \$270.00 and the East side Debris Basins fee is \$32.00.

²⁴ Fees for all other uses (e.g. Residential, Commercial, etc.), please refer to the Transportation Impact Fee Analysis (Exhibit B) Table 14 of pages 11 and 12.

B. Furthermore:

1. In addition to the fees listed above, every development within the City boundaries of Santaquin, Utah, shall pay an infrastructure inspection fee according to the following:

- a. Subdivision Infrastructure. Prior to the construction of any infrastructure which is approved as a part of a subdivision and is located within the boundaries of the same subdivision, the developer shall provide the City with funds, in an amount equal to 4% of the approved construction estimate for the necessary infrastructure improvements, as a means to defray the costs of inspection of said improvements. All such funds shall be non-refundable and paid in addition to any other bonding or surety requirements. Any shortcomings in the amount of the funds shall be paid in full by the developer prior to final approval of the infrastructure.
 - b. Off-Site and Other Infrastructure. Prior to the construction of any infrastructure which is:
1) approved as a part of a subdivision but which is not located within the boundaries of the subdivision; or 2) unrelated to an approved subdivision, the developer shall provide the City with funds, in an amount equal to 2% of the approved construction estimate for the necessary infrastructure improvements, as a means to defray the costs of inspection of said improvements. All such funds shall be non-refundable and paid in addition to any other bonding or surety requirements. Any shortcomings in the amount of the funds shall be paid in full by the developer prior to final approval of the infrastructure.
2. Bond or Escrow. The sub divider shall furnish a bond or escrow in the amount of one hundred twenty-five percent (125%) of improvement costs with the city recorder, prior to the beginning of any subdivision construction, to assure the proper installation and construction of all required improvements within two (2) years immediately following the approval of the subdivision plat by the city council. Release of such bond or escrow shall be made as per city code (11-11-3).
3. Payment of fees in full shall be the responsibility of the applicant. Payment of fees in full shall be required as a part of all application submittals, as stipulated herein. It shall be the responsibility of the applicant to submit the necessary materials in order to be eligible for review on an agenda of any City reviewing body. Placement on an agenda is not necessarily automatic and verification of the review of the application by the City is **strongly** encouraged.

C. In addition and notwithstanding the above schedule of fees, should the review and processing fees exceed those identified herein, the applicant shall pay **actual costs** as determined and documented by the City Recorder.

This resolution shall be come effective upon passage and shall repeal and supersede any and all resolutions dealing with the same subject.

Approved this 19th day of January 2021.

Kirk F. Hunsaker, Mayor

ATTEST:

K. Aaron Shirley, City Recorder

ORDINANCE 01-01-2021

AN ORDINANCE ADOPTING THE CITY DRINKING WATER MASTER PLAN AND CAPITAL FACILITY PLAN; ADOPTING THE CITY DRINKING WATER IMPACT FEE FACILITIES PLAN AND IMPACT FEE ANALYSIS; ADOPTING DRINKING WATER IMPACT FEES; ADOPTING CERTAIN POLICIES RELATED TO IMPACT FEES; AND ESTABLISHING A SERVICE AREA FOR PURPOSES OF IMPACT FEES

WHEREAS, Santaquin City (the “City”) is a political subdivision of the State of Utah, authorized and organized under applicable provisions of Utah law; and

WHEREAS, the City has legal authority, pursuant to Title 11, Chapter 36a of the Utah Code Annotated, as amended (“*Impact Fees Act*” or “*Act*”), to impose development impact fees as a condition of development approval, which impact fees are used to defray capital infrastructure costs attributable to new development activity; and

WHEREAS, the City has previously enacted and imposed impact fees for public facilities, as defined in Utah Law, Title 11, Chapter 36a, Section 102, and as more particularly set forth in the Santaquin City Fee Schedule; and

WHEREAS, the City desires to amend its previously adopted Drinking Water Impact Fees in accordance with applicable provisions of the Impact Fees Act in order to appropriately assign capital infrastructure costs to development in an equitable and proportionate manner as more particularly provided herein; and

WHEREAS, the City properly noticed its intent to amend the Drinking Water Master Plan, Impact Fees Facilities Plan and Impact Fee Analysis as required by law and the City has, through its consultants, completed the Drinking Water Master Plan, Impact Fee Facilities Plan and Impact Fee Analysis in accordance with applicable provisions of the Impact Fees Act, which Drinking Water Master Plan, Impact Fee Facilities Plan and Impact Fee Analysis are more particularly described and adopted herein; and

WHEREAS, the City has provided the required notice and held a public hearing before the City Council regarding the proposed Drinking Water Master Plan, Impact Fee Facilities Plan, Impact Fee Analysis and Impact Fees in accordance with applicable provisions of the Impact Fees Act; and

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF SANTAQUIN CITY, STATE OF UTAH, AS FOLLOWS:

SECTION I. PURPOSE

This Drinking Water Master Plan (attached hereto as **Exhibit A**) and Impact Fees Ordinance establishes the City’s Drinking Water Master Plan and establishes Impact Fees policies and procedures and is promulgated pursuant to Title 11, Chapter 36a, Part 4, Enactment of Impact Fees, and other requirements of the Impact Fees Act. This Ordinance adopts the Drinking Water Master Plan and Impact Fees for related facilities within the City Service Area as defined herein, provides a schedule of Drinking Water

Impact Fees for development activity, and sets forth direction for challenging, modifying and appealing Drinking Water Impact Fees. This Ordinance does not replace, supersede, or modify any ordinance regarding impact fees unrelated to Drinking Water facilities and improvements. This Ordinance may be referred to and cited as the “Drinking Water Master Plan and Impact Fees Ordinance.”

SECTION II. STATUTORY AUTHORITY AND RESTRICTIONS

1. *Impact Fees Act Authority.* The City is authorized to impose impact fees subject to and in accordance with applicable provisions of the Impact Fees Act. Impact fees may only be established for public facilities as defined in Section 11-36a-102 that have a life expectancy of 10 or more years and are owned or operated by or on behalf of a local political subdivision. Public facilities for which impact fees may be imposed includes Drinking Water facilities.
2. *Impact Fees Act Restrictions.* Pursuant to Section 11-36a-202 of the Impact Fees Act, the City may not impose an impact fee to: (1) cure deficiencies in public facilities serving existing development; (2) raise the established level of service of a public facility serving existing development; (3) recoup more than the local political subdivision’s costs actually incurred for excess capacity in an existing system improvement; or (4) include an expense for overhead, unless the expense is calculated pursuant to a methodology that is consistent with generally accepted cost accounting practices and the methodological standards set forth by the federal Office of Management and Budget for federal grant reimbursement.

SECTION III. SERVICE AREA

The Impact Fees Act requires the City to establish one or more service areas within which the City will calculate and impose a particular impact fee. The service area within which the proposed Drinking Water Impact Fees will be imposed is described in Santaquin City Code (S.C.C.) § 9.08.040.

SECTION IV. IMPACT FEE FACILITIES PLAN (IFFP)

1. *Impact Fee Facilities Plan Required.* Pursuant to Section 11-36a-301 of the Impact Fees Act, before imposing or amending an impact fee, the City is required to prepare an impact fee facilities plan to determine the public facilities required to serve development resulting from new development activity. The impact fee facilities plan shall identify the demands placed upon existing public facilities by new development activity and the proposed means by which the City will meet those demands.
2. *Drinking Water Impact Fee Facilities Plan.* The City has, through its consultants, researched and analyzed the factors set forth in Section 11-36a-302 of the Impact Fees Act and has caused to be prepared a Drinking Water Impact Fee Facilities Plan (“IFFP”), as more particularly set forth in **Exhibit B**, attached hereto and incorporated herein by this reference. The Drinking Water IFFP has been prepared based on reasonable growth assumptions for the City and general demand characteristics of current and future users of Drinking Water facilities within the City. The City Council finds that the Drinking Water IFFP identifies the impact on system

improvements created by development activity and estimates the proportionate share of the costs of impacts on system improvements that are reasonably related to new development activity. As shown in the Drinking Water IFFP, the City has considered all revenue sources to finance the impacts on system improvements, including grants, bonds, interfund loans, impact fees, and anticipated or accepted dedications of system improvements. The Drinking Water IFFP establishes that impact fees are necessary to maintain a proposed level of service that complies with applicable provisions of Section 11-36a-302 of the Impact Fees Act.

3. *Plan Certification.* The Drinking Water IFFP includes a written certification in accordance with Section 11-36a-306 of the Impact Fees Act.
4. *Adoption of Drinking Water Impact Fee Facilities Plan.* The Drinking Water IFFP as set forth in **Exhibit B**, is hereby adopted in its entirety by the City in accordance with applicable provisions of the Impact Fees Act.

SECTION V. WRITTEN IMPACT FEE ANALYSIS (IFA)

1. *Written Impact Fee Analysis Required.* Pursuant to Section 11-36a-303 of the Impact Fees Act, each local political subdivision intending to impose an impact fee shall prepare a written analysis of each impact fee to be imposed and a summary of the impact fee analysis designed to be understood by a lay person. The impact fee analysis shall identify the anticipated impact on or consumption of any existing capacity of a public facility by the anticipated development activity; identify the anticipated impact on system improvements required by the anticipated development activity to maintain the established level of service for each public facility; demonstrate how the anticipated impacts are reasonably related to the anticipated development activity; estimate the proportionate share of the costs for existing capacity that will be recouped and the costs of impacts on system improvements that are reasonably related to the new development activity; and identify how the impact fee is calculated.
2. *Drinking Water Impact Fee Analysis.* The City has, through its consultants, researched and analyzed the factors set forth in Section 11-36a-304 of the Impact Fees Act, including the proportionate share analysis required therein, and has caused to be prepared a Drinking Water Impact Fee Analysis (“IFA”), as more particularly set forth in **Exhibit B**, attached hereto and incorporated herein by this reference. The City Council finds that the Drinking Water IFA identifies the impacts upon public facilities required by the development activity and demonstrates how those impacts on system improvements are reasonably related to the development activity, estimates the proportionate share of the costs of impacts on system improvements that are reasonably related to the development activity, and identifies how the Drinking Water Impact Fees are calculated.
3. *Analysis Certification.* The Drinking Water IFA includes a written certification in accordance with Section 11-36a-306 of the Impact Fees Act.

4. *Adoption of Drinking Water Impact Fee Analysis.* The Drinking Water IFA as set forth in **Exhibit B**, is hereby adopted in its entirety by the City in accordance with applicable provisions of the Impact Fees Act.

SECTION VI. IMPACT FEE SCHEDULE AND FORMULA

1. *Impact Fee Schedule or Formula Required.* Pursuant to Section 11-36a-402 of the Impact Fees Act, the City is required to provide a schedule of impact fees for each type of development activity that specifies the amount of the impact fee to be imposed for each type of system improvement or the formula that the City will use to calculate each impact fee.
2. *Maximum Drinking Water Impact Fee Schedule.* Based on the Drinking Water IFA, the maximum Drinking Water Impact Fees which the City may impose on development activity within the defined Service Area is based on the following formula and specified fees:

**Drinking Water Impact Fee¹⁹
Based on Meter Size**

Water Meter Size	ERC	Impact Fee
¾" or 1"	1.00	\$1,180
1 ½ "	3.33	\$3,929
2"	5.33	\$6,289
3"	10.00	\$11,799
4"	16.67	\$19,669
6"	33.33	\$39,327
8"	53.33	\$62,926

Note 19 on the fee schedule would read: "If situations arise where one customer wishes to use multiple meters, or it appears that the proposed fees by meter size in Table 3-13 will not lead to a fair and equitable result, the City may instead calculate impact fees according to the following formula:" ...

$$\text{"Impact fee} = (\text{Peak Day Water use [gpd]}) / (500 \text{ gpd/ERC}) * (\$1,180/\text{ERC})"$$

In accordance with Section 11-36a-402 of the Impact Fees Act, the City is authorized to adjust the standard impact fee at the time the fee is charged to respond to: (i) unusual circumstances found in specific cases; or (ii) a request for a prompt and individualized impact fee review for the development activity of the state, a school district, or a charter school and an offset or credit for a public facility for

which an impact fee has been or will be collected; to ensure that the impact fees are imposed fairly; or (iii) a developer's studies and data which show how specific adjustments of the fee are applicable to the intended use(s).

3. *Developer Credits.* In accordance with Section 11-36a-402 of the Impact Fees Act, a developer may be allowed a credit against Drinking Water Impact Fees or proportionate reimbursement of Drinking Water Impact Fees if the developer dedicates land for a system improvement, builds and dedicates some or all of a system improvement; or dedicates a public facility that the City and the developer agree will reduce the need for a system improvement; *provided* that the system improvement is: (i) identified in the City's Drinking Water IFFP; and (ii) is required by the City as a condition of approving the development activity. To the extent required in Section 11-36a-402, the City shall provide a credit against Drinking Water Impact Fees for any dedication of land for, improvement to, or new construction of, any system improvements provided by the developer if the facilities are system improvements, as defined herein and included in the Drinking Water IFFP; or are dedicated to the public and offset the need for an identified system improvement.

SECTION VII. CALCULATION OF IMPACT FEES

1. *Impact Fee Calculations.* Pursuant to Section 11-36a-305, in calculating the proposed Drinking Water Impact Fees, the City has based such amounts calculated on realistic estimates and the assumptions underlying such estimates are more particularly disclosed in the Drinking Water IFA set forth in **Exhibit B**.
2. *Previously Incurred Costs.* To the extent that new growth and development will be served by previously constructed improvements, the City's Drinking Water Impact Fees may include public facility costs and outstanding bond costs related to the Drinking Water improvements previously incurred by the City. These costs may include all projects included in the Drinking Water IFFP, which are under construction or completed but have not been utilized to their capacity, as evidenced by outstanding debt obligations. Any future debt obligations determined to be necessitated by growth activity will also be included to offset the costs of future capital projects.

SECTION VIII. NOTICE AND HEARING

1. *Notice.* All noticing requirements set forth in the Impact Fees Act, including, but not limited to, provisions of Title 11, Chapter 36a, Part 5, have been provided. Copies of the Drinking Water IFFP and Drinking Water IFA, together with a summary designed to be understood by a lay person, and this Impact Fee Ordinance, have been made available to the public by placing said materials, in the Santaquin City Library and the Community Development Offices located in Santaquin City Hall at least ten (10) days before the public hearing. Notice has also been provided in accordance with applicable provisions of *Utah Code Ann.* § 10-9a-205.
2. *Hearing.* The City Council held a public hearing regarding the Drinking Water IFFP, the Drinking Water IFA, and this Drinking Water Impact Fee Ordinance, on January

19, 2021, and a copy of the Ordinance was available in its substantially final form at the City Recorder's Office in the Santaquin City Hall before the date of the hearing, all in conformity with the requirements of *Utah Code Ann.* § 10-9a-205 and applicable noticing provisions of the Impact Fees Act.

Section IX. Miscellaneous Provisions

1. Contrary Provisions Repealed. Any and all other provisions of the Santaquin City Code that are contrary to the provisions of this Ordinance are hereby repealed.
2. Codification, Inclusion in the Code, and Scrivener's Errors. It is the intent of the City Council that the provisions of this ordinance be made part of the Santaquin City Code as adopted, that sections of this ordinance may be re-numbered or re-lettered, that the word ordinance may be changed to section, chapter, or other such appropriate word or phrase in order to accomplish such intent regardless of whether such inclusion in a code is accomplished. Sections of the ordinance may be re-numbered or re-lettered. Typographical errors which do not affect the intent of this ordinance may be authorized by the City without need of public hearing by its filing a corrected or re-codified copy of the same with the City Recorder.
3. Severability. If any section, phrase, sentence, or portion of this ordinance is for any reason held invalid or unconstitutional by any court of competent jurisdiction, such portion shall be deemed a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions thereof.
4. Other Impact Fees Not Repealed. Except as otherwise specifically provided herein, this Drinking Water Impact Fee Ordinance shall not repeal, modify or affect any impact fee of the City in existence as of the effective date of this Ordinance.

Section X. Effective Date.

The City Recorder shall deposit a copy of this ordinance in the official records of the City on January 19, 2021, and before 5:00 p.m. on that day, shall place a copy of this ordinance in three places within the City. This ordinance shall become effective at 5:00 p.m. on January 20, 2021.

PASSED AND APPROVED this 19th day of January 2021.

By: _____
Mayor Kirk F. Hunsaker

ATTEST:

By _____
K. Aaron Shirley, City Recorder

Voting

Council Member Nick Miller	_____
Council Member Betsy Montoya	_____
Council Member Lynn Mecham	_____
Council Member David Hathaway	_____
Council Member Jennifer Bowman	_____

STATE OF UTAH)
) ss.
COUNTY OF UTAH)

I, K. AARON SHIRLEY, City Recorder of Santaquin City, Utah, do hereby certify and declare that the above and foregoing is a true, full, and correct copy of an ordinance passed by the City Council of Santaquin City, Utah, on the 19th day of January 2021, entitled

“AN ORDINANCE ADOPTING THE CITY DRINKING WATER MASTER PLAN AND CAPITAL FACILITY PLAN; ADOPTING THE CITY DRINKING WATER IMPACT FEE FACILITIES PLAN AND IMPACT FEE ANALYSIS; ADOPTING DRINKING WATER IMPACT FEES; ADOPTING CERTAIN POLICIES RELATED TO IMPACT FEES; AND ESTABLISHING A SERVICE AREA FOR PURPOSES OF IMPACT FEES”

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the Corporate Seal of Santaquin City Utah this 19th day of January 2021.

K. AARON SHIRLEY
Santaquin City Recorder
(SEAL)

AFFIDAVIT OF POSTING

STATE OF UTAH)
) ss.
COUNTY OF UTAH)

I, **K. AARON SHIRLEY**, City Recorder of Santaquin City, Utah, do hereby certify and declare that I posted in three (3) public places the ordinance, which is attached hereto on the 20th day of January 2021.

The three places are as follows:

1. Zions Bank
2. Post Office
3. City Office

I further certify that copies of the ordinance so posted were true and correct copies of said ordinance.

K. AARON SHIRLEY
Santaquin City Recorder

The foregoing instrument was acknowledged before me this ____ day of _____, 20__,
by K. AARON SHIRLEY.

My Commission Expires:

Notary Public

Residing at: Utah County



DRINKING WATER IMPACT FEE FACILITY PLAN AND IMPACT FEE ANALYSIS

(HAL Project No.: 415.02.100)

DRAFT

January 2021

SANTAQUIN CITY
DRINKING WATER IMPACT FEE FACILITY PLAN
AND IMPACT FEE ANALYSIS

(HAL Project No.: 415.02.100)

DRAFT

Steven C. Jones, P.E.
Project Manager



January 2021

ACKNOWLEDGEMENTS

Hansen, Allen & Luce thanks the following individuals for their contributions to this project:

Santaquin City Government

Kirk Hunsaker, Mayor
Nicholas Miller, Councilperson
Betsy Montoya, Councilperson
Lynn Mecham, Councilperson
Jennifer Bowman, Councilperson
Dave Hathaway, Councilperson

Santaquin City Staff

Norm Beagley, Assistant City Manager/Engineer
Jon Lundell, City Engineer
Benjamin Reeves, City Manager
Jason Callaway, Public Works Operations Manager
Shannon Hoffman, Admin Service Director/Treasurer
Aaron Shirley, Finance Director/Recorder

Hansen, Allen & Luce, Inc.

Steven C. Jones, P.E., Vice President, Project Manager
Richard M. Noble, Vice President
Ridley J. Griggs, Staff Engineer

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	i
TABLE OF CONTENTS	ii
LIST OF TABLES	iii
LIST OF FIGURES	iii
IMPACT FEE CERTIFICATION	iv
IMPACT FEE SUMMARY	S-1
PURPOSE OF STUDY	S-1
LEVEL OF SERVICE	S-1
IMPACT FEE CALCULATION	S-1
CHAPTER 1 INTRODUCTION	1-1
PURPOSE AND SCOPE	1-1
IMPACT FEE COLLECTION	1-1
MASTER PLANNING	1-1
CHAPTER 2 SYSTEM DEMAND AND CAPACITY	2-1
GENERAL	2-1
EXISTING EQUIVALENT RESIDENTIAL CONNECTIONS AND IRRIGATED ACREAGE	2-1
LEVEL OF SERVICE	2-1
METHODOLOGY USED TO DETERMINE EXISTING SYSTEM CAPACITY	2-2
WATER SOURCE AND REMAINING CAPACITY	2-2
WATER SOURCE REDUNDANCY	2-3
STORAGE FACILITIES AND REMAINING CAPACITY	2-5
DISTRIBUTION SYSTEM	2-5
OPERATIONS FACILITY	2-6
CHAPTER 3 IMPACT FEE FACILITY PLAN AND ANALYSIS	3-1
GROWTH PROJECTIONS	3-1
COST OF EXISTING FACILITIES	3-2
Source Facilities	3-2
Storage Facilities	3-2
Distribution Facilities	3-2
Operations Facility	3-3
COST OF FUTURE FACILITIES	3-4
IMPACT FEE UNIT CALCULATION	3-4
Source	3-5
Storage	3-6
Distribution	3-6
Planning	3-7
Facilities	3-8
TOTAL IMPACT FEE UNIT CALCULATION	3-9
NONSTANDARD IMPACT FEE CALCULATION	3-10
COSTS BY TIME PERIOD	3-10
REVENUE OPTIONS	3-11
General Obligation Bonds through Property Taxes	3-11
Revenue Bonds	3-11
State/Federal Grants and Loans	3-11
User Fees	3-12

Impact Fees	3-12
REFERENCES	R-1

APPENDIX A

Historic Project Costs

LIST OF TABLES

NO.	TITLE	PAGE
S-1	Proposed Impact Fee by Component	S-2
2-1	Demand and Capacity of Existing Drinking Water Sources	2-3
2-2	Demand and Capacity of Existing Drinking Water Sources - Redundancy	2-4
2-3	Existing Drinking Water Pump Stations	2-4
2-4	Demand and Capacity of Existing Storage Tanks.....	2-5
3-1	Growth Projections.....	3-1
3-2	Impact Fee Eligible Cost of Existing Source Facilities	3-2
3-3	Impact Fee Eligible Cost of Existing Distribution Facilities.....	3-3
3-4	Impact Fee Eligible Cost of Existing Operations Facility.....	3-3
3-5	Estimated Cost of Future Facilities	3-4
3-6	Source Impact Fee Unit Calculation.....	3-5
3-7	Source Cost by Time Period	3-5
3-8	Storage Impact Fee Unit Calculation	3-6
3-9	Storage Cost by Time Period	3-6
3-10	Distribution Impact Fee Unit Calculation	3-7
3-11	Distribution Cost by Time Period.....	3-7
3-12	Planning Component of Impact Fee.....	3-8
3-13	Facilities Impact Fee Unit Calculation	3-8
3-14	Facilities Cost by Time Period.....	3-8
3-15	Total Proposed Impact Fee per Typical Single-Family Connection	3-9
3-16	Proposed Drinking Water Impact Fee per Based on Meter Size.....	3-9
3-17	Facility Cost by Time Period	3-10

LIST OF FIGURES

NO.	TITLE	PAGE
2-1	Existing Drinking Water System.....	After 2-1
3-1	Drinking Water System Impact Fee Facilities Plan	After 3-4

IMPACT FEE CERTIFICATION

An Impact Fee Certification will be included with the final report.

IMPACT FEE SUMMARY

PURPOSE OF STUDY

The **purpose** of the Impact Fee Facility Plan (IFFP) and Impact Fee Analysis (IFA) is to comply with the requirements of the Utah Impact Fees Act by identifying demands placed on the existing drinking water system by new development and by identifying the means by which the City will meet these new demands. The Santaquin City Drinking Water System Master Plan has been used in support of this analysis. There are several growth-related capital facilities anticipated to be needed in the next 10 years, so the calculated impact fee is based on anticipated capital facility projects as well as existing excess capacity and documented historic costs.

The impact fee **service area** is the drinking water system service area, which includes the current city boundary and potential expansion areas as identified in the City's Drinking Water Master Plan.

LEVEL OF SERVICE

The existing and proposed **level of service** for the drinking water system includes the following:

Level of Service

- Indoor Source Capacity: 500 gpd/ERC (Peak Day)
- Indoor Source Volume: 0.336 ac-ft/ERC (Annual Demand)
- Indoor Storage Capacity: 300 gallons/ERC (Equalization), 60 gallons/ERC (emergency), and 77.3 gallons/ERC (fire flow), or 437.3 gallons/ERC total
- Outdoor Source Capacity: 8.0 gpm/irr-ac (Peak Day)
- Outdoor Source Volume: 4.0 ac-ft/irr-ac (Annual Demand)
- Outdoor Storage Capacity: 9,200 Gallons/irr-ac
- Distribution Capacity: 40 psi minimum during peak day demand conditions, 30 psi minimum during peak instantaneous conditions, and a redundant source for indoor water
- Source Redundancy: The indoor demand of 500 gpd/ERC must be able to be met by the drinking water system with any source out of service.

Fire Suppression

- Minimum Fire Flow (buildings smaller than 3,600 sq. ft.): 1,000 gpm for 2 hours
- Minimum Fire Flow (buildings 3,600 sq. ft. and larger): 1,500 gpm for 2 hours
- Minimum Pressure: 20 psi residual during peak day + fire flow event

IMPACT FEE CALCULATION

The existing system served about 5,380 equivalent residential connections at the end of 2019. Projected **growth** adds 2,080 equivalent residential connections in the next 10 years for a total of 7,460 connections or equivalent.

The costs calculated for the capacity required for growth in the next 10 years comes from the proportional historical buy-in costs of **excess capacity** in existing facilities and **new projects** required entirely to provide capacity for new development.

The **drinking water impact fee** is calculated based on the buy-in cost for facilities which have capacity remaining and the estimated cost of projects required to support future growth. These costs were added together and divided by the number of equivalent residential connections (ERCs) that are projected to be added within the next 10 years.

Components of the impact fee are presented in Table S-1.

Table S-1
Proposed Impact Fee by Component

Component	Per Typical Residential Connection
Source	\$557.10
Storage	\$472.47
Distribution	\$95.98
Planning	\$20.44
Facilities	\$33.95
Total	\$1,180

CHAPTER 1 INTRODUCTION

PURPOSE AND SCOPE

Santaquin City is experiencing rapid growth. To ensure availability of funds for growth-related infrastructure projects, an Impact Fee Facility Plan (IFFP) and Impact Fee Analysis (IFA) were commissioned by the City.

This report identifies those items that the Utah Impact Fees Act specifically requires, including demands placed upon existing facilities by new development and the proposed means by which the municipality will meet those demands.

IMPACT FEE COLLECTION

An impact fee is a one-time charge on new development to pay for that portion of a public facility that is required to support that new development. Impact fees enable local governments to finance public facility improvements necessary for growth, without burdening existing customers with costs that are exclusively attributable to growth.

In order to determine the appropriate impact fee, the cost of the facilities associated with future development must be proportionately distributed. As a guideline in determining the “proportionate share”, the fee must be found to be roughly proportionate and reasonably related to the impact caused by the new development.

MASTER PLANNING

A Drinking Water System Master Plan was prepared in conjunction with this analysis. This master plan is incorporated by reference into this analysis.

The master plan for the City’s drinking water system is more comprehensive than the IFA. It provides the basis for the IFA as well as identifies all Capital Facilities required of the Drinking Water System for the 20-year planning range, including maintenance, repair, replacement, and growth-related projects. The recommendations made within the master plan are in compliance with current City policies and standard engineering practices.

A hydraulic model of the drinking water system was prepared to aid in the analyses performed to complete the Drinking Water System Master Plan. The model was used to assess existing performance, to establish a proposed level of service and to confirm the effectiveness of the proposed capital facility projects to maintain the proposed level of service over the next 10 years.

CHAPTER 2 SYSTEM DEMAND AND CAPACITY

GENERAL

The purpose of this section is to identify the current level of service, characterize the facilities of the existing system, and determine the remaining capacity of these facilities.

Santaquin's existing drinking water system is comprised of a distribution network, water storage facilities, and water sources. These facilities are found within 6 pressure zones. Figure 2-1 illustrates the existing water system and its service area.

EXISTING EQUIVALENT RESIDENTIAL CONNECTIONS AND IRRIGATED ACREAGE

Water demands from non-residential water users, such as commercial, industrial, or civic water users have been determined in terms of an Equivalent Residential Connection (ERC). The use of ERCs is a common engineering practice used to describe the entire system's usage based on a common unit of measurement. An ERC is equal to the average demand of one single-family, detached residential connection. Using ERCs for analysis is a way to allocate existing and future demands over non-residential land uses.

Santaquin operates a separate pressurized irrigation system that serves certain areas of the City. Outside of the pressurized irrigation system service area, customers irrigate from the drinking water system. In these areas, the City considers outdoor water demand in terms of irrigated acres.

At the end of 2019, the City was estimated to have 5,380 ERCs and 125 irrigated acres served by the drinking water system.

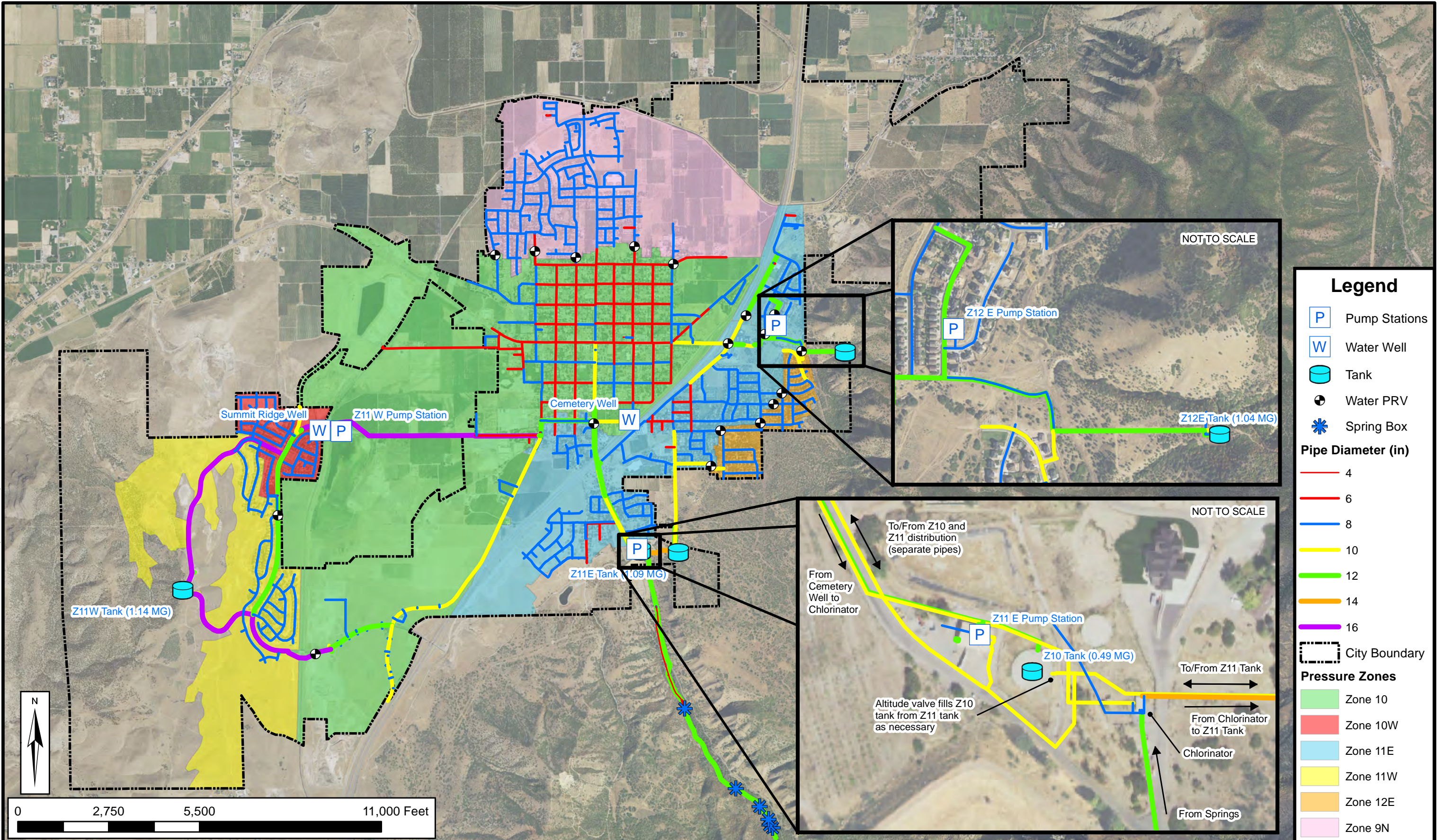
LEVEL OF SERVICE

The City has established a level of service for the Drinking Water System. It establishes the sizing criteria for the City's distribution (pipelines), source, storage facilities, and water rights. The level of service standards are shown below:

Level of Service

- Indoor Source Capacity: 500 gpd/ERC (Peak Day)
- Indoor Source Volume: 0.336 ac-ft/ERC (Annual Demand)
- Indoor Storage Capacity: 300 gallons/ERC (Equalization), 60 gallons/ERC (emergency), and 77.3 gallons/ERC (fire flow), or 437.3 gallons/ERC total
- Outdoor Source Capacity: 8.0 gpm/irr-ac (Peak Day)
- Outdoor Source Volume: 4.0 ac-ft/irr-ac (Annual Demand)
- Outdoor Storage Capacity: 9,200 Gallons/irr-ac
- Distribution Capacity: 40 psi minimum during peak day demand conditions, 30 psi minimum during peak instantaneous conditions, and a redundant source for indoor water
- Source Redundancy: The indoor demand of 500 gpd/ERC must be able to be met by the drinking water system with any source out of service.

Date: 9/5/2020
Document Path: H:\Projects\415 - Santaquin\02.100 - Culinary Water Master Plan\GIS\Working\FFP DW Figure 2-1 Existing System.mxd



SANTAQUIN DRINKING WATER MASTER PLAN

EXISTING DRINKING WATER SYSTEM

FIGURE 2-1

Fire Suppression

- Minimum Fire Flow (buildings smaller than 3,600 sq. ft.): 1,000 gpm for 2 hours
- Minimum Fire Flow (buildings 3,600 sq. ft. and larger): 1,500 gpm for 2 hours
- Minimum Pressure: 20 psi residual during peak day + fire flow event

Some Utah cities have found that peak day water use in multi-family dwelling units tends to be slightly lower than surrounding single-family dwellings, possibly because there are fewer occupants per unit in multi-family developments than there are in single-family developments. However, there is nothing in law or City code that restricts water use or occupancy levels in multi-family units as compared to single-family units. Master plan infrastructure was designed under the assumption that multi-family units will use as much water as single-family units on the peak day. That being the case, it is recommended that all residential units be treated as one ERC for impact fee purposes.

METHODOLOGY USED TO DETERMINE EXISTING SYSTEM CAPACITY

Each component of the Drinking Water System was assessed a capacity in terms of gallons per minute (for peak day source), acre-feet per year (for annual source), or gallons (for storage). Demands on each component were computed by applying the level of service to the amount of ERCs and irrigated areas served by each component. The difference between the capacity of the component and the demand on the component is the component's remaining capacity, which can be used to serve either ERCs or irrigated acres. A hydraulic model was developed for the purpose of assessing system operation and distribution capacity.

WATER SOURCE AND REMAINING CAPACITY

Drinking water sources in Santaquin include a series of springs and three wells, as described in Table 2-1.

Table 2-1
Demand and Capacity of Existing Drinking Water Sources

Source	Existing Zone	Peak Day Source Capacity (gpm) ¹	Annual Source Capacity ² (ac-ft)
Cemetery Well	11E	740	597
Center Street Well ³	10	490	395
Springs 2-5	11E	700	1,129
Summit Ridge Well	11W	2,625	2,117
Total		4,555	4,238
Demand at Level of Service⁴		2,748	2,248
Capacity Remaining		+1,807	+1,990

1. Peak Day Well capacity assumes the well runs 21 hours per day.
2. Annual Source Capacity assumes the well runs an average of 12 hours per day.
3. The Center Street Well is currently used in the PI system. It can be used in the drinking water system in the event of an emergency.
4. See Table 3-4 and page 3-5 of the Drinking Water Master Plan

There are no existing deficiencies and there is excess capacity remaining for peak day and average yearly source requirements.

WATER SOURCE REDUNDANCY

Table 2-2 shows a comparison of the capacity of the system drinking water system with its largest source (Summit Ridge Well) out of service, and the system indoor demand at the level of service.

**Table 2-2
Demand and Capacity of Existing Drinking Water Sources - Redundancy**

Source	Existing Zone	Peak Day Source Capacity (gpm)
Cemetery Well	11E	740
Center Street Well	10	490
Springs 2-5	11E	700
Summit Ridge Well	11W	0
Source Capacity - Redundancy		1,930
Indoor Demand at Level of Service (gpm)¹		1,868
Capacity Remaining (gpm)		+62
Capacity Remaining (%)		3.2%

1. See Table 3-6 of the Drinking Water Master Plan

There is a remaining capacity of 62 gpm in the drinking water system when considering source redundancy.

Table 2-3 shows the demand and capacity of the City's pump stations. Demands listed in Table 2-3 are the demands that would be required if one source to the zone went out of service (to comply with the redundancy requirement of the level of service).

**Table 2-3
Existing Drinking Water Pump Stations**

Name	From Zone	To Zone	Pumps	Rated Capacity (gpm)	Demand (gpm)	Capacity Remaining (gpm)	Capacity Remaining (%)
Summit Ridge Booster	10	11W/10W	1 @ 1,000 gpm	1,000 gpm	954	+46	4.6%
Canyon Road Booster	10	11E/12E	2 @ 1,200 gpm	1,200 gpm	0 ¹	+1,200	100%
Zone 12E Booster	11E	12E	3 @ 500 gpm	1,000 gpm	320	+680	68.0%
Total					1,274	1,926	-

1. The City uses Canyon Road Booster to improve operations and save energy, but it is not required to meet level of service demands in the zones it serves.

The Canyon Road Booster is considered to have 100% of capacity remaining because the demands in Zone 11E and 12 can be met either by the Springs or by the Cemetery Well if the pump station is not running. The booster station is housed in the same building as the City's Zone 11E PI pump station, and was constructed at the same time to save money and provide for operational flexibility. It will become necessary as growth continues east of I-15.

STORAGE FACILITIES AND REMAINING CAPACITY

Santaquin currently operates four concrete water storage tanks totaling 3.76 MG. Table 2-4 shows the capacity of each tank and the storage demand of the system. Demands were calculated by applying the level of service to the ERCs served by each tank. The fire flow storage requirements are sufficient to meet the required fire flows provided by the local fire authority as per IFC.

Table 2-4
Demand and Capacity of Existing Storage Tanks

Tank and Zone	Volume (MG)	Storage Requirement (MG)	Remaining Capacity (MG)	Remaining Capacity (%)
Zone 11W	1.14	3.45	+0.31	8.2%
Zone 10 ¹	0.49			
Zone 11E ¹	1.09			
Zone 12E ¹	1.04			
Total	3.76	3.45	+0.31	8.2%

1. Tanks in Zone 10, 11E, and 12E are hydraulically connected and can work together to provide storage to those zones. The Zone 11W tank cannot use capacity from the other tanks, and therefore must be considered separately from the others.

There are 0.31 MG of storage capacity remaining in the drinking water system. The proposed solution in the Drinking Water Master Plan is to construct a tank in Zone 10. See Chapters 4 and 7 of the master plan report for more details.

DISTRIBUTION SYSTEM

Pipe diameters range from 4 inches to 16 inches, with the majority being 6 and 8 inches in diameter. The function of the larger pipes in the system is to fill the storage tanks and meet peak day and fire flow demands. Smaller pipes facilitate local distribution. Figure 2-1 illustrates the existing distribution pipelines. A hydraulic model was used to identify areas with existing deficiencies. Deficiencies are described in Chapter 5 of the Master Plan report. Costs to fix these deficiencies are not impact fee-eligible and are not considered in this report. The model was also used to identify pipes required for future growth. These projects are impact fee-eligible and are discussed further in Chapter 3.

OPERATIONS FACILITY

In 2016, Santaquin City constructed a public works operations facility to support the operation and maintenance of the City's drinking water, pressurized irrigation water, sanitary sewer, and street systems.

CHAPTER 3 IMPACT FEE FACILITY PLAN AND ANALYSIS

This section relies on the data presented in the previous sections to calculate a proposed impact fee based on an appropriate buy-in cost of available existing excess capacity previously purchased by the City, and the cost of projects needed to support projected growth.

The projected costs of the drinking water system projects are presented. Also included in this section are the possible revenue sources that the City may consider to fund the recommended projects.

GROWTH PROJECTIONS

The development of impact fees requires growth projections over the next ten years. Growth projections for Santaquin were made by incorporating the growth rate presented in the Master Plan. Total growth projections for the City through 2029 are summarized in Table 3-1.

**Table 3-1
Growth Projections**

Year	ERCs
2020	5,380
2021	5,560
2022	5,750
2023	5,940
2024	6,140
2025	6,340
2026	6,550
2027	6,770
2028	6,990
2029	7,220
2030	7,460
10-year Difference	+2,080

The existing system served about 5,380 ERCs at the beginning of 2020. Projected growth adds 2,080 ERCs in the next 10 years for a total of 7,460 ERCs.

COST OF EXISTING FACILITIES

This section contains a discussion of the excess capacity remaining within existing facilities, as well as the portion of the cost of those facilities that is eligible to be repaid using impact fees. Historic costs were obtained from the City's 2013 Culinary Water System Impact Fee Facilities Plan (JUB, 2013) and from Santaquin City Records.

Source Facilities

Capacity in existing source facilities that has not been consumed by existing users is eligible to be reimbursed by impact fees. The impact fee-eligible cost of existing source facilities is summarized in table 3-2.

Table 3-2
Impact Fee Eligible Cost of Existing Source Facilities

Project	Cost	Funded by Santaquin (%)	Capacity Remaining (%)	Impact Fee Eligible Cost³
Canyon Road Booster	\$1,112,903.04	100%	100% ¹	\$1,112,903.04
Totals	\$1,112,903.04	-	-	\$1,112,903.04

1. See Table 2-3.

2. See Table 2-2. The capacity of all sources were considered together for purposes of redundancy.

3. Calculated as (cost) * (% funded by Santaquin) * (% capacity remaining)

Storage Facilities

The City does not have records of costs paid for existing storage facilities.

Distribution Facilities

Capacity in existing distribution facilities that has not been consumed by existing users is eligible to be reimbursed by impact fees. The impact fee-eligible cost of existing distribution facilities is summarized in Table 3-3.

**Table 3-3
Impact Fee Cost of Existing Distribution Facilities**

Project	Cost	Funded by Santaquin (%)	Capacity Remaining¹ (%)	Impact Fee Eligible Cost²
Harvest View 8" Line	\$57,470.00	100%	71%	\$40,873.73
12" Summit Ridge PRV	\$19,869.70	100%	71%	\$14,131.70
12-inch pipes installed 2013 and earlier ³	\$140,060.00	100%	71%	\$99,613.26
16-inch pipes installed 2013 and earlier ³	\$852,151.00	100%	71%	\$606,065.53
Totals	\$1,069,550.70	-	71%	\$760,684.21

1. Capacity remaining in existing system distribution facilities was conservatively estimated as the difference between the existing irrigated ERC count (5,380) and the projected ERC count at 2060 (18,630).
2. Calculated as (cost) * (% funded by Santaquin) * (% capacity remaining)
3. Historic costs are document in the City's 2013 Impact Fee Facilities Plan (JUB, 2013). See Appendix A.

Operations Facility

Because the operations facility is a necessary component of the drinking water system, the cost attributable to new development is eligible to be reimbursed by impact fees. The cost of the operations facility attributable to the drinking water system is summarized in Table 3-4.

**Table 3-4
Cost of Existing Operations Facility**

Project	Cost	Funded by Santaquin (%)	Attributable to Drinking Water System (%)	Cost Attributable to Drinking Water System
Totals	\$2,530,000	100%	25%¹	\$632,500

1. 25% of construction costs are considered attributable to the drinking water system.

COST OF FUTURE FACILITIES

The facilities and costs presented in Table 3-5 and shown on Figure 3-1 are proposed projects essential to maintain the current level of service while accommodating future growth within the next 10 years. The facility sizing for the future proposed projects was based on the proposed level of service with growth projections provided by the City and hydraulic modeling. The proposed impact fee will be based both on costs of existing projects and the projected cost of future construction projects. Detailed information on these projects and their estimated cost is included in the City's drinking water master plan report.

Table 3-5
Estimated Cost of Future Facilities

Project	Map ID	Source	Distribution	Storage	Total	Capacity Added
Foothill Village Booster Station	1	\$600,000	\$0	\$0	\$600,000	1,000 gpm pumping
Zone 11E Pipe Upsizing	2	\$0	\$52,000	\$0	\$52,000	Distribution ¹
Zone 10 system expansion (2 MG tank, pump station, pipeline)	3	\$900,000	\$459,000	\$3,036,000	\$4,395,000	Distribution ¹ 1,500 gpm pumping 2.5 MG storage
Zone 10 Well	4	\$1,584,000	\$0	\$0	\$1,584,000	1,500 gpm source ²
Total		\$3,084,000	\$511,000	\$3,036,000	\$6,631,000	Distribution 2,500 gpm pumping 1,500 gpm source 2.5 MG storage

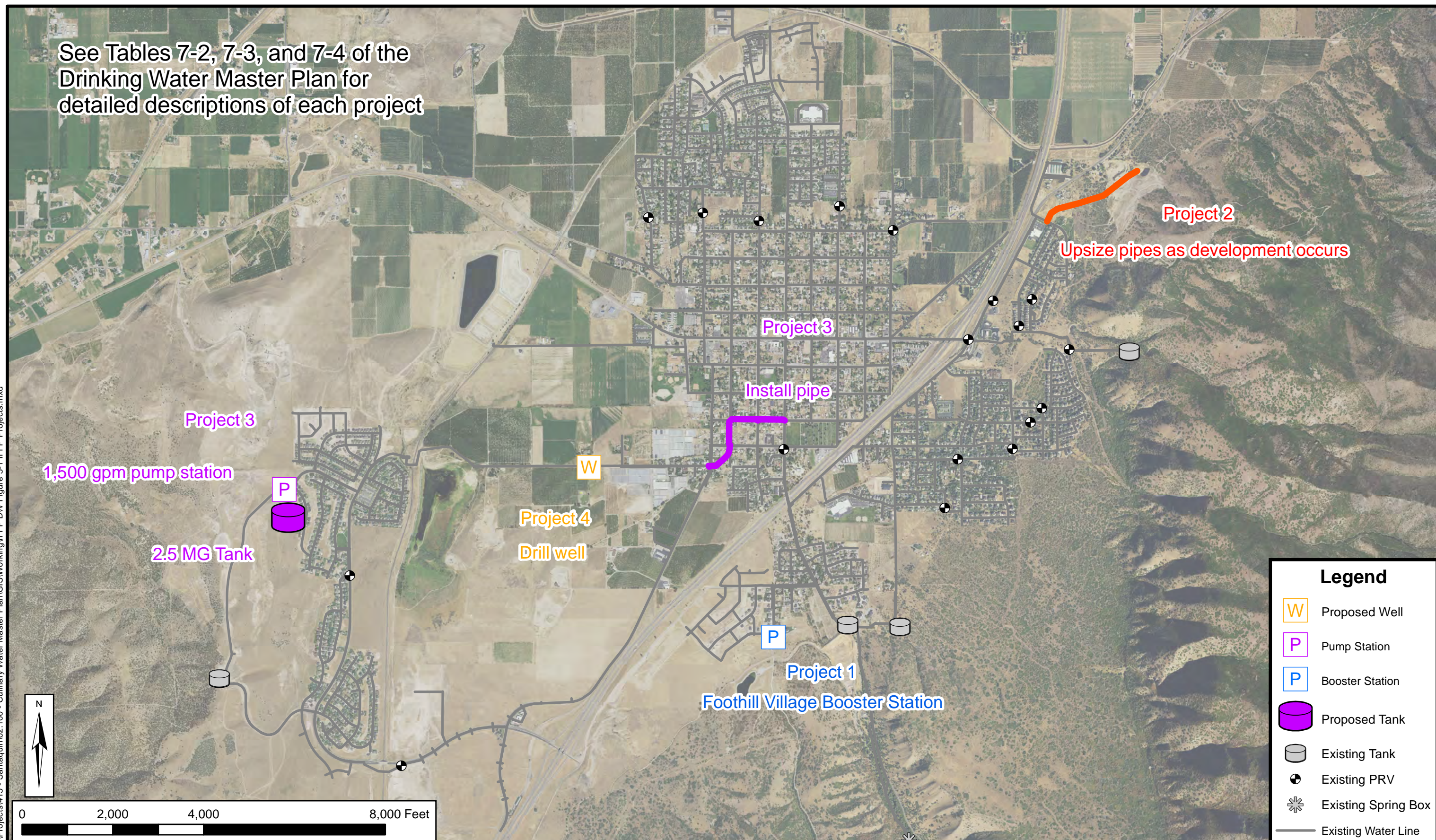
1. Transmission capacity for each pipeline is not explicitly accounted for in this table.

2. It is assumed that a new well would yield approximately 1,500 gpm.

IMPACT FEE UNIT CALCULATION

Only those costs attributed to the new growth in the next 10 years can be included in the impact fee. The following sections describe the impact fee calculation for each component.

See Tables 7-2, 7-3, and 7-4 of the Drinking Water Master Plan for detailed descriptions of each project



**SANTAQUIN DRINKING WATER
IMPACT FEE FACILITIES PLAN**

**DRINKING WATER SYSTEM
IMPACT FEE FACILITIES PLAN**

**FIGURE
3-1**

Source

Projected growth in the system will require the construction of a new drinking water pump station in Zone 11W and an additional well. The source impact fee was calculated by combining the available buy-in capacity and cost of existing source facilities with the capacity and projected cost of planned future sources. This calculation is needed for both water source production (wells) and source conveyance (pump stations). See Table 3-6.

Table 3-6
Source Impact Fee Unit Calculation

	Wells			Pump Stations		
	Existing ¹	Future ²	Total	Existing ³	Future ²	Total
Eligible Cost	\$0	\$1,584,000	\$1,584,000	\$1,112,903.04	\$1,500,000	\$2,612,903.04
Capacity (gpm)	62	1,500	1,562	1,926	2,500	4,426
Well impact (per gpm) ⁴ :			\$1,014.08	Pump Impact (per gpm) ⁴ :		\$590.35
Well impact (per ERC) ⁵ :			\$352.11	Pump Impact (per ERC) ⁵ :		\$204.98
Total Source Impact (per ERC)						\$557.10

1. See Tables 2-2, 2-3, and 3-2
2. See Table 3-5
3. See Tables 2-3 and 3-2
4. Calculated as the sum of existing and future eligible costs divided by the sum of existing and future eligible capacity
5. Calculated at a proposed level of service of 500 gpd/ERC or 0.347 gpm/ERC

Expected source costs by time period are listed in Table 3-7. Source facilities are expected to support growth for more than 10 years. The portion of their costs attributable to growth outside of the 10-year planning window is not impact fee-eligible.

Table 3-7
Source Cost by Time Period

Time Period	ERCs served	Buy-in Cost	Growth Cost	Total Cost
Existing	5,380	\$0.00	\$0.00	\$0.00
Next 10 years	2,080	\$214,606.46	\$944,154.07	\$1,158,760.53
Beyond 10 years	11,170	\$898,296.58	\$2,139,845.93	\$3,038,142.51
Total	18,630	\$1,112,903.04	\$3,084,000.00	\$4,196,903.04

Storage

Projected growth in Zone 11W requires construction of a new tank. The approach taken in the master plan is to construct a Zone 10 facility that will relieve some of the demands currently being placed on the Zones 11W and 11E tanks. This will allow growth to continue across the system.

The storage impact fee was calculated as shown in Table 3-8.

Table 3-8
Storage Impact Fee Unit Calculation

	Existing ¹	Future ²	Total
Eligible Cost	\$0	\$3,036,000	\$3,036,000
Capacity (gal)	310,000	2,500,000	2,810,000
Storage impact (per gal) ³			\$1.08
Storage impact (per ERC) ⁴			\$472.47

1. See Table 2-4
2. See Table 3-5
3. Calculated as the sum of existing and future eligible costs divided by the sum of existing and future eligible capacity
4. Calculated at the proposed level of service of 437.3 gal/ERC. Includes 77.3 gallons of fire storage, which was computed by dividing the 2060 fire storage requirement (1.44 MG) by the projected 2060 ERC count (18,630).

Expected storage costs by time period are listed in Table 3-9. Storage facilities are expected to support growth for more than 10 years. The portion of their costs attributable to growth outside of the 10-year planning window is not impact fee-eligible.

Table 3-9
Storage Cost by Time Period

Time Period	ERCs served	Buy-in Cost	Growth Cost	Total Cost
Existing	5,380	\$0.00	\$0.00	\$0.00
Next 10 years	2,080	\$0.00	\$982,739.15	\$982,739.15
Beyond 10 years	11,170	\$0.00	\$2,053,260.85	\$2,053,260.85
Total	18,630	\$0.00	\$3,036,000.00	\$3,036,000.00

Distribution

Several distribution projects will be required to support growth through the 10-year planning period. The portion of the impact fee for these projects is shown in Table 3-10.

**Table 3-10
Distribution Impact Fee Calculation**

	Existing¹	Future²	Total
Eligible Cost	\$760,684.21	\$511,000	\$1,271,684.21
Capacity (ERCs) ³	13,250	13,250	13,250
Distribution Impact (per ERC)⁴			\$95.98

1. See Table 3-3
2. See Table 3-5
3. Distribution infrastructure is sized to accommodate future users through year 2060. A remaining capacity of 13,250 ERCs was calculated as the projected year 2060 ERCs (18,630) minus ERCs existing at the beginning of year 2020 (5,380). This calculation is appropriate even for existing projects due to their recent construction date.
4. Calculated as the sum of existing and future eligible costs divided by the sum of existing and future eligible capacity

Expected distribution costs by time period are listed in Table 3-10. Distribution facilities are expected to support growth for more than 10 years. The portion of their costs attributable to growth outside of the 10-year planning window is not impact fee-eligible.

**Table 3-11
Distribution Cost by Time Period**

Time Period	ERCs served	Buy-in Cost	Growth Cost	Total Cost
Existing	5,380	\$308,866.49	\$0.00	\$308,866.49
Next 10 years	2,080	\$119,413.07	\$80,217.36	\$199,630.43
Beyond 10 years	11,170	\$641,271.14	\$430,782.64	\$1,072,053.78
Total	18,630	\$1,069,550.70	\$511,000.00	\$1,580,550.70

Planning

The planning portion of the impact fee was calculated as shown in Table 3-12. Portions of the City's 2020 master plan study that are attributable to growth (approximately 50% of total expenditures) are impact fee eligible. 100% of costs associated with the Impact Fee Facility Plan and Impact Fee Analysis are impact fee eligible.

Table 3-12
Planning Component of Impact Fee

Planning Document	Cost	% of Plan Associated with Growth	Cost Associated with Growth	ERCs Served	Cost per ERC
2020 Water Master Plan	\$62,294	50%	\$31,147	2,080	\$14.97
2020 IFFP and IFA	\$11,362	100%	\$11,362	2,080	\$5.46
Total	\$73,656	-	\$42,509	2,080	\$20.44

All of these costs are anticipated to be recovered within the 10-year planning window.

Facilities

The impact fee cost for the public works facility was calculated as shown in Table 3-13.

Table 3-13
Facilities Impact Fee Unit Calculation

	Existing facility
Eligible Cost ¹	\$632,500
ERCs at Year 2060 ²	18,630
Facilities Impact (per ERC)³	\$33.95

1. See Table 3-4
2. The facility will serve customers throughout the planning horizon.
3. Calculated as the cost divided by the ERCs served at year 2060.

Table 3-14 shows the cost of the public works facility attributable to each time period.

Table 3-14
Facilities Cost by Time Period

Time Period	ERCs served	Buy-in Cost
Existing	5,380	\$182,654.32
Next 10 years	2,080	\$70,617.28
Beyond 10 years	11,170	\$379,228.40
Total	18,630	\$632,500.00

TOTAL IMPACT FEE UNIT CALCULATION

The proposed drinking water system impact fee for one ERC is **\$1,180**. See Table 3-15.

Table 3-15
Total Proposed Impact Fee per
Typical Single-Family Connection

Component	Per Typical Residential Connection
Source	\$557.10
Storage	\$472.47
Distribution	\$95.98
Planning	\$20.44
Facilities	\$33.95
Total	\$1,180

The impact fee has been calculated based on 1 ERC which would correspond to a standard ¾" or 1" meter. Larger meters are assumed to serve more than 1 ERC and will have a higher corresponding impact fee. Table 3-16 indicates the impact fee rate schedule based on water meter size. The ERC factor is calculated based on American Water Works Association (AWWA) rated capacity for each meter size.

Table 3-16
Proposed Drinking Water
Impact Fee Based on Meter Size

Water Meter Size	ERC	Impact Fee
¾" or 1"	1.00	\$1,180
1 ½ "	3.33	\$3,929
2"	5.33	\$6,289
3"	10.00	\$11,799
4"	16.67	\$19,669
6"	33.33	\$39,327
8"	53.33	\$62,926

NONSTANDARD IMPACT FEE CALCULATION

If situations arise where one customer wishes to use multiple meters, or it appears that the proposed fees by meter size in Table 3-13 will not lead to a fair and equitable result, the City may instead calculate impact fees according to the following formula:

$$\text{Impact fee} = (\text{Peak Day Water use [gpd]}) / (500 \text{ gpd/ERC}) * (\$1,180/\text{ERC})$$

For example, a customer who would use 20,000 gallons of water on the peak day would have an impact fee calculated as follows:

$$\text{Impact fee} = (20,000 \text{ gpd}) / (500 \text{ gpd/ERC}) * (\$1,180/\text{ERC}) = \$47,200$$

COSTS BY TIME PERIOD

Table 3-17 is a summary of the existing and future facility costs by drinking water system component and by time period. Existing costs are those costs attributed to capacity currently being used by existing connections. Costs attributed to the next 10 years are costs for the existing capacity or new capacity for the assumed growth in the next 10 years. Costs attributed to beyond 10 years are costs for the existing capacity or new capacity for the assumed growth beyond 10 years.

Table 3-17
Facility Cost by Time Period

	Existing	Next 10 Years	Beyond 10 Years	Total
Source	\$0.00	\$1,158,760.53	\$3,038,142.51	\$4,196,903.04
Storage	\$0.00	\$982,739.15	\$2,053,260.85	\$3,036,000.00
Distribution	\$308,866.49	\$199,630.43	\$1,072,053.78	\$1,580,550.70
Planning	\$0.00	\$42,509.00	\$0.00	\$42,509.00
Facilities	\$182,654.32	\$70,617.28	\$379,228.40	\$632,500.00
Total Cost	\$491,520.81	\$2,454,256.39	\$6,542,685.53	\$9,488,462.74

REVENUE OPTIONS

Utah Code 11-36a-302(2) requires a local political subdivision to generally consider all revenue sources to finance the impacts on system improvements, including grants, bonds, interfund loans, impact fees, and anticipated or accepted dedications of system improvements. This impact fee facilities plan considers each of these options. An expanded discussion on options the City has to generate revenue is included in this section for reference.

Revenue options for the recommended projects include: general obligation bonds, revenue bonds, State/Federal grants and loans, user fees, and impact fees. Although this analysis focuses on impact fees, the City may need to consider a combination of these funding options. The following discussion describes each of these options.

General Obligation Bonds through Property Taxes

This form of debt enables the City to issue general obligation bonds for capital improvements and replacement. General Obligation (G.O.) Bonds would be used for items not typically financed through the Water Revenue Bonds (for example, the purchase of water source to ensure a sufficient water supply for the City in the future). G.O. bonds are debt instruments backed by the full faith and credit of the City which would be secured by an unconditional pledge of the City to levy assessments, charges or ad valorem taxes necessary to retire the bonds. G.O. bonds are the lowest-cost form of debt financing available to local governments and can be combined with other revenue sources such as specific fees, or special assessment charges to form a dual security through the City's revenue generating authority. These bonds are supported by the City as a whole, so the amount of debt issued for the water system is limited to a fixed percentage of the real market value for taxable property within the City. G.O. Bonds must be approved through a citizen vote. For growth related projects this type of revenue places an unfair burden on existing residents as they had previously paid for their level of service.

Revenue Bonds

This form of debt financing is also available to the City for utility related capital improvements. Unlike G.O. bonds, revenue bonds are not backed by the City as a whole, but constitute a lien against the water service charge revenues of a Water Utility. Revenue bonds present a greater risk to the investor than do G.O. bonds, since repayment of debt depends on an adequate revenue stream, legally defensible rate structure /and sound fiscal management by the issuing jurisdiction. Due to this increased risk, revenue bonds generally require a higher interest rate than G.O. bonds, although currently interest rates are at historic lows. This type of debt also has very specific coverage requirements in the form of a reserve fund specifying an amount, usually expressed in terms of average or maximum debt service due in any future year. This debt service is required to be held as a cash reserve for annual debt service payment to the benefit of bondholders. Typically, voter approval is not required when issuing revenue bonds. For growth related projects this type of revenue places an unfair burden on existing residents as they had previously paid for their level of service.

State/Federal Grants and Loans

Historically, both local and county governments have experienced significant infrastructure funding support from state and federal government agencies in the form of block grants, direct grants in aid, interagency loans, and general revenue sharing. Federal expenditure pressures and virtual elimination of federal revenue sharing dollars are clear indicators that local government

may be left to its own devices regarding infrastructure finance in general. However, state/federal grants and loans should be further investigated as a possible funding source for needed water system improvements.

It is also important to assess likely trends regarding federal / state assistance in infrastructure financing. Future trends indicate that grants will be replaced by loans through a public works revolving fund. Local governments can expect to access these revolving funds or public works trust funds by demonstrating both the need for and the ability to repay the borrowed monies, with interest. As with the revenue bonds discussed earlier, the ability of infrastructure programs to wisely manage their own finances will be a key element in evaluating whether many secondary funding sources, such as federal/state loans, will be available to the City.

Not charging impact fees, or significantly lowering them could be viewed negatively from the perspective of State/Federal funding agencies. Charging a proper impact fee signals to these agencies that the community is using all possible means to finance the projects required to provide vital services to their residents.

User Fees

Similar to property taxes on existing residents, user fees to pay for improvements related to new growth-related projects places an unfair burden on existing residents as they had previously paid for their level of service.

Impact Fees

As discussed in Section 1, an impact fee is a one-time charge to a new development for the purpose of raising funds for the construction of improvements required by the new growth and to maintain the current level of service. Impact fees in Utah are regulated by the Impact Fee Statute and substantial case law. Impact fees are a form of a development exaction that requires a fee to offset the burdens created by the development on existing municipal services. Funding the future improvements required by growth through impact fees does not place the burden on existing residents to provide funding of these new improvements.

REFERENCES

JUB Engineers. 2013. "Santaquin City Culinary Water System Impact Fee Facilities Plan."

APPENDIX A

Historic Project Costs
(JUB, 2013 and City Records)

Drinking Water Infrastructure projects (City records)

Project	Cost to City	Funding Source
Main Zone/11 E Booster Pump	\$ 1,112,903.04	Impact Fees
Installed 8" CW line within Harvest View Drive	\$ 57,470.00	Impact Fees
Installed 12" PRV in Summit Ridge Parkway	\$ 19,869.70	Impact Fees

APPENDIX C – DETAILS OF PIPES WITH RESERVE CAPACITY

Table C-1. Existing Culinary Water Pipes Reserve Capacity Detail

Pipe Segment ID	Dia (in)	Segment Length (ft)	Existing Flow (GPM)	Buildout Flow (GMP)	% of Capacity Available for Growth	% of Cost Funded by City	Year Built	% of Cost Eligible for Impact Fee Reimbursement	Estimated Present Day Project Cost (\$)	Ratio of ENR CPI for Year Built to Current Year	Estimated Historic Project Cost Eligible for Impact Fee Reimbursement (\$)	Actual Known Historic Project Costs Eligible for Impact Fee Reimbursement (\$)
Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12	Col 13
											= Col 9 x 10 x 11	
P11547	10	863		545	100%	100%		100%	\$59,554			
P11747	10	1034		555	100%							
P12283	10	329	18	108	84%							
P47	10	1207	19	593	97%							
P253	10	163	19	620	97%							
P45	10	814	19	620	97%							
366	10	145	19	628	97%							
P121	10	939	19	628	97%							
P11677	10	225	21	644	97%	100%	1992	97%	\$15,518	0.5266	\$7,904	
P1439	10	2509	21	690	97%	100%	2002	97%	\$173,087	0.6906	\$115,877	
P11583	10	982	25	317	92%	-100%		-92%	\$67,751			
328	10	985	32	113	71%							
P11595	10	1058	39	750	95%	100%	2002	95%	\$73,030	0.6906	\$47,785	
P415	10	197	39	750	95%	100%	2002	95%	\$13,593	0.6906	\$8,894	
330	10	4317	72	334	79%							
P251	10	112	72	637	89%							
284	10	575	132	228	42%	100%		42%	\$39,696			
207	10	583	309	469	34%							
P12629	10	272	440	1433	69%							
279	10	195	459	807	43%	100%	1992	43%	\$13,427	0.5266	\$3,047	
P73	10	391	472	806	41%	100%	1992	41%	\$26,945	0.5266	\$5,879	
P12627	10	232	493	1583	69%							
280	10	47	493	1659	70%							
P87	10	1775	652	2179	70%							
198	10	512	657	937	30%	100%	1992	30%	\$35,335	0.5266	\$5,565	
199	10	48	657	944	30%	100%	1992	30%	\$3,305	0.5266	\$529	
218	10	424	678	1143	41%	100%	2002	41%	\$29,256	0.6906	\$8,217	
P117	10	1984	706	2199	68%							
282	10	592	755	1782	58%	100%	1992	58%	\$40,827	0.5266	\$12,397	
203	10	697	768	1209	36%	100%	1992	36%	\$48,065	0.5266	\$9,223	
204	10	281	789	1228	36%							
221	10	424	893	1366	35%	100%	2002	35%	\$29,263	0.6906	\$6,999	
283	10	590	1008	2692	63%	100%	1992	63%	\$40,717	0.5266	\$13,411	
P393	10	1502	1022	1074	5%	100%	1992	5%	\$103,631	0.5266	\$2,643	
196	10	974	1022	1664	39%	100%	1992	39%	\$67,213	0.5266	\$13,664	
P11445	10	162	1022	1664	39%	100%	1992	39%	\$11,164	0.5266	\$2,270	
P12615	10	996	1022	1664	39%	100%	1992	39%	\$68,703	0.5266	\$13,967	
P53	10	62	1022	1664	39%	100%	1992	39%	\$4,244	0.5266	\$863	
220	10	842	1279	1338	4%	100%	2002	4%	\$58,105	0.6906	\$1,782	
P11447	10	1171	1641	2273	28%	100%	1992	28%	\$80,806	0.5266	\$11,832	
Total for all existing 10 inch pipes											\$280,914	
Total Length:	31,206											
Weighted Average of all Pipes Listed:					67%							
Length of Impact Fee Eligible	15,007											
Weighted Average of Impact Fee Eligible Pipes:					53%							

Pipe Segment ID	Dia (in)	Segment Length (ft)	Existing Flow (GPM)	Buildout Flow (GMP)	% of Capacity Available for Growth	% of Cost Funded by City	Year Built	% of Cost Eligible for Impact Fee Reimbursement	Estimated Present Day Project Cost (\$)	Ratio of ENR CPI for Year Built to Current Year	Estimated Historic Project Cost Eligible for Impact Fee Reimbursement (\$)	Actual Known Historic Project Costs Eligible for Impact Fee Reimbursement (\$)
Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12	Col 13
											= Col 9 x 10 x 11	
B2291	12	627		289	100%	100%	2002	100%	\$51,373	0.6906	\$35,479	
B2199	12	171		344	100%	100%	2002	100%	\$13,981	0.6906	\$9,655	
P1443	12	1903		476	100%	100%	2002	100%	\$156,079	0.6906	\$107,789	
P203	12	520	1	7	83%							
P205	12	581	4	14	74%							
P207	12	686	13	101	87%							
P1441	12	2262	21	1008	98%	100%	2002	98%	\$185,517	0.6906	\$125,436	
P11683	12	873	30	137	78%	100%	2002	78%	\$71,586	0.6906	\$38,733	
P11997	12	391	41	308	87%	100%	2002	87%	\$32,062	0.6906	\$19,181	
P209	12	292	52	114	55%							
P41	12	22	66	116	43%							
P12001	12	684	66	165	60%	100%	2002	60%	\$56,088	0.6906	\$23,199	
B1829	12	363	73	150	52%	100%	2002	52%	\$29,766	0.6906	\$10,587	
P359	12	31	210	424	51%							
P321	12	38	219	433	49%	100%		49%	\$3,149			
P11689	12	169	267	487	45%	100%	2002	45%	\$13,866	0.6906	\$4,335	
P11623	12	1189	313	939	67%	100%	1992	67%	\$97,514	0.5266	\$34,235	
P12799	12	38	393	704	44%	100%	2002	44%	\$3,149	0.6906	\$962	
P12801	12	37	393	704	44%	100%	2002	44%	\$3,050	0.6906	\$932	
P107	12	321	430	1158	63%							
P11861	12	689	432	1099	61%							
B2271	12	1354	476	765	38%	100%	2002	38%	\$111,061	0.6906	\$28,941	
P227	12	380	508	655	22%							
P11875	12	20	515	1488	65%	100%	2002	65%	\$1,607	0.6906	\$726	
P223	12	260	528	654	19%							
B2277	12	1372	641	808	21%	100%	2002	21%	\$112,488	0.6906	\$16,020	
P365	12	125	707	906	22%	100%	1992	22%	\$10,283	0.5266	\$1,188	
P11769	12	460	923	1102	16%	100%	2002	16%	\$37,728	0.6906	\$4,220	
197	12	643	984	1405	30%	100%	1992	30%	\$52,742	0.5266	\$8,321	
P11873	12	17	1178	1488	21%	100%	2002	21%	\$1,427	0.6906	\$206	
P315	12	60	1178	1488	21%							
P12729	12	647	1571	5118	69%	100%	2002	69%	\$53,087	0.6906	\$25,410	
P12385	12	769	1571	8769	82%	100%	2002	82%	\$63,050	0.6906	\$35,743	
B2299	12	728	1575	2999	47%	100%	2002	47%	\$59,680	0.6906	\$19,568	
B2301	12	409	1575	2999	47%	100%	2002	47%	\$33,530	0.6906	\$10,994	
P11729	12	597	1924	4940	61%	100%	2008	61%				\$40,769
P11725	12	599	1988	4525	56%	100%	2008	56%				\$40,926
P11723	12	425	2206	4345	49%	100%	2008	49%				\$29,015
P61	12	42	2873	5683	49%	100%	1992	49%	\$3,460	0.5266	\$901	
256	12	1217	2873	5683	49%	100%	1992	49%	\$99,786	0.5266	\$25,987	
255	12	390	2873	5684	49%	100%	1992	49%	\$31,980	0.5266	\$8,329	
254	12	217	2873	5684	49%	100%	1992	49%	\$17,753	0.5266	\$4,623	
253	12	330	2873	5684	49%	100%	1992	49%	\$27,035	0.5266	\$7,041	
252	12	984	2873	5684	49%	100%	1992	49%	\$80,672	0.5266	\$21,009	
P381	12	32	2873	5684	49%	100%	1992	49%	\$2,616	0.5266	\$681	
P83	12	538	2874	5685	49%	100%	1992	49%	\$44,141	0.5266	\$11,494	
P424	12	243	2874	5685	49%	100%	1992	49%	\$19,885	0.5266	\$5,178	
P11833	12	430	2916	4645	37%	100%	2008	37%				\$29,350
P51	12	76	3365	4008	16%	100%	1992	16%	\$6,216	0.5266	\$524	
Total for all existing 12 inch pipes											\$494,179	\$140,060
Total Length:	25,250											
Weighted Average of all Pipes Listed:					62%							
Length of Impact Fee Eligible	21,408											
Weighted Average of Impact Fee Eligible Pipes:					62%							

Pipe Segment ID	Dia (in)	Segment Length (ft)	Existing Flow (GPM)	Buildout Flow (GMP)	% of Capacity Available for Growth	% of Cost Funded by City	Year Built	% of Cost Eligible for Impact Fee Reimbursement	Estimated Present Day Project Cost (\$)	Ratio of ENR CPI for Year Built to Current Year	Estimated Historic Project Cost Eligible for Impact Fee Reimbursement (\$)	Actual Known Historic Project Costs Eligible for Impact Fee Reimbursement (\$)
Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12	Col 13
											= Col 9 x 10 x 11	
B1241	14	24		444	100%	100%	2002	100%	\$2,454	0.6906	\$1,695	
P13	14	1010	1607	5282	70%	100%	1992	70%	\$102,030	0.5266	\$37,380	
P11491	14	224	2942	4376	33%	100%	2008	33%	\$22,584	0.8780	\$6,499	
Total of all existing 14 inch pipes											\$45,573	
Total Length:	1,258											
Weighted Average of all Pipes Listed:					64%							
Length of Impact Fee Eligible	1,258											
Weighted Average of Impact Fee Eligible Pipes:					64%							
B2309	16	526		545	100%	100%	2002	100%	\$64,221	0.6906	\$44,351	
P11549	16	1687		545	100%	100%	2002	100%	\$205,790	0.6906	\$142,120	
P411	16	224		545	100%	100%	2002	100%	\$27,279	0.6906	\$18,839	
SR1	16	942		545	100%	100%	2002	100%	\$114,887	0.6906	\$79,342	
P201	16	1356	39	93	58%							
326	16	788	43	211	80%							
P12619	16	795	155	392	60%							
P11615	16	1211	359	557	36%							
P367	16	954	707	906	22%	100%	1992	22%	\$116,412	0.5266	\$13,446	
B2187	16	341	1226	2208	44%	100%	2002	44%	\$41,578	0.6906	\$12,767	
SR1439	16	294	1401	2494	44%	100%	2002	44%	\$35,844	0.6906	\$10,850	
P11607	16	2660	1571	5118	69%	100%	2002	69%	\$324,532	0.6906	\$155,339	
P12727	16	426	1571	5118	69%	100%	2002	69%	\$51,923	0.6906	\$24,853	
B2193	16	433	1575	2987	47%	100%	2002	47%	\$52,826	0.6906	\$17,244	
P11681	16	3974	2452	2814	13%	100%	2008	13%				\$440,979
P12737	16	707	2452	3513	30%	100%	2008	30%				\$78,433
P397	16	64	2873	5684	49%	100%	1992	49%	\$7,747	0.5266	\$2,018	
P11493	16	1993	2942	3912	25%	100%	2008	25%				\$221,150
P11609	16	566	2942	5433	46%	100%	2008	46%				\$62,775
P11727	16	309	2942	5433	46%	100%	2008	46%				\$34,289
P12445	16	131	2942	5767	49%	100%	2008	49%				\$14,526
Total of all existing 16 inch pipes:											\$334,698	\$852,151
Total Length:	20,379											
Weighted Average of all Pipes Listed:					50%							
Length of Impact Fee Eligible	16,229											
Weighted Average of Impact Fee Eligible Pipes:					49%							



DRINKING WATER MASTER PLAN AND CAPITAL FACILITY PLAN

(HAL Project No.: 415.02.100)

DRAFT

January 2021

SANTAQUIN CITY

DRINKING WATER MASTER PLAN AND CAPITAL FACILITY PLAN

(HAL Project No.: 415.02.100)

DRAFT

**Steven C. Jones, P.E.
Project Manager**



January 2021

ACKNOWLEDGEMENTS

Hansen, Allen & Luce thanks the following individuals for their contributions to this project:

Santaquin City Government

Kirk Hunsaker, Mayor
Nicholas Miller, Councilperson
Betsy Montoya, Councilperson
Lynn Mecham, Councilperson
Jennifer Bowman, Councilperson
Dave Hathaway, Councilperson

Santaquin City Staff

Benjamin Reeves, City Manager
Norm Beagley, Assistant City Manager/Engineer
Jon Lundell, City Engineer

Jason Callaway, Public Works Operations Manager
Shannon Hoffman, Admin Service Director/Treasurer
Aaron Shirley, Finance Director/Recorder

Hansen, Allen & Luce, Inc.

Steven C. Jones, P.E., Vice President, Project Manager
Richard M. Noble, Vice President
Ridley J. Griggs, Staff Engineer

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	i
TABLE OF CONTENTS	ii
LIST OF TABLES	v
LIST OF FIGURES	vi
GLOSSARY OF TECHNICAL TERMS	vi
ABBREVIATIONS AND UNITS.....	viii
EXECUTIVE SUMMARY	ES-1
PURPOSE OF STUDY.....	ES-1
PLANNING HORIZONS	ES-1
COMPONENTS OF A WATER DISTRIBUTION SYSTEM	ES-1
METHODS	ES-1
LEVEL OF SERVICE	ES-2
DISTRIBUTION SYSTEM VULNERABILITIES	ES-2
DISTRIBUTION SYSTEM – GENERAL RECOMMENDATIONS.....	ES-4
General Source Recommendations.....	ES-4
General Storage Recommendations.....	ES-4
General Distribution Recommendations	ES-4
CAPITAL FACILITY PLAN	ES-5
CONCLUSIONS	ES-7
 CHAPTER 1 INTRODUCTION.....	 1-1
PURPOSE AND SCOPE	1-1
BACKGROUND.....	1-1
COMPLIANCE WITH PERTINENT LEGISLATION.....	1-2
LEVEL OF SERVICE	1-2
MASTER PLANNING METHODOLOGY.....	1-3
DESIGN AND PERFORMANCE CRITERIA	1-3
PRESSURE ZONE REVISIONS	1-4
 CHAPTER 2 SYSTEM GROWTH	 2-1
GROWTH PROJECTIONS.....	2-1
EQUIVALENT RESIDENTIAL CONNECTIONS.....	2-1
EXISTING AND FUTURE CONNECTIONS	2-2
EXISTING AND FUTURE IRRIGABLE ACREAGE.....	2-2
 CHAPTER 3 WATER SOURCES AND DEMAND.....	 3-1
EXISTING WATER SOURCES	3-1
Springs 2 - 5.....	3-1
Cemetery Well	3-1
Center Street Well.....	3-2
Summit Ridge Well	3-2
EXISTING WATER SOURCE DEMAND.....	3-2
Analysis.....	3-3
EXISTING WATER SOURCE REQUIREMENTS	3-3
Existing Peak Day Demand	3-3
Existing Pump Stations	3-4
Existing Average Yearly Demand	3-5
SOURCE REDUNDANCY.....	3-5
FUTURE WATER SOURCE REQUIREMENTS.....	3-6

Future Peak Day Demand	3-6
Future Average Yearly Demand	3-7
Comparison to Former DDW Standards	3-7
SOURCE - CONCLUSIONS.....	3-8
SOURCE - RECOMMENDATIONS.....	3-8
Future Pump Stations	3-8
Water Dedication Policy	3-9
General Source Recommendations.....	3-9
CHAPTER 4 WATER STORAGE	4-1
EXISTING WATER STORAGE	4-1
EXISTING WATER STORAGE REQUIREMENTS	4-1
Fire Suppression Storage	4-1
Equalization Storage.....	4-2
Emergency Storage	4-2
SUMMARY OF EXISTING STORAGE	4-3
FUTURE WATER STORAGE REQUIREMENTS	4-4
Equalization Storage.....	4-5
Fire Suppression Storage	4-5
Emergency Storage	4-5
WATER STORAGE RECOMMENDATIONS.....	4-5
CHAPTER 5 WATER DISTRIBUTION.....	5-1
HYDRAULIC MODEL	5-1
Development.....	5-1
Model Components.....	5-1
ANALYSIS METHODOLOGY.....	5-2
EXISTING WATER DISTRIBUTION SYSTEM.....	5-2
Fire Flow Deficiencies.....	5-4
FUTURE WATER DISTRIBUTION SYSTEM DEMANDS.....	5-4
WATER DISTRIBUTION SYSTEM RECOMMENDATIONS	5-5
CHAPTER 6 SYSTEM OPTIMIZATION.....	6-1
ENERGY AND SYSTEM PERFORMANCE	6-1
Source Energy Costs	6-1
Pumping Operation	6-2
WATER USE PRIORITY	6-3
NON-REVENUE WATER	6-3
CHAPTER 7 CAPITAL FACILITY PLAN	7-1
INTRODUCTION	7-1
GROWTH PROJECTIONS.....	7-1
Changes to Expected Growth Areas.....	7-1
Large Developments.....	7-1
METHODOLOGY	7-2
RECOMMENDED PROJECTS AND COSTS	7-2
Precision of Cost Estimates	7-3
GROWTH-RELATED PROJECTS	7-3
MAINTENANCE OR DEFICIENCY PROJECTS	7-8
Fire Flow Projects	7-8
Facility Replacement.....	7-8
FUNDING OPTIONS	7-9

General Obligation Bonds.....	7-9
Revenue Bonds	7-9
State or Federal Grants and Loans.....	7-10
Impact Fees	7-10
REFERENCES	R-1
 APPENDIX A	
Drinking Water Master Plan Map	
 APPENDIX B	
Population Projections	
 APPENDIX C	
Water System Data and Calculations	
 APPENDIX D	
Springs Evaluation	
 APPENDIX E	
EPANET 2.0 Hydraulic Models and Model Calibration Data	
 APPENDIX F	
Capital Facility Plan Cost Estimates	
 APPENDIX G	
Checklist for Hydraulic Model Design Elements Report	

LIST OF TABLES

NO.	TITLE	PAGE
ES-1	Level of Service Parameters	ES-2
ES-2	System Vulnerabilities	ES-3
ES-3	Proposed Solutions to System Vulnerabilities.....	ES-4
ES-4	Maintenance/Deficiency Projects	ES-5
ES-5	System Growth-Related Capital Projects (0 – 20 Years)	ES-6
ES-6	Development-Driven Projects (0 – 20 Years).....	ES-6
1-1	Level of Service Parameters	1-2
1-2	System Design Criteria	1-4
2-1	Existing and Future ERCs	2-2
2-2	Existing and Future Irrigable Acreage	2-3
2-3	Growth Projections.....	2-4
3-1	Capacity of Existing Drinking Water Sources.....	3-1
3-2	Historic Drinking Water Use	3-2
3-3	Water Use Variation	3-3
3-4	Existing Peak Day Demand by Pressure Zone	3-4
3-5	Existing Drinking Water Pump Stations	3-4
3-6	Supply and Demand by Pressure Zone, Assuming Source Failure	3-5
3-7	Future Peak Day Demand by Pressure Zone	3-7
3-8	Recommended Future Drinking Water Pump Stations	3-8
4-1	Capacity of Existing Storage Tanks	4-1
4-2	Existing Fire Suppression Storage by Tank	4-2
4-3	Existing Drinking Water Storage Requirements by Zone	4-3
4-4	Attributes of Existing Storage Tanks	4-4
4-5	Future Drinking Water Storage Requirements	4-4
4-6	Recommended Future Storage Facilities	4-6
5-1	Compliance of Existing Distribution System with Utah Rule	5-3
5-2	Design Parameters for Future Distribution System.....	5-4
6-1	Non-Revenue Water in the Santaquin Drinking Water System.....	6-4
7-1	Estimated Costs for Growth-Related Projects.....	7-4
7-2	Recommended Source Projects	7-5
7-3	Recommended Storage Projects	7-5
7-4	Recommended Distribution Projects	7-6
7-5	Recommended Efficiency Projects	7-7
7-6	Fire Flow Projects Required to Provide 1,500 gpm.....	7-8
7-7	Recommended Long-Term Annual Replacement Budget.....	7-9

LIST OF FIGURES

NO.	TITLE	PAGE
1-1	Existing Drinking Water System	After 1-1
1-2	Santaquin City Water Service Area.....	After 1-2
1-3	Existing and Future Pressure Zones.....	After 1-4
2-1	Santaquin Historic and Projected Population	2-1
2-2	ERC Density by Area	After 2-2
5-1	Summary of Pipe Length by Diameter	5-3
5-2	Modeled Existing Fire Flow Capacity	After 5-3
5-3	Modeled Existing Peak Day Pressure	After 5-3
6-1	Expected vs. Observed Source Energy Intensity	6-1
6-2	Pump Loading (example)	6-2
7-1	Capital Facility Plan (0-20 Years) Projected Areas of Development	After 7-1
7-2	Recommended Growth Projects 0-10 Year Timeframe	After 7-3
7-3	Recommended Growth Projects 10-20 Year Timeframe	After 7-3
7-4	Projects Required to Provide 1,500 gpm Fire Flow Capacity.....	After 7-8

GLOSSARY OF TECHNICAL TERMS

Average Daily Flow: The average yearly demand volume expressed in a flow rate.

Average Yearly Demand: The volume of water used during an entire year.

Buildout: When the development density reaches maximum allowed by planned development.

Demand: Required water flow rate or volume.

Distribution System: The network of pipes, valves and appurtenances contained within a water system.

Drinking Water: Water of sufficient quality for human consumption. Also referred to as Culinary or Potable water.

Equivalent Residential Connection: A measure used in comparing water demand from non-residential connections to residential connections.

Fire Flow Requirements: The rate of water delivery required to extinguish a particular fire. Usually it is given in rate of flow (gallons per minute) for a specific period of time (hours).

Head: A measure of the pressure in a distribution system that is exerted by the water. Head represents the height of the free water surface (or pressure reduction valve setting) above any point in the hydraulic system.

Head loss: The amount of pressure lost in a distribution system under dynamic conditions due to the wall roughness and other physical characteristics of pipes in the system.

Peak Day: The day(s) of the year in which a maximum amount of water is used in a 24-hour period.

Peak Day Demand: The average daily flow required to meet the needs imposed on a water system during the peak day(s) of the year.

Peak Instantaneous Demand: The flow required to meet the needs imposed on a water system during maximum flow on a peak day.

Pressure Reducing Valve (PRV): A valve used to reduce excessive pressure in a water distribution system.

Pressure Zone: The area within a distribution system in which water pressure is maintained within specified limits.

Service Area: Typically, the area within the boundaries of the entity or entities that participate in the ownership, planning, design, construction, operation and maintenance of a water system.

Static Pressure: The pressure exerted by water within the pipelines and other water system appurtenances when water is not flowing through the system, i.e., during periods of little or no water use.

Storage Reservoir: A facility used to store, contain and protect water until it is needed by the customers of a water system. Also referred to as a Storage Tank.

Transmission Pipeline: A pipeline that transfers water from a source to a reservoir or from a reservoir to a distribution system.

Water Conservation: Planned management of water to prevent waste.

ABBREVIATIONS AND UNITS

ac	acre [area]
ac-ft	acre-foot (1 ac-ft = 325,851 gal) [volume]
CIP	Capital Improvement Plan
CFP	Capital Facilities Plan
CUWCD	Central Utah Water Conservancy District
CWP	Central Water Project
DIP	Ductile Iron Pipe
DBP	disinfection byproduct
EPA	U.S. Environmental Protection Agency
EPANET	EPA hydraulic network modeling software
ERC	Equivalent Residential Connection
ft	foot [length]
ft/s	feet per second [velocity]
gal	gallon [volume]
gpd	gallons per day [flow rate]
gpm	gallons per minute [flow rate]
HAL	Hansen, Allen & Luce, Inc.
hp	horsepower [power]
hr	hour [time]
IFA	Impact Fee Analysis
IFC	International Fire Code
IFFP	Impact Fee Facilities Plan
in.	inch [length]
kgal	thousand gallons [volume]
kW	kilowatt [power]
kWh	kilowatt hour [energy]
MG	million gallons [volume]
MGD	million gallons per day [flow rate]
mg/L	milligram per liter [concentration]
µg/L	microgram per liter [concentration]
mi	mile [length]
psi	pounds per square inch [pressure]
s	second [time]
SCADA	Supervisory Control and Data Acquisition
THM	trihalomethane
UV	ultraviolet radiation (disinfection method)
wsfu	water supply fixture unit
yr	year[time]

EXECUTIVE SUMMARY

PURPOSE OF STUDY

The purpose of this study is to help Santaquin City provide safe, efficient and reliable drinking water service to its customers, both now and into the future, at the lowest cost.

PLANNING HORIZONS

The ultimate planning horizon for this study is the year 2060. However, this report provides guidance applicable at various time intervals:

1. Near future: low-cost actions and best practices the City can implement to reduce costs and improve operations.
2. 10-year: system improvements needed within 10 years to provide capacity for anticipated new development. The cost of these improvements will be used to set impact fees and guide the formulation of near-term budgets.
3. 20-year: system improvements needed within 20 years for anticipated new development. These improvements are included in the capital facility plan to guide the formulation of longer-term budgets.
4. Future: all system improvements necessary to serve the City at year 2060, when it is developed at the density defined by the City's current general plan and zoning ordinances (except for remaining agricultural lands). These recommendations will help the City secure key pieces of land and work with developers to properly plan for infrastructure that is compatible with the future system.

COMPONENTS OF A WATER DISTRIBUTION SYSTEM

The following three components of a water distribution system were analyzed to determine the capacity and ability of the water system to meet existing and future water demands:

1. Source – the water used to supply the system
2. Storage – a location to store water between the time it is delivered to the system and the time it is used by a customer
3. Distribution – pipelines used to deliver water from sources or storage locations to the customer

Each of these components must have enough capacity and capability to serve existing and future customers. To ensure adequate capacity, this study proposes a level of service as a design standard for new development (as discussed in the following section).

METHODS

Water usage and water system data were used to develop a responsible level of service for each component (source, storage, distribution) of the water system. The level of service was used to evaluate the existing system, identify existing deficiencies, and develop a computer model of the existing system.

The land use element of the general plan, population projections, development concept plans, and the proposed level of service were used to forecast the magnitude and locations of future

water demands in the City. Computer modeling and other tools were used to determine what infrastructure is necessary to best meet these demands.

LEVEL OF SERVICE

Level of service is the standard to which the drinking water system is designed to meet. The level of service is based on three years of historical water billing and water production data provided by the City. The level of service is based on Equivalent Residential Connections (ERCs). One ERC is defined as the average water demand of an average residence in Santaquin.

Table ES-1 shows the levels of service used for this study. Pressure requirements are expressed in units of pounds per square inch (psi). Other requirements are expressed in units of demand (gallons per minute [gpm] or volume (gallons [gal] or acre-feet [ac-ft]) per ERC. Because some areas are irrigated by the drinking water system, a level of service for outdoor use has also been defined, using an irrigable acre (irr-ac) as a standard of measurement.

Table ES-1
Level of Service Parameters

Parameter	Proposed Level of Service - Indoor Use	Proposed Level of Service - Outdoor Use
Minimum system pressure	40 psi	40 psi
Maximum system pressure	125 psi	125 psi
Maximum daily pressure variation	20 psi	20 psi
Peak Day Demand	500 gpd/ERC	8.0 gpm/irr-ac
Average Yearly Demand	0.336 ac-ft/ERC	4.0 ac-ft/irr-ac
Storage	360 gal/ERC	9,200 gal/irr-ac

These level of service parameters were used to quantify system demand and compare it to system capacity. This allowed the project team to identify vulnerabilities in the water system and make plans for future growth.

DISTRIBUTION SYSTEM VULNERABILITIES

The system was analyzed to identify vulnerabilities in the existing system and areas which need improvements in order to support future growth. Table ES-2 contains a summary of system vulnerabilities. Further information about these vulnerabilities is described in subsequent sections.

**Table ES-2
System Vulnerabilities**

ID	Description	Notes
V1	Zone 11W Source and Storage	The Zone 11W drinking water tank and the Summit Ridge pump station are rapidly approaching capacity. There is heavy development pressure in this area, and these facilities will not have sufficient capacity after year 2021.
V2	System Source Redundancy	Because drinking water sources can go out of service for a variety of reasons, the drinking water system should have sufficient capacity to meet peak demands with the largest source (Summit Ridge Well) out of service. Redundant capacity is available as of this writing, but will be exhausted by year 2022.
V3	Zone 10 Storage	The limited amount of storage in Zone 10 makes it difficult for the City to operate the Summit Ridge Well. The resulting operational scheme used by the City leads to high electrical demand charges and spillage of spring water.
V4	Source Water Loss	Approximately 30 – 40% of the water Santaquin produces is ultimately non-revenue water. This is higher than average and is most likely indicative of leakage problems.
V5	Limited Fire Flow Capacity	Several hydrants in Santaquin cannot provide the desired 1,500 gpm of flow.
V6	Lack of Separate PI Source	The drinking water system supplies irrigation water to substantial portions of the pressurized irrigation system. This mode of operation puts additional stress on the drinking water distribution system and sources.

Recommended solutions to these vulnerabilities are shown in Table ES-3 and described in further detail in Chapter 7.

**Table ES-3
Proposed Solutions to System Vulnerabilities**

Description	Notes	Vulnerabilities Addressed
Zone 10 Western Tank (2021)	Construct an additional tank in Zone 10 (in the Summit Ridge area) to provide adequate storage for future users and help to improve the operation of the Summit Ridge Well and City pump stations. Connect the tank to the Zone 10 portion of the Summit Ridge development.	V1, V3
Zone 10 Well (2021)	Drill and equip an additional well in Zone 10 to provide continued redundant capacity.	V2
Leak Detection Study	Commission a leak detection study to reduce non-revenue water, save energy, and save money	V4
Fire flow distribution projects	Depending on available funding and City priorities, replace existing undersized pipelines to resolve fire flow deficiencies.	V5
PI Projects	Construct several projects in the PI system to provide source and storage capacity (see the Santaquin PI Master Plan for details).	V6

DISTRIBUTION SYSTEM – GENERAL RECOMMENDATIONS

The following subsections contain general recommendations for Santaquin to follow to ensure continued water service into the future.

General Source Recommendations

The following are recommended actions for Santaquin to take to ensure adequate source capacity into the future:

1. Take all actions necessary to preserve groundwater quality and supply. For the foreseeable future, groundwater will be the only drinking water supply for Santaquin City.
2. Drill new wells to support future growth and provide redundancy.

General Storage Recommendations

The following are recommended actions for Santaquin to take to ensure adequate storage capacity into the future:

1. Construct additional storage tanks to support growth.
2. Use building permit data to track remaining capacity in existing drinking water tanks.

General Distribution Recommendations

The following are recommended actions for Santaquin to take to ensure adequate distribution capacity into the future:

1. Upsize pipes to master plan size as development occurs. Master plan pipe sizes are shown on the master plan map in Appendix A.
2. Keep a record of the age of system pipes. Replace pipes which are beyond their service life or are experiencing frequent leaks. Recommendations for the service life of system components are discussed in Chapter 7.

CAPITAL FACILITY PLAN

Projects necessary to support growth over the next 20 years are identified and described in the Capital Facility Plan. Conceptual-level cost estimates were prepared for each project. Costs were classified as either (1) A project to correct an existing deficiency or maintain the system; or (2) A project attributable to new growth. This distinction is important because projects attributable to new growth are eligible to be repaid with impact fees.

Table ES-4 briefly summarizes the estimated costs of projects that the City may opt to implement (depending on available funds and City priorities). Figure 7-4 in the report shows each proposed fire flow project.

Table ES-4
Maintenance/Deficiency Projects

Project	Estimated Cost
Fire Flow Projects	\$1,039,000
Leak Detection Study	\$40,000
Total	\$1,079,000

System growth will necessitate three major capital projects within the next 20 years. These projects have an estimated cost of **\$10,263,000** (see Table ES-5). These costs are eligible to be paid for by impact fees.

**Table ES-5
System Growth-Related Capital Projects (0 – 20 Years)**

Type & Phasing Year	Map ID ¹	Recommended Project	Growth Cost
Storage, Distribution, Efficiency – 2021	3	Construct a 2.5 MG tank in Zone 10W, a 1,500 gpm pump station to supply Zone 11W, a 16-inch diameter pipe to improve distribution capacity, and reconfigure the Summit Ridge Well to improve operations and save energy and money. ²	\$4,431,000
Source – 2021	4	Drill an additional well to provide redundant source capacity and support growth.	\$1,584,000
Storage, Distribution – 10 – 20 Years	10	Replace the existing Zone 10 tank with a 2.5 MG tank and construct 20-inch diameter pipeline to connect it to the distribution system. ²	\$4,248,000
Total			\$10,263,000

1. The Map ID corresponds to the project number on the Capital Facility Plan map. Refer to Figures 7-3 and 7-4.
2. Projects 3 and 10 both address a need for more storage in Pressure Zone 10. It is recommended that construction on one of these projects be scheduled for 2021; however, project 3 does not necessarily need to take precedence over Project 10. Either will meet the City's needs. See Chapter 4 for further discussion

Development will require additional distribution pipelines and booster stations to be installed or upsized throughout the 20-year capital facility planning project period. A brief summary of these costs is included in Table ES-6. These costs are also eligible to be paid by impact fees.

**Table ES-6
Development-Driven Projects (0 – 20 Years)**

Project	Estimated Cost
Zone 12E Foothill Village Booster Station (2021)	\$600,000
Pipe Upsizing (0 – 10 Years)	\$52,000
Pipe Upsizing and Installation (10 – 20 Years)	\$1,821,000
Zone 11 NE Booster Station (10 – 20 Years)	\$1,200,000
Total	\$3,673,000

CONCLUSIONS

It is recommended that the City take the following actions within the next year to ensure safe, reliable, and cost-effective water service:

1. Immediately begin planning and budgeting for the projects outlined in the Capital Facility Plan.
2. Begin design work on the above-mentioned Zone 10W tank and pipeline, with intentions to construct these facilities in 2021.
3. Use the master plan to review each new development, to ensure properly sized and located infrastructure is constructed as development progresses. Doing so will eliminate the need for guesswork, help the City use its resources most efficiently, and ensure excellent performance of the drinking water system, both now and in the future.

CHAPTER 1 INTRODUCTION

PURPOSE AND SCOPE

The purpose of this master plan is to provide direction to the City of Santaquin regarding decisions that will be made now and into the future to provide an adequate drinking water system for its customers at the most reasonable cost. Recommendations are based on demand data, growth projections, standards of the Utah Division of Drinking Water (DDW), city zoning, the Santaquin City general plan, known planned developments, and standard engineering practices.

The master plan is a study of the City's drinking water system and customer water use. The following topics are addressed herein: general planning, growth projections, water rights, water loss, water rates, impact fees, source requirements, storage requirements, and distribution system requirements. Operational parameters for the City's drinking water system were reviewed, and recommendations were made to optimize the system based on stability, ease of use, and cost. Based on this study, needed capital improvements have been identified with conceptual-level cost estimates for the recommended improvements.

The results of the study are limited by the accuracy of growth projections, data provided by the City, and other assumptions used in preparing the study. It is expected that the City will review and update this master plan every 5–10 years as new information about development, system performance, or water use becomes available.

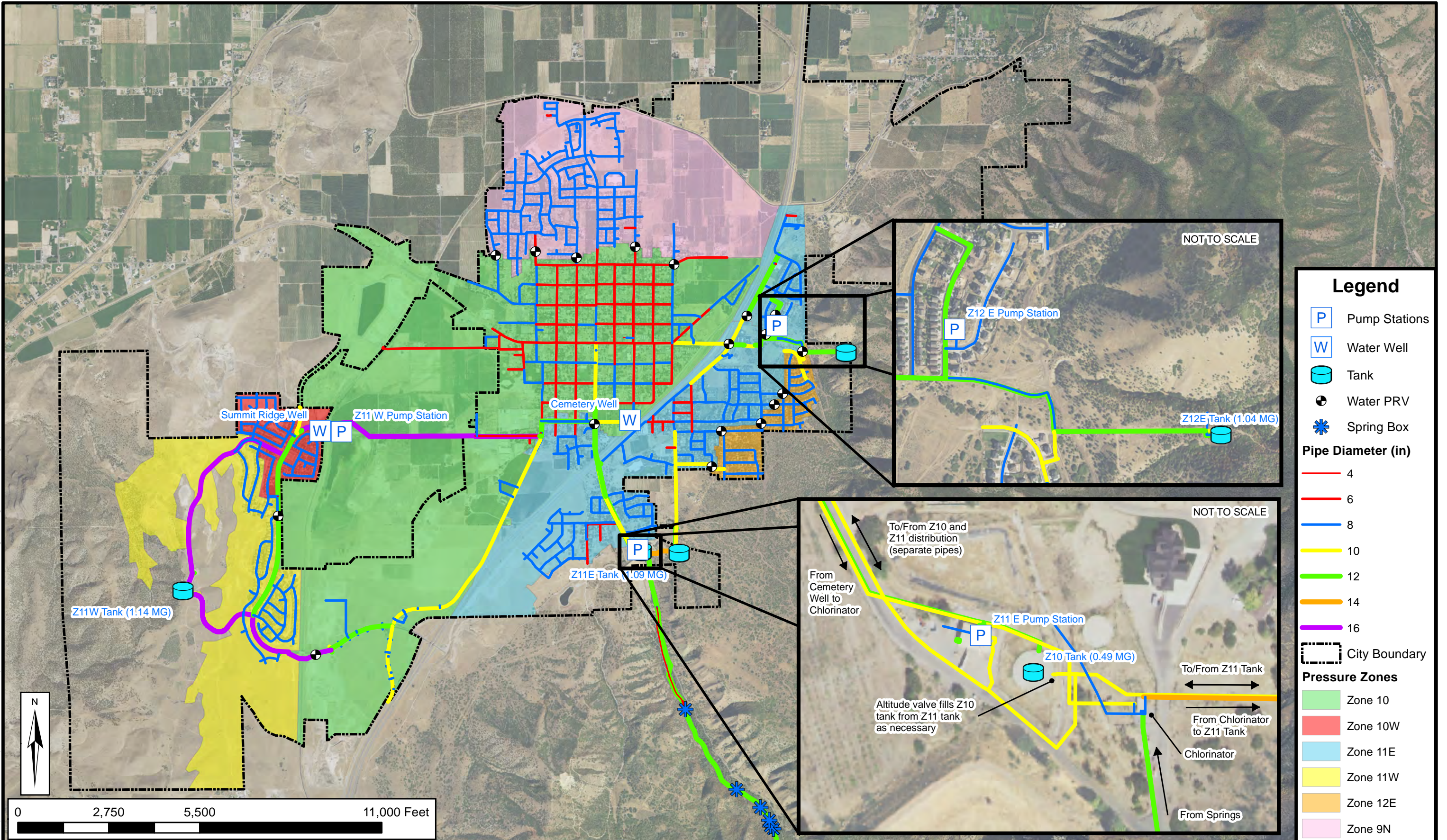
BACKGROUND

Santaquin City was first settled in late 1851 and is located about 70 miles south of Salt Lake City in Utah County. Although its history lies mostly in agriculture, its population today also has a substantial number of commuters who work in Provo, Spanish Fork, and other nearby cities. Utah County has experienced rapid growth in recent decades, and this growth has extended to Santaquin as population centers have expanded and property values have increased. From 2010–2018, Santaquin grew at a rate of 34.1% from a population of 9,128 to an estimated 12,274 (U.S. Census Bureau). In June 2020, the City provided drinking water service to 3,796 connections.

The existing drinking water system includes four storage tanks, three pump stations, five pressure zones, and about 78 miles of pipe with diameters ranging from 4 inches to 16 inches. Figure 1-1 shows existing drinking water infrastructure. The City recognizes that its continued growth necessitates proactively planning additional drinking water facilities to maintain an acceptable level of service for both indoor and outdoor water use.

Santaquin's drinking water system is master planned to be separate from the City's pressurized irrigation system, but it currently supplements the pressurized irrigation system in several areas. Separate drinking water and pressurized irrigation water pipelines exist in these developments; however, pressurize irrigation source and storage facilities are not yet constructed in some areas. As the excess capacity in the drinking water system is needed for future growth, pressurized irrigation water system facilities will be constructed to increase the capacity of the pressurized irrigation water system, thus freeing up capacity for future drinking water demands. The pressurized irrigation water system is addressed in a separate master plan document.

Date: 8/21/2020
Document Path: H:\Projects\415 - Santaquin\02.100 - Culinary Water Master Plan\GIS\Working\DW Figure 1-1 Existing System.mxd



SANTAQUIN DRINKING WATER MASTER PLAN

EXISTING DRINKING WATER SYSTEM

FIGURE 1-1

Item # 10.

COMPLIANCE WITH PERTINENT LEGISLATION

Santaquin City intends to comply with all requirements in Utah House Bill 31, *Water Supply and Surplus Water Amendments* (2019 General Session), including the requirement to define a water service area and post a map showing it. Figure 1-2 shows the service area for the Santaquin City drinking water system, the Santaquin City municipal boundary, and customer connections outside of the City boundary.

This master plan will also assist Santaquin in complying with Utah House Joint Resolution 1, *Proposal to Amend Utah Constitution* (2019 General Session), which directs municipalities to protect and preserve water rights and water supply.

LEVEL OF SERVICE

The level of service (LOS) is the water volume and pressure standards that the drinking water system is designed to meet. Level of service is regulated by Utah Administrative Rule 309, which is administered by the Utah Division of Drinking Water (DDW). In the past, the DDW set standard sizing requirements which each water utility was required to meet, based on equivalent residential connections or ERCs. In 2018, the DDW revised this approach to set system-specific sizing requirements. The Division of Drinking water is currently in the process of defining these system-specific requirements for Santaquin. As such, the level of service in this master plan is based on *anticipated* sizing requirements. Slight adjustments may be required if the DDW imposes minimum sizing requirements which are more restrictive than anticipated.

The level of service for this master plan is based on production and meter data collected and reported by Santaquin City over several years. It incorporates appropriate safety factors and is intended to produce a design which is responsible without being unnecessarily expensive. It considers both indoor use and areas which are irrigated using the drinking water system.

The LOS parameters used for this study are summarized in Table 1-1. The development of each LOS parameter is described in later chapters.

Table 1-1
Level of Service Parameters

Parameter	Former DDW Standard	Proposed Level of Service - Indoor Use	Proposed Level of Service - Outdoor Use
Minimum system pressure	30 psi	40 psi	40 psi
Maximum system pressure	N/A	125 psi	125 psi
Maximum daily pressure variation	N/A	20 psi	20 psi
Peak Day Demand	800 gpd/ERC	500 gpd/ERC	8.0 gpm/irr-ac
Average Yearly Demand	0.45 ac-ft/ERC	0.336 ac-ft/ERC	4.0 ac-ft/irr-ac
Storage	400 gal/ERC	360 gal/ERC	9,200 gal/irr-ac
Minimum Fire Flow	-	1,500 gpm for 2 hours	-

MASTER PLANNING METHODOLOGY

Drinking water systems consist of water sources, storage facilities, distribution pipes, pump stations, valves, and other components. Design and operation of the individual components must be coordinated so that they operate efficiently under a range of demands and conditions. The system must be capable of responding to daily and seasonal variations in demand while simultaneously providing sufficient capacity for firefighting and other emergency situations.

Identifying present and future water system needs is essential in the management and planning of a water system. Existing water demands were calculated from SCADA data and billed water use. Existing water use data, together with planned land uses in the City General Plan (and proposed development concepts), were used to project future water use.

This report follows the DDW requirements of Rule R309-510 (“Facility Design and Operation: Minimum Sizing Requirements”) and Rule R309-105 (“Administration: General Responsibilities of Public Water Systems”) of the Utah Administrative Code. The report addresses sources, storage, distribution, minimum pressures, hydraulic modeling, capital improvements, funding, and other topics pertinent to Santaquin’s drinking water system.

Computer models of the City’s drinking water system were prepared to simulate the performance of facilities under existing and future conditions. System improvement recommendations were prepared from the analysis and are presented in this report.

DESIGN AND PERFORMANCE CRITERIA

Summaries of the key design criteria and demand requirements for the drinking water system are included in Table 1-2. The design criteria were used in evaluating system performance and in recommending future improvements. Criteria development is described in later chapters.

Table 1-2: System Design Criteria

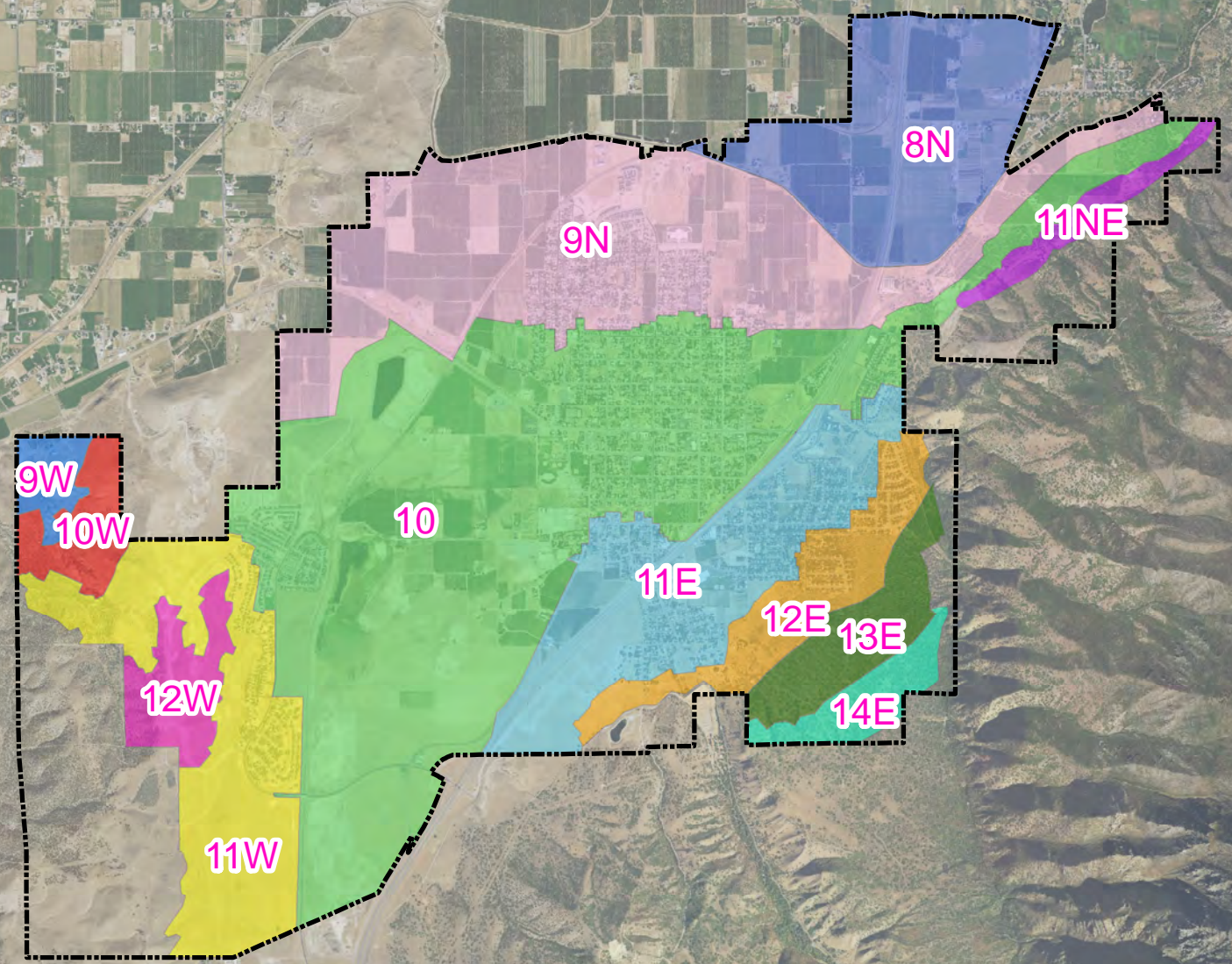
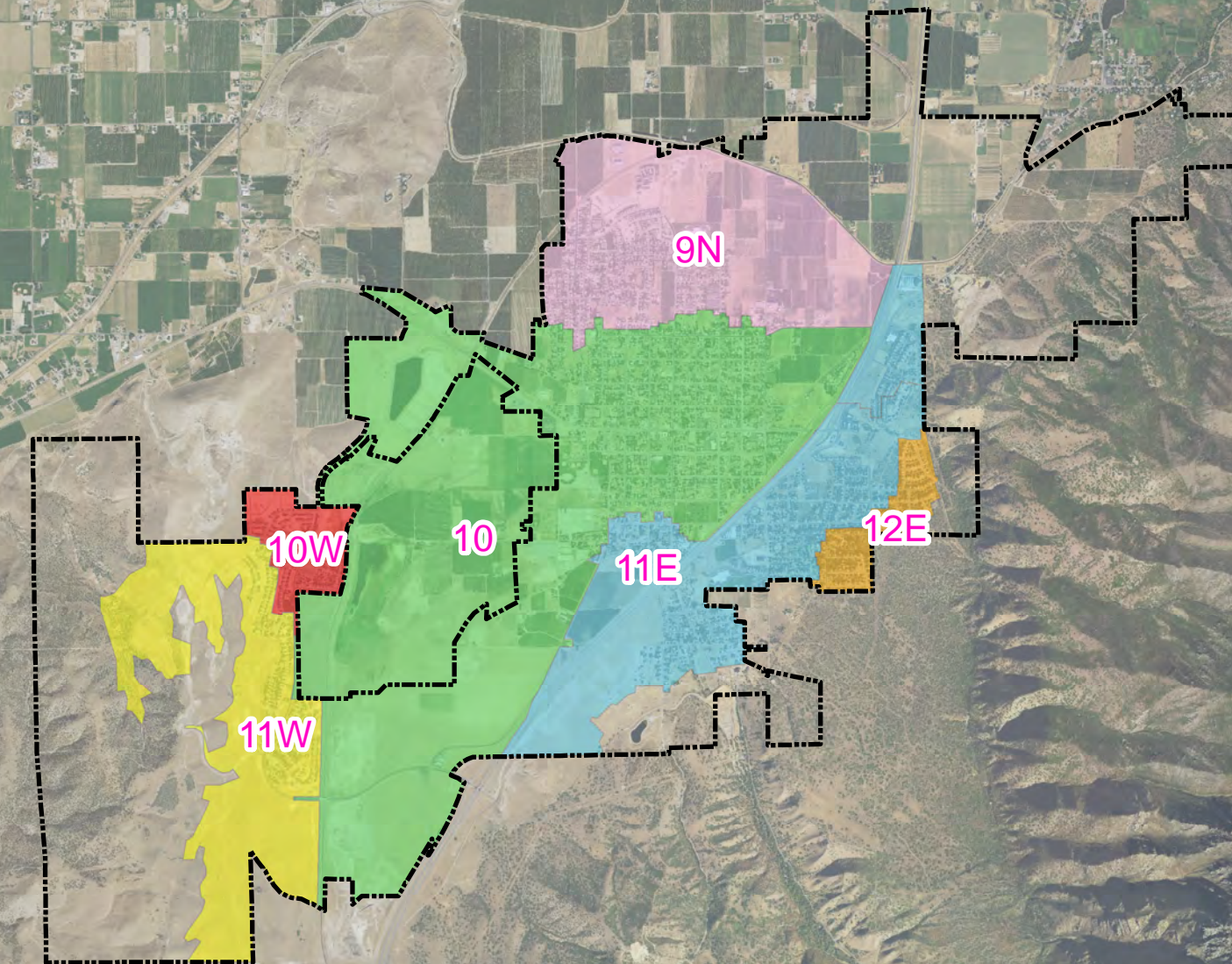
	Criteria	Existing Requirements	Estimated Future Requirements
Equivalent Residential Connections	Billing data/LOS	5,380 ERC	18,630 ERC
Irrigable Acreage	Billing data/LOS	125 irr-ac	185 irr-ac
Source Peak Day Demand Average Yearly Demand	Section R309-510-7/LOS Section R309-510-7/LOS	2,868 gpm 2,308 ac-ft	7,949 gpm 7,000 ac-ft
Storage Equalization Emergency Fire Suppression Total	Section R309-501-8/LOS City preference IFC/ Fire Marshall	2.76 MG 0.32 MG <u>0.36 MG</u> 3.45 MG	7.29 MG 1.12 MG <u>1.44 MG</u> 9.85 MG
Distribution Peak Instantaneous Minimum Peak Day Fire Flow Max. Operating Pressure Max. Pressure fluctuation Min. Pressure: Peak Day Peak Instantaneous	Meter data/LOS IFC/ Fire Marshall/LOS LOS LOS Section R309-510-9/LOS Section R309-510-9/LOS	5,736 gpm 1,500 gpm @ 20psi 125 psi 20 psi 40 psi 30 psi	15,898 gpm 1,500 gpm @ 20psi 125 psi 20 psi 40 psi 30 psi

PRESSURE ZONE REVISIONS

This master plan proposes revisions to the City's existing pressure zones (see details in Chapter 5). Tables which explain existing conditions are organized based on existing pressure zones. Tables which explain future conditions are organized based on proposed future pressure zones. Figure 1-3 shows the difference between existing and proposed pressure zones. The master plan map in Appendix A shows additional proposed infrastructure.

Existing

Future



SANTAQUIN DRINKING WATER MASTER PLAN

EXISTING AND FUTURE PRESSURE ZONES

FIGURE
1-3

Item # 10.

CHAPTER 2 SYSTEM GROWTH

GROWTH PROJECTIONS

The development of impact fees requires growth projections over the next ten years. In addition to impact fee projects, this report will also highlight anticipated projects 10-20 years out in the “Capital Facilities Plan” section of this report. Growth projections for Santaquin were evaluated as a part of this master planning effort.

City input and growth projections made by the Governor’s Office of Management and Budget (GOMB), Mountainland Association of Governments (MAG), and a market-driven growth analysis prepared for Envision Utah were considered in the development of growth projections used for this study. Detailed information is included in Appendix B. Figure 2-1 and Table 2-1 show the historic and projected population for Santaquin through 2060.

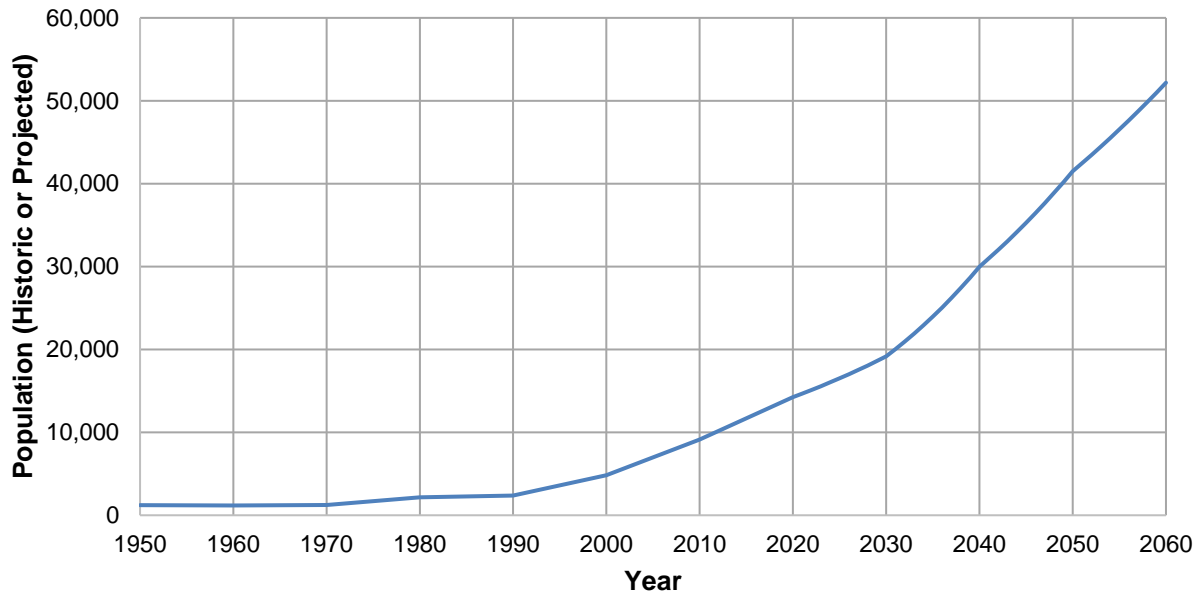


Figure 2-1: Santaquin Historic and Projected Population

EQUIVALENT RESIDENTIAL CONNECTIONS

Drinking water demands are expressed in terms of equivalent residential connections (ERCs). The use of ERCs is a standard engineering practice to describe the entire system in a common unit of measurement. One ERC is equal to the average demand of an average single-family, detached residential connection. Non-residential demands are converted to ERCs for planning purposes. For example, a commercial building requiring six times as much water as a typical single-family, detached residential connection is assigned an ERC count of 6.

EXISTING AND FUTURE CONNECTIONS

HAL analyzed the City's water use data from years 2017 through 2019 to determine the existing ERCs served by each pressure zone. HAL also used growth projections and land use plans to project the ERCs each zone in the system will serve in 2060. A breakdown of the existing and future ERCs by pressure zone is shown in Table 2-1. Figure 2-2 shows the projected future land use and corresponding density of ERCs.

Table 2-1
Existing and Future ERCs

Zone	Existing ERCs	Future ERCs
8N	0	340
9N	810	3,470
9W	0	140
10	2,910	8,780
10W	300	310
11W	260	1,400
11E	870	2,420
11NE	0	140
12W	0	210
12E	230	920
13E	0	420
14E	0	80
Total	5,380	18,630

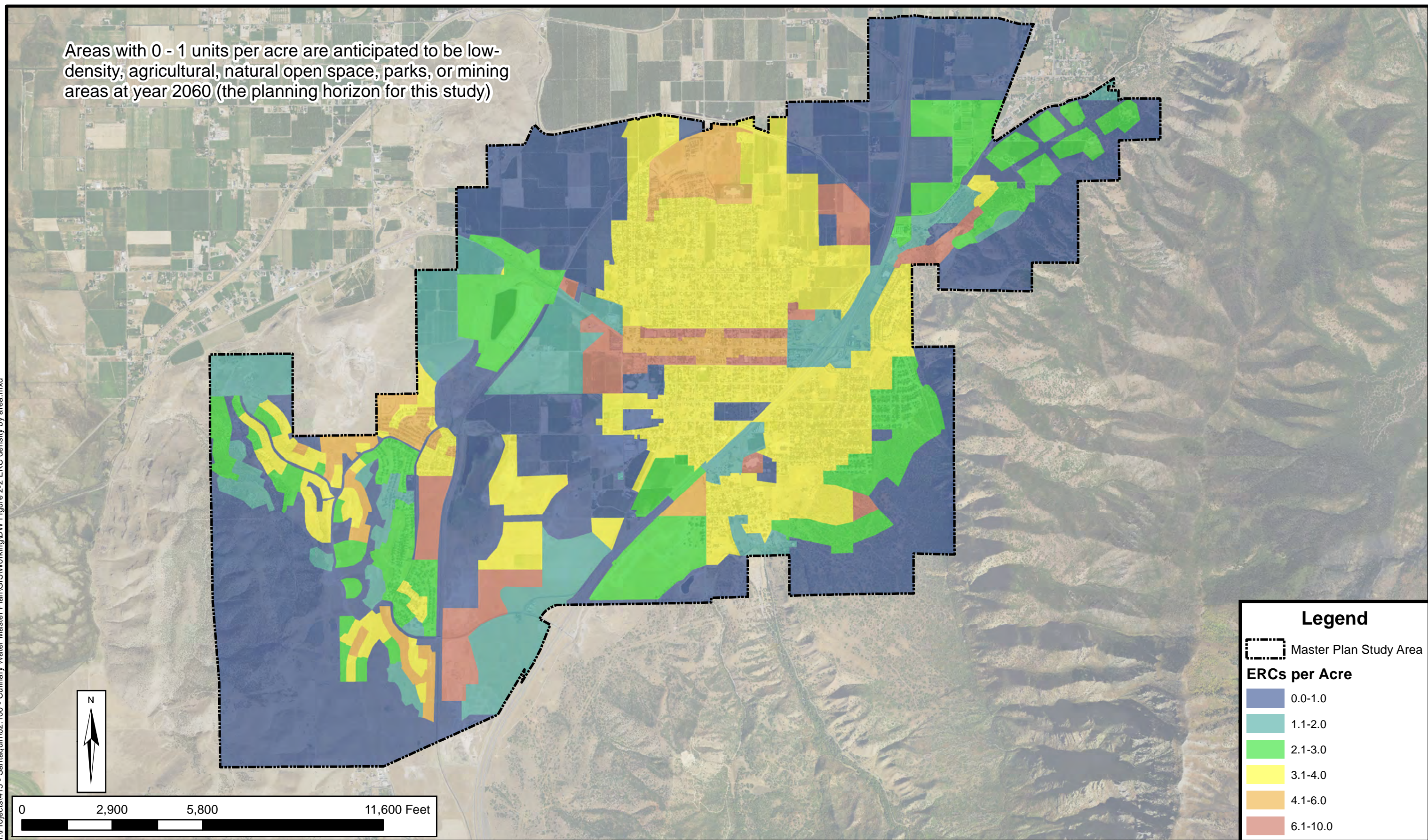
Data used to calculate the ERCs are included in Appendix C along with water usage and connection data.

EXISTING AND FUTURE IRRIGABLE ACREAGE

The Santaquin drinking water system supplies water for outdoor irrigation in certain areas of the City. This master plan will also consider the demands imposed on the drinking water system by outdoor irrigation. Outdoor water demands are based on irrigable acreage (irr-ac). The existing irrigable acreage served by the drinking water system was determined based on an analysis of aerial imagery, the layout of the drinking and P.I. systems, and discussions with City personnel.

Future irrigable acreage was forecasted for pressure zones not planned to be served with a separate PI system. These areas are located at high elevations and will have demands small enough that a separate irrigation system is not financially justified. Table 2-2 provides a breakdown of the existing and future irrigable acreage served by the drinking water system, by pressure zone.

Areas with 0 - 1 units per acre are anticipated to be low-density, agricultural, natural open space, parks, or mining areas at year 2060 (the planning horizon for this study)



**Table 2-2
Existing and Future Irrigable Acreage**

Zone	Existing Irrigable Acreage	Future Irrigable Acreage
8N	0	0
9N	0	0
9W	0	0
10	0	0
10W	40	0
11W	55	0
11E	0	0
11NE	0	30
12W	0	40
12E	30	0
13E	0	85
14E	0	30
Total	125	185

Table 2-3 contains the projected population and ERC count through 2040. These projections are used to develop the Capital Facility Plan in Chapter 7.

**Table 2-3
Growth Projections**

Year	Projected Population	Projected ERCs	Annual Growth
2020	14,242	5,380	3.0%
2021	14,671	5,560	3.0%
2022	15,113	5,750	3.0%
2023	15,568	5,940	3.0%
2024	16,037	6,140	3.0%
2025	16,520	6,340	3.0%
2026	17,017	6,550	3.0%
2027	17,530	6,770	3.0%
2028	18,058	6,990	3.0%
2029	18,602	7,220	3.0%
2030	19,162	7,460	3.0%
2031	20,039	7,700	4.6%
2032	20,957	7,950	4.6%
2033	21,916	8,210	4.6%
2034	22,920	8,480	4.6%
2035	23,969	8,770	4.6%
2036	25,066	9,070	4.6%
2037	26,214	9,380	4.6%
2038	27,414	9,700	4.6%
2039	28,669	10,050	4.6%
2040	29,982	10,400	4.6%

While growth projections are an essential component of this master plan, it should be noted that system capacity is dependent on the number of ERCs in the system. Infrastructure improvements should be made when certain ERC counts are reached – which may occur in a different year than is projected in this plan. Timing for capital improvement projects should be determined based on the development that actually occurs in the system, rather than a target date which is not known with certainty.

CHAPTER 3 WATER SOURCES AND DEMAND

This chapter presents an overview of existing and future source requirements and makes recommendations that will help the City meet these requirements as it grows. Water rights are covered in detail in the Santaquin 40-year water rights plan (in a separate document), and as such, are not discussed in detail in this chapter.

EXISTING WATER SOURCES

The Santaquin drinking water system currently has a series of springs and two wells that provide the system with a total peak day capacity of 4,555 gpm and an annual source capacity of 4,238 ac-ft. A summary of the capacity of these sources is shown in Table 3-1.

Table 3-1
Capacity of Existing Drinking Water Sources

Source	Existing Zone	Physical Flow Capacity (gpm)	Peak Day Source Capacity (gpm) ¹	Annual Source Capacity ² (ac-ft)
Cemetery Well	11E	850	740	597
Center Street Well ³	10	560	490	395
Springs 2-5	11E	700	700	1,129
Summit Ridge Well	11W	3,000	2,625	2,117
Total		5,110	4,555	4,238

1. Peak Day Well capacity assumes the well runs 21 hours per day.
2. Annual Source Capacity assumes the well runs an average of 12 hours per day.
3. The Center Street Well is currently used in the PI system. It can be used in the drinking water system in the event of an emergency.

Springs 2 - 5

The City owns five springs in Santaquin Canyon. Spring 1 is used in the PI system. The remainder supply the drinking water system. Water from the springs is chlorinated and then supplied to the Zone 11E tank. From there, it can be pumped to higher zones or fed to lower zones as needed. Because the springs are the lowest-cost source of water in the system, they are used to the maximum extent possible.

In recent years, production from the springs has been lower than average. As a part of this master planning effort, HAL analyzed the springs to determine whether actions could be taken to increase their yield. A summary of this analysis is included in Appendix D. Based on available hydrologic data, it appears that flows from Springs 2 and 3 typically increase if annual precipitation increases, and vice versa. No redevelopment actions are recommended at this time. However, if Springs 2 and 3 do not increase production following several wet years, redevelopment may be needed.

Cemetery Well

Santaquin uses the Cemetery Well to provide source to Pressure Zone 11E. Water from the Cemetery Well can be fed down to lower zones or pumped up to higher zones as needed.

Center Street Well

The Center Street Well was used as a drinking water supply for many years. However, it was connected to the PI system in 2012 to provide additional source to that system. Should the need arise, it can be connected to the drinking water system. For purposes of this plan, it is only considered an emergency source.

Summit Ridge Well

Summit Ridge Well is the largest drinking water source for the City, and plays a key role in meeting peak summer demands. During the summer season, water from Summit Ridge Well is pumped into Zone 10, where it can be consumed, fed down, or pumped up to other pressure zones as needed. During the winter season, valving and controls in the Summit Ridge Wellhouse are changed to enable the well to pump directly to the Zone 11W (and feed down to Zones 10W and 10 as necessary). This mode of operation can also be used at times when the Summit Ridge pump station is not operating. The Summit Ridge Well experiences limited use in the winter, because the City typically prioritizes other sources during periods of lower demand.

EXISTING WATER SOURCE DEMAND

In 2018, House Bill 303 amended Title 19, Chapter 4 of the Utah Code (the Safe Drinking Water Act). Section 19-4-114 of the new code directs the Utah Division of Drinking Water (DDW) to establish system-specific water source and storage minimum sizing requirements (rather than prescribing statewide sizing standards) based on at least three years of actual water use data and/or an engineering study. Historical data for the last three years was used to calculate the peak day drinking water demand as shown in Table 3-2. The requirement was calculated following guidance provided by the DDW.

Table 3-2
Historic Drinking Water Use

Water Use Variable	Year		
	2017	2018	2019
ERCs	4,236	5,022	5,366
<u>Average Yearly Demand</u>			
Total (ac-ft)	1,089	1,110	1,271
Per ERC (ac-ft/ERC)	0.257	0.221	0.237
Per ERC (gpd/ERC)	230	197	211
Per ERC (gpm/ERC)	0.16	0.14	0.15
<u>Peak Day Demand</u>			
Total (gpm) ¹	1,270	1,563	1,557
Per ERC (gpd/ERC)	432	448	418
Per ERC (gpm/ERC)	0.30	0.31	0.29

1. Peak day demand shown is the demand attributable to use within the drinking water system. Water supplied to the PI through crossovers or wholesaled to Genola City is not accounted for in the listed number. Development of the outdoor level of service is described in detail in the City's 2020 Pressurized Irrigation Master Plan report.

Analysis

Variation factors were computed according to DDW guidance and as shown in Table 3-3.

Table 3-3
Water Use Variation

Water Use Variable	Calculation	Calculated Factor ¹	Proposed Factor	Proposed Level of Service ²
Average Yearly Demand (gpd/ERC)	$(230 - 197) / (197)$	17%	30%	300
Peak Day Demand (gpd/ERC)	$(448 - 418) / (418)$	7%	12%	500

1. Calculated as $(\text{Maximum} - \text{Minimum}) / (\text{Minimum})$ from Table 3-2.

2. Calculated as $(\text{Maximum}) * (1 + \text{Proposed Factor})$, with Maximum from Table 3-2.

The City has chosen level of service parameters greater than the calculated minimum for the following reasons:

1. Leakage and water main breaks are likely to increase over time as pipes age and more length of pipe is installed.
2. Santaquin City pressurized irrigation sources produce vastly different amounts of water from year to year, and in some years, there is a greater reliance on the drinking water system for irrigation than is typical.
3. Santaquin City desires a responsible level of drought contingency protection in the event that flows from the springs diminish and/or groundwater levels decrease.

EXISTING WATER SOURCE REQUIREMENTS

According to DDW standards (Section R309-510-7), water sources must be able to meet both the expected water demand on the peak day (flow requirement) and the average demand over the course of one year (volume requirement).

Existing Peak Day Demand

Peak day demand is the water demand on the day of the year with the highest water use. Peak day demand must be considered for both indoor use and all irrigable acreage served by the drinking water system.

Table 3-4 shows the computed peak day demand by pressure zone. The City's pump stations and PRVs enable water to be transferred among pressure zones.

**Table 3-4
Existing Peak Day Demand by Pressure Zone**

Existing Zone(s)	ERCs	Irrigable Acres	Existing Demand (gpm)	Existing Supply (gpm)	Transfers in (+) or out (-)	Surplus (+) or Deficit (-)
9N	810	0	281	0	+281	+0
10	2,910	0	1,010	2,625	-1,235	+380
10W	300	40	424	0	+424	+0
11W	260	55	530	0	+530	+0
11E	870	0	302	1,440	-320	+818
12E	230	30	320	0	+320	+0
Total	5,380	125	2,868	4,065	+0	+1,198

As demonstrated in Table 3-4, there is surplus capacity available in the system as a whole and in all pressure zones. However, the City experiences some difficulty operating the system efficiently. System inefficiencies is discussed somewhat in the following section and again in more detail in Chapter 6.

Existing Pump Stations

Santaquin City operates three drinking water pump stations. These pump stations are summarized in Table 3-5. All pump stations have capacity remaining.

**Table 3-5
Existing Drinking Water Pump Stations**

Name	From Zone	To Zone	Pumps	Rated Capacity (gpm)	Peak Day Demand (gpm)	Surplus (+) or Deficit (-) (gpm)
Summit Ridge Booster	10	11W/10W	1 @ 1000 gpm	1,000 gpm	954	+46
Canyon Road Booster	10	11E/12E	2 @ 1,200 gpm	1,200 gpm	622	+578
Zone 12E Booster	11E	12E	3 @ 500 gpm	1,000 gpm	320	+680

The Summit Ridge Booster is the sole source of water to zones 11W and 10W during normal peak day operation. The Summit Ridge Well can be configured to pump to Zone 11W directly if needed. While this is very energy-inefficient due to a greater static lift, it provides redundancy despite there being only one pump in the Zone 11W pumphouse.

During typical summertime operations, the City leaves the Cemetery Well off and instead uses the Canyon Road Booster to move water from Zone 10 (produced by Summit Ridge Well) to Zone 11E. This enables the City to more effectively operate Summit Ridge Well. Capacity in the booster station is limited.

The Zone 12E booster is the only source of water to Zone 12E.

Existing Average Yearly Demand

Average yearly demand is the volume of water used during an entire year, and is used to ensure the sources can supply enough volume to meet demand under existing and future conditions. Average yearly demand must be considered for both indoor use and all irrigable acreage served by the drinking water system.

At the proposed level of service of 0.336 ac-ft per ERC and 4.0 ac-ft per irrigable acre, the existing average yearly demand requirement is **2,308 ac-ft/yr**. A comparison to the annual source capacity listed in Table 3-1 shows that there is capacity remaining for average yearly demand.

SOURCE REDUNDANCY

At times, water sources fail to produce. Possible reasons for this include contamination, drought, decreasing groundwater levels, pump failure, etc. For this reason, Santaquin City has included source redundancy as a component of their LOS, which specifies that the indoor level of service of 500 gpd/ERC must be able to be met if the largest water source (Summit Ridge Well) is out of commission.

If the Summit Ridge Well were to fail, Santaquin personnel would shut off the backflow preventers that serve the PI system and connect the Center Street Well to the drinking water system. Table 3-6 contains a comparison of the peak day demand and capacity of each pressure zone of the drinking water system, assuming these actions have been taken.

**Table 3-6
Supply and Demand by Pressure Zone, Assuming Source Failure**

Existing Zone(s)	ERCs	Irrigable Acres ¹	Demand (gpm) ²	Supply (gpm) ³	Transfers in (+) or out (-)	Surplus (+) or Deficit (-)
9N	810	0	281	0	+281	+0
10	2,910	0	1,010	490	+520	+0
10W	300	0	104	0	+104	+0
11W	260	0	90	0	+90	+0
11E	870	0	302	1,440	-1,076	+62
12E	230	0	80	0	+80	+0
Total	5,380	0	1,868	1,930	+0	+62

1. This analysis assumes that the backflow preventers serving the PI system would be shut off
2. Demand listed is at the level of service of 500 gpd/ERC
3. Assumes that Center Street Well is being used in the drinking water system

Conclusions from this source redundancy analysis (assuming Summit Ridge Well were to fail on a peak day) are as follows:

- There are no existing deficiencies for source redundancy. However, remaining capacity is limited.

Based on these conclusions, the following are recommended:

1. Complete a source protection plan for the Center Street Well to ensure that it is available for use in the drinking water system. Ensure there is sufficient equipment and in-house knowledge to quickly switch it to the drinking water system if needed.
2. Establish a method to quickly contact customers in the event of source failure. This could be used to encourage conservation and reduce peak demands.
3. Plan to drill another well to provide redundancy for future growth (details will be provided in the Capital Facility Plan in Chapter 7).

FUTURE WATER SOURCE REQUIREMENTS

As with existing water source requirements, future water source requirements were evaluated on criteria for both peak day and average yearly demand (Section R309-510-7).

Future Peak Day Demand

Following the methodology described for existing conditions, the peak day source requirement for each pressure zone is shown in Table 3-7.

**Table 3-7
Future Peak Day Demand by Pressure Zone**

Future Zone	ERCs	Irr-ac	Demand (gpm)	Existing Supply (gpm)	Surplus (+) or Deficit (-)
8N	340	0	118	0	-118
9N	3,470	0	1,205	0	-1,205
9W	140	0	49	0	-49
10	8,780	0	3,049	2,625	-424
10W	310	0	108	0	-108
11W	1,400	0	486	0	-486
11E	2,420	0	840	1,440	+600
11NE	140	30	289	0	-289
12W	210	40	393	0	-393
12E	920	0	319	0	-319
13E	420	85	826	0	-826
14E	80	30	268	0	-268
Total	18,630	185	7,949	4,065	-3,884

As shown in Table 3-7, the existing system does not have sufficient source capacity to meet projected peak day water demands in 2060. Additional sources will be needed.

Future Average Yearly Demand

Following the methodology described for existing conditions, the future average yearly demand requirement is projected to be **7,000 ac-ft/yr**. A comparison to the annual source capacity listed in Table 3-1 shows that there is not sufficient existing source capacity to meet this demand. More average yearly source capacity will be needed.

Comparison to Former DDW Standards

Appendix C contains a comparison of the requirements calculated at the proposed level of service to the requirements as calculated according to former DDW standards. For both existing and future conditions, the proposed level of service results in a lower calculated requirement than former DDW standards.

SOURCE - CONCLUSIONS

Key conclusions from this analysis are as follows:

- Existing drinking water sources are adequate for both peak day demand and average yearly demand at the level of service.
- Existing pump stations adequately meet peak day demands at the level of service.
- If the Summit Ridge Well were to fail during the period of peak demand, the City would need to shut off the backflow preventers that supply the PI system and use the Center Street Well in the drinking water system in order to meet peak day demands at the level of service of 500 gpd/ERC.
- Additional drinking water pump stations will be needed to support anticipated future growth.
- Additional drinking water sources will be needed to support anticipated future growth. Wells are the recommended future drinking water source for Santaquin City.

SOURCE - RECOMMENDATIONS

Future Pump Stations

Recommended future pump stations are shown in Table 3-8.

Table 3-8
Recommended Future Drinking Water Pump Stations

Name	From Zone	To Zone	Peak Day Flow Served (gpm)	Fire Flow Requirement (gpm)	Recommended Pumping Configuration ¹
Zone 11NE	10	11NE	290	1500	1 @ 100 gpm 2 @ 300 gpm 1 @ 1500 gpm VFD
Zone 11W	10	11W	1,040	0	1 @ 500 gpm 2 @ 1000 gpm
Zone 12W	11W	12W	400	0	2 @ 500 gpm
Zone 13E	11E	13E	830	0	3 @ 500 gpm
Zone 14E	13E	14E	270	0	2 @ 300 gpm

1. Prior to construction, each pump station must be re-evaluated to ensure that the listed size is adequate for the proposed developments being constructed and consistent with the latest general plan land use concept.

Water Dedication Policy

Santaquin City Code 8-1-10 requires developers to convey a minimum of three acre-feet of water rights per gross acre of developed land. This requirement was analyzed and compared to the water usage level of service in this study to ensure that the City is collecting an appropriate amount of water for developments being constructed.

Except for high-density residential zoning, the City water rights requirement of three acre-feet per gross acre was found to provide sufficient water rights to meet demands at the level of service. The following approach is recommended for high-density residential areas:

1. Compute the indoor requirement by multiplying the number of ERCs by the level of service of 0.336 ac-ft/ERC
2. Reduce the indoor requirement by 20% as an allowance to the developer, considering that multi-family developments tend to use less water per connection than single-family homes
3. Compute irrigable acreage based on the site plan and assess water rights for irrigable acreage at the level of service of 4.0 ac-ft/irr-ac.

For example, a multi-family development on a 5-acre parcel with 50 units and 1.8 irrigable acres would have a calculated water requirement as follows:

$$(50 \text{ ERC}) * (0.336 \text{ ac-ft/ERC}) * (80\%) + (1.8 \text{ irr-ac}) * (4.0 \text{ ac-ft/irr-ac}) = 20.64 \text{ ac-ft.}$$

Note that this requirement is greater than the 15 ac-ft that would be calculated using the current City code.

General Source Recommendations

The following are recommended actions to take to ensure adequate source capacity is available for existing and future customers:

1. Complete a source protection plan for the Center Street Well so it can be used as a backup source if needed.
2. Establish a method to quickly contact customers in the event of source failure. This could be used to encourage conservation and reduce peak demands.
3. Plan to drill future wells to secure additional source capacity and redundancy.

CHAPTER 4 WATER STORAGE

EXISTING WATER STORAGE

The City's existing drinking water system includes four storage facilities with a total capacity of 3.76 MG. Their locations are shown on the City's Drinking Water Master Plan Map in Appendix A. Table 4-1 summarizes the capacity of each storage tank.

**Table 4-1
Capacity of Existing Storage Tanks**

Tank and Zone	Volume (MG)
Zone 10	0.49
Zone 11E	1.09
Zone 11W	1.14
Zone 12E	1.04
Total	3.76

EXISTING WATER STORAGE REQUIREMENTS

According to DDW standards outlined in Section R309-510-8, storage tanks must be able to provide: 1) fire suppression storage to supply water for firefighting; 2) emergency storage, as deemed necessary; and 3) equalization storage volume to make up the difference between source and demand. Each of the requirements is addressed below.

Fire Suppression Storage

Fire suppression storage is required for water systems that provide water for firefighting (Subsection R309-510-8(3)). The local fire authority determines the need for fire suppression storage. The policy for Santaquin City is to provide 1,500 gpm of fire flow at all areas of the system. Buildings must be designed to require no more than 1,500 gpm.

Contact information for the Santaquin Fire department is as follows:

Fire Chief: Ryan Lind
Phone: 801-754-1941
Address: 275 West Main Street
Santaquin, Utah

Storage was allocated to each tank according to simulations of fire flow during peak day conditions, considering that fire flow may be supplied by storage in higher zones. Fire suppression storage was determined with the following assumptions:

- All pressure zones have a maximum fire flow requirement of 1,500 gpm for two hours. This equates to a fire storage of 180,000 gallons.
- 180,000 gallons of fire storage must be stored in Zone 12E, because it is the highest zone on the eastern bench and does not have access to other storage through PRVs.
- 180,000 gallons of fire storage must be stored in Zone 11W, because it is the highest zone on the western side of town and does not have access to other storage through PRVs.
- Fire storage in Zones 12E and 11W can be fed down to lower zones through PRVs. No dedicated fire storage is assumed in the tanks in Zones 11E and 10.

Table 4-2 summarizes the fire suppression storage reserved in each storage facility.

**Table 4-2
Existing Fire Suppression Storage by Tank**

Tank and Zone	Fire Suppression Storage (gallons)
Zone 10	0
Zone 11E	0
Zone 11W	180,000
Zone 12E	180,000
Total	360,000

Equalization Storage

The proposed level of service for equalization storage in the drinking water system is equivalent to the proposed average yearly demand level of service of 300 gal/ERC for indoor use (calculated based on R309-510-8(2)). See Chapter 3 for source calculations. The City also plans for 9,200 gallons of storage per irrigable acre served by the drinking water system. This is equal to the irrigation level of service as calculated in the Santaquin 2020 Pressurized Irrigation Master Plan report.

With 5,380 ERCs and 125 irrigable acres under existing conditions, Santaquin needs 2.76 MG of equalization storage in its drinking water system.

Emergency Storage

While there are no specific DDW requirements for emergency storage (Subsection R309-510-8(4)), water systems can choose to maintain emergency storage to mitigate risks, provide system reliability, and protect public health and welfare. Emergency storage may be used in case of pipeline failures, equipment failures, power outages, source contamination, and natural disasters.

For the above listed reasons, Santaquin City has chosen an emergency storage requirement equal to 20% of the equalization storage requirement, or 60 gal/ERC. Table 4-3 lists the equalization storage requirement by pressure zone, as well as total storage requirements.

**Table 4-3
Existing Drinking Water Storage Requirements by Zone**

Zone	ERCs	Irrigable Acreage	Equalization (MG)	Fire (MG)	Emergency (MG)	Total Required Storage (MG)	Existing Storage (MG)	Remaining Capacity (MG)
9N	810	0	0.24	0	0.05	0.29	0	-0.29
10	2,910	0	0.87	0	0.17	1.05	0.49	-0.56
10W	300	40	0.46	0	0.02	0.48	0	-0.48
11W	260	55	0.58	0.18	0.02	0.78	1.14	+0.36
11E	870	0	0.26	0	0.05	0.31	1.09	+0.78
12E	230	30	0.35	0.18	0.01	0.54	1.04	+0.50
Total	5,380	125	2.76	0.36	0.32	3.45	3.76	+0.31

1. Equalization storage requirements under the former DDW standard would be 2.51 MG.

It is important to note that the storage in a zone is only useful within that zone, or the zones below it. Zones 9, 10, and 10W draw upon the storage in Zones 11E and 11W, so these zones meet level of service storage requirements, despite showing a deficit in Table 4-3. However, storage in Zone 11 is not useful to zone 12.

Conclusions about the City's existing storage capacity are as follows:

- The system is nearly out of storage capacity. The Zone 10 and Zone 11W tanks are most stressed.
- The Zone 10 tank relies heavily on storage from higher zones. Storage demands for the zones it serves are much higher than its existing capacity.
- Much of the capacity in the Zone 11E tank serves lower zones.
- The Zone 12E tank has capacity remaining.

SUMMARY OF EXISTING STORAGE

A summary of selected attributes of existing storage tanks is shown in Table 4-4.

**Table 4-4
Attributes of Existing Storage Tanks**

Name and Zone	Type	Diameter (ft)	Volume (MG)	Outlet Level (ft)	Emergency Storage Level (ft)	Fire Suppression Level (ft)	Overflow / Equalization Level (ft)
10	Concrete	80	0.49	0.0	5.9	0.0	13.0
11E	Concrete	89	1.09	0.5	1.1	0.0	23.3
11W	Concrete	92	1.14	0.0	3.7	3.6	23.0
12E	Concrete	88	1.04	0.0	4.3	4.0	23.1

FUTURE WATER STORAGE REQUIREMENTS

Table 4-5 presents the future drinking water storage requirements by pressure zone. These are then discussed below. A total of 9.85 MG is needed at year 2060.

**Table 4-5
Future Drinking Water Storage Requirements**

Zone	ERCs	Irr-ac	Equalization (MG)	Fire (MG)	Emergency (MG)	Total Required Storage (MG)	Existing Storage (MG)	Surplus / Deficiency (MG)
8N	340	0	0.10	0.00	0.02	0.12	0	-0.12
9N	3,470	0	1.04	0.18	0.21	1.43	0	-1.43
9W	140	0	0.04	0.00	0.01	0.05	0	-0.05
10	8,780	0	2.63	0.18	0.53	3.34	0.49	-2.85
10W	310	0	0.09	0.00	0.02	0.11	0	-0.11
11W	1,400	0	0.42	0.18	0.08	0.68	1.14	0.46
11E	2,420	0	0.73	0.18	0.15	1.05	1.09	0.04
11NE	140	30	0.32	0.00	0.01	0.33	0	-0.33
12W	210	40	0.43	0.18	0.01	0.62	0	-0.62
12E	920	0	0.28	0.18	0.06	0.51	1.04	0.53
13E	420	85	0.91	0.18	0.03	1.11	0	-1.11
14E	80	30	0.30	0.18	0.00	0.48	0	-0.48
Total	18,630	185	7.29	1.44	1.12	9.85	3.76	-6.09

Equalization Storage

Following the methodology described for existing conditions, and calculating 18,630 ERCs and 185 irrigable acres at year 2060, the projected indoor equalization storage requirement is 7.29 MG.

Fire Suppression Storage

For the 2060 scenario, fire storage has been assumed for all zones except those zones fed only through PRVs. This will become necessary as the system grows, because the wider spatial extent of the system (and consequent long distribution mains) will limit the amount of water that can be fed through PRVs from higher zones. The total projected fire storage requirement is 1.44 MG.

Emergency Storage

Emergency storage was evaluated at 60 gal/ERC, as discussed previously. The total emergency storage requirement at year 2060 is projected to be 1.12 MG.

WATER STORAGE RECOMMENDATIONS

Several additional storage facilities are recommended to meet the needs of the City through year 2060. Table 4-6 contains a summary of key attributes of these facilities. In all cases, a detailed review of existing and proposed development concepts will be needed prior to construction.

**Table 4-6
Recommended Future Storage Facilities**

Zone	Combined Minimum Size¹ (MG)	Approximate HGL when Full (ft)	Notes
10	5.0	5180 ²	Two Zone 10 tanks are recommended (they will also serve Zone 9N). The westernmost tank is recommended at 2.5 MG. It is also recommended that the existing Zone 10 storage be replaced or augmented to a total capacity of 2.5 MG. See the Capital Facility Plan in Chapter 7 for recommendations on the timing of these improvements.
12W	1.0	5416	Sizing is based upon the development concept for the Summit Ridge master planned development. The size of the tank must be re-evaluated if this concept plan changes significantly.
13E	1.25	5586	The development concept for Zone 13E is presently not well-defined. A detailed review will be needed prior to the construction of this tank, to ensure adequate size.
14E	0.5	5746	The development concept for Zone 14E is presently not well-defined. A detailed review will be needed prior to the construction of this tank, to ensure adequate size.

1. The volume listed is the minimum requirement for the zone. This may be accomplished with multiple tanks in some instances.
2. Precise survey elevations of the Zone 10 tank were not available for this study. Detailed analysis should be done to confirm this elevation before any design work occurs.

There is a need to construct additional storage to support growth. Zone 10 is the recommended location for the City's next storage tank. Projects 3 and 10 in the Capital Facility Plan both address this need, and there are advantages and disadvantages to each. The Capital Facility Plan in Chapter 7 lists the westernmost tank as the first priority for the following reasons:

- Minimal new transmission would be required (thus, initial cost would likely be lower)
- The timing of construction coincides with the necessary timing of construction for the Zone 11W pump station and the recommended Zone 10 to Zone 10W connection, both in that area of the City
- It is necessary to secure land for this facility, which is typically easier done sooner rather than later

However, there are several compelling reasons to instead construct additional storage at the site of the existing Zone 10 tank, including the following:

- Most projected growth in Zones 9N and 10 occurs toward the eastern side of town
- Land for the tank is already owned by the City

The main disadvantage of this option is that it would likely have a higher upfront cost due to a required 20-inch diameter transmission pipeline. However, the City should consider growth patterns and long-term priorities when weighing these options. Either would be acceptable. Chapter 7 includes more details on the location and timing of these proposed storage projects.

CHAPTER 5 WATER DISTRIBUTION

HYDRAULIC MODEL

Development

A computer model of the City's drinking water distribution system was developed to analyze the performance of the existing and future distribution system and to prepare solutions for existing facilities not meeting the distribution system requirements. The model was developed with the software EPANET 2.0, published by the U.S. Environmental Protection Agency (EPA 2014; Rossman 2000). EPANET simulates the hydraulic behavior of pipe networks. Sources, pipes, tanks, valves, controls, and other data used to develop the model were obtained from GIS data of the city's drinking water system and other information supplied by the City.

HAL developed models for two phases of drinking water system development. The first phase was a model representing the existing system (existing model). This model was used to calibrate the model and identify deficiencies in the existing system. Calibration was performed using fire hydrant tests and by comparing model results to the City's SCADA output. Calibration data is included in Appendix E. The second phase was a model representing future conditions and the improvements necessary to accommodate growth (future model).

Model Components

The two basic elements of the model are pipes and nodes. A pipe is described by its inside diameter, length, minor friction loss factors, and a roughness value associated with friction head losses. A pipe can contain elbows, bends, valves, pumps, and other operational elements. Nodes are the endpoints of a pipe and can be categorized as junction nodes or boundary nodes. A junction node is a point where two or more pipes meet, where a change in pipe diameter occurs, or where flow is added (source) or removed (demand). A boundary node is a point where the hydraulic grade is known (a reservoir, tank, or PRV). Other components include tanks, reservoirs, pumps, valves, and controls.

The model is not an exact replica of the actual water system. Pipeline locations used in the model are approximate and not every pipeline may be included in the model, although efforts were made to make the model as complete and accurate as possible. Moreover, it is not necessary to include all of the distribution system pipes in the model to accurately simulate its performance.

Pipe Network

The pipe network layout originated from GIS data provided by the City. Elevation information was obtained from LIDAR data. Pipes in the system are generally PVC. Darcy-Weisbach roughness coefficients for pipes in this model ranged from 0.4 – 1.0, which is typical for these pipe materials in EPANET (Rossman 2000, 31).

Water Demands

Water demands were allocated in the model based on billed usage and billing addresses. Demand was determined for each billing address, and the addresses were geocoded in order to link the demands to a physical location. The geocoded demands were then assigned to the closest model node. With the proper spatial distribution, demands were scaled to reach the peak day demand determined in Chapter 3. For the future model, future demands were estimated according to the zoning and density shown in the City's general plan, and development concepts with

approval. Future demands were assigned to new nodes representing the expected location of new development in each pressure zone.

The pattern of water demand over a 24-hour period is called the diurnal curve or daily demand curve. There was not sufficient data to determine an indoor diurnal curve for the system, so a typical indoor curve with a peaking factor of 2.0 was selected for this study. A diurnal curve for outdoor demands was determined from SCADA data. These diurnal curves were put into the model to simulate changes in water demand throughout the day.

In summary, the spatial distribution of demands followed geocoded water use data; the flow and volume of demands followed the proposed level of service described in Chapter 3; and the temporal pattern of demand followed typical diurnal curves.

Water Sources and Storage Tanks

The sources of water in the model are the two wells and springs. A well is represented by a reservoir and pump. A spring is represented by a reservoir and a flow control valve. Tank location, height, diameter, and volume are represented in the model. The extended-period model predicts water levels in the tanks as they fill from sources and as they empty to meet demand in the system.

ANALYSIS METHODOLOGY

HAL used extended-period and steady-state modeling to analyze the performance of the water system with current and projected future demands. An extended-period model represents system behavior over a period of time: tanks filling and draining, pumps turning on or off, pressures fluctuating, and flows shifting in response to demands. A steady-state model represents a snapshot of system performance. The peak day extended period model was used to set system conditions for the steady-state model, calibrate zone to zone water transfers, analyze system controls and the performance of the system over time, and to analyze system recommendations for performance over time. The steady-state model was used for analyzing the peak day plus fire flow conditions.

Four operating conditions were analyzed with the extended period model: Static conditions, peak day conditions, peak instantaneous conditions, and peak day plus fire flow conditions. Each of these conditions is a worst-case situation so the performance of the distribution system may be analyzed for compliance with DDW standards and City preferences.

EXISTING WATER DISTRIBUTION SYSTEM

Santaquin's drinking water distribution system consists of all pipelines, valves, fittings, and other appurtenances used to convey water from sources and storage tanks to water users. The existing water system contains approximately 78 miles of pipe with diameters of 4 inches to 16 inches. Figure 5-1 presents a summary of pipe length by diameter.

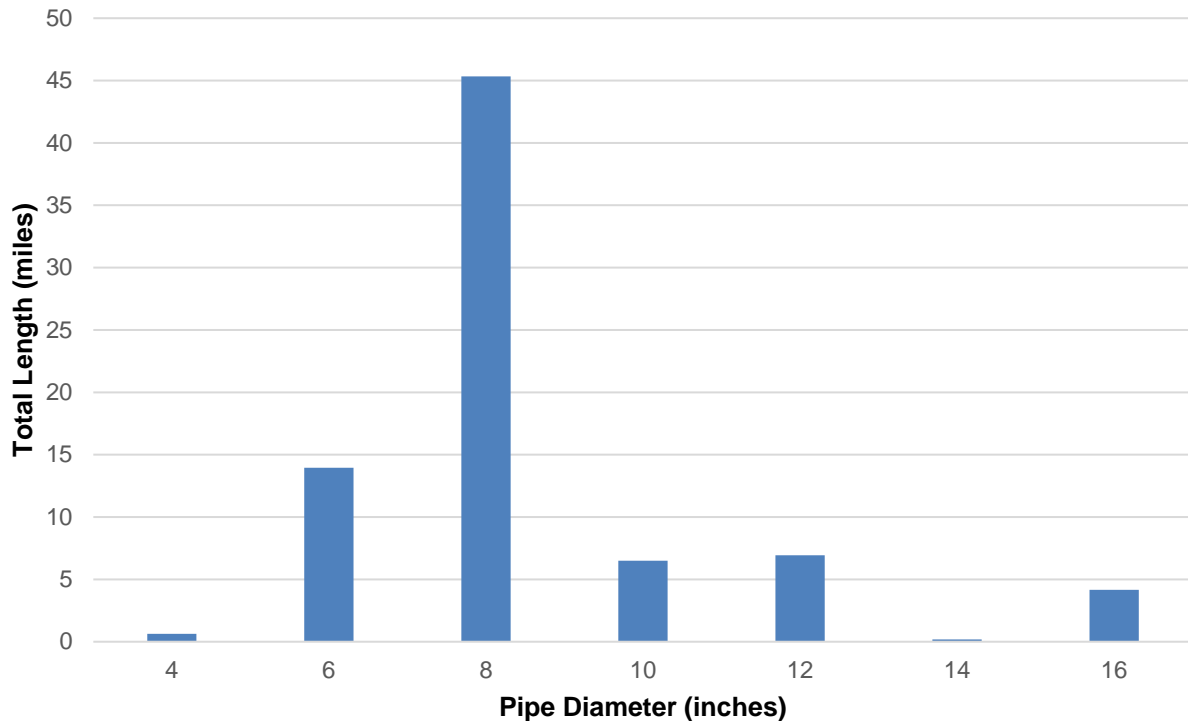


Figure 5-1: Summary of Pipe Length by Diameter

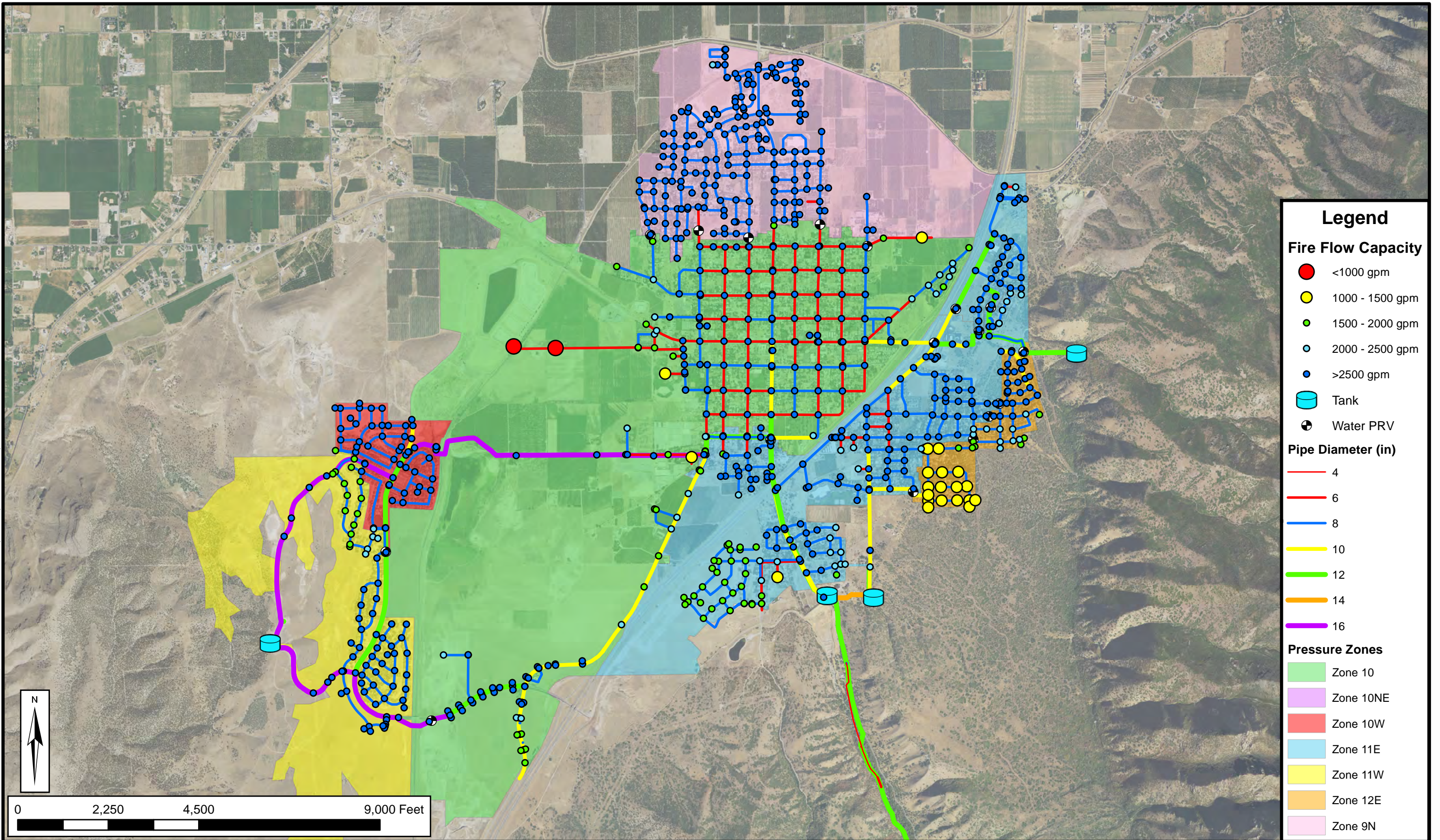
Performance of the drinking water system was evaluated according to the requirements listed in Table 5-1.

**Table 5-1
Compliance of Existing
Distribution System with Utah Rule**

Condition	Requirement ¹	System Design Flow ²	Compliance Status
Peak Day	Minimum 40 psi service pressure	2,868 gpm	All connections comply.
Peak Instantaneous	Minimum 30 psi service pressure	5,736 gpm	All connections comply.
Peak Day plus Fire Flow ³	Minimum 20 psi service pressure	2,868 gpm (system) Plus 1,500 gpm fire	All areas comply except as shown on Figure 5-2.

1. Requirements are as stated in Utah Code R309-105-9(2). The requirement for connections prior to 2007 is a minimum of 20 psi under all conditions.
2. Peak day system flows are discussed in Chapter 3. Peak day flow was multiplied by a factor of 2.0 to produce peak instantaneous flow.
3. Fire flow is discussed in Chapter 4. The maximum fire flow requirement in Santaquin is 1,500 gpm.

Date: 7/29/2020
Document Path: H:\Projects\415 - Santaquin\02.100 - Culinary Water Master Plan\GIS\Working\DW Figure 5-2 Existing Fire Flow.mxd

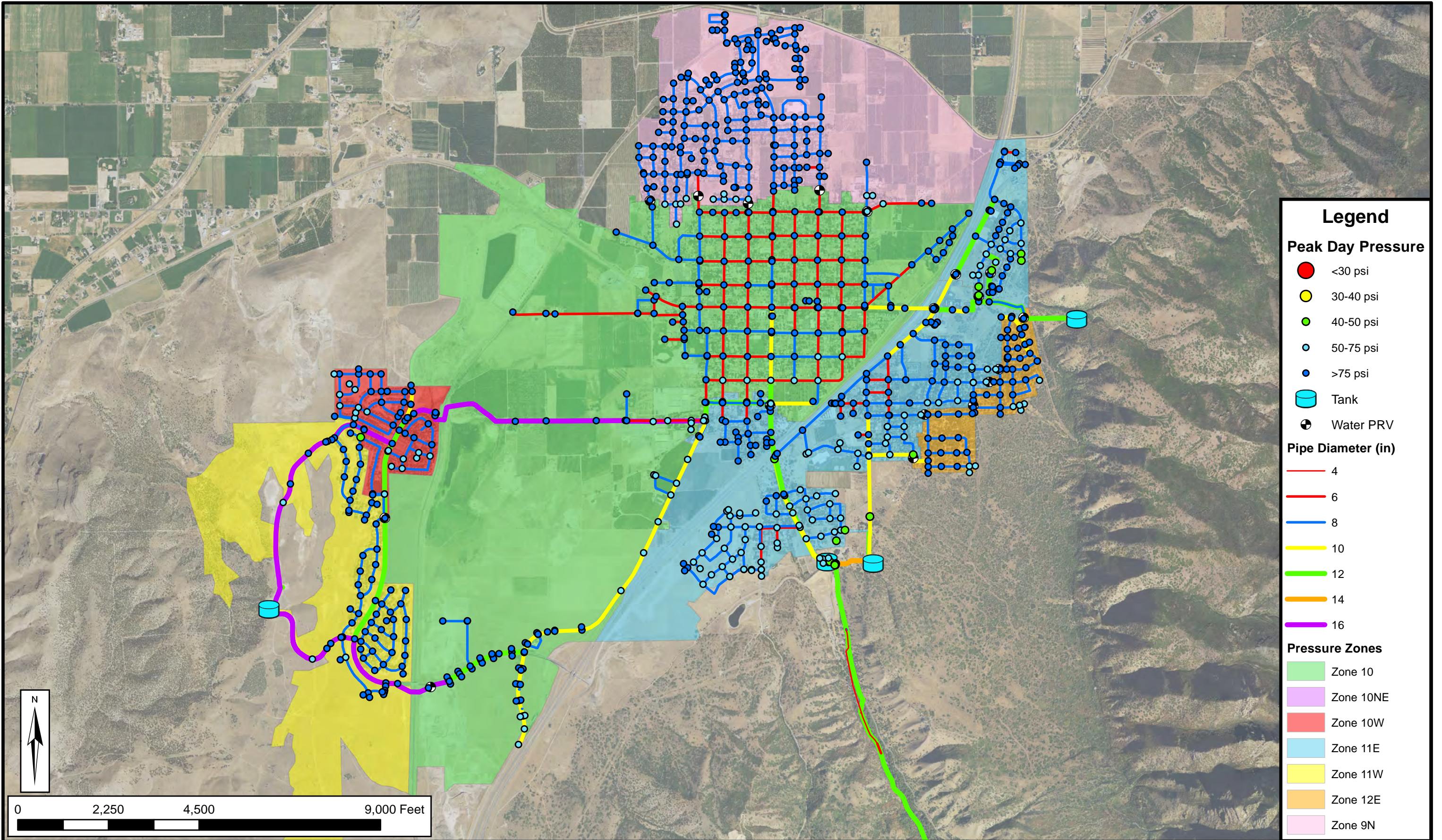


SANTAQUIN DRINKING WATER MASTER PLAN

MODELED EXISTING FIRE FLOW CAPACITY

FIGURE 5-2

Date: 7/29/2020
Document Path: H:\Projects\415 - Santaquin\02.100 - Culinary Water Master Plan\GIS\Working\DW Figure 5-3 Existing Peak Day.mxd



SANTAQUIN DRINKING WATER MASTER PLAN

MODELED EXISTING PEAK DAY PRESSURE

FIGURE 5-3

Item # 10.

Fire Flow Deficiencies

A brief description of each area with modeled flow deficiencies is included below:

- The dead end 6-inch pipe in 14000 S (County coordinates), near the City's winter storage ponds, is not able to provide 1,000 gpm of fire flow capacity.
- The dead end 6-inch pipe in 13600 S (County coordinates) cannot provide 1,500 gpm of fire flow.
- The pipes south of 425 S in Zone 12E cannot provide 1,500 gpm of fire flow.
- The dead end 6-inch pipe in Center Street cannot provide 1,500 gpm of fire flow.

The City is aware of these deficiencies, and several were approved either because they are in rural areas where development of full fire flow requirements is not practical, they were constructed before the International Fire Code required 1,500 gpm, or they were granted approval with the understanding that fire flow capacity would be limited until a future time when looping would increase fire flow capacity.

Modeling should not replace physical hydrant testing as the primary means of determining available fire flow. Testing hydrants is recommended in each of these areas to more precisely determine the existence and the extent of any flow deficiencies.

FUTURE WATER DISTRIBUTION SYSTEM DEMANDS

Demands in the future water distribution model are shown in Table 5-2. The buildout system was designed to meet all regulatory requirements.

Table 5-2
Design Parameters for
Future Distribution System

Condition	Requirement ¹	System Design Flow ²
Peak Day	Minimum 40 psi service pressure	7,949 gpm
Peak Instantaneous	Minimum 30 psi service pressure	15,898 gpm
Peak Day plus Fire Flow ³	Minimum 20 psi service pressure	7,949 gpm (system) Plus 1,500 gpm fire

1. Requirements are as stated in Utah Code R309-105-9(2)
2. Peak day system flows are discussed in Chapter 3. Peak day flow was multiplied by a factor of 2.0 to produce peak instantaneous flow.
3. Fire flow is discussed in Chapter 4. The maximum fire flow requirement in Santaquin is 1,500 gpm.

WATER DISTRIBUTION SYSTEM RECOMMENDATIONS

The model output primarily consists of the computed pressures at nodes and flow rates through pipes. The model also provides additional data related to pipeline flow velocity and head loss to help evaluate the performance of the various components of the distribution system. Results from the model are available on a CD in Appendix E. Due to the large number of pipes and nodes in the model, it is impractical to prepare a figure which illustrates pipe numbers and node numbers. The reader should refer to the CD to review model output.

Recommendations for distribution improvement projects were based on modeling, as outlined above, and guidance provided by Santaquin personnel. Because they will provide distribution to and from future sources and tanks, the alignments of these projects may need to change as the locations of tanks and sources are more precisely determined.

Several revisions to existing pressure zones are proposed in order to preserve supply in tanks, reduce required pumping, and save energy. Revised pressure zone boundaries are shown in Fig 1-2 of this report and in the master plan map in Appendix A. Elevations of the proposed pressure zones are included in Appendix C.

The locations and lengths of future distribution pipelines will vary depending on the final location of future streets. Anticipated future pipes 10 inches in diameter and larger have been located according to zone demand following proposed road alignments. The locations of these pipes are illustrated on the Drinking Water Master Plan Map in Appendix A.

CHAPTER 6 SYSTEM OPTIMIZATION

ENERGY AND SYSTEM PERFORMANCE

Energy costs typically account for a substantial portion of a water utility's operating budget. The evaluation presented in this section provides guidance to Santaquin on how to operate its water system in the most efficient way.

Source Energy Costs

Producing, treating, and delivering high-quality water requires energy, which is usually a water utility's largest operational expense and can account for 30%–40% of municipal energy consumption (EPA 2015). Efforts to increase energy efficiency bring financial savings and can facilitate improvements in water quality and hydraulic performance. As part of the optimization analysis, HAL estimated the energy intensity associated with each source in the distribution system.

To analyze well performance, the estimated energy intensity of each well was calculated based on its total dynamic head. This value was then compared to the observed energy intensity calculated based on three years of meter and billing data. The results for each of the City's sources are presented in Figure 6-1. Modeling had to be used to infer the performance of the winter operation of Summit Ridge well, due to limited available data.

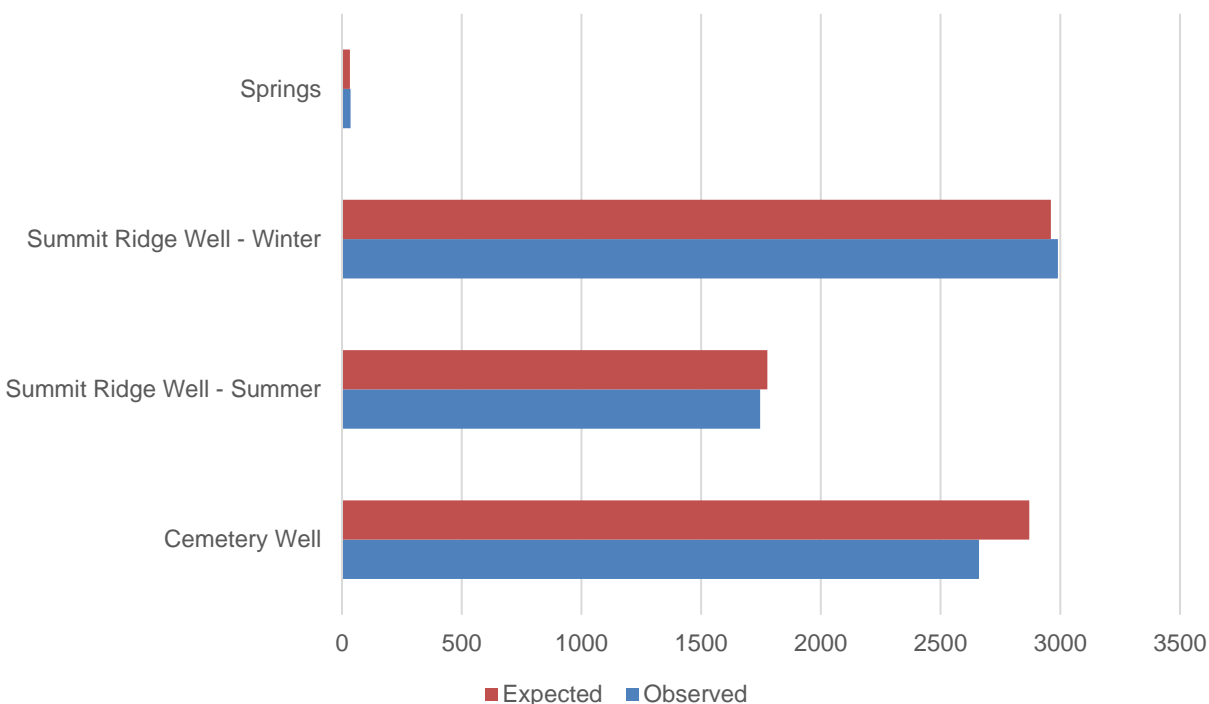


Figure 6-1: Expected vs. Observed Source Energy Intensity (kWh/MG)

Conclusions from this analysis are as follows:

- The City's wells are operating within expected limits for efficiency.
- Springs 2-5 are the most efficient water source for the system, and should be used to their maximum extent.
- Summit Ridge Well is a more efficient source of water than the Cemetery well due to a lower total dynamic head across the pump. It is a preferable source for Zones 10 and 9N. Because water from Summit Ridge Well must be pumped again to reach Zone 11E, it is comparable to the Cemetery Well from an energy perspective.

Pumping Operation

Some pump operation schemes are more efficient than others. "Loading" is a common inefficiency HAL has observed in water systems throughout the United States. Loading occurs when pumps are oversized or storage facilities are undersized. An example schematic of loading is shown in Figure 6-2.

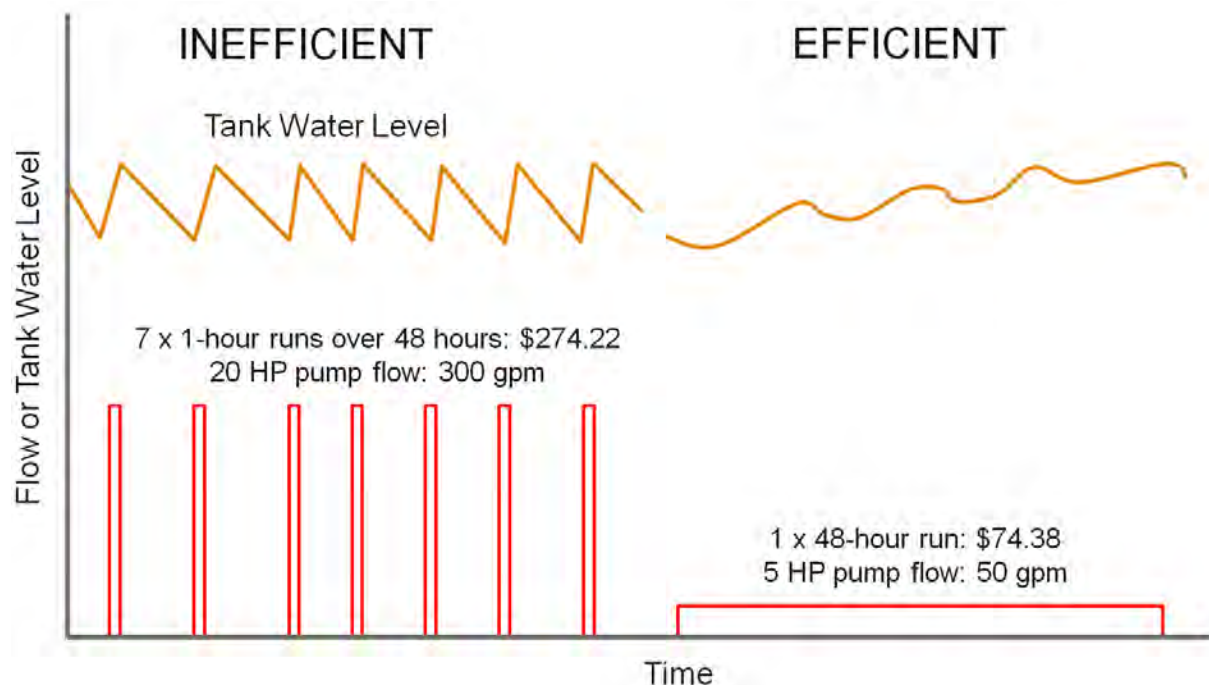


Figure 6-2: Pump Loading (example)

Loading can substantially increase head loss, which amounts to wasted energy. It also leads to a much higher electrical demand charge than may be necessary.

The Summit Ridge Well is prone to loading both because of its high flow capacity and because the tank in Zone 10 is undersized. To prevent rapid cycling of the Summit Ridge Well, the City has programmed their booster stations to work in conjunction with the Summit Ridge Well to fill all tanks simultaneously. This control scheme has operational benefits, but also causes some of the City's spring water to overflow to the PI system via the bypass. When this occurs, the least expensive water (from Springs 2-5) is replaced by more expensive water from the Summit Ridge Well. This water must then be pumped to Zone 11E, which adds additional expense. A more

energy- and cost-efficient approach would be to take full advantage of the inexpensive spring water, and supplement with wells only as necessary.

Typically, HAL recommends the installation of a VFD to reduce loading. However, the Summit Ridge Well is currently equipped with a VFD, and runs on the lowest possible setting when pumping into Zone 10. Higher settings are used if pumping to Zone 11W.

The following actions would decrease loading, thereby saving energy and money:

- Construct additional storage in Zone 10.
- Modify the Summit Ridge well pump so it can pump into Zone 10 at a range of flows (using a VFD).
- Reconfigure the pumping control scheme for the Zone 11E pump station so that the full flow of the springs can always be used. To do so, the pump station would need to shut off before completely filling the tank. This would allow spring flow to continue to fill the tank, rather than spill.

WATER USE PRIORITY

Considering the energy intensity of each source, and all other information presented in this report, HAL recommends prioritizing the use of drinking water sources according to the following rules:

1. Springs 2-5 should always be the preferred source. They are much less expensive than either of the wells. They should be used to their maximum capacity.
2. At this time, it makes sense to use the Cemetery Well as the first supplemental source to the springs during periods of lower demand (winter, spring, and fall). This is due to the small amount of storage in Zone 10, which makes it difficult to operate the Summit Ridge Well.
3. During the peak summer demand period, Summit Ridge Well should be used as the first source to supplement the springs. Cemetery Well generally should not be needed during the summer period.
4. When more storage is constructed in Zone 10, Summit Ridge Well should be the preferred year-round source of water for the zone. Cemetery Well should function chiefly as a backup supply.

NON-REVENUE WATER

Every water system loses some water or at least cannot account for the fate of all water produced. This water, which is not billed for, is commonly known as non-revenue water. Mechanisms for non-revenue water include the following:

- Leaks from pipes or at tanks
- Water line breaks
- Hydrant flushing
- Construction water use
- Pumping to waste
- Unmetered users

Water production data and billing data for years 2017 through 2019 was analyzed to quantify the non-revenue water produced in the Santaquin City drinking water system. Results are summarized in Table 6-1.

Table 6-1
Non-Revenue Water in the Santaquin Drinking Water System

Year	Water Supplied (ac-ft)	Water Billed	Non-Revenue Water (ac-ft)	Non- Revenue Percentage
2017	1,426.0	936.5	489.5	34%
2018	1,484.3	861.7	622.6	42%
2019	1,270.9	886.49	384.4	30%

The United States Environmental Protection Agency reports a typical national rate of non-revenue water of 16% (EPA 2013). HAL often sees non-revenue water percentages of 15-30% in Utah. Based on data from the last three years, it appears that non-revenue water is a persistent problem in Santaquin.

Each year, Santaquin increases their metering capabilities and improves the accuracy of their water metering and tracking data. This may explain why the reported non-revenue water in 2019 is less than the previous two years.

The most likely explanation for the high percentage of non-revenue water in Santaquin is leakage. Accordingly, HAL makes the following recommendations:

1. Plan and budget for a leak detection program. Finding and repairing even one or two leaks can result in substantial water and cost savings over time.
2. Plan for and fund a pipeline replacement program. Routine pipe replacement is a recommended best practice for any water systems, as pipes have a finite service life. However, proactive pipeline replacement has the added benefit of reducing water main line breaks and leaks, which tend to increase as pipes age. See Chapter 7 for recommendations on facility replacement.

A water loss audit was performed as a part of this master planning effort. More detailed information on water loss is included in Appendix C.

CHAPTER 7 CAPITAL FACILITY PLAN

INTRODUCTION

The purpose of this section is to identify the drinking water facilities that are required, for the 20-year planning period, to meet the demands placed on the system by future development. Proposed facilities were sized to meet master plan requirements and located to accommodate 20-year growth projections. Each capital facility plan project will require a detailed design analysis before construction to ensure that the location and sizing is appropriate for the actual growth that has taken place since this capital facility plan (CFP) was developed. Specific projects with estimated costs are presented at the end of this chapter.

GROWTH PROJECTIONS

Areas of expected growth within 10 years and within 20 years were identified based on existing development patterns, population projections, and discussions with City personnel. These areas are shown on Figure 7-1.

Most development pressure in Santaquin is occurring in the Summit Ridge Development, on the East Bench, and on the northern end of the City. Growth in each of these areas is expected to continue for more than 20 years. Scattered infill and redevelopment within the main town are also expected.

Changes to Expected Growth Areas

The Master Plan is intended to incorporate a reasonable degree of flexibility. Minor developments or infill developments not anticipated in the City's growth projections can generally be served after a site-level evaluation, without substantial changes to the master plan. If growth patterns change substantially from those predicted, however, it is recommended that the assumptions in this master plan be re-evaluated to ensure the City is planning properly for the growth that actually occurs.

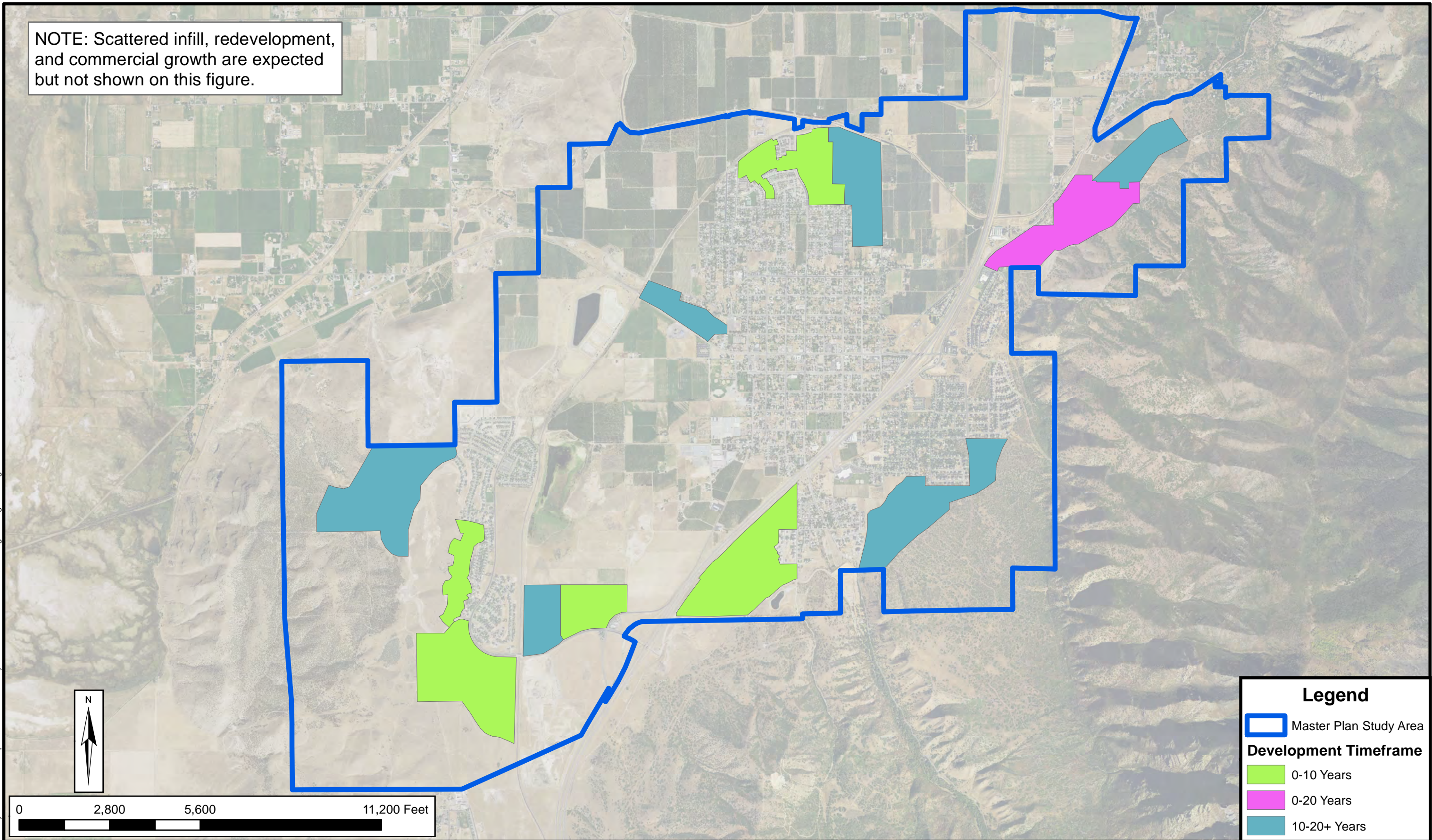
Large Developments

For large developments that will be constructed in a number of phases over a number of years, it is recommended that the City require a utilities phasing plan as part of the development agreement. A utilities phasing plan clearly defines when and how key infrastructure will be constructed within the development. The utilities phasing plan should be negotiated in such a way that it will protect the City's financial interests and hold the developer responsible for supporting growth in that development – even if ownership changes.

In Santaquin, it is recommended that utilities phasing plans be required for the following types of developments:

- Developments larger than 10 acres
- Developments that will be constructed in multiple phases or issue multiple plats
- Areas being evaluated for annexation

NOTE: Scattered infill, redevelopment, and commercial growth are expected but not shown on this figure.



Legend

Master Plan Study Area

Development Timeframe

- 0-10 Years
- 0-20 Years
- 10-20+ Years

In a typical utilities phasing plan, the construction of infrastructure is tied directly to the number of residential units (or square footage of nonresidential space) permitted to be constructed within the development. An example utilities phasing agreement for drinking water might include the following components:

- Additional drinking water storage capacity must be provided before more than [#] units are permitted to be constructed within the development.
- Separate PI source and storage must be provided before more than [#] units are permitted to be constructed within the development.

METHODOLOGY

Growth projections were used to forecast future water demands on a year-by-year basis, which were then compared to the capacity of existing source and storage facilities. When this analysis showed that existing facilities would not have capacity for the 20-year planning period, solutions were identified to ensure that the City can meet demands at the proposed level of service.

A hydraulic model was developed for the purpose of assessing the system operation and capacity with future demands added to the system. The model was used to identify problem areas in the system and to identify the most efficient way to make improvements to distribution pipelines, sources, pumps, and storage facilities. Solutions and alternatives were discussed with City staff.

The drinking water system supplements the PI water system in certain areas of the City. In several cases, the most efficient approach to maintain capacity in the drinking water system will be to provide PI source to an area currently served by drinking water sources, rather than build additional capacity into the drinking water system. **This drinking water capital facility plan assumes that all projects listed herein and in the pressurized irrigation capital facility plan (presented in a separate document) will be constructed in a timely manner, as identified in their respective master plans.** If this is not the case, the drinking water projects in this chapter need to be re-evaluated.

The future system was evaluated in the same manner as the existing system, by modeling (1) peak instantaneous demands and (2) peak day demands plus fire flow conditions.

RECOMMENDED PROJECTS AND COSTS

As discussed in previous chapters, source, storage and distribution system capacity expansion will be needed to meet the demands of future growth. Cost estimates have been prepared for the recommended projects and are summarized in following tables and included in detail in Appendix F.

Unit costs for the construction cost estimates are based on conceptual level engineering. Sources used to estimate construction costs include:

1. "Means Heavy Construction Cost Data, 2019"
2. Price quotes from equipment suppliers
3. Recent construction bids for similar work

All costs are presented in 2020 dollars.

Precision of Cost Estimates

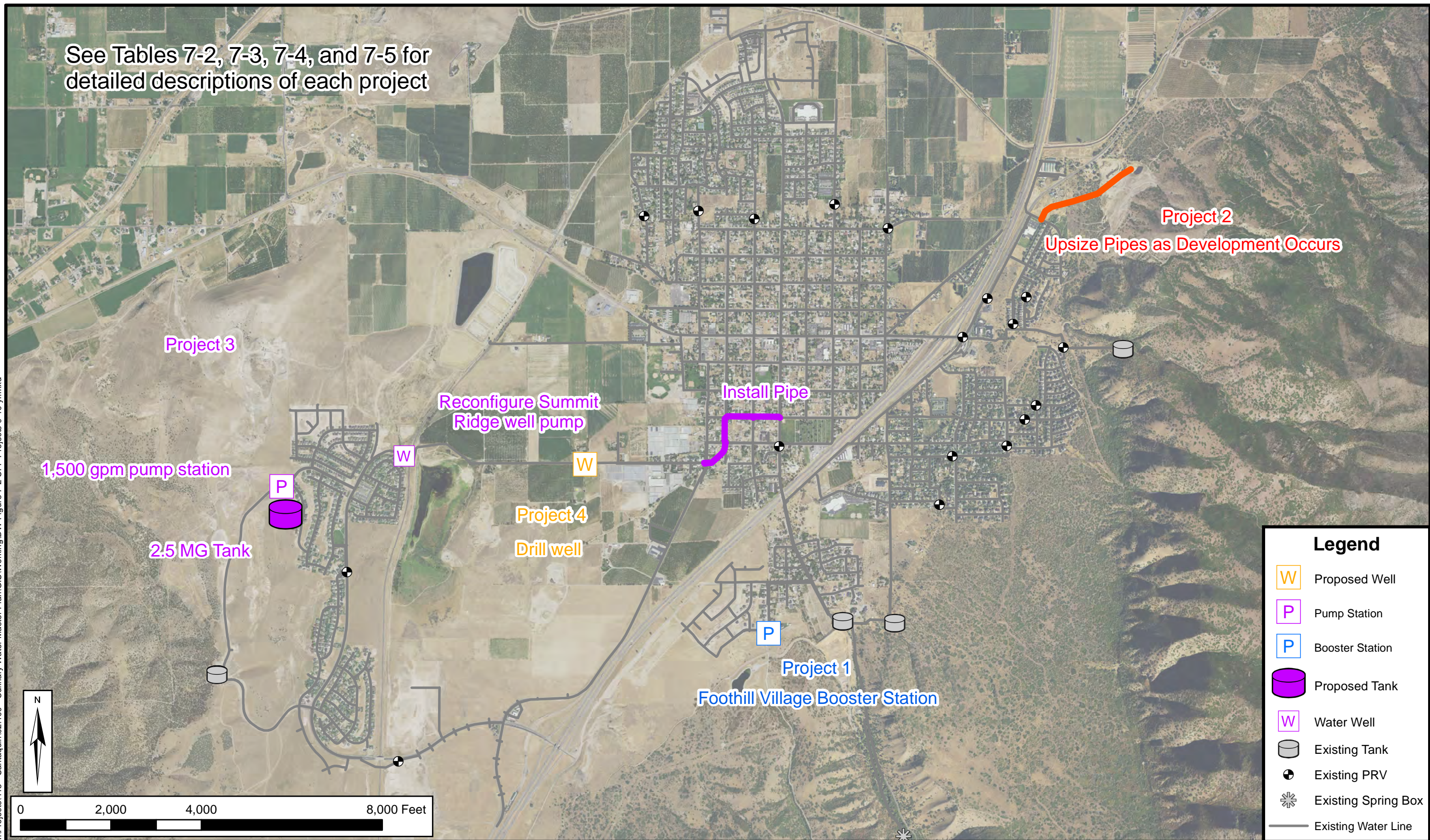
Master plan projects are a high-level representation of the infrastructure the City will need to construct in order to correct deficiencies or meet growth. However, due to the many unknown factors at this stage of design (such as alignment and depth of pipelines, utility conflicts, the cost of land and easements, construction methodology, types of equipment and material to be used, interest and inflation rates, permitting requirements, etc.), there is a significant level of uncertainty in estimated costs.

Every effort has been made to produce cost estimates which will help the City prepare a responsible budget that will meet the City's needs without being excessive or unreasonable. However, it is recommended that the City plan additional contingency into the budget when preparing to complete individual projects.

GROWTH-RELATED PROJECTS

A summary of the estimated cost of each growth-related project is included in Table 7-1. Projects are shown on Figures 7-2 and 7-3. Tables 7-2 through 7-5 include more detailed descriptions of the recommended projects, organized by project type (source, storage, distribution, or efficiency).

See Tables 7-2, 7-3, 7-4, and 7-5 for detailed descriptions of each project



Date: 8/28/2020
Document Path: H:\Projects\415 - Santaquin\02.100 - Culinary Water Master Plan\GIS\Working\DW Figure 7-3 CFP Projects 10-20 yr.mxd



Table 7-1
Estimated Costs for Growth-Related Projects

Trigger	Figure Number	Figure ID ¹	Project Type(s) Included ²	Estimated Phasing Year ³	Cost
Development	7-2	1	Source	2021	\$600,000
Development	7-2	2	Distribution	0-5 Years	\$52,000
System Growth	7-2	3	Source, Storage, Distribution, Efficiency	2021	\$4,431,000
System Growth	7-2	4	Source	2021	\$1,584,000
Development	7-3	5	Source, Distribution	10-20 Years	\$1,403,000
Development	7-3	6	Distribution	10-20 Years	\$80,000
Development	7-3	7	Distribution	10-20 Years	\$234,000
System Growth	7-3	8	Distribution	10-20 Years	\$198,000
Development	7-3	9	Distribution	10-20 Years	\$968,000
System Growth	7-3	10	Storage, Distribution	10-20 Years	\$4,248,000
Development	7-3	11	Distribution	10-20 Years	\$99,000
Development	7-3	12	Distribution	10-20 Years	\$39,000
Subtotal 0 – 10 Years					\$6,667,000
Subtotal 10 – 20 Years					\$7,269,000
Total					\$13,936,000

1. ID refers to the ID numbers shown on Figures 7-2 and 7-3.
2. See Tables 7-2 for source projects, 7-3 for storage projects, 7-4 for distribution projects, and 7-5 for efficiency projects.
3. The phasing year for development-driven projects is estimated, but development-driven projects are not necessary until the area develops. This may occur earlier or later than listed in this document.

Recommended source projects are shown in Table 7-2 and on Figure 7-2.

**Table 7-2
Recommended Source Projects**

Type & Phasing Year	Figure Number	Map ID	Recommended Project	Cost
Source – Growth Project 2021	7-2	1	Construct a booster pump station to serve the Zone 12E portion of the Foothill Village development.	\$600,000
Source – Growth Project 2021	7-2	3	Construct a 1,500 gpm booster station to serve Zone 11W. Must be constructed along with the storage and distribution components of this project (Tables 7-3 and 7-4).	\$1,200,000
Source – Growth Project 2021	7-2	4	Drill a well to provide redundant source for new growth. ¹	\$1,584,000
Source – Growth Project Development-Driven	7-3	5	Construct a booster station to serve Zone 11NE. This will be required only when development occurs in this area.	\$900,000
Total				\$4,284,000

1. It is assumed that the well will have sufficient yield to provide source capacity through the 20-year window (considering that some drinking water demands will be replaced when additional irrigation source water is available from the planned ULS pipeline). See Chapter 3 of the Pressurized Irrigation Master Plan report for further discussion on this pipeline. If yield on the planned well is poor, an additional well may be necessary.

Recommended storage projects are shown in Table 7-3 and on Figures 7-2 and 7-3.

**Table 7-3
Recommended Storage Projects**

Type & Phasing Year	Figure Number	Map ID	Recommended Project	Cost
Storage – Growth Project 2021	7-2	3	Construct a 2.5 MG tank to serve Zone 10, including the Zone 10W portion of Summit Ridge. Includes associated piping. Connect the Zone 10 portion of the Summit Ridge development to the 16-inch pipeline supplying the tank. Must be constructed along with the source and distribution components of this project (Tables 7-2 and 7-4).	\$3,036,000
Storage – Growth Project 10 – 20 Years	7-3	10	Replace the existing Zone 10 tank with a 2.5 MG tank to provide capacity for future growth. Must be constructed along with the distribution component of this project (Table 7-4).	\$3,000,000
Total				\$6,036,000

Projects 3 and 10 both address the City's need for additional storage capacity in Zone 10. Each has advantages and disadvantages, as discussed in Chapter 4, and either would meet the near-term needs of the City if constructed. It is recommended that one of these projects be constructed beginning in year 2021.

Recommended distribution projects (including PRVs) are shown in Table 7-4 and on Figures 7-2 and 7-3.

Table 7-4
Recommended Distribution Projects

Type & Phasing Year	Figure Number	Map ID	Recommended Project	Cost
Distribution – Growth Project Development -Driven	7-2	2	Upsize approximately 2300 ft of pipe to 10-inch diameter in SR 198 to serve growth and provide capacity for future growth in the northeastern portion of the City.	\$52,000
Distribution – Growth Project 2021	7-2	3	Install approximately 700 ft of 16-inch diameter pipe and 1800 ft of 12-inch diameter pipe to provide distribution capacity from the western portion of Zone 10 to the eastern portion of Zone 10. Must be constructed along with the source and storage components of this project (Tables 7-2 and 7-3).	\$459,000
Distribution – Growth Project Development -Driven	7-3	5	Upsize approximately 8900 ft of pipe to 10-inch diameter in Zones 10 and 11NE to serve growth and provide future capacity in the northeastern portion of the City.	\$203,000
Distribution – Growth Project Development -Driven	7-3	6	Upsize approximately 3500 ft of pipe to 10-inch diameter in Zone 12E to serve growth and provide future capacity.	\$80,000
Distribution – Growth Project 10-20 yrs	7-3	7	Install approximately 1200 ft of 12-inch diameter pipe and a PRV to serve growth and provide future capacity in Zone 9N.	\$234,000
Distribution – Growth Project Development -Driven	7-3	8	Upsize approximately 5700 ft of pipe to 12-inch diameter in Zone 9N to serve growth and provide future capacity.	\$198,000
Distribution – Growth Project 10-20 yrs	7-3	9	Install approximately 6300 ft of 10-inch diameter pipeline in a planned future road to serve the western portion of Zone 10.	\$968,000

Type & Phasing Year	Figure Number	Map ID	Recommended Project	Cost
Distribution – Growth Project 10-20 yrs	7-3	10	Install approximately 4200 ft of 20-inch diameter pipeline in Center Street and Canyon Road to provide increased capacity to the Z10 tank site and the Z11E booster. Must be constructed along with the storage component of this project (Table 7-3).	\$1,248,000
Distribution – Growth Project Development -Driven	7-3	11	Upsize approximately 1900 ft of pipe to 10-inch diameter and 1600 ft of pipe to 12-inch diameter to serve growth and provide future capacity in Zone 11W.	\$99,000
Distribution – Growth Project Development -Driven	7-3	12	Upsize approximately 1700 ft of pipe to 10-inch diameter to serve the northwestern portion of Zone 10.	\$39,000
Total				\$3,579,000

Recommended efficiency projects are shown in Table 7-5 and on Figure 7-2. Costs in Table 7-5 are not impact fee-eligible, but will provide the City with long-term energy savings. Incentives from Rocky Mountain Power may be available to assist the City with paying the initial cost.

Table 7-5
Recommended Efficiency Projects

Type & Phasing Year	Map ID	Recommended Project	Cost
Efficiency Project 2021	3 (Fig 7-2)	Remove a bowl from the Summit Ridge Well pump to enable the well to pump to Zone 10 head with better VFD control (this is recommended after the new Zone 10 tank is constructed). This will allow the City to reduce the monthly demand charge, reduce overflow of spring water, and improve the operation of the well. This cannot be accomplished until the source, storage, and transmission components of this project (Tables 7-2, 7-3, and 7-4) are complete.	\$36,000
Efficiency Project 0-5 Years	N/A	Commission a leak detection and repair program in order to save energy, money, and water.	\$40,000
Total			\$76,000

The leak detection study revealed that the value of unaccounted-for water produced each year in Santaquin has a value of approximately \$23,000 (see Appendix C). The budget for the leak detection project was formulated by assuming unaccounted-for water could be reduced by approximately 25% (\$5,000 per year), with a desired payback of 8 years. The City is free to spend more or less money on leak detection depending on available resources and City priorities.

MAINTENANCE OR DEFICIENCY PROJECTS

This section contains maintenance or deficiency-related projects for the City's consideration. These projects would not be impact fee-eligible and are not required to be implemented, but will provide certain benefits that the City may find worthwhile. These projects should be considered and implemented as resources allow and as priority dictates.

Fire Flow Projects

As discussed in Chapter 5, several areas of the City cannot provide the recommended fire flow of 1,500 gpm. Construction in these areas was approved with this understanding. However, projects to provide a minimum of 1,500 gpm of fire flow were identified in order to inform the City what would be required if it becomes a priority to increase fire flow capacity in these areas. A brief description of each project is listed in Table 7-6. Projects are shown on Figure 7-4.

Table 7-6
Fire Flow Projects Required to Provide 1,500 gpm

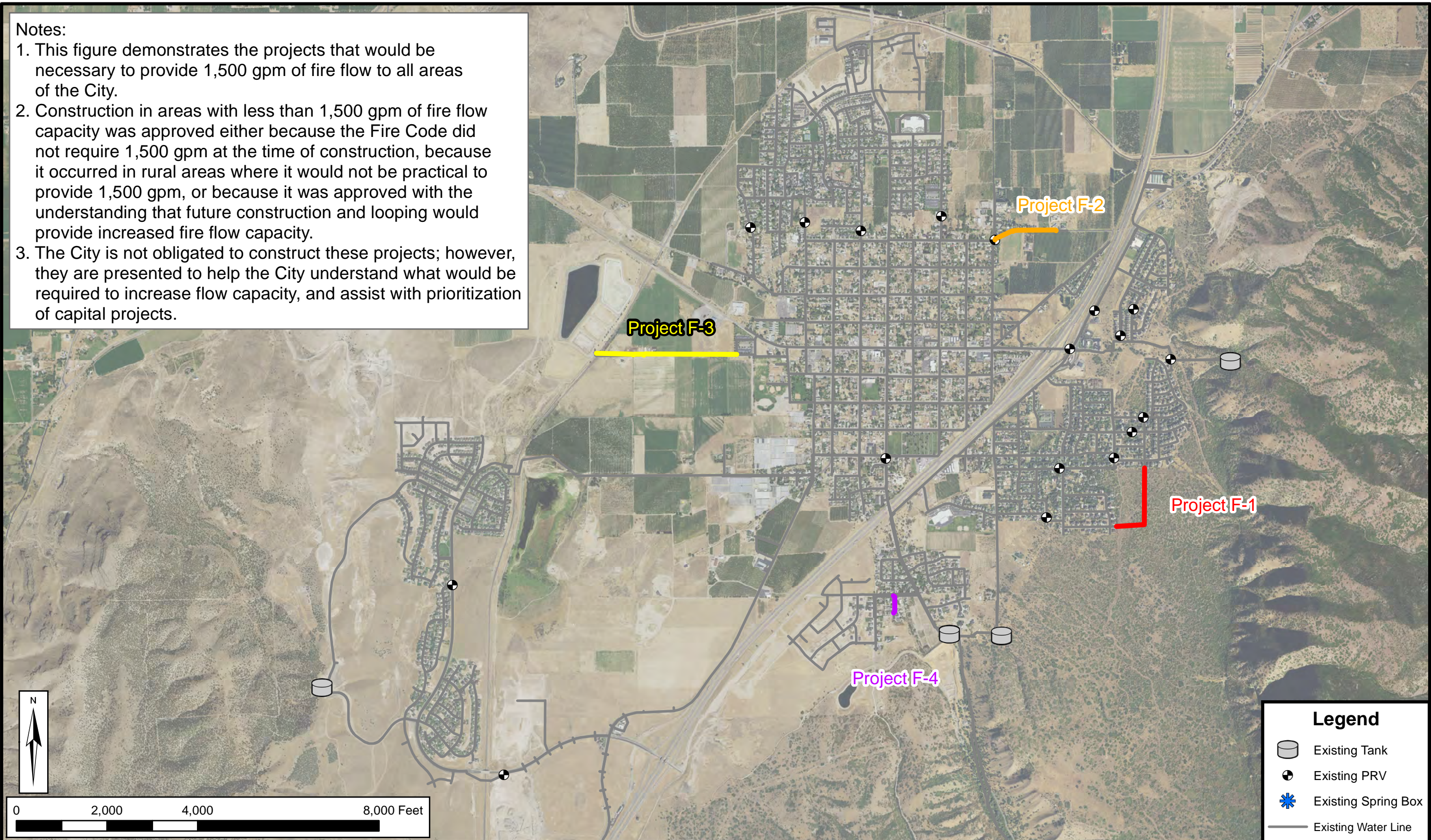
Type & Phasing Year	Map ID	Recommended Project	Cost
Distribution – Fire Flow Project 0-5 Years	F-1	Install approximately 1900 ft of 8-inch diameter distribution pipe to create a loop and solve existing fire flow deficiencies in Zone 12E.	\$249,000
Distribution – Fire Flow Project 0-5 Years	F-2	Install approximately 1400 ft of 12-inch diameter distribution pipe in 400 N from 400 E to the easternmost existing hydrant in the street. The cost of an 8-inch pipe is attributable to correcting the fire deficiency; an upsize to 12-inch would be attributable to growth.	\$183,000 (Deficiency) \$49,000 (Growth)
Distribution – Fire Flow Project 0-5 Years	F-3	Install approximately 3100 ft of 10-inch diameter distribution pipe in 14000 S (County) from 500 W to the Winter Storage Ponds to solve existing fire flow deficiencies along that road.	\$506,000
Distribution – Fire Flow Project 0-5 Years	F-4	Install approximately 400 ft of 8-inch diameter distribution pipe in Center Street to solve the existing fire flow deficiency.	\$52,000
Total			\$1,039,000

Facility Replacement

Water system components have a finite service life. It is recommended that the City establish an annual budget for replacement of facilities which are beyond their useful service life or are experiencing problems (breaks, leakage, etc.). The typical service life of water system components is shown in Table 7-7, along with a calculation showing a recommended long-term annual depreciation budget for the City.

Notes:

1. This figure demonstrates the projects that would be necessary to provide 1,500 gpm of fire flow to all areas of the City.
2. Construction in areas with less than 1,500 gpm of fire flow capacity was approved either because the Fire Code did not require 1,500 gpm at the time of construction, because it occurred in rural areas where it would not be practical to provide 1,500 gpm, or because it was approved with the understanding that future construction and looping would provide increased fire flow capacity.
3. The City is not obligated to construct these projects; however, they are presented to help the City understand what would be required to increase flow capacity, and assist with prioritization of capital projects.



Legend

- Existing Tank
- Existing PRV
- Existing Spring Box
- Existing Water Line

SANTAQUIN DRINKING WATER MASTER PLAN

**PROJECTS REQUIRED TO PROVIDE
1,500 GPM FIRE FLOW CAPACITY**

**FIGURE
7-4**

Table 7-7
Recommended Long-Term Annual Replacement Budget

Component	Service Life (Years)	Unit Cost (\$)	Quantity	Replacement Value (\$)	Recommended Annual Budget (\$)
Storage Tank	75	\$1.00/gal	3.76 MG	\$3,760,000	\$50,000
Well	50	\$1.5M/well	3 Wells	\$4,500,000	\$90,000
Pipeline	60	\$60/ft	410,000 ft	\$24,600,000	\$410,000
Total				\$32,860,000	\$550,000

Because many facilities in Santaquin are quite new, it may be appropriate for the City to begin with a lower budget than is listed in Table 7-7.

FUNDING OPTIONS

Funding options for the recommended projects, in addition to water use fees, include: general obligation bonds, revenue bonds, State/Federal grants and loans, and impact fees. In reality, the City may need to consider a combination of these funding options. The following discussion describes each of these options.

General Obligation Bonds

This form of debt enables the City to issue general obligation bonds for capital improvements and replacement. General Obligation (G.O.) bonds would be used for items not typically financed through the Water Revenue Bonds (for example, the purchase of water source to ensure a sufficient water supply for the City in the future). G.O. bonds are debt instruments backed by the full faith and credit of the City which would be secured by an unconditional pledge of the City to levy assessments, charges, or ad valorem taxes necessary to retire the bonds. G.O. bonds are the lowest-cost form of debt financing available to local governments and can be combined with other revenue sources such as specific fees, or special assessment charges to form a dual security through the City's revenue-generating authority. These bonds are supported by the City as a whole, so the amount of debt issued for the water system is limited to a fixed percentage of the real market value for taxable property within the City. G.O. bonds must be approved by a citizen vote.

Revenue Bonds

This form of debt financing is also available to the City for utility-related capital improvements. Unlike G.O. bonds, revenue bonds are not backed by the City as a whole, but constitute a lien against the water service charge revenues of a Water Utility. Revenue bonds present a greater risk to the lender than do G.O. bonds, since repayment of debt depends on an adequate revenue stream, legally defensible rate structure, and sound fiscal management by the issuing jurisdiction. Due to this increased risk, revenue bonds generally require a higher interest rate than G.O. bonds, although current interest rates are quite low. This type of debt also has very specific coverage requirements in the form of a reserve fund specifying an amount, usually expressed in terms of average or maximum debt service due in any future year. This debt service is required to be held

as a cash reserve for annual debt service payment to the benefit of bondholders. Typically, voter approval is not required when issuing revenue bonds.

State or Federal Grants and Loans

Historically, both local and county governments have experienced significant infrastructure funding support from state and federal government agencies in the form of block grants, direct grants in aid, interagency loans, and general revenue sharing. Federal expenditure pressures and virtual elimination of federal revenue sharing are clear indicators that local government may be left to its own devices regarding infrastructure finance in general. However, state or federal grants and loans should be further investigated as a possible funding source for needed water system improvements.

It is also important to assess likely trends regarding state or federal assistance in infrastructure financing. Future trends indicate that grants will be replaced by loans through a public works revolving fund. Local governments can expect to access these revolving funds or public works trust funds by demonstrating both the need for and the ability to repay the borrowed monies, with interest. As with the revenue bonds discussed earlier, the ability of infrastructure programs to wisely manage their own finances will be a key element in evaluating whether many secondary funding sources, such as federal/state loans, will be available to the City.

Impact Fees

The Utah Impact Fees Act, codified in Title 11, Chapter 36a, of the Utah Code, authorizes municipalities to collect impact fees to fund public facilities. An impact fee is “a payment of money imposed upon new development activity . . . to mitigate the impact of the new development on public infrastructure” (Subsection 11-36a-102(8)). Impact fees enable local governments to finance infrastructure improvements without burdening existing development with costs that are exclusively attributable to growth.

Impact fees can be applied to water-related facilities under the Utah Impact Fees Act. The Act is designed to provide a logical and clear framework for establishing new development assessments. It is also designed to establish the basis for the fee calculation which the City must follow in order to comply with the statute. The fundamental objective for the fee structure is the imposition on new development of only those costs associated with providing or expanding water infrastructure to meet the capacity needs created by that specific new development. Impact fees cannot be applied retroactively.

An impact fee analysis has taken place as part of the 2020 master planning effort. It is described in a separate document.

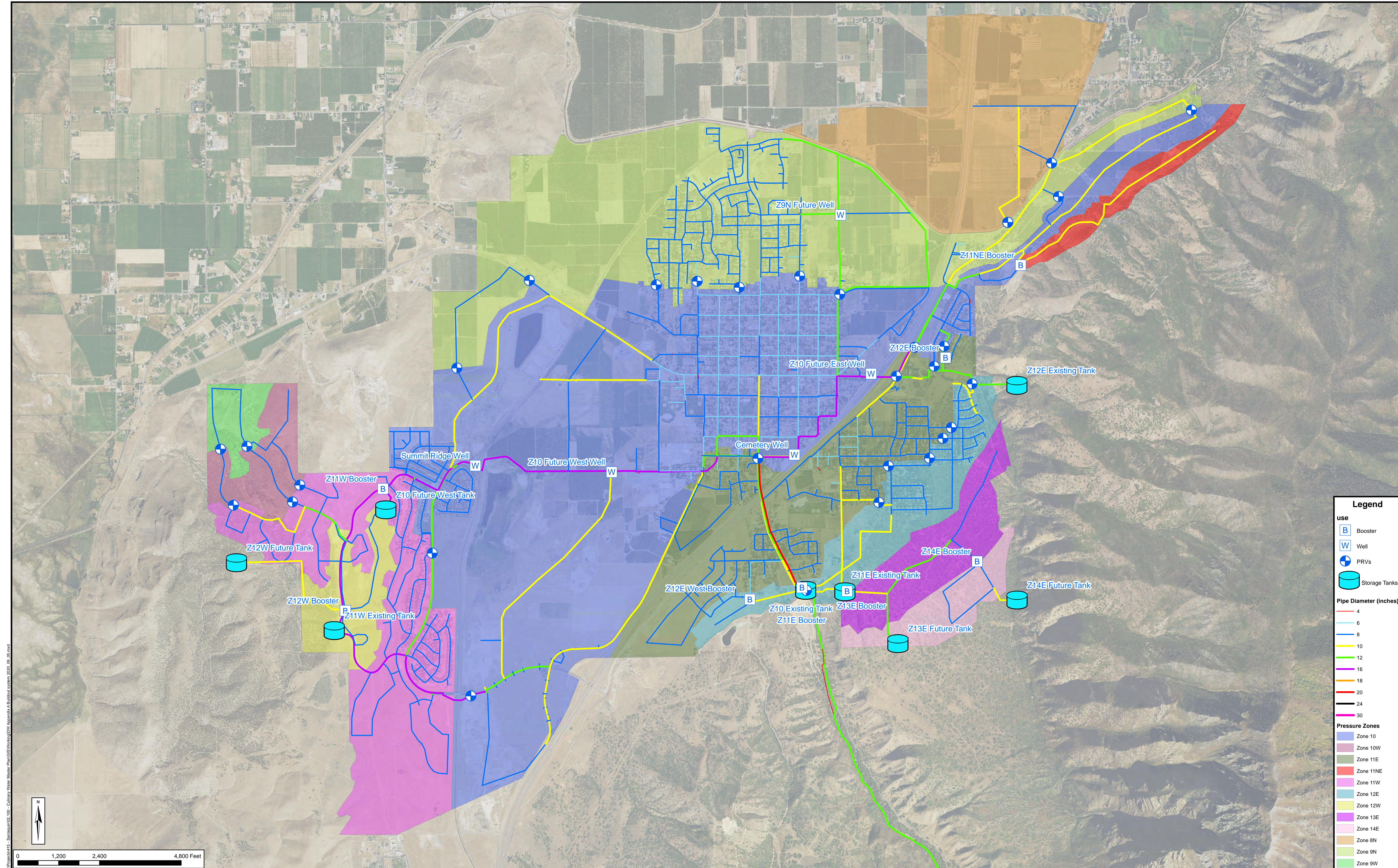
REFERENCES

- DWRi (Utah Division of Water Rights). 2020. Public Water Supplier Information, Santaquin City Corporation (Culinary). Accessed April 20.
https://www.waterrights.utah.gov/asp_apps/viewEditPWS/pwsView.asp?SYSTEM_ID=1268.
- EPA (U.S. Environmental Protection Agency). 2019. "EPANET: Application for Modeling Drinking Water Distribution Systems." EPA. Accessed April 20.
<http://www.epa.gov/nrmrl/wswrd/dw/epanet.html>.
- EPA (U.S. Environmental Protection Agency). 2013. "Water Audits and Water Loss Control for Public Water Systems." EPA 816-F-13-002. Office of Water.
<http://www.epa.gov/sites/production/files/2015-04/documents/epa816f13002.pdf>.
- Kem C. Gardner Policy Institute. 2016. "The Beehive Shape: Provisional 50-Year Demographic and Economic Projections for the State of Utah, 2015 – 2065." Accessed April 20.
https://gardner.utah.edu/wp-content/uploads/2016/11/2016_10_07_StateProjections-Final-Nov-3.pdf.
- Rossman, Lewis A. 2000. *EPANET 2 User's Manual*. EPA/600/R-00/057. Cincinnati, Oh.: U.S. Environmental Protection Agency, National Risk Management Research Laboratory.
<http://nepis.epa.gov/Adobe/PDF/P1007WWU.pdf>.
- State of Utah. 2019a. Utah Administrative Code, Section R309-105: Administration: General Responsibilities of Public Water Systems. In effect Mar. 1. Accessed Apr. 20.
<https://rules.utah.gov/publicat/code/r309/r309-105.htm>.
- . 2019b. Utah Administrative Code, Section R309-510: Facility Design and Operation: Minimum Sizing Requirements. In effect Mar. 1. Accessed Apr. 20.
<https://rules.utah.gov/publicat/code/r309/r309-510.htm>.
- . 2014c. Utah Code Annotated, Section 11-36: Impact Fees Act. Accessed Apr. 20.
https://le.utah.gov/xcode/Title11/Chapter36A/11-36a.html?v=C11-36a_1800010118000101.
- . 2019d. Utah State Legislature, House Bill 31: Water Supply and Surplus Water Amendments. Accessed Jan. 15, 2021.
<https://le.utah.gov/~2019/bills/static/HB0031.html>.
- . 2019e. Utah State Legislature, House Joint Resolution 1: Proposal to Amend Utah Constitution – Municipal Water Resources. Accessed Jan. 15, 2021.
<https://le.utah.gov/~2019/bills/static/HJR001.html>.
- Utah Division of Drinking Water, "General Guidance for Water Use Data Reporting and Setting System-Specific Source and Storage Sizing Requirements," DDW-ENG-0048 (Oct. 15, 2018), <https://documents.deq.utah.gov/drinking-water/engineering/DDW-2018-009165.pdf>.

Utah Division of Drinking Water, “Detailed Guidance for Water Use Data Reporting and Setting System-Specific Source and Storage Sizing Requirements,” DDW-ENG-0047 (Oct. 18, 2018), <https://documents.deq.utah.gov/drinking-water/engineering/DDW-2018-011527.pdf>.

APPENDIX A

Drinking Water Master Plan Map



Legend

use

- B Booster
- W Well
- PRVs
- Storage Tanks

Pipe Diameter (inches)

- 4
- 6
- 8
- 10
- 12
- 16
- 18
- 20
- 24
- 30

Pressure Zones

- Zone 10
- Zone 10W
- Zone 11E
- Zone 11NE
- Zone 11W
- Zone 12E
- Zone 12W
- Zone 13E
- Zone 14E
- Zone 8N
- Zone 9N
- Zone 9W

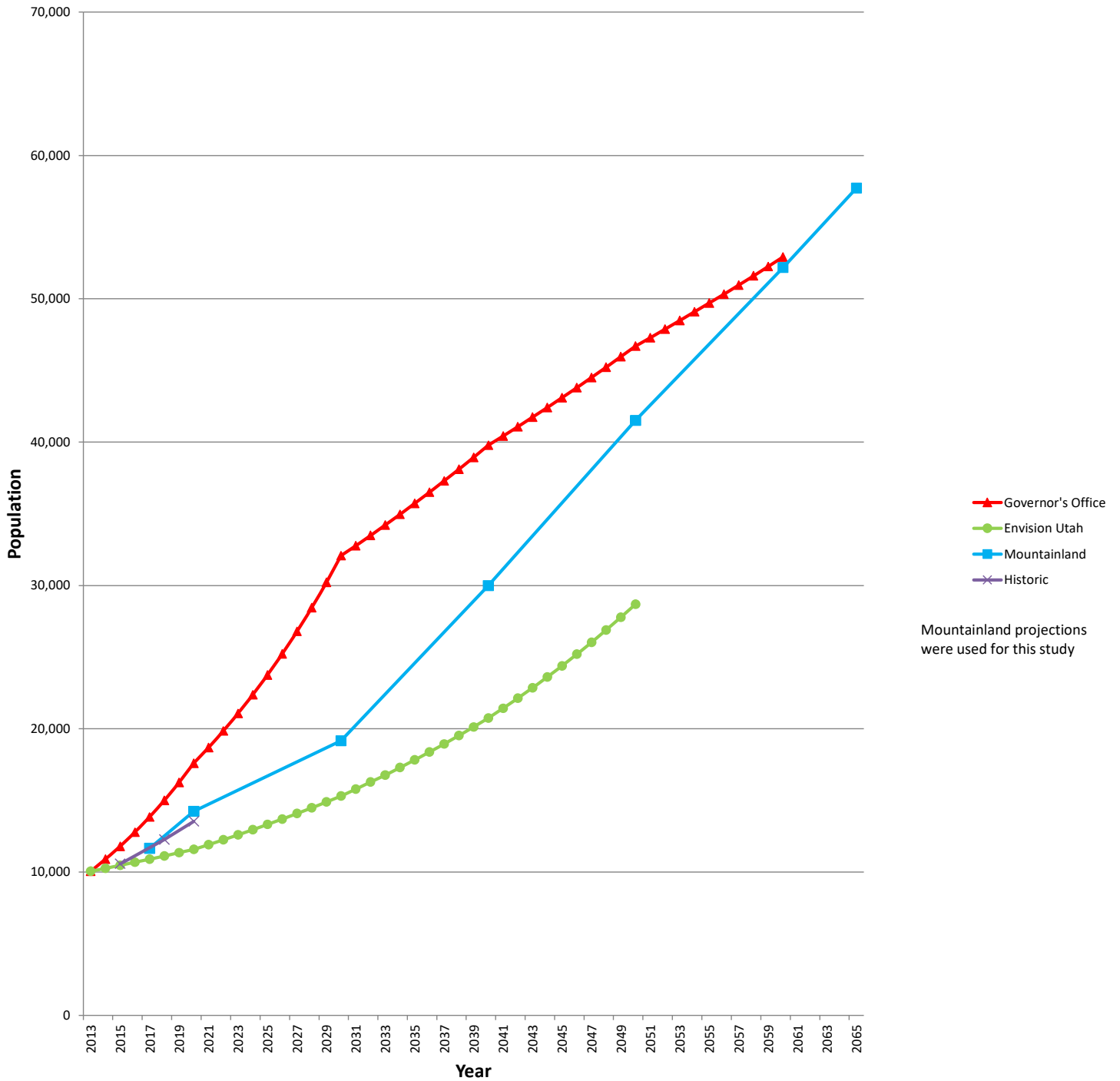
Date: 05/20/2020
H:\Projects\115 - Santaquin\02_100 - Culinary Water Master Plan\GIS\Work\DW\Appendix A\Bulbous system 2060_09_05.mxd



APPENDIX B

Population Projections

Santaquin Population Projection by Year



APPENDIX C

Water System Data and Calculations

Level of Service Parameter	Per ERC	Per irr-ac
Peak Day Source (gpm)	0.35	8
Average Yearly Source (ac-ft)	0.45	4
Storage (gal)	360	9200

Service (ERCs and irr-ac)

Pressure Zone	Existing		10-yr		20-yr		2060	
	ERC	Irr-ac	ERC	Irr-ac	ERC	Irr-ac	ERC	Irr-ac
8N	0	0	0	0	0	0	341	0
9N	812	0	1128	0	1821	0	3469	0
9W	0	0	0	0	0	0	141	0
10	2905	0	3970	0	4963	0	8778	0
10W	296	40	296	0	296	0	307	0
11W	256	55	652	0	1302	121	1403	0
11E	871	0	1128	0	1279	0	2416	0
11NE	0	0	0	0	88	21	143	30
12W	0	0	0	0	0	0	210	40
12E	226	30	226	30	591	96	856	0
12S	0	0	62	16	62	16	65	20
13E	0	0	0	0	0	0	420	85
14E	0	0	0	0	0	0	82	30
Totals	5366	125.0	7462	46.0	10402	254.0	18631	205.0

Peak Day Demand (gpm)

Pressure Zone	Existing	10-yr	20-yr	2060
8N	0	0	0	118
9N	282	392	632	1205
9W	0	0	0	49
10	1009	1379	1723	3048
10W	423	103	103	107
11W	529	226	1420	487
11E	302	392	444	839
11NE	0	0	199	290
12W	0	0	0	393
12E	318	318	973	297
12S	0	150	150	183
13E	0	0	0	826
14E	0	0	0	268
Totals	2863	2959	5644	8109

Average Yearly Demand (ac-ft)

Pressure Zone	Existing	10-yr	20-yr	2060
8N	0.00	0.00	0.00	153.45
9N	365.40	507.60	819.45	1561.05
9W	0.00	0.00	0.00	63.45
10	1307.25	1786.70	2233.55	3950.30
10W	293.20	133.20	133.20	138.15
11W	335.20	293.40	1069.90	631.35
11E	391.95	507.60	575.55	1087.20
11NE	0.00	0.00	123.60	184.35
12W	0.00	0.00	0.00	254.50
12E	221.70	221.70	649.95	385.20
12S	0.00	91.90	91.90	109.25
13E	0.00	0.00	0.00	529.00
14E	0.00	0.00	0.00	156.90
Totals	2914.70	3542.10	5697.10	9204.15

Storage (MG)

Pressure Zone	Existing	10-yr	20-yr	2060
8N	0.00	0.00	0.00	0.12
9N	0.29	0.41	0.66	1.25
9W	0.00	0.00	0.00	0.05
10	1.05	1.43	1.79	3.16
10W	0.47	0.11	0.11	0.11
11W	0.60	0.23	1.58	0.51
11E	0.31	0.41	0.46	0.87
11NE	0.00	0.00	0.22	0.33
12W	0.00	0.00	0.00	0.44
12E	0.36	0.36	1.10	0.31
12S	0.00	0.17	0.17	0.21
13E	0.00	0.00	0.00	0.93
14E	0.00	0.00	0.00	0.31
Totals	3.08	3.11	6.08	8.59

Recommended Drinking Water Pressure Zone Elevations

Zone	Recommended Maximum Service Elevation (ft)	Recommended Minimum Service Elevation (ft)	Recommended HGL (ft)
14E	5630	5470	5745
13E	5470	5300	5585
12E	5300	5150	5415
12W	5300	5150	5415
11NE	5150	5030	5265
11E	5150	5030	5265
11W	5180	5020	5295
10W	5020	4890	5135
10	5030	4890	5145
9N	4890	4800	5005
9W	4890	4700	5005
8N	4800	4640	4915

Notes:

1. HGL is approximate and intended to represent the static HGL when a tank is three-quarters full.
2. The elevation reference datum is as follows:

Projection: UTM Zone 12
Vertical Datum: NAVD88 (GEOID12B)
Horizontal Datum: NAD83 (2011)
WKID: 6341

2018 LiDAR data was used. See:

<https://gis.utah.gov/data/elevation-and-terrain/2018-lidar-central-utah/>

Comparison of Proposed Level of Service to Former DDW Standards

This document shows a comparison of the former DDW drinking water standards with the proposed level of service standards.

This table summarizes the former DDW standards and the proposed level of service standards.

Level of Service Parameter	Former DDW		Level of Service	
	Indoor (per ERC)	Outdoor (per irr-ac)	Indoor (per ERC)	Outdoor (per irr-ac)
Peak Day Demand (gpd)	800	5702	500	11,520
Average Yearly Demand (ac-ft)	0.45	1.87	0.336	4

This table shows the calculated peak day demand and average yearly demand requirements under both the former DDW standard and the proposed level of service. The proposed level of service results in lower water requirements for both peak day demand and average yearly demand, for both existing and future scenarios.

Method	ERCs		Irrigated Acreage		Peak Day Demand (gpm)		Average Yearly Demand (ac-ft)	
	Existing	Future	Existing	Future	Existing	Future	Existing	Future
Former DDW standard	5380	18630	125	185	3484	11083	2655	8729
Level of service	5380	18630	125	185	2868	7949	2308	7000
Difference	0	0	0	0	-616	-3134	-347	-1730



AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

American Water Works Association
Copyright © 2014, All Rights Reserved.

?	Click to access definition
+	Click to add a comment

Water Audit Report for: **Santaquin**
Reporting Year: **2019** **1/2019 - 12/2019**

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

WATER SUPPLIED

Volume from own sources: acre-ft/yr
Water imported: acre-ft/yr
Water exported: acre-ft/yr

Master Meter and Supply Error Adjustments

Pcnt:



AWWA Free Water Audit Software: System Attributes and Performance Indicators

WAS v5.0
American Water Works Association.
Copyright © 2014, All Rights Reserved.

Water Audit Report for: **Santaquin**
Reporting Year: **2019** **1/2019 - 12/2019**

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 65 out of 100 ***

System Attributes:

Apparent Losses:	5.394	acre-ft/yr
+	Real Losses:	363.150 acre-ft/yr
=	Water Losses:	368.544 acre-ft/yr

? Unavoidable Annual Real Losses (UARL): 98.14 acre-ft/yr

Annual cost of Apparent Losses: \$3,708

Annual cost of Real Losses: \$11,998

Valued at **Variable Production Cost**

[Return to Reporting Worksheet to change this assumption](#)

Performance Indicators:

Financial:

Non-revenue water as percent by volume of Water Supplied: 30.2%

Non-revenue water as percent by cost of operating system: 1.1% Real Losses valued at Variable Production Cost

Operational Efficiency:

Apparent Losses per service connection per day: 1.31 gallons/connection/day

Real Losses per service connection per day: 87.91 gallons/connection/day

Real Losses per length of main per day*: N/A

Real Losses per service connection per day per psi pressure: 0.98 gallons/connection/day/psi

From Above, Real Losses = Current Annual Real Losses (CARL): 363.15 acre-feet/year

? Infrastructure Leakage Index (ILI) [CARL/UARL]: 3.70

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline



AWWA Free Water Audit Software: User Comments

WAS v5.0

American Water Works Association.
Copyright © 2014. All Rights Reserved.

Use this worksheet to add comments or notes to explain how an input value was calculated, or to document the sources of the information used.

General Comment:

Audit Item	Comment
Volume from own sources:	https://waterrights.utah.gov/asp_apps/viewEditPWS/pwsView.asp?SYSTEM_ID=1268
Vol. from own sources: Master meter error adjustment:	
Water imported:	
Water imported: master meter error adjustment:	
Water exported:	https://waterrights.utah.gov/asp_apps/viewEditPWS/pwsView.asp?SYSTEM_ID=1268
Water exported: master meter error adjustment:	
Billed metered:	https://waterrights.utah.gov/asp_apps/viewEditPWS/pwsView.asp?SYSTEM_ID=1268
Billed unmetered:	
Unbilled metered:	
Unbilled unmetered:	

Audit Item	Comment
Unauthorized consumption:	
Customer metering inaccuracies:	
Systematic data handling errors:	
Length of mains:	As reported in Master Plan report.
Number of active AND inactive service connections:	3,688 active connections. The City reported that they have very few or no inactive connections.
Average length of customer service line:	
Average operating pressure:	Provided by the model.
Total annual cost of operating water system:	Provided by the City.
Customer retail unit cost (applied to Apparent Losses):	https://www.santaquin.org/government/fee_schedule
Variable production cost (applied to Real Losses):	Calculated from City's energy billing data. Calculations made by Ridley.



AWWA Free Water Audit Software: Water Balance

WAS v5.0

American Water Works Association.
Copyright © 2014, All Rights Reserved.Water Audit Report for: **Santaquin**Reporting Year: **2019****1/2019 - 12/2019**Data Validity Score: **65**

Own Sources (Adjusted for known errors) 1,955.810	Water Exported 684.890	Billed Water Exported				
	Water Supplied 1,270.920	Authorized Consumption 902.377	Billed Authorized Consumption 886.490	Billed Metered Consumption (water exported is removed) 886.490	Revenue Water 886.490	
				Billed Unmetered Consumption 0.000		
			Unbilled Authorized Consumption 15.887	Unbilled Metered Consumption 0.000	Non-Revenue Water (NRW) 384.430	
				Unbilled Unmetered Consumption 15.887		
		Water Losses 368.544	Apparent Losses 5.394	Unauthorized Consumption 3.177		
				Customer Metering Inaccuracies 0.000		
				Systematic Data Handling Errors 2.216		
		Water Imported 0.000		Real Losses 363.150	Leakage on Transmission and/or Distribution Mains Not broken down	
	Leakage and Overflows at Utility's Storage Tanks Not broken down					
Leakage on Service Connections Not broken down						



AWWA Free Water Audit Software: Dashboard

WAS v5.0

American Water Works Association.
Copyright © 2014, All Rights Reserved.

The graphic below is a visual representation of the Water Balance with bar heights proportional to the volume of the audit components

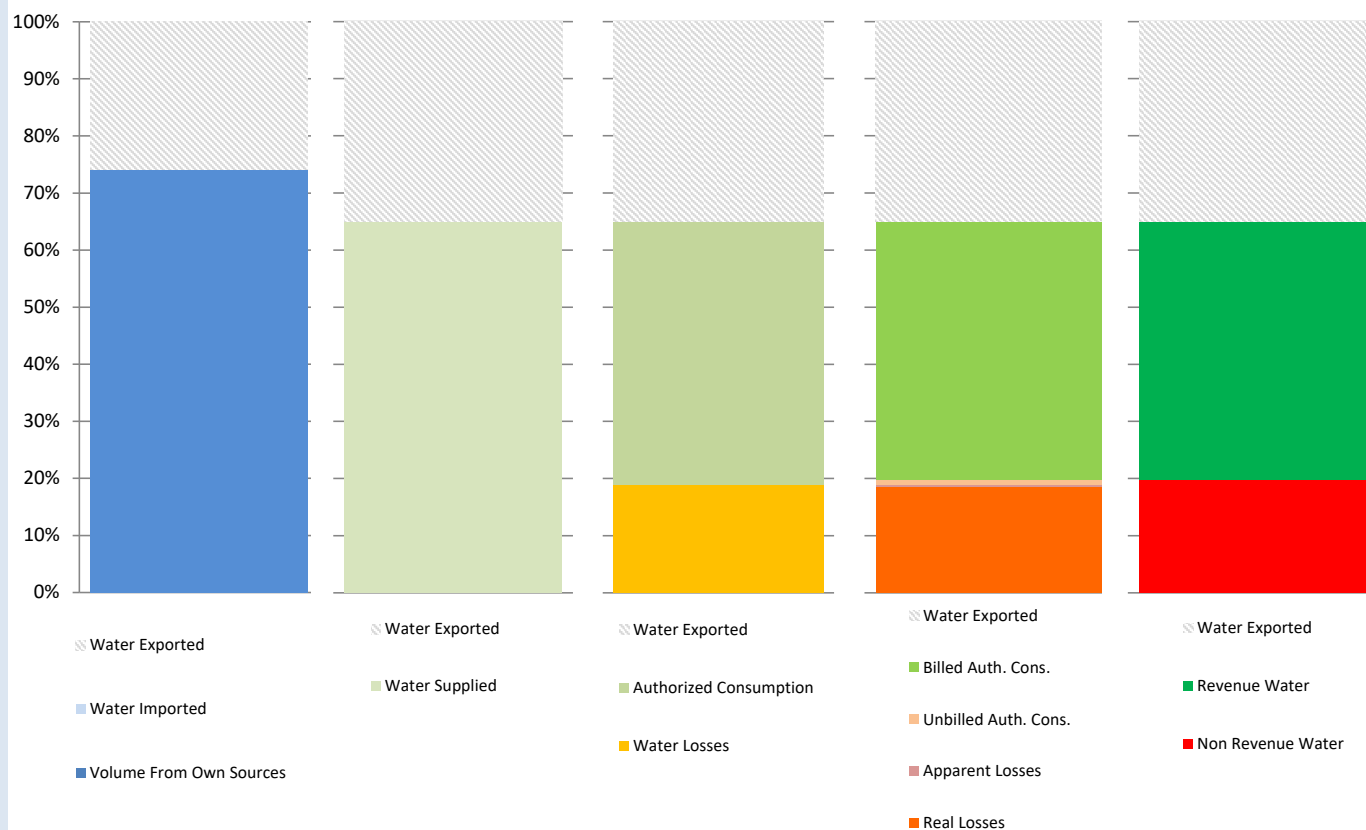
Water Audit Report for: **Santaquin**

Reporting Year: **2019** **1/2019 - 12/2019**

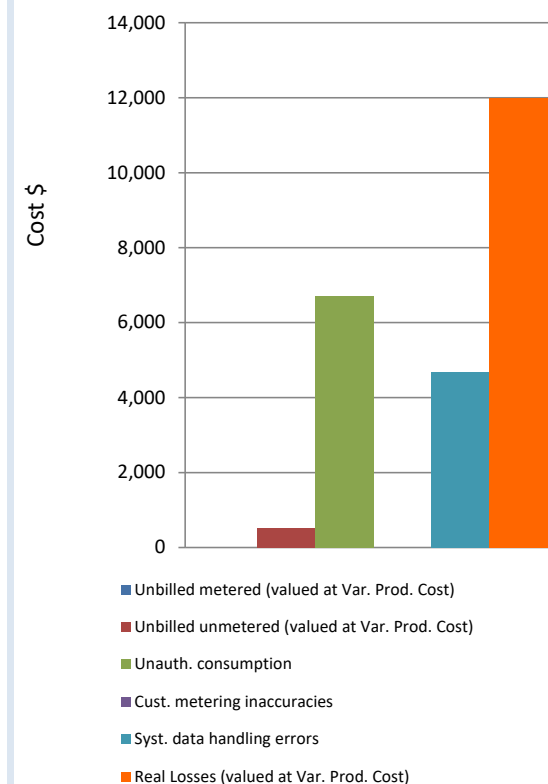
Data Validity Score: **65**

☐ Show me the VOLUME of Non-Revenue Water

☒ Show me the COST of Non-Revenue Water



Total Cost of NRW = \$23,904





AWWA Free Water Audit Software: Grading Matrix

WAS 5.0

American Water Works Association. Copyright © 2014. All Rights Reserved.

The grading assigned to each audit component and the corresponding recommended improvements and actions are highlighted in yellow. Audit accuracy is likely to be improved by prioritizing those items shown in red

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
WATER SUPPLIED											
Volume from own sources:	Select this grading only if the water utility purchases/imports all of its water resources (i.e. has no sources of its own)	Less than 25% of water production sources are metered, remaining sources are estimated. No regular meter accuracy testing or electronic calibration conducted.	25% - 50% of treated water production sources are metered; other sources estimated. No regular meter accuracy testing or electronic calibration conducted.	Conditions between 2 and 4	50% - 75% of treated water production sources are metered; other sources estimated. Occasional meter accuracy testing or electronic calibration conducted.	Conditions between 4 and 6	At least 75% of treated water production sources are metered, <u>at least 90% of the source flow is derived from metered sources</u> . Meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually, with less than 10% found outside of +/- 3% accuracy. Procedures are reviewed by a third party knowledgeable in the M36 methodology.
Improvements to attain higher data grading for "Volume from own Sources" component:		<u>to qualify for 2:</u> Organize and launch efforts to collect data for determining volume from own sources	<u>to qualify for 4:</u> Locate all water production sources on maps and in the field, launch meter accuracy testing for existing meters, begin to install meters on unmetered water production sources and replace any obsolete/defective meters.		<u>to qualify for 6:</u> Formalize annual meter accuracy testing for all source meters; specify the frequency of testing. Complete installation of meters on unmetered water production sources and complete replacement of all obsolete/defective meters.		<u>to qualify for 8:</u> Conduct annual meter accuracy testing and calibration of related instrumentation on all meter installations on a regular basis. Complete project to install new, or replace defective existing, meters so that entire production meter population is metered. Repair or replace meters outside of +/- 6% accuracy.		<u>to qualify for 10:</u> Maintain annual meter accuracy testing and calibration of related instrumentation for all meter installations. Repair or replace meters outside of +/- 3% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to further improve meter accuracy.		<u>to maintain 10:</u> Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.
Volume from own sources master meter and supply error adjustment:	Select n/a only if the water utility fails to have meters on its sources of supply	Inventory information on meters and paper records of measured volumes exist but are incomplete and/or in a very crude condition; data error cannot be determined	No automatic datalogging of production volumes; daily readings are scribed on paper records without any accountability controls. Flows are not balanced across the water distribution system; tank/storage elevation changes are not employed in calculating the "Volume from own sources" component and archived flow data is adjusted only when grossly evident data error occurs.	Conditions between 2 and 4	Production meter data is logged automatically in electronic format and reviewed at least on a monthly basis with necessary corrections implemented. "Volume from own sources" tabulations include estimate of daily changes in tanks/storage facilities. Meter data is adjusted when gross data errors occur, or occasional meter testing deems this necessary.	Conditions between 4 and 6	Hourly production meter data logged automatically & reviewed on at least a weekly basis. Data is adjusted to correct gross error when meter/instrumentation equipment malfunction is detected; and/or error is confirmed by meter accuracy testing. Tank/storage facility elevation changes are automatically used in calculating a balanced "Volume from own sources" component, and data gaps in the archived data are corrected on at least a weekly basis.	Conditions between 6 and 8	Continuous production meter data is logged automatically & reviewed each business day. Data is adjusted to correct gross error from detected meter/instrumentation equipment malfunction and/or results of meter accuracy testing. Tank/storage facility elevation changes are automatically used in "Volume from own sources" tabulations and data gaps in the archived data are corrected on a daily basis.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically balances flows from all sources and storages; results are reviewed each business day. Tight accountability controls ensure that all data gaps that occur in the archived flow data are quickly detected and corrected. Regular calibrations between SCADA and sources meters ensures minimal data transfer error.
Improvements to attain higher data grading for "Master meter and supply error adjustment" component:		<u>to qualify for 2:</u> Develop a plan to restructure recordkeeping system to capture all flow data; set a procedure to review flow data on a daily basis to detect input errors. Obtain more reliable information about existing meters by conducting field inspections of meters and related instrumentation, and obtaining manufacturer literature.	<u>to qualify for 4:</u> Install automatic datalogging equipment on production meters. Complete installation of level instrumentation at all tanks/storage facilities and include tank level data in automatic calculation routine in a computerized system. Construct a computerized listing or spreadsheet to archive input volumes, tank/storage volume changes and import/export flows in order to determine the composite "Water Supplied" volume for the distribution system. Set a procedure to review this data on a monthly basis to detect gross anomalies and data gaps.		<u>to qualify for 6:</u> Refine computerized data collection and archive to include hourly production meter data that is reviewed at least on a weekly basis to detect specific data anomalies and gaps. Use daily net storage change to balance flows in calculating "Water Supplied" volume. Necessary corrections to data errors are implemented on a weekly basis.		<u>to qualify for 8:</u> Ensure that all flow data is collected and archived on at least an hourly basis. All data is reviewed and detected errors corrected each business day. Tank/storage levels variations are employed in calculating balanced "Water Supplied" component. Adjust production meter data for gross error and inaccuracy confirmed by testing.		<u>to qualify for 10:</u> Link all production and tank/storage facility elevation change data to a Supervisory Control & Data Acquisition (SCADA) System, or similar computerized monitoring/control system, and establish automatic flow balancing algorithm and regularly calibrate between SCADA and source meters. Data is reviewed and corrected each business day.		<u>to maintain 10:</u> Monitor meter innovations for development of more accurate and less expensive flowmeters. Continue to replace or repair meters as they perform outside of desired accuracy limits. Stay abreast of new and more accurate water level instruments to better record tank/storage levels and archive the variations in storage volume. Keep current with SCADA and data management systems to ensure that archived data is well-managed and error free.
Water Imported:	Select n/a if the water utility's supply is exclusively from its own water resources (no bulk purchased/ imported water)	Less than 25% of imported water sources are metered, remaining sources are estimated. No regular meter accuracy testing.	25% - 50% of imported water sources are metered; other sources estimated. No regular meter accuracy testing.	Conditions between 2 and 4	50% - 75% of imported water sources are metered; other sources estimated. Occasional meter accuracy testing conducted.	Conditions between 4 and 6	At least 75% of imported water sources are metered, meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually for all meter installations. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of imported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of imported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually for all meter installations, with less than 10% of accuracy tests found outside of +/- 3% accuracy.
Improvements to attain higher data grading for "Water Imported Volume" component: (Note: usually the water supplier selling the water - "the Exporter" - to the utility being audited is responsible to maintain the metering installation measuring the imported volume. The utility should coordinate carefully with the Exporter to ensure that adequate meter upkeep takes place and an accurate measure of the Water Imported volume is quantified.)		<u>to qualify for 2:</u> Review bulk water purchase agreements with partner suppliers; confirm requirements for use and maintenance of accurate metering. Identify needs for new or replacement meters with goal to meter all imported water sources.	<u>To qualify for 4:</u> Locate all imported water sources on maps and in the field, launch meter accuracy testing for existing meters, begin to install meters on unmetered imported water interconnections and replace obsolete/defective meters.		<u>to qualify for 6:</u> Formalize annual meter accuracy testing for all imported water meters, planning for both regular meter accuracy testing and calibration of the related instrumentation. Continue installation of meters on unmetered imported water interconnections and replacement of obsolete/defective meters.		<u>to qualify for 8:</u> Complete project to install new, or replace defective, meters on all imported water interconnections. Maintain annual meter accuracy testing for all imported water meters and conduct calibration of related instrumentation at least annually. Repair or replace meters outside of +/- 6% accuracy.		<u>to qualify for 10:</u> Conduct meter accuracy testing for all meters on a semi-annual basis, along with calibration of all related instrumentation. Repair or replace meters outside of +/- 3% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.		<u>to maintain 10:</u> Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Continue to conduct calibration of related instrumentation on a semi-annual basis. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Water imported master meter and supply error adjustment:	Select n/a if the Imported water supply is unmetered, with Imported water quantities estimated on the billing invoices sent by the Exporter to the purchasing Utility.	Inventory information on imported meters and paper records of measured volumes exist but are incomplete and/or in a very crude condition; data error cannot be determined. Written agreement(s) with water Exporter(s) are missing or written in vague language concerning meter management and testing.	No automatic datalogging of imported supply volumes; daily readings are scribed on paper records without any accountability controls to confirm data accuracy and the absence of errors and data gaps in recorded volumes. Written agreement requires meter accuracy testing but is vague on the details of how and who conducts the testing.	Conditions between 2 and 4	Imported supply metered flow data is logged automatically in electronic format and reviewed at least on a monthly basis by the Exporter with necessary corrections implemented. Meter data is adjusted by the Exporter when gross data errors are detected. A coherent data trail exists for this process to protect both the selling and the purchasing Utility. Written agreement exists and clearly states requirements and roles for meter accuracy testing and data management.	Conditions between 4 and 6	Hourly Imported supply metered data is logged automatically & reviewed on at least a weekly basis by the Exporter. Data is adjusted to correct gross error when meter/instrumentation equipment malfunction is detected; and to correct for error confirmed by meter accuracy testing. Any data gaps in the archived data are detected and corrected during the weekly review. A coherent data trail exists for this process to protect both the selling and the purchasing Utility.	Conditions between 6 and 8	Continuous Imported supply metered flow data is logged automatically & reviewed each business day by the Importer. Data is adjusted to correct gross error from detected meter/instrumentation equipment malfunction and/or results of meter accuracy testing. Any data errors/gaps are detected and corrected on a daily basis. A data trail exists for the process to protect both the selling and the purchasing Utility.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically records data which is reviewed each business day by the Exporter. Tight accountability controls ensure that all error/data gaps that occur in the archived flow data are quickly detected and corrected. A reliable data trail exists and contract provisions for meter testing and data management are reviewed by the selling and purchasing Utility at least once every five years.
Improvements to attain higher data grading for "Water imported master meter and supply error adjustment" component:		<u>to qualify for 2:</u> Develop a plan to restructure recordkeeping system to capture all flow data; set a procedure to review flow data on a daily basis to detect input errors. Obtain more reliable information about existing meters by conducting field inspections of meters and related instrumentation, and obtaining manufacturer literature. Review the written agreement between the selling and purchasing Utility.	<u>to qualify for 4:</u> Install automatic datalogging equipment on Imported supply meters. Set a procedure to review this data on a monthly basis to detect gross anomalies and data gaps. Launch discussions with the Exporters to jointly review terms of the written agreements regarding meter accuracy testing and data management; revise the terms as necessary.		<u>to qualify for 6:</u> Refine computerized data collection and archive to include hourly Imported supply metered flow data that is reviewed at least on a weekly basis to detect specific data anomalies and gaps. Make necessary corrections to errors/data errors on a weekly basis.		<u>to qualify for 8:</u> Ensure that all Imported supply metered flow data is collected and archived on at least an hourly basis. All data is reviewed and errors/data gaps are corrected each business day.		<u>to qualify for 10:</u> Conduct accountability checks to confirm that all Imported supply metered data is reviewed and corrected each business day by the Exporter. Results of all meter accuracy tests and data corrections should be available for sharing between the Exporter and the purchasing Utility. Establish a schedule for a regular review and updating of the contractual language in the written agreement between the selling and the purchasing Utility; at least every five years.		<u>to maintain 10:</u> Monitor meter innovations for development of more accurate and less expensive flowmeters; work with the Exporter to help identify meter replacement needs. Keep communication lines with Exporters open and maintain productive relations. Keep the written agreement current with clear and explicit language that meets the ongoing needs of all parties.
Water Exported:	Select n/a if the water utility sells no bulk water to neighboring water utilities (no exported water sales)	Less than 25% of exported water sources are metered, remaining sources are estimated. No regular meter accuracy testing.	25% - 50% of exported water sources are metered; other sources estimated. No regular meter accuracy testing.	Conditions between 2 and 4	50% - 75% of exported water sources are metered, other sources estimated. Occasional meter accuracy testing conducted.	Conditions between 4 and 6	At least 75% of exported water sources are metered, meter accuracy testing and/or electronic calibration conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of exported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of exported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually for all meter installations, with less than 10% of accuracy tests found outside of +/- 3% accuracy.
Improvements to attain higher data grading for "Water Exported Volume" component: (Note: usually, if the water utility being audited sells (Exports) water to a neighboring purchasing Utility, it is the responsibility of the utility exporting the water to maintain the metering installation measuring the Exported volume. The utility exporting the water should ensure that adequate meter upkeep takes place and an accurate measure of the Water Exported volume is quantified.)		<u>to qualify for 2:</u> Review bulk water sales agreements with purchasing utilities; confirm requirements for use & upkeep of accurate metering. Identify needs to install new, or replace defective meters as needed.	<u>To qualify for 4:</u> Locate all exported water sources on maps and in field, launch meter accuracy testing for existing meters, begin to install meters on unmetered exported water interconnections and replace obsolete/defective meters		<u>to qualify for 6:</u> Formalize annual meter accuracy testing for all exported water meters. Continue installation of meters on unmetered exported water interconnections and replacement of obsolete/defective meters.		<u>to qualify for 8:</u> Complete project to install new, or replace defective, meters on all exported water interconnections. Maintain annual meter accuracy testing for all exported water meters. Repair or replace meters outside of +/- 6% accuracy.		<u>to qualify for 10:</u> Maintain annual meter accuracy testing for all meters. Repair or replace meters outside of +/- 3% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.		<u>to maintain 10:</u> Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.
Water exported master meter and supply error adjustment:	Select n/a only if the water utility fails to have meters on its exported supply interconnections.	Inventory information on exported meters and paper records of measured volumes exist but are incomplete and/or in a very crude condition; data error cannot be determined. Written agreement(s) with the utility purchasing the water are missing or written in vague language concerning meter management and testing.	No automatic datalogging of exported supply volumes; daily readings are scribed on paper records without any accountability controls to confirm data accuracy and the absence of errors and data gaps in recorded volumes. Written agreement requires meter accuracy testing but is vague on the details of how and who conducts the testing.	Conditions between 2 and 4	Exported metered flow data is logged automatically in electronic format and reviewed at least on a monthly basis, with necessary corrections implemented. Meter data is adjusted by the utility selling (exporting) the water when gross data errors are detected. A coherent data trail exists for this process to protect both the utility exporting the water and the purchasing Utility. Written agreement exists and clearly states requirements and roles for meter accuracy testing and data management.	Conditions between 4 and 6	Hourly exported supply metered data is logged automatically & reviewed on at least a weekly basis by the utility selling the water. Data is adjusted to correct gross error when meter/instrumentation equipment malfunction is detected; and to correct for error found by meter accuracy testing. Any data gaps in the archived data are detected and corrected during the weekly review. A coherent data trail exists for this process to protect both the selling (exporting) utility and the purchasing Utility.	Conditions between 6 and 8	Continuous exported supply metered flow data is logged automatically & reviewed each business day by the utility selling (exporting) the water. Data is adjusted to correct gross error from detected meter/instrumentation equipment malfunction and any error confirmed by meter accuracy testing. Any data errors/gaps are detected and corrected on a daily basis. A data trail exists for the process to protect both the selling (exporting) Utility and the purchasing Utility.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically records data which is reviewed each business day by the utility selling (exporting) the water. Tight accountability controls ensure that all error/data gaps that occur in the archived flow data are quickly detected and corrected. A reliable data trail exists and contract provisions for meter testing and data management are reviewed by the selling Utility and purchasing Utility at least once every five years.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Improvements to attain higher data grading for "Water exported master meter and supply error adjustment" component.		<p><u>to qualify for 2:</u> Develop a plan to restructure recordkeeping system to capture all flow data; set a procedure to review flow data on a daily basis to detect input errors. Obtain more reliable information about existing meters by conducting field inspections of meters and related instrumentation, and obtaining manufacturer literature. Review the written agreement between the utility selling (exporting) the water and the purchasing Utility.</p>	<p><u>to qualify for 4:</u> Install automatic datalogging equipment on exported supply meters. Set a procedure to review this data on a monthly basis to detect gross anomalies and data gaps. Launch discussions with the purchasing utilities to jointly review terms of the written agreements regarding meter accuracy testing and data management; revise the terms as necessary.</p>		<p><u>to qualify for 6:</u> Refine computerized data collection and archive to include hourly exported supply metered flow data that is reviewed at least on a weekly basis to detect specific data anomalies and gaps. Make necessary corrections to errors/data errors on a weekly basis.</p>		<p><u>to qualify for 8:</u> Ensure that all exported metered flow data is collected and archived on at least an hourly basis. All data is reviewed and errors/data gaps are corrected each business day.</p>		<p><u>to qualify for 10:</u> Conduct accountability checks to confirm that all exported metered flow data is reviewed and corrected each business day by the utility selling the water. Results of all meter accuracy tests and data corrections should be available for sharing between the utility and the purchasing Utility. Establish a schedule for a regular review and updating of the contractual language in the written agreements with the purchasing utilities, at least every five years.</p>		<p><u>to maintain 10:</u> Monitor meter innovations for development of more accurate and less expensive flowmeters; work with the purchasing utilities to help identify meter replacement needs. Keep communication lines with the purchasing utilities open and maintain productive relations. Keep the written agreement current with clear and explicit language that meets the ongoing needs of all parties.</p>
AUTHORIZED CONSUMPTION											
Billed metered:	n/a (not applicable). Select n/a only if the entire customer population is not metered and is billed for water service on a flat or fixed rate basis. In such a case the volume entered must be zero.	Less than 50% of customers with volume-based billings from meter readings; flat or fixed rate billing exists for the majority of the customer population	At least 50% of customers with volume-based billing from meter reads; flat rate billing for others. Manual meter reading is conducted, with less than 50% meter read success rate, remaining accounts' consumption is estimated. Limited meter records, no regular meter testing or replacement. Billing data maintained on paper records, with no auditing.	Conditions between 2 and 4	At least 75% of customers with volume-based, billing from meter reads; flat or fixed rate billing for remaining accounts. Manual meter reading is conducted with at least 50% meter read success rate; consumption for accounts with failed reads is estimated. Purchase records verify age of customer meters; only very limited meter accuracy testing is conducted. Customer meters are replaced only upon complete failure. Computerized billing records exist, but only sporadic internal auditing conducted.	Conditions between 4 and 6	At least 90% of customers with volume-based billing from meter reads; consumption for remaining accounts is estimated. Manual customer meter reading gives at least 80% customer meter reading success rate; consumption for accounts with failed reads is estimated. Good customer meter records exist, but only limited meter accuracy testing is conducted. Regular replacement is conducted for the oldest meters. Computerized billing records exist with annual auditing of summary statistics conducted by utility personnel.	Conditions between 6 and 8	At least 97% of customers exist with volume-based billing from meter reads. At least 90% customer meter reading success rate; at least 80% read success rate with planning and budgeting for trials of Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) in one or more pilot areas. Good customer meter records. Regular meter accuracy testing guides replacement of statistically significant number of meters each year. Routine auditing of computerized billing records for global and detailed statistics occurs annually by utility personnel, and is verified by third party at least once every five years.	Conditions between 8 and 10	At least 99% of customers exist with volume-based billing from meter reads. At least 95% customer meter reading success rate; minimum 80% meter reading success rate, with Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) trials underway. Statistically significant customer meter testing and replacement program in place on a continuous basis. Computerized billing with routine, detailed auditing, including field investigation of representative sample of accounts undertaken annually by utility personnel. Audit is conducted by third party auditors at least once every three years.
Improvements to attain higher data grading for "Billed Metered Consumption" component:	If n/a is selected because the customer meter population is unmetered, consider establishing a new policy to meter the customer population and employ water rates based upon metered volumes.	<p><u>to qualify for 2:</u> Conduct investigations or trials of customer meters to select appropriate meter models. Budget funding for meter installations. Investigate volume based water rate structures.</p>	<p><u>to qualify for 4:</u> Purchase and install meters on unmetered accounts. Implement policies to improve meter reading success. Catalog meter information during meter read visits to identify age/model of existing meters. Test a minimal number of meters for accuracy. Install computerized billing system.</p>		<p><u>to qualify for 6:</u> Purchase and install meters on unmetered accounts. Eliminate flat fee billing and establish appropriate water rate structure based upon measured consumption. Continue to achieve verifiable success in removing manual meter reading barriers. Expand meter accuracy testing. Launch regular meter replacement program. Launch a program of annual auditing of global billing statistics by utility personnel.</p>		<p><u>to qualify for 8:</u> Purchase and install meters on unmetered accounts. If customer meter reading success rate is less than 97%, assess cost-effectiveness of Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) system for portion or entire system; or otherwise achieve ongoing improvements in manual meter reading success rate to 97% or higher. Refine meter accuracy testing program. Set meter replacement goals based upon accuracy test results. Implement annual auditing of detailed billing records by utility personnel and implement third party auditing at least once every five years.</p>		<p><u>to qualify for 10:</u> Purchase and install meters on unmetered accounts. Launch Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) system trials if manual meter reading success rate of at least 99% is not achieved within a five-year program. Continue meter accuracy testing program. Conduct planning and budgeting for large scale meter replacement based upon meter life cycle analysis using cumulative flow target. Continue annual detailed billing data auditing by utility personnel and conduct third party auditing at least once every three years.</p>		<p><u>to maintain 10:</u> Continue annual internal billing data auditing, and third party auditing at least every three years. Continue customer meter accuracy testing to ensure that accurate customer meter readings are obtained and entered as the basis for volume based billing. Stay abreast of improvements in Automatic Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) and information management. Plan and budget for justified upgrades in metering, meter reading and billing data management to maintain very high accuracy in customer metering and billing.</p>
Billed unmetered:	Select n/a if it is the policy of the water utility to meter all customer connections and it has been confirmed by detailed auditing that all customers do indeed have a water meter; i.e. no intentionally unmetered accounts exist	Water utility policy does not require customer metering; flat or fixed fee billing is employed. No data is collected on customer consumption. The only estimates of customer population consumption available are derived from data estimation methods using average fixture count multiplied by number of connections, or similar approach.	Water utility policy does not require customer metering; flat or fixed fee billing is employed. Some metered accounts exist in parts of the system (pilot areas or District Metered Areas) with consumption read periodically or recorded on portable dataloggers over one, three, or seven day periods. Data from these sample meters are used to infer consumption for the total customer population. Site specific estimation methods are used for unusual buildings/water uses.	Conditions between 2 and 4	Water utility policy does require metering and volume based billing in general. However, a liberal amount of exemptions and a lack of clearly written and communicated procedures result in up to 20% of billed accounts believed to be unmetered by exemption; or the water utility is in transition to becoming fully metered, and a large number of customers remain unmetered. A rough estimate of the annual consumption for all unmetered accounts is included in the annual water audit, with no inspection of individual unmetered accounts.	Conditions between 4 and 6	Water utility policy does require metering and volume based billing but established exemptions exist for a portion of accounts such as municipal buildings. As many as 15% of billed accounts are unmetered due to this exemption or meter installation difficulties. Only a group estimate of annual consumption for all unmetered accounts is included in the annual water audit, with no inspection of individual unmetered accounts.	Conditions between 6 and 8	Water utility policy does require metering and volume based billing for all customer accounts. However, less than 5% of billed accounts remain unmetered because meter installation is hindered by unusual circumstances. The goal is to minimize the number of unmetered accounts. Reliable estimates of consumption are obtained for these unmetered accounts via site specific estimation methods.	Conditions between 8 and 10	Water utility policy does require metering and volume based billing for all customer accounts. Less than 2% of billed accounts are unmetered and exist because meter installation is hindered by unusual circumstances. The goal exists to minimize the number of unmetered accounts to the extent that is economical. Reliable estimates of consumption are obtained at these accounts via site specific estimation methods.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Improvements to attain higher data grading for "Billed Unmetered Consumption" component:		to qualify for 2: Conduct research and evaluate cost/benefit of a new water utility policy to require metering of the customer population; thereby greatly reducing or eliminating unmetered accounts. Conduct pilot metering project by installing water meters in small sample of customer accounts and periodically reading the meters or datalogging the water consumption over one, three, or seven day periods.	to qualify for 4: Implement a new water utility policy requiring customer metering. Launch or expand pilot metering study to include several different meter types, which will provide data for economic assessment of full scale metering options. Assess sites with access difficulties to devise means to obtain water consumption volumes. Begin customer meter installation.		to qualify for 6: Refine policy and procedures to improve customer metering participation for all but solidly exempt accounts. Assign staff resources to review billing records to identify errant unmetered properties. Specify metering needs and funding requirements to install sufficient meters to significant reduce the number of unmetered accounts		to qualify for 8: Push to install customer meters on a full scale basis. Refine metering policy and procedures to ensure that all accounts, including municipal properties, are designated for meters. Plan special efforts to address "hard-to-access" accounts. Implement procedures to obtain a reliable consumption estimate for the remaining few unmetered accounts awaiting meter installation.		to qualify for 10: Continue customer meter installation throughout the service area, with a goal to minimize unmetered accounts. Sustain the effort to investigate accounts with access difficulties, and devise means to install water meters or otherwise measure water consumption.		to maintain 10: Continue to refine estimation methods for unmetered consumption and explore means to establish metering, for as many billed remaining unmetered accounts as is economically feasible.
Unbilled metered:	select n/a if all billing-exempt consumption is unmetered.	Billing practices exempt certain accounts, such as municipal buildings, but written policies do not exist; and a reliable count of unbilled metered accounts is unavailable. Meter upkeep and meter reading on these accounts is rare and not considered a priority. Due to poor recordkeeping and lack of auditing, water consumption for all such accounts is purely guesstimated.	Billing practices exempt certain accounts, such as municipal buildings, but only scattered, dated written directives exist to justify this practice. A reliable count of unbilled metered accounts is unavailable. Sporadic meter replacement and meter reading occurs on an as-needed basis. The total annual water consumption for all unbilled, metered accounts is estimated based upon approximating the number of accounts and assigning consumption from actively billed accounts of same meter size.	Conditions between 2 and 4	Dated written procedures permit billing exemption for specific accounts, such as municipal properties, but are unclear regarding certain other types of accounts. Meter reading is given low priority and is sporadic. Consumption is quantified from meter readings where available. The total number of unbilled, unmetered accounts must be estimated along with consumption volumes.	Conditions between 4 and 6	Written policies regarding billing exemptions exist but adherence in practice is questionable. Metering and meter reading for municipal buildings is reliable but sporadic for other unbilled metered accounts. Periodic auditing of such accounts is conducted. Water consumption is quantified directly from meter readings where available, but the majority of the consumption is estimated.	Conditions between 6 and 8	Written policy identifies the types of accounts granted a billing exemption. Customer meter management and meter reading are considered secondary priorities, but meter reading is conducted at least annually to obtain consumption volumes for the annual water audit. High level auditing of billing records ensures that a reliable census of such accounts exists.	Conditions between 8 and 10	Clearly written policy identifies the types of accounts given a billing exemption, with emphasis on keeping such accounts to a minimum. Customer meter management and meter reading for these accounts is given proper priority and is reliably conducted. Regular auditing confirms this. Total water consumption for these accounts is taken from reliable readings from accurate meters.
Improvements to attain higher data grading for "Unbilled Metered Consumption" component:		to qualify for 2: Reassess the water utility's policy allowing certain accounts to be granted a billing exemption. Draft an outline of a new written policy for billing exemptions, with clear justification as to why any accounts should be exempt from billing, and with the intention to keep the number of such accounts to a minimum.	to qualify for 4: Review historic written directives and policy documents allowing certain accounts to be billing-exempt. Draft an outline of a written policy for billing exemptions, identify criteria that grants an exemption, with a goal of keeping this number of accounts to a minimum. Consider increasing the priority of reading meters on unbilled accounts at least annually.		to qualify for 6: Draft a new written policy regarding billing exemptions based upon consensus criteria allowing this occurrence. Assign resources to audit meter records and billing records to obtain census of unbilled metered accounts. Gradually include a greater number of these metered accounts to the routes for regular meter reading.		to qualify for 8: Communicate billing exemption policy throughout the organization and implement procedures that ensure proper account management. Conduct inspections of accounts confirmed in unbilled metered status and verify that accurate meters exist and are scheduled for routine meter readings. Gradually increase the number of unbilled metered accounts that are included in regular meter reading routes.		to qualify for 10: Ensure that meter management (meter accuracy testing, meter replacement) and meter reading activities for unbilled accounts are accorded the same priority as billed accounts. Establish ongoing annual auditing process to ensure that water consumption is reliably collected and provided to the annual water audit process.		to maintain 10: Reassess the utility's philosophy in allowing any water uses to go "unbilled". It is possible to meter and bill all accounts, even if the fee charged for water consumption is discounted or waived. Metering and billing all accounts ensures that water consumption is tracked and water waste from plumbing leaks is detected and minimized.
Unbilled unmetered:		Extent of unbilled, unmetered consumption is unknown due to unclear policies and poor recordkeeping. Total consumption is quantified based upon a purely subjective estimate.	Clear extent of unbilled, unmetered consumption is unknown, but a number of events are randomly documented each year, confirming existence of such consumption, but without sufficient documentation to quantify an accurate estimate of the annual volume consumed.	Conditions between 2 and 4	Extent of unbilled, unmetered consumption is partially known, and procedures exist to document certain events such as miscellaneous fire hydrant uses. Formulae is used to quantify the consumption from such events (time running multiplied by typical flowrate, multiplied by number of events).	Default value of 1.25% of system input volume is employed	Coherent policies exist for some forms of unbilled, unmetered consumption but others await closer evaluation. Reasonable recordkeeping for the managed uses exists and allows for annual volumes to be quantified by inference, but unsupervised uses are guesstimated.	Conditions between 6 and 8	Clear policies and good recordkeeping exist for some uses (ex: water used in periodic testing of unmetered fire connections), but other uses (ex: miscellaneous uses of fire hydrants) have limited oversight. Total consumption is a mix of well quantified use such as from formulae (time running multiplied by typical flow, multiplied by number of events) or temporary meters, and relatively subjective estimates of less regulated use.	Conditions between 8 and 10	Clear policies exist to identify permitted use of water in unbilled, unmetered fashion, with the intention of minimizing this type of consumption. Good records document each occurrence and consumption is quantified via formulae (time running multiplied by typical flow, multiplied by number of events) or use of temporary meters.
Improvements to attain higher data grading for "Unbilled Unmetered Consumption" component:		to qualify for 5: Utilize the accepted default value of 1.25% of the volume of water supplied as an expedient means to gain a reasonable quantification of this use. to qualify for 2: Establish a policy regarding what water uses should be allowed to remain as unbilled and unmetered. Consider tracking a small sample of one such use (ex: fire hydrant flushing).	to qualify for 5: Utilize accepted default value of 1.25% of the volume of water supplied as an expedient means to gain a reasonable quantification of this use. to qualify for 4: Evaluate the documentation of events that have been observed. Meet with user groups (ex: fire hydrants - fire departments, contractors to ascertain their need and/or volume requirements for water from fire hydrants).		to qualify for 5: Utilize accepted default value of 1.25% of the volume of water supplied as an expedient means to gain a reasonable quantification of all such use. This is particularly appropriate for water utilities who are in the early stages of the water auditing process, and should focus on other components since the volume of unbilled, unmetered consumption is usually a relatively small quantity component, and other larger-quantity components should take priority.	to qualify for 6 or greater: Finalize policy and begin to conduct field checks to better establish and quantify such usage. Proceed if top-down audit exists and/or a great volume of such use is suspected.	to qualify for 8: Assess water utility policy and procedures for various unmetered usages. For example, ensure that a policy exists and permits are issued for use of fire hydrants by persons outside of the utility. Create written procedures for use and documentation of fire hydrants by water utility personnel. Use same approach for other types of unbilled, unmetered water usage.		to qualify for 10: Refine written procedures to ensure that all uses of unbilled, unmetered water are overseen by a structured permitting process managed by water utility personnel. Reassess policy to determine if some of these uses have value in being converted to billed and/or metered status.		to maintain 10: Continue to refine policy and procedures with intention of reducing the number of allowable uses of water in unbilled and unmetered fashion. Any uses that can feasibly become billed and metered should be converted eventually.
APPARENT LOSSES											

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Unauthorized consumption:		Extent of unauthorized consumption is unknown due to unclear policies and poor recordkeeping. Total unauthorized consumption is guesstimated.	Unauthorized consumption is a known occurrence, but its extent is a mystery. There are no requirements to document observed events, but periodic field reports capture some of these occurrences. Total unauthorized consumption is approximated from this limited data.	conditions between 2 and 4	Procedures exist to document some unauthorized consumption such as observed unauthorized fire hydrant openings. Use formulae to quantify this consumption (time running multiplied typical flowrate, multiplied by number of events).	Default value of 0.25% of volume of water supplied is employed	Coherent policies exist for some forms of unauthorized consumption (more than simply fire hydrant misuse) but others await closer evaluation. Reasonable surveillance and recordkeeping exist for occurrences that fall under the policy. Volumes quantified by inference from these records.	Conditions between 6 and 8	Clear policies and good auditable recordkeeping exist for certain events (ex: tampering with water meters, illegal bypasses of customer meters); but other occurrences have limited oversight. Total consumption is a combination of volumes from formulae (time x typical flow) and subjective estimates of unconfirmed consumption.	Conditions between 8 and 10	Clear policies exist to identify all known unauthorized uses of water. Staff and procedures exist to provide enforcement of policies and detect violations. Each occurrence is recorded and quantified via formulae (estimated time running multiplied by typical flow) or similar methods. All records and calculations should exist in a form that can be audited by a third party.
Improvements to attain higher data grading for "Unauthorized Consumption" component:		to qualify for 5: Use accepted default of 0.25% of volume of water supplied. to qualify for 2: Review utility policy regarding what water uses are considered unauthorized, and consider tracking a small sample of one such occurrence (ex: unauthorized fire hydrant openings)	to qualify for 5: Use accepted default of 0.25% of system input volume to qualify for 4: Review utility policy regarding what water uses are considered unauthorized, and consider tracking a small sample of one such occurrence (ex: unauthorized fire hydrant openings)		to qualify for 5: Utilize accepted default value of 0.25% of volume of water supplied as an expedient means to gain a reasonable quantification of all such use. This is particularly appropriate for water utilities who are in the early stages of the water auditing process.	to qualify for 6 or greater: Finalize policy updates to clearly identify the types of water consumption that are authorized from those usages that fall outside of this policy and are, therefore, unauthorized. Begin to conduct regular field checks. Proceed if the top-down audit already exists and/or a great volume of such use is suspected.	to qualify for 8: Assess water utility policies to ensure that all known occurrences of unauthorized consumption are outlawed, and that appropriate penalties are prescribed. Create written procedures for detection and documentation of various occurrences of unauthorized consumption as they are uncovered.		to qualify for 10: Refine written procedures and assign staff to seek out likely occurrences of unauthorized consumption. Explore new locking devices, monitors and other technologies designed to detect and thwart unauthorized consumption.		to maintain 10: Continue to refine policy and procedures to eliminate any loopholes that allow or tacitly encourage unauthorized consumption. Continue to be vigilant in detection, documentation and enforcement efforts.
Customer metering inaccuracies:	select n/a only if the entire customer population is unmetered. In such a case the volume entered must be zero.	Customer meters exist, but with unorganized paper records on meters; no meter accuracy testing or meter replacement program for any size of retail meter. Metering workflow is driven chaotically with no proactive management. Loss volume due to aggregate meter inaccuracy is guesstimated.	Poor recordkeeping and meter oversight is recognized by water utility management who has allotted staff and funding resources to organize improved recordkeeping and start meter accuracy testing. Existing paper records gathered and organized to provide cursory disposition of meter population. Customer meters are tested for accuracy only upon customer request.	Conditions between 2 and 4	Reliable recordkeeping exists; meter information is improving as meters are replaced. Meter accuracy testing is conducted annually for a small number of meters (more than just customer requests, but less than 1% of inventory). A limited number of the oldest meters are replaced each year. Inaccuracy volume is largely an estimate, but refined based upon limited testing data.	Conditions between 4 and 6	A reliable electronic recordkeeping system for meters exists. The meter population includes a mix of new high performing meters and dated meters with suspect accuracy. Routine, but limited, meter accuracy testing and meter replacement occur. Inaccuracy volume is quantified using a mix of reliable and less certain data.	Conditions between 6 and 8	Ongoing meter replacement and accuracy testing result in highly accurate customer meter population. Statistically significant number of meters are tested in audit year. This testing is conducted on samples of meters of varying age and accumulated volume of throughput to determine optimum replacement time for various types of meters.	Ongoing meter replacement and accuracy testing result in highly accurate customer meter population. Statistically significant number of meters are tested in audit year. This testing is conducted on samples of meters of varying age and accumulated volume of throughput to determine optimum replacement time for these meters.	Good records of all active customer meters exist and include as a minimum: meter number, account number/location, type, size and manufacturer. Ongoing meter replacement occurs according to a targeted and justified basis. Regular meter accuracy testing gives a reliable measure of composite inaccuracy volume for the customer meter population. New metering technology is embraced to keep overall accuracy improving. Procedures are reviewed by a third party knowledgeable in the M36 methodology.
Improvements to attain higher data grading for "Customer meter inaccuracy volume" component:	If n/a is selected because the customer meter population is unmetered, consider establishing a new policy to meter the customer population and employ water rates based upon metered volumes.	to qualify for 2: Gather available meter purchase records. Conduct testing on a small number of meters believed to be the most inaccurate. Review staffing needs of the metering group and budget for necessary resources to better organize meter management.	to qualify for 4: Implement a reliable record keeping system for customer meter histories, preferably using electronic methods typically linked to, or part of, the Customer Billing System or Customer Information System. Expand meter accuracy testing to a larger group of meters.		to qualify for 6: Standardize the procedures for meter recordkeeping within an electronic information system. Accelerate meter accuracy testing and meter replacements guided by testing results.		to qualify for 8: Expand annual meter accuracy testing to evaluate a statistically significant number of meter makes/models. Expand meter replacement program to replace statistically significant number of poor performing meters each year.		to qualify for 9: Continue efforts to manage meter population with reliable recordkeeping. Test a statistically significant number of meters each year and analyze test results in an ongoing manner to serve as a basis for a target meter replacement strategy based upon accumulated volume throughput.	to qualify for 10: Continue efforts to manage meter population with reliable recordkeeping, meter testing and replacement. Evaluate new meter types and install one or more types in 5-10 customer accounts each year in order to pilot improving metering technology.	to maintain 10: Increase the number of meters tested and replaced as justified by meter accuracy test data. Continually monitor development of new metering technology and Advanced Metering Infrastructure (AMI) to grasp opportunities for greater accuracy in metering of water flow and management of customer consumption data.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Systematic Data Handling Errors:	Note: all water utilities incur some amount of this error. Even in water utilities with unmetered customer populations and fixed rate billing, errors occur in annual billing tabulations. Enter a positive value for the volume and select a grading.	Policies and procedures for activation of new customer water billing accounts are vague and lack accountability. Billing data is maintained on paper records which are not well organized. No auditing is conducted to confirm billing data handling efficiency. An unknown number of customers escape routine billing due to lack of billing process oversight.	Policy and procedures for activation of new customer accounts and oversight of billing records exist but need refinement. Billing data is maintained on paper records or insufficiently capable electronic database. Only periodic unstructured auditing work is conducted to confirm billing data handling efficiency. The volume of unbilled water due to billing lapses is a guess.	Conditions between 2 and 4	Policy and procedures for new account activation and oversight of billing operations exist but needs refinement. Computerized billing system exists, but is dated or lacks needed functionality. Periodic, limited internal audits conducted and confirm with approximate accuracy the consumption volumes lost to billing lapses.	Conditions between 4 and 6	Policy and procedures for new account activation and oversight of billing operations is adequate and reviewed periodically. Computerized billing system is in use with basic reporting available. Any effect of billing adjustments on measured consumption volumes is well understood. Internal checks of billing data error conducted annually. Reasonably accurate quantification of consumption volume lost to billing lapses is obtained.	Conditions between 6 and 8	New account activation and billing operations policy and procedures are reviewed at least biannually. Computerized billing system includes an array of reports to confirm billing data and system functionality. Checks are conducted routinely to flag and explain zero consumption accounts. Annual internal checks conducted with third party audit conducted at least once every five years. Accountability checks flag billing lapses. Consumption lost to billing lapses is well quantified and reducing year-by-year.	Conditions between 8 and 10	Sound written policy and procedures exist for new account activation and oversight of customer billing operations. Robust computerized billing system gives high functionality and reporting capabilities which are utilized, analyzed and the results reported each billing cycle. Assessment of policy and data handling errors are conducted internally and audited by third party at least once every three years, ensuring consumption lost to billing lapses is minimized and detected as it occurs.
Improvements to attain higher data grading for "Systematic Data Handling Error volume" component:		to qualify for 2: Draft written policy and procedures for activating new water billing accounts and oversight of billing operations. Investigate and budget for computerized customer billing system. Conduct initial audit of billing records by flow-charting the basic business processes of the customer account/billing function.	to qualify for 4: Finalize written policy and procedures for activation of new billing accounts and overall billing operations management. Implement a computerized customer billing system. Conduct initial audit of billing records as part of this process.		to qualify for 6: Refine new account activation and billing operations procedures and ensure consistency with the utility policy regarding billing, and minimize opportunity for missed billings. Upgrade or replace customer billing system for needed functionality - ensure that billing adjustments don't corrupt the value of consumption volumes. Procedurize internal annual audit process.		to qualify for 8: Formalize regular review of new account activation process and general billing practices. Enhance reporting capability of computerized billing system. Formalize regular auditing process to reveal scope of data handling error. Plan for periodic third party audit to occur at least once every five years.		to qualify for 10: Close policy/procedure loopholes that allow some customer accounts to go unbilled, or data handling errors to exist. Ensure that billing system reports are utilized, analyzed and reported every billing cycle. Ensure that internal and third party audits are conducted at least once every three years.		to maintain 10: Stay abreast of customer information management developments and innovations. Monitor developments of Advanced Metering Infrastructure (AMI) and integrate technology to ensure that customer endpoint information is well-monitored and errors/lapses are at an economic minimum.
SYSTEM DATA											
Length of mains:		Poorly assembled and maintained paper as-built records of existing water main installations makes accurate determination of system pipe length impossible. Length of mains is guesstimated.	Paper records in poor or uncertain condition (no annual tracking of installations & abandonments). Poor procedures to ensure that new water mains installed by developers are accurately documented.	Conditions between 2 and 4	Sound written policy and procedures exist for documenting new water main installations, but gaps in management result in an uncertain degree of error in tabulation of mains length.	Conditions between 4 and 6	Sound written policy and procedures exist for permitting and commissioning new water mains. Highly accurate paper records with regular field validation; or electronic records and asset management system in good condition. Includes system backup.	Conditions between 6 and 8	Sound written policy and procedures exist for permitting and commissioning new water mains. Electronic recordkeeping such as a Geographic Information System (GIS) and asset management system are used to store and manage data.	Conditions between 8 and 10	Sound written policy exists for managing water mains extensions and replacements. Geographic Information System (GIS) data and asset management database agree and random field validation proves truth of databases. Records of annual field validation should be available for review.
Improvements to attain higher data grading for "Length of Water Mains" component:		to qualify for 2: Assign personnel to inventory current as-built records and compare with customer billing system records and highway plans in order to verify poorly documented pipelines. Assemble policy documents regarding permitting and documentation of water main installations by the utility and building developers; identify gaps in procedures that result in poor documentation of new water main installations.	to qualify for 4: Complete inventory of paper records of water main installations for several years prior to audit year. Review policy and procedures for commissioning and documenting new water main installation.		to qualify for 6: Finalize updates/improvements to written policy and procedures for permitting/commissioning new main installations. Confirm inventory of records for five years prior to audit year; correct any errors or omissions.		to qualify for 8: Launch random field checks of limited number of locations. Convert to electronic database such as a Geographic Information System (GIS) with backup as justified. Develop written policy and procedures.		to qualify for 10: Link Geographic Information System (GIS) and asset management databases, conduct field verification of data. Record field verification information at least annually.		to maintain 10: Continue with standardization and random field validation to improve the completeness and accuracy of the system.
Number of active AND inactive service connections:		Vague permitting (of new service connections) policy and poor paper recordkeeping of customer connections/billings result in suspect determination of the number of service connections, which may be 10-15% in error from actual count.	General permitting policy exists but paper records, procedural gaps, and weak oversight result in questionable total for number of connections, which may vary 5-10% of actual count.	Conditions between 2 and 4	Written account activation policy and procedures exist, but with some gaps in performance and oversight. Computerized information management system is being brought online to replace dated paper recordkeeping system. Reasonably accurate tracking of service connection installations & abandonments; but count can be up to 5% in error from actual total.	Conditions between 4 and 6	Written new account activation and overall billing policies and procedures are adequate and reviewed periodically. Computerized information management system is in use with annual installations & abandonments totaled. Very limited field verifications and audits. Error in count of number of service connections is believed to be no more than 3%.	Conditions between 6 and 8	Policies and procedures for new account activation and overall billing operations are written, well-structured and reviewed at least biannually. Well-managed computerized information management system exists and routine, periodic field checks and internal system audits are conducted. Counts of connections are no more than 2% in error.	Conditions between 8 and 10	Sound written policy and well managed and audited procedures ensure reliable management of service connection population. Computerized information management system, Customer Billing System, and Geographic Information System (GIS) information agree; field validation proves truth of databases. Count of connections recorded as being in error is less than 1% of the entire population.
Improvements to attain higher data grading for "Number of Active and Inactive Service Connections" component:	Note: The number of Service Connections does not include fire hydrant leads/lines connecting the hydrant to the water main	to qualify for 2: Draft new policy and procedures for new account activation and overall billing operations. Research and collect paper records of installations & abandonments for several years prior to audit year.	to qualify for 4: Refine policy and procedures for new account activation and overall billing operations. Research computerized recordkeeping system (Customer Information System or Customer Billing System) to improve documentation format for service connections.		to qualify for 6: Refine procedures to ensure consistency with new account activation and overall billing policy to establish new service connections or decommission existing connections. Improve process to include all totals for at least five years prior to audit year.		to qualify for 8: Formalize regular review of new account activation and overall billing operations policies and procedures. Launch random field checks of limited number of locations. Develop reports and auditing mechanisms for computerized information management system.		to qualify for 10: Close any procedural loopholes that allow installations to go undocumented. Link computerized information management system with Geographic Information System (GIS) and formalize field inspection and information system auditing processes. Documentation of new or decommissioned service connections encounters several levels of checks and balances.		to maintain 10: Continue with standardization and random field validation to improve knowledge of system.
	Note: if customer water	Gratings 1-9 apply if customer properties are unmetered, if customer meters exist and are located inside the customer building premises, or if the water utility owns and is responsible for the entire service connection piping from the water main to the customer building. In any of these cases the average distance between the curb stop or boundary separating utility/customer responsibility for service connection piping, and the typical first point of use (ex: faucet) or the customer meter must be quantified. Gratings of 1-9 are used to grade the validity of the means to quantify this value. (See the "Service Connection Diagram" worksheet)									Either of two conditions can be met for a grading of 10:

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Average length of customer service line:	meters are located outside of the customer building next to the curb stop or boundary separating utility/customer responsibility, then the auditor should answer "Yes" to the question on the Reporting Worksheet asking about this. If the answer is Yes, the grading description listed under the Grading of 10(a) will be followed, with a value of zero automatically entered at a Grading of 10. See the Service Connection Diagram worksheet for a visual presentation of this distance.	Vague policy exists to define the delineation of water utility ownership and customer ownership of the service connection piping. Curb stops are perceived as the breakpoint but these have not been well-maintained or documented. Most are buried or obscured. Their location varies widely from site-to-site, and estimating this distance is arbitrary due to the unknown location of many curb stops.	Policy requires that the curb stop serves as the delineation point between water utility ownership and customer ownership of the service connection piping. The piping from the water main to the curb stop is the property of the water utility, and the piping from the curb stop to the customer building is owned by the customer. Curb stop locations are not well documented and the average distance is based upon a limited number of locations measured in the field.	Conditions between 2 and 4	Good policy requires that the curb stop serves as the delineation point between water utility ownership and customer ownership of the service connection piping. Curb stops are generally installed as needed and are reasonably documented. Their location varies widely from site-to-site, and an estimate of this distance is hindered by the availability of paper records of limited accuracy.	Conditions between 4 and 6	Clear written policy exists to define utility/customer responsibility for service connection piping. Accurate, well-maintained paper or basic electronic recordkeeping system exists. Periodic field checks confirm piping lengths for a sample of customer properties.	Conditions between 6 and 8	Clearly worded policy standardizes the location of curb stops and meters, which are inspected upon installation. Accurate and well maintained electronic records exist with periodic field checks to confirm locations of service lines, curb stops and customer meter pits. An accurate number of customer properties from the customer billing system allows for reliable averaging of this length.	Conditions between 8 and 10	a) Customer water meters exist outside of customer buildings next to the curb stop or boundary separating utility/customer responsibility for service connection piping. If so, answer "Yes" to the question on the Reporting Worksheet asking about this condition. A value of zero and a Grading of 10 are automatically entered in the Reporting Worksheet. b) Meters exist inside customer buildings, or properties are unmetered. In either case, answer "No" to the Reporting Worksheet question on meter location, and enter a distance determined by the auditor. For a Grading of 10 this value must be a very reliable number from a Geographic Information System (GIS) and confirmed by a statistically valid number of field checks.
Improvements to attain higher data grading for "Average Length of Customer Service Line" component:		<u>to qualify for 2:</u> Research and collect paper records of service line installations. Inspect several sites in the field using pipe locators to locate curb stops. Obtain the length of this small sample of connections in this manner.	<u>to qualify for 4:</u> Formalize and communicate policy delineating utility/customer responsibilities for service connection piping. Assess accuracy of paper records by field inspection of a small sample of service connections using pipe locators as needed. Research the potential migration to a computerized information management system to store service connection data.		<u>to qualify for 6:</u> Establish coherent procedures to ensure that policy for curb stop, meter installation and documentation is followed. Gain consensus within the water utility for the establishment of a computerized information management system.		<u>to qualify for 8:</u> Implement an electronic means of recordkeeping, typically via a customer information system, customer billing system, or Geographic Information System (GIS). Standardize the process to conduct field checks of a limited number of locations.		<u>to qualify for 10:</u> Link customer information management system and Geographic Information System (GIS), standardize process for field verification of data.		<u>to maintain 10:</u> Continue with standardization and random field validation to improve knowledge of service connection configurations and customer meter locations.
Average operating pressure:		Available records are poorly assembled and maintained paper records of supply pump characteristics and water distribution system operating conditions. Average pressure is guesstimated based upon this information and ground elevations from crude topographical maps. Widely varying distribution system pressures due to undulating terrain, high system head loss and weak/erratic pressure controls further compromise the validity of the average pressure calculation.	Limited telemetry monitoring of scattered pumping station and water storage tank sites provides some static pressure data, which is recorded in handwritten logbooks. Pressure data is gathered at individual sites only when low pressure complaints arise. Average pressure is determined by averaging relatively crude data, and is affected by significant variation in ground elevations, system head loss and gaps in pressure controls in the distribution system.	Conditions between 2 and 4	Effective pressure controls separate different pressure zones; moderate pressure variation across the system, occasional open boundary valves are discovered that breach pressure zones. Basic telemetry monitoring of the distribution system logs pressure data electronically. Pressure data gathered by gauges or dataloggers at fire hydrants or buildings when low pressure complaints arise, and during fire flow tests and system flushing. Reliable topographical data exists. Average pressure is calculated using this mix of data.	Conditions between 4 and 6	Reliable pressure controls separate distinct pressure zones; only very occasional open boundary valves are encountered that breach pressure zones. Well-covered telemetry monitoring of the distribution system (not just pumping at source treatment plants or wells) logs extensive pressure data electronically. Pressure gathered by gauges/dataloggers at fire hydrants and buildings when low pressure complaints arise, and during fire flow tests and system flushing. Average pressure is determined by using this mix of reliable data.	Conditions between 6 and 8	Well-managed, discrete pressure zones exist with generally predictable pressure fluctuations. A current full-scale SCADA System or similar realtime monitoring system exists to monitor the water distribution system and collect data, including real time pressure readings at representative sites across the system. The average system pressure is determined from reliable monitoring system data.	Conditions between 8 and 10	Well-managed pressure districts/zones, SCADA System and hydraulic model exist to give very precise pressure data across the water distribution system. Average system pressure is reliably calculated from extensive, reliable, and cross-checked data. Calculations are reported on an annual basis as a minimum.
Improvements to attain higher data grading for "Average Operating Pressure" component:		<u>to qualify for 2:</u> Employ pressure gauging and/or datalogging equipment to obtain pressure measurements from fire hydrants. Locate accurate topographical maps of service area in order to confirm ground elevations. Research pump data sheets to find pump pressure/flow characteristics	<u>to qualify for 4:</u> Formalize a procedure to use pressure gauging/datalogging equipment to gather pressure data during various system events such as low pressure complaints, or operational testing. Gather pump pressure and flow data at different flow regimes. Identify faulty pressure controls (pressure reducing valves, altitude valves, partially open boundary valves) and plan to properly configure pressure zones. Make all pressure data from these efforts available to generate system-wide average pressure.		<u>to qualify for 6:</u> Expand the use of pressure gauging/datalogging equipment to gather scattered pressure data at a representative set of sites, based upon pressure zones or areas. Utilize pump pressure and flow data to determine supply head entering each pressure zone or district. Correct any faulty pressure controls (pressure reducing valves, altitude valves, partially open boundary valves) to ensure properly configured pressure zones. Use expanded pressure dataset from these activities to generate system-wide average pressure.		<u>to qualify for 8:</u> Install a Supervisory Control and Data Acquisition (SCADA) System, or similar realtime monitoring system, to monitor system parameters and control operations. Set regular calibration schedule for instrumentation to insure data accuracy. Obtain accurate topographical data and utilize pressure data gathered from field surveys to provide extensive, reliable data for pressure averaging.		<u>to qualify for 10:</u> Annually, obtain a system-wide average pressure value from the hydraulic model of the distribution system that has been calibrated via field measurements in the water distribution system and confirmed in comparisons with SCADA System data.		<u>to maintain 10:</u> Continue to refine the hydraulic model of the distribution system and consider linking it with SCADA System for real-time pressure data calibration, and averaging.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
COST DATA											
Total annual cost of operating water system:		Incomplete paper records and lack of financial accounting documentation on many operating functions makes calculation of water system operating costs a pure guesstimate	Reasonably maintained, but incomplete, paper or electronic accounting provides data to estimate the major portion of water system operating costs.	Conditions between 2 and 4	Electronic, industry-standard cost accounting system in place. However, gaps in data are known to exist, periodic internal reviews are conducted but not a structured financial audit.	Conditions between 4 and 6	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited periodically by utility personnel, but not a Certified Public Accountant (CPA).	Conditions between 6 and 8	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited at least annually by utility personnel, and at least once every three years by third-party CPA.	Conditions between 8 and 10	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited annually by utility personnel and annually also by third-party CPA.
Improvements to attain higher data grading for "Total Annual Cost of Operating the Water System" component:		<u>to qualify for 2:</u> Gather available records, institute new financial accounting procedures to regularly collect and audit basic cost data of most important operations functions.	<u>to qualify for 4:</u> Implement an electronic cost accounting system, structured according to accounting standards for water utilities		<u>to qualify for 6:</u> Establish process for periodic internal audit of water system operating costs; identify cost data gaps and institute procedures for tracking these outstanding costs.		<u>to qualify for 8:</u> Standardize the process to conduct routine financial audit on an annual basis. Arrange for CPA audit of financial records at least once every three years.		<u>to qualify for 10:</u> Standardize the process to conduct a third-party financial audit by a CPA on an annual basis.		<u>to maintain 10:</u> Maintain program, stay abreast of expenses subject to erratic cost changes and long-term cost trend, and budget/track costs proactively
Customer retail unit cost (applied to Apparent Losses):	Customer population unmetered, and/or only a fixed fee is charged for consumption.	Antiquated, cumbersome water rate structure is used, with periodic historic amendments that were poorly documented and implemented; resulting in classes of customers being billed inconsistent charges. The actual composite billing rate likely differs significantly from the published water rate structure, but a lack of auditing leaves the degree of error indeterminate.	Dated, cumbersome water rate structure, not always employed consistently in actual billing operations. The actual composite billing rate is known to differ from the published water rate structure, and a reasonably accurate estimate of the degree of error is determined, allowing a composite billing rate to be quantified.	Conditions between 2 and 4	Straight-forward water rate structure in use, but not updated in several years. Billing operations reliably employ the rate structure. The composite billing rate is derived from a single customer class such as residential customer accounts, neglecting the effect of different rates from varying customer classes.	Conditions between 4 and 6	Clearly written, up-to-date water rate structure is in force and is applied reliably in billing operations. Composite customer rate is determined using a weighted average residential rate using volumes of water in each rate block.	Conditions between 6 and 8	Effective water rate structure is in force and is applied reliably in billing operations. Composite customer rate is determined using a weighted average composite consumption rate, which includes residential, commercial, industrial, institutional (CII), and any other distinct customer classes within the water rate structure.	Conditions between 8 and 10	Current, effective water rate structure is in force and applied reliably in billing operations. The rate structure and calculations of composite rate - which includes residential, commercial, industrial, institutional (CII), and other distinct customer classes - are reviewed by a third party knowledgeable in the M36 methodology at least once every five years.
Improvements to attain higher data grading for "Customer Retail Unit Cost" component:		<u>to qualify for 2:</u> Formalize the process to implement water rates, including a secure documentation procedure. Create a current, formal water rate document and gain approval from all stakeholders.	<u>to qualify for 4:</u> Review the water rate structure and update/formalize as needed. Assess billing operations to ensure that actual billing operations incorporate the established water rate structure.		<u>to qualify for 6:</u> Evaluate volume of water used in each usage block by residential users. Multiply volumes by full rate structure.	<u>Launch effort to fully meter the customer population and charge rates based upon water volumes</u>	<u>to qualify for 8:</u> Evaluate volume of water used in each usage block by all classifications of users. Multiply volumes by full rate structure.		<u>to qualify for 10:</u> Conduct a periodic third-party audit of water used in each usage block by all classifications of users. Multiply volumes by full rate structure.		<u>to maintain 10:</u> Keep water rate structure current in addressing the water utility's revenue needs. Update the calculation of the customer unit rate as new rate components, customer classes, or other components are modified.
Variable production cost (applied to Real Losses):	Note: if the water utility purchases/imports its entire water supply, then enter the unit purchase cost of the bulk water supply in the Reporting Worksheet with a grading of 10	Incomplete paper records and lack of documentation on primary operating functions (electric power and treatment costs most importantly) makes calculation of variable production costs a pure guesstimate	Reasonably maintained, but incomplete, paper or electronic accounting provides data to roughly estimate the basic operations costs (pumping power costs and treatment costs) and calculate a unit variable production cost.	Conditions between 2 and 4	Electronic, industry-standard cost accounting system in place. Electric power and treatment costs are reliably tracked and allow accurate weighted calculation of unit variable production costs based on these two inputs and water imported purchase costs (if applicable). All costs are audited internally on a periodic basis.	Conditions between 4 and 6	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Pertinent additional costs beyond power, treatment and water imported purchase costs (if applicable) such as liability, residuals management, wear and tear on equipment, impending expansion of supply, are included in the unit variable production cost, as applicable. The data is audited at least annually by utility personnel.	Conditions between 6 and 8	Reliable electronic, industry-standard cost accounting system in place, with all pertinent primary and secondary variable production and water imported purchase (if applicable) costs tracked. The data is audited at least annually by utility personnel, and at least once every three years by a third-party knowledgeable in the M36 methodology.	Conditions between 8 and 10	Either of two conditions can be met to obtain a grading of 10: 1) Third party CPA audit of all pertinent primary and secondary variable production and water imported purchase (if applicable) costs on an annual basis, or: 2) Water supply is entirely purchased as bulk imported water, and unit purchase cost serves as the variable production cost.
Improvements to attain higher data grading for "Variable Production Cost" component:		<u>to qualify for 2:</u> Gather available records, institute new procedures to regularly collect and audit basic cost data and most important operations functions.	<u>to qualify for 4:</u> Implement an electronic cost accounting system, structured according to accounting standards for water utilities		<u>to qualify for 6:</u> Formalize process for regular internal audits of production costs. Assess whether additional costs (liability, residuals management, equipment wear, impending infrastructure expansion) should be included to calculate a more representative variable production cost.		<u>to qualify for 8:</u> Formalize the accounting process to include direct cost components (power, treatment) as well as indirect cost components (liability, residuals management, etc.) Arrange to conduct audits by a knowledgeable third-party at least once every three years.		<u>to qualify for 10:</u> Standardize the process to conduct a third-party financial audit by a CPA on an annual basis.		<u>to maintain 10:</u> Maintain program, stay abreast of expenses subject to erratic cost changes and budget/track costs proactively



AWWA Free Water Audit Software: Determining Water Loss Standing

WAS v5.0

American Water Works Association.
Copyright © 2014, All Rights Reserved.Water Audit Report for: **Santaquin**Reporting Year: **2019** **1/2019 - 12/2019**Data Validity Score: **65**

Water Loss Control Planning Guide

Functional Focus Area	Water Audit Data Validity Level / Score				
	Level I (0-25)	Level II (26-50)	Level III (51-70)	Level IV (71-90)	Level V (91-100)
Audit Data Collection	Launch auditing and loss control team; address production metering deficiencies	Analyze business process for customer metering and billing functions and water supply operations. Identify data gaps.	Establish/revise policies and procedures for data collection	Refine data collection practices and establish as routine business process	Annual water audit is a reliable gauge of year-to-year water efficiency standing
Short-term loss control	Research information on leak detection programs. Begin flowcharting analysis of customer billing system	Conduct loss assessment investigations on a sample portion of the system: customer meter testing, leak survey, unauthorized consumption, etc.	Establish ongoing mechanisms for customer meter accuracy testing, active leakage control and infrastructure monitoring	Refine, enhance or expand ongoing programs based upon economic justification	Stay abreast of improvements in metering, meter reading, billing, leakage management and infrastructure rehabilitation
Long-term loss control		Begin to assess long-term needs requiring large expenditure: customer meter replacement, water main replacement program, new customer billing system or Automatic Meter Reading (AMR) system.	Begin to assemble economic business case for long-term needs based upon improved data becoming available through the water audit process.	Conduct detailed planning, budgeting and launch of comprehensive improvements for metering, billing or infrastructure management	Continue incremental improvements in short-term and long-term loss control interventions
Target-setting			Establish long-term apparent and real loss reduction goals (+10 year horizon)	Establish mid-range (5 year horizon) apparent and real loss reduction goals	Evaluate and refine loss control goals on a yearly basis
Benchmarking			Preliminary Comparisons - can begin to rely upon the Infrastructure Leakage Index (ILI) for performance comparisons for real losses (see below table)	Performance Benchmarking - ILI is meaningful in comparing real loss standing	Identify Best Practices/ Best in class - the ILI is very reliable as a real loss performance indicator for best in class service
For validity scores of 50 or below, the shaded blocks should not be focus areas until better data validity is achieved.					

Once data have been entered into the Reporting Worksheet, the performance indicators are automatically calculated. How does a water utility operator know how well his or her system is performing? The AWWA Water Loss Control Committee provided the following table to assist water utilities in gauging an approximate Infrastructure Leakage Index (ILI) that is appropriate for their water system and local conditions. The lower the amount of leakage and real losses that exist in the system, then the lower the ILI value will be.

Note: this table offers an approximate guideline for leakage reduction target-setting. The best means of setting such targets include performing an economic assessment of various loss control methods. However, this table is useful if such an assessment is not possible.

**General Guidelines for Setting a Target ILI
(without doing a full economic analysis of leakage control options)**

Target ILI Range	Financial Considerations	Operational Considerations	Water Resources Considerations
1.0 - 3.0	Water resources are costly to develop or purchase; ability to increase revenues via water rates is greatly limited because of regulation or low ratepayer affordability.	Operating with system leakage above this level would require expansion of existing infrastructure and/or additional water resources to meet the demand.	Available resources are greatly limited and are very difficult and/or environmentally unsound to develop.
>3.0 -5.0	Water resources can be developed or purchased at reasonable expense; periodic water rate increases can be feasibly imposed and are tolerated by the customer population.	Existing water supply infrastructure capability is sufficient to meet long-term demand as long as reasonable leakage management controls are in place.	Water resources are believed to be sufficient to meet long-term needs, but demand management interventions (leakage management, water conservation) are included in the long-term
>5.0 - 8.0	Cost to purchase or obtain/treat water is low, as are rates charged to customers.	Superior reliability, capacity and integrity of the water supply infrastructure make it relatively immune to supply shortages.	Water resources are plentiful, reliable, and easily extracted.
Greater than 8.0	Although operational and financial considerations may allow a long-term ILI greater than 8.0, such a level of leakage is not an effective utilization of water as a resource. Setting a target level greater than 8.0 - other than as an incremental goal to a smaller long-term target - is discouraged.		
Less than 1.0	If the calculated Infrastructure Leakage Index (ILI) value for your system is 1.0 or less, two possibilities exist. a) you are maintaining your leakage at low levels in a class with the top worldwide performers in leakage control. b) A portion of your data may be flawed, causing your losses to be greatly understated. This is likely if you calculate a low ILI value but do not employ extensive leakage control practices in your operations. In such cases it is beneficial to validate the data by performing field measurements to confirm the accuracy of production and customer meters, or to identify any other potential sources of error in the data.		

APPENDIX D

Springs Evaluation

MEMORANDUM

DATE: October 30, 2020

TO: Norm Beagley, P.E.
Jon Lundell, P.E.
Santaquin City
275 West Main Street
Santaquin, UT 84655

FROM: Roy B. McDaniel, P.E.
Hansen, Allen & Luce, Inc. (HAL)
859 West So. Jordan Pkwy – Suite 200
South Jordan, Utah 84095

SUBJECT: Analysis of Existing Culinary Water Springs

PROJECT NO.: 415.02.100 **DRAFT**

INTRODUCTION

Purpose and Scope

The purpose of this memo is to provide direction to the City of Santaquin regarding the question to redevelop its culinary water springs located in Santaquin Canyon. Santaquin City has seen a decline in the volume of water produced from its spring sources. Hansen, Allen & Luce (HAL) evaluated the springs to determine whether the decline is related to the recent dry period that the region has been experiencing or by deterioration of the spring collection pipes and boxes, thus requiring replacement.

As part of this evaluation, HAL has reviewed and analyzed record drawings of the springs, historic spring flow data, and precipitation records. Dennis Barnes, a City employee, and former Public Works Director with over 37 years of experience managing the City's water systems and springs, guided the inspection of the springs and provided valuable historical information.

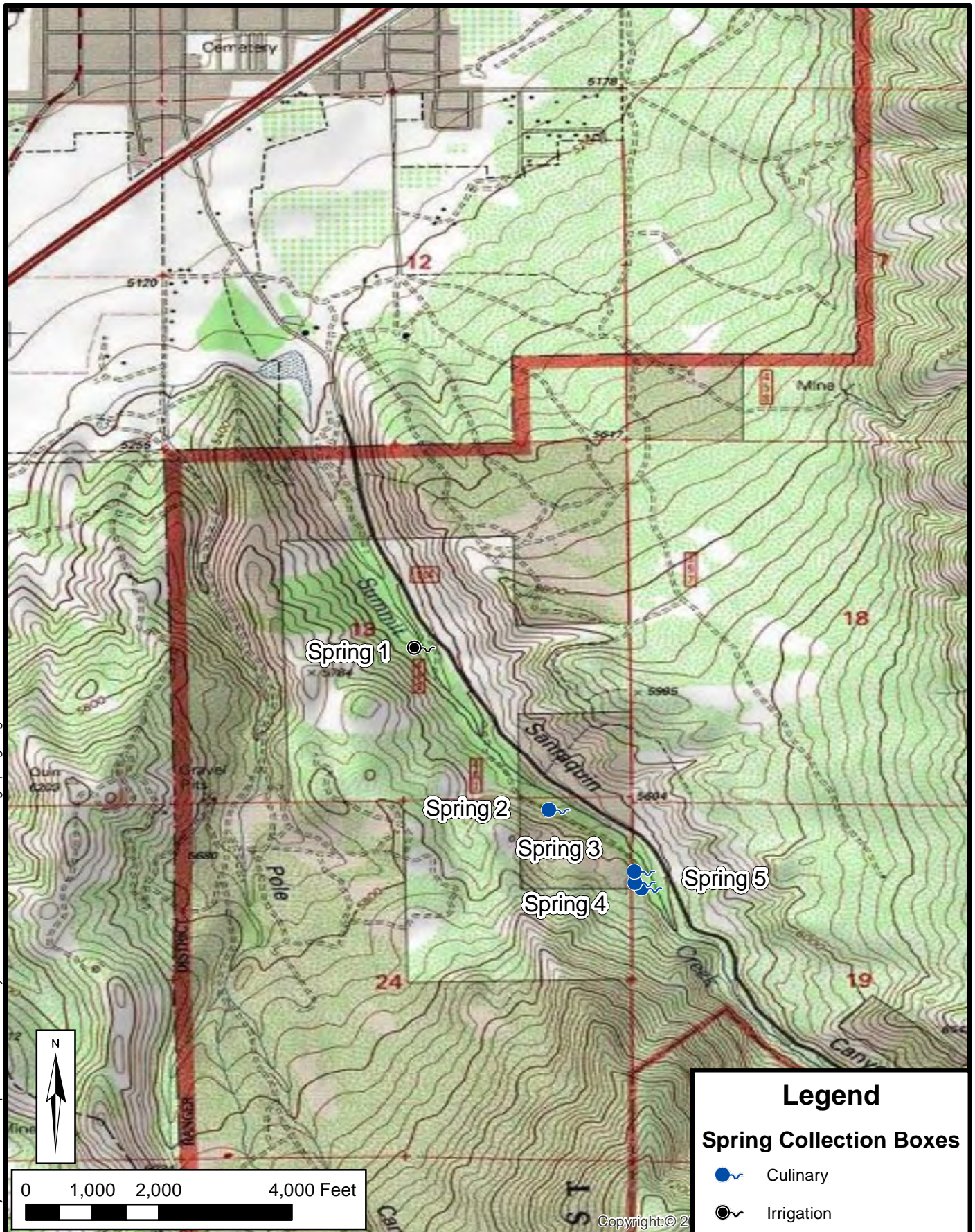
Background

Santaquin City's culinary water springs are located on the west side of Summit Creek in Santaquin Canyon. The Town of Santaquin began using the springs for culinary water between 1911 and 1914. According to the "Proof of Appropriation of Water" filed in April 1921, the construction consisted of "cement or concrete pipe laid with open joints two to three feet below creek bed in channel of stream" with the purpose of collection water from "springs in the bed of Summit Creek."

Summit Creek experienced massive floods in 1983 that washed out the bank of the stream channel and the collection works, requiring the collection works to be reconstructed. Due to Spring 1 being reconstructed at a lower elevation and having poorer water quality, it is no longer used in the culinary water system. The City most recently reconstructed Springs 2 through 5 in 1993, with engineering plans being prepared by Sunrise Engineering.

Figure D-1 shows the location of Springs 2 – 5 in relation to the City and Summit Creek.

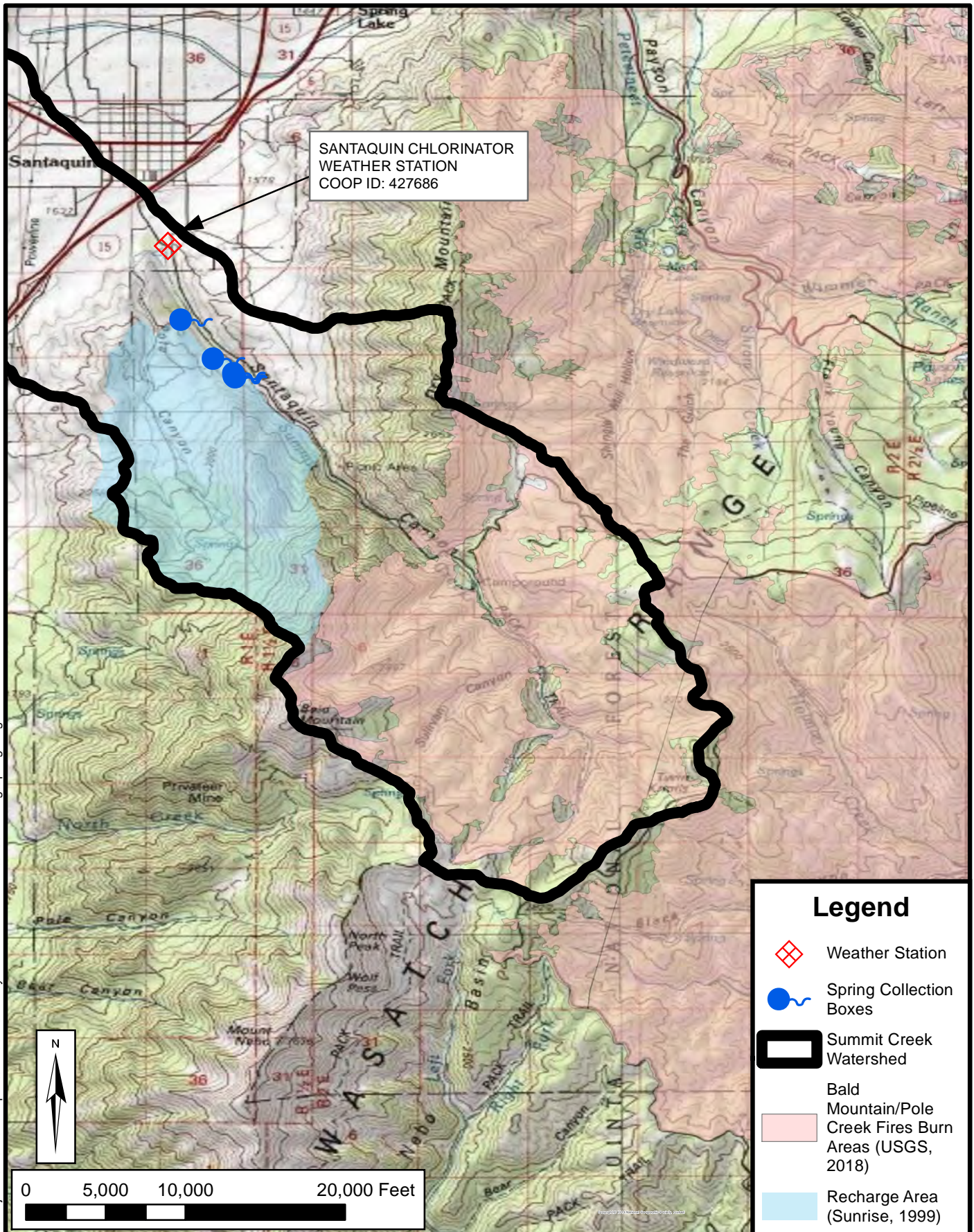
Date: 8/12/2020
Document Path: H:\Projects\415 - Santaquin\02.100 - Culinary Water Master Plan\GIS\WorkingSprings Figure D-1.mxd



SANTAQUIN CITY ANALYSIS OF CULINARY WATER SPRINGS SPRING LOCATIONS

FIGURE
D-1

Item # 10.



ANALYSIS OF HYDROLOGY AND SPRING FLOW DATA

Figure D-2 shows the springs, the weather station used in the analysis, and the recharge area defined in the Drinking Water Source Protection plan (Sunrise, 1999). Spring flow data was analyzed to determine if there is a correlation between the reduction in spring flow and the precipitation patterns in Santaquin Canyon.

Weather Data

The Utah Climate Center maintains a weather station at Santaquin City's chlorination building, named "Santaquin Chlorinator". The weather station is at the mouth of Santaquin Canyon, approximately 1.3 miles from Spring 2, and 1.7 miles from Springs 3, 4, & 5. According to the Drinking Water Source Protection Plan (Sunrise, 1999), the watershed that recharges the spring extends approximately 5 miles to the south and east of the weather station.

Figure D-3 shows a graph of the annual precipitation from 1993 to 2020, and the average annual precipitation value of 18.82 inches. The graph shows that the periods of 1999-2003, 2007, 2010, and 2012-2017 saw below average precipitation. The linear trendline calculated for the precipitation data shows that precipitation values have been decreasing since 1993.

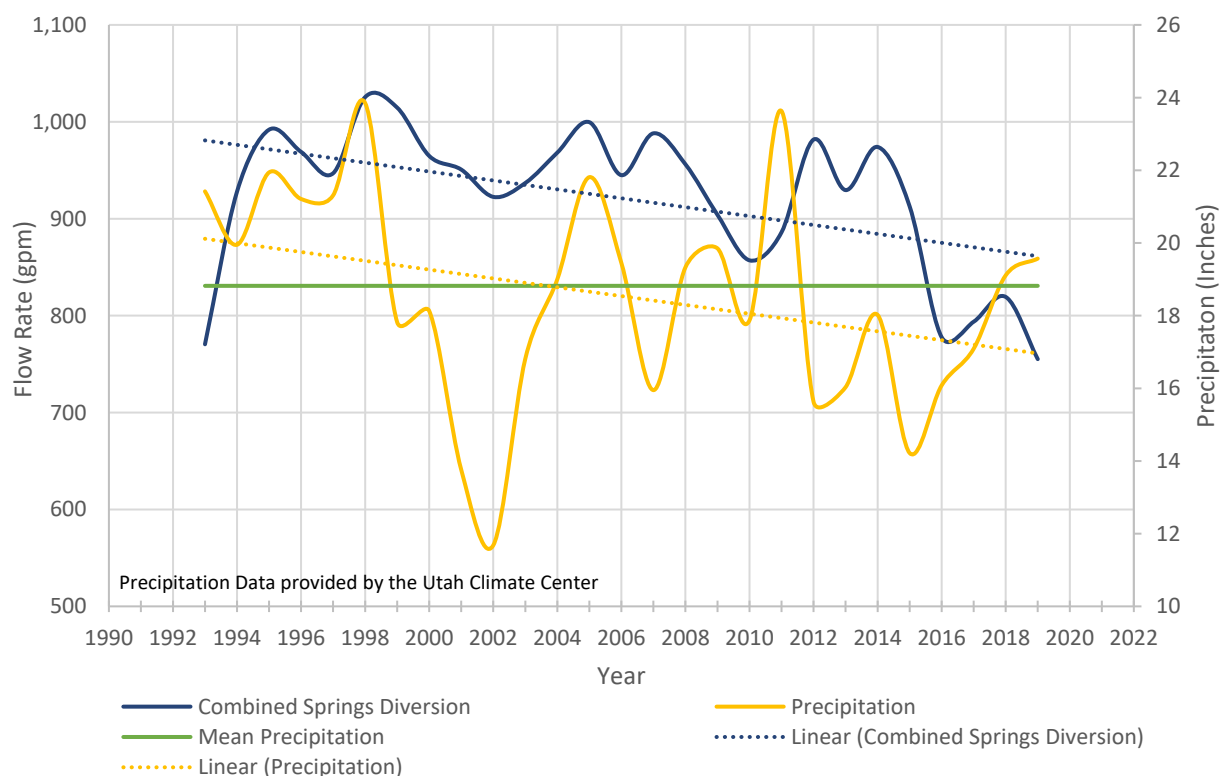


Figure D-3: Annual Precipitation vs Annual Metered Spring Flow

The total spring flow from Springs 2 – 5 are also metered and the volume of water being diverted is reported to the Utah Division of Water Rights. The annual diversions, converted to gallons per minute (gpm), are also plotted on Figure D-3.

Figure D-3 shows correlation between the peaks and valleys of both the precipitation graph and the metered discharge graph. Like the precipitation graph, the trendline shows the metered discharges have been decreasing. This indicates that the decrease in water coming from the springs is being influenced by the decrease in precipitation that is happening in the Santaquin area.

Individual Spring Flows

Santaquin City has recorded the flow rate of each spring several months each year since 1993. The flow rate is measured using a rectangular weir and staff gauge located in the box. Normally the flow rate is taken at each spring several times of the year, with January being the most consistent month of spring flow measurement. One difficulty in analyzing the readings over the weir is that the measurements were not taken consistently, so it was difficult to determine individual patterns of each spring. This could be resolved by installing transducers in each spring that would measure the depth of water over the weir on a daily, weekly, or monthly basis, and downloaded at regular intervals.

Figure D-4 shows that both Springs 2 and 3 have seen a decline in production since 1993, with Spring 3 seeing the biggest drop. This appears to follow a similar downward trend as the annual metered flows and precipitation.

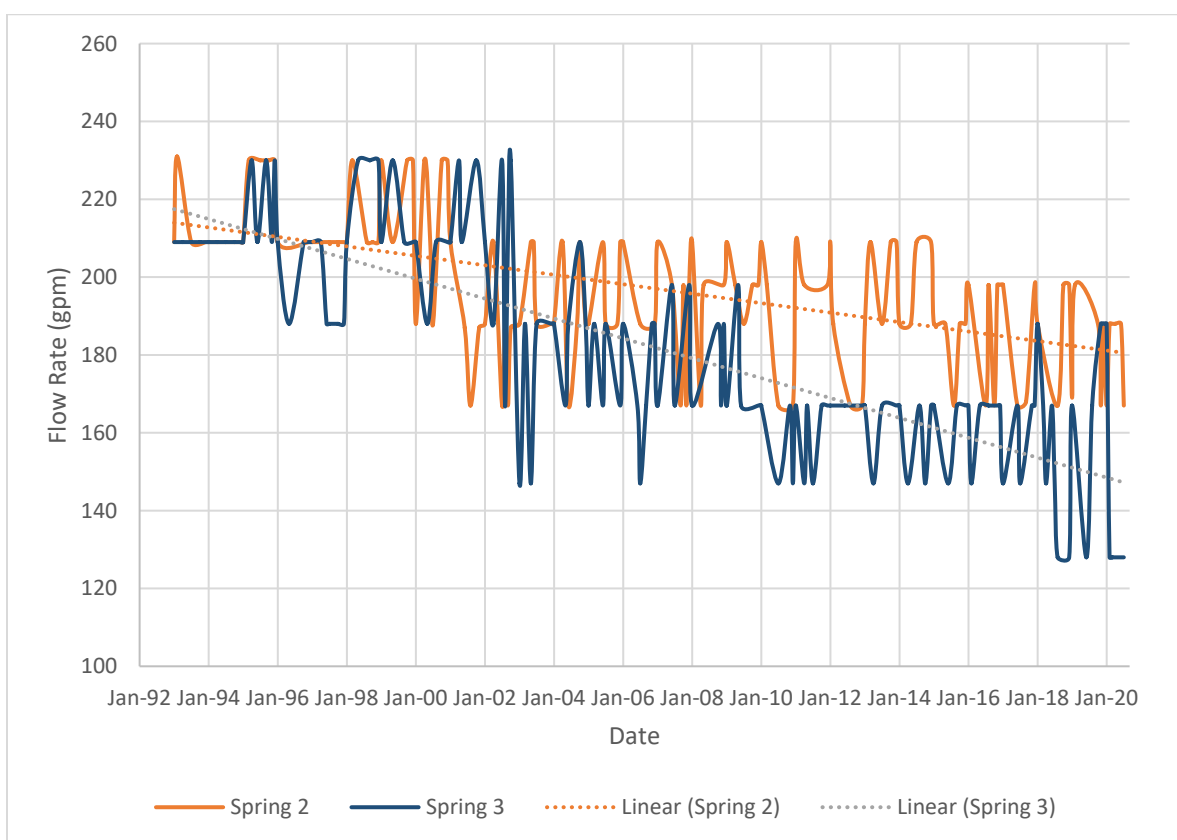


Figure D-4: Monthly Flow Measurements Springs 2 and 3 - January 1993 to July 2020

Figure D-5 shows that the flows from Springs 4 and 5 have been consistently steadier until January 2020, when production started to drop. Spring 5 is the largest, and most consistent producer of water of all the springs, seeing very little variation until 2020. Spring 4 fluctuates more than Spring 5 but has not seen a pattern of significant decrease in flow over the past 27 years.

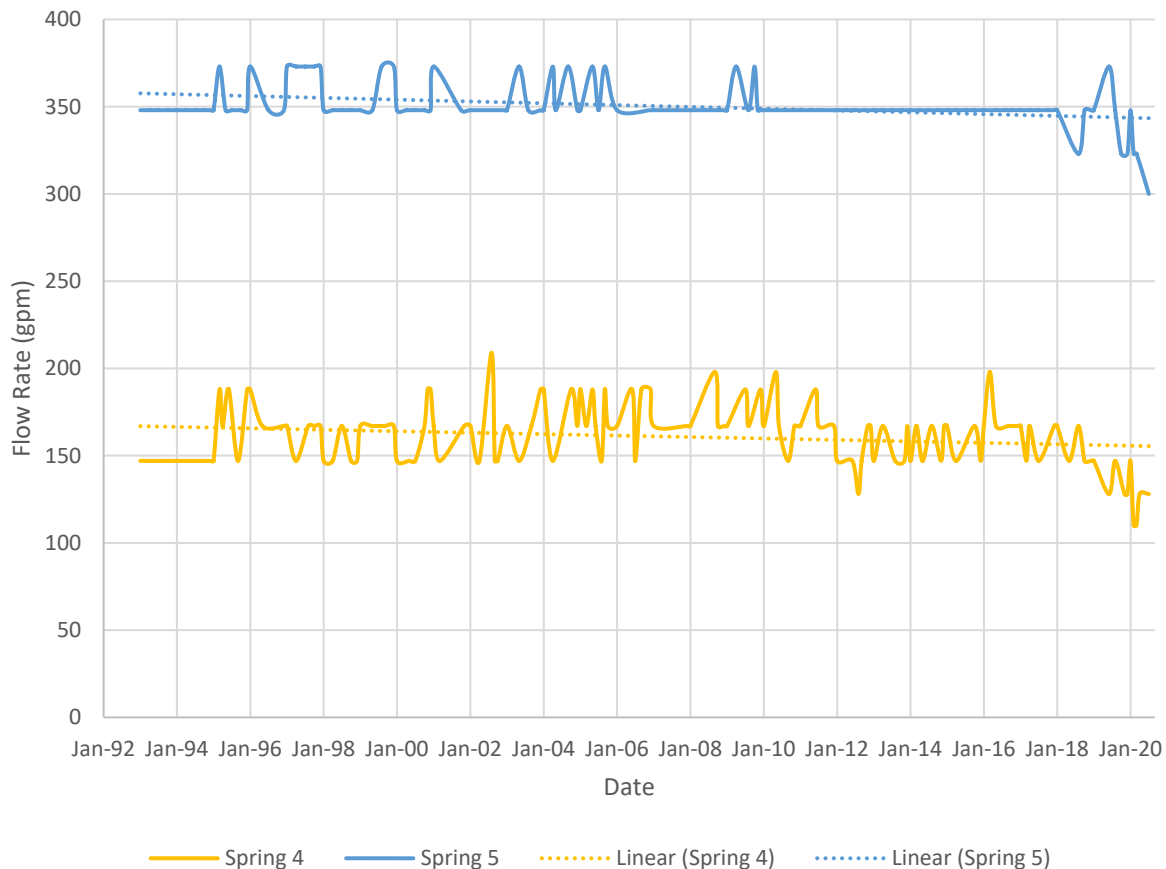


Figure D-5: Monthly Flow measurements springs 4 & 5 – January 1993 to July 2020

An analysis of the spring flows shows that Springs 2 and 3 are seeing the longest decline in spring flow with sharp decreases seen between 2000 and 2003, soon after a period when annual precipitation fell significantly below the average annual precipitation. Annual precipitation fell significantly below average beginning in 2012, and not improving until 2018. This same period saw further decrease in spring flow production, indicating that Springs 2 and 3 are influenced quickly by precipitation.

Springs 4 and 5 have produced constant flows from 1993 through 2019 and have only seen decreases in flow since the beginning of 2020. This may indicate that these springs are influenced by a much larger regional aquifer that is not directly influenced by yearly precipitation patterns.

Hydrologic Implications of the Bald Mountain and Pole Creek Fires

The Bald Mountain and Pole Creek fires began separately on August 24 and September 6, 2018 and combined into one larger fire that burned areas within the Summit Creek watershed (See Figure D-2). The fires caused increased flows in the Summit Creek watershed, which have deposited increased silt and debris in the debris basin at the mouth of Santaquin Canyon. This has led to the question of whether the forest fires have affected the production of the springs.

There are numerous scholarly articles and papers that discuss the hydrologic effects of forest fires, giving examples of snow melting earlier in the season, increased runoff, and decrease of infiltration due to damaged soil (USDA, 2005). Forest fires can also increase the snowpack and snow water equivalent in burn areas (Maxwell, 2019). On the other hand, these papers discuss the complicated issues that make the results of each forest fire behave differently.

Springs 4 and 5 have exhibited constant flows until January 2020. Since then, the flows have uncharacteristically decreased. The recharge area identified as part of the Drinking Water Source Protection plan does not include any of the burn areas identified in the forest fires, but bedrock aquifers are complex, and difficult to understand, and the area may not be delineated accurately. Additionally, ash may have migrated into the recharge area, changing the snowmelt and recharge characteristics of the aquifer. The fire could be a cause for the decreases seen in 2020 but would need further investigation to confirm the cause.

A study of forest fires in New Mexico that studied the hydrologic effects of wildfires observed that arid watersheds recover in 3 to 5 years following a forest fire (Wine and Cadol, 2016). If that is the case, one could expect to see decreased flows from the springs through 2021 through 2023.

INSPECTION OF SPRINGS

The springs were inspected on the morning of August 4, 2020, and were attended by Dennis Barnes, representing Santaquin City, and Roy McDaniel, P.E., representing HAL. Photographs of the inspection are included at the end of this report. The inspection of the springs did not reveal any obvious problems that may indicate that the reduction in spring flow is caused by a failure of the springs.

The purpose of the inspection was to look for signs of failure of the spring collection devices, such as deep rooted vegetation growing in the spring collection area and evidence of roots or other debris in the spring collection box and drains, and evidence of water seeping past the spring collection pipes.

Rocks, sand and gravel in the spring collection box or drain would indicate a failure in the collection pipe that may need to be repaired. Hard water deposits could indicate plugging of the gravel collection. Roots could indicate failure of the liner, clay cut-off wall, or just that trees are consuming a large portion of water. The site visit did not reveal any of these problems. There was some gravel and rocks in the bottom of the spring collection boxes, but it was minor, and reportedly has been there since the boxes were installed.

Springs 2 and 3 did not have any trees closer than 15 feet on the downhill side, or 50 or more feet on the uphill side of the collection pipes. The dominant tree species appeared to be the Canyon Maple, also known as Bigtooth Maple. In many cases, the trees were growing up against the barbed wire fences. There was no evidence that the trees or other vegetation were causing problems along the main collection areas.

As mentioned earlier, Dennis Barnes reported that Spring 2's collection pipe extended into a small, buried cave on the south side of the canyon. The location of the pipe was not apparent, and it could be possible that some roots could be reducing flow.

The overflow/drainpipe for Spring 2 was not available for inspection due to it being buried. The assumed location of the outlet is marked by a black metal pipe placed as a marker sticking out of the ground.

ANALYSIS OF SPRING PLANS

Description of Design

Marvin J. Wilson, P.E., of Sunrise Engineering, sealed and signed the "Santaquin City CDBG Spring Redevelopment Project" on September 9, 1993, providing information on the construction of Springs 2 & 3. Figure D-6 shows a cross section of the spring collection design.

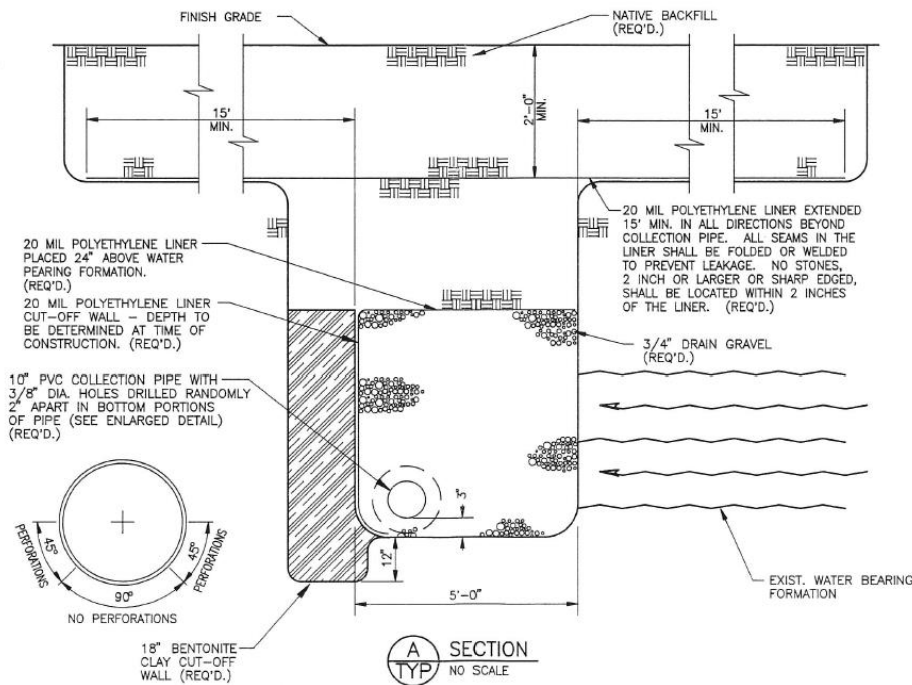


FIGURE D-6: SPRING COLLECTION DESIGN FOR SPRINGS 2 & 3 (SUNRISE, 1993)

The gravel, bentonite wall, and 20-mil liner were to be placed 2 feet higher than the top of the water bearing formation to minimize the risk of water flowing over the top of the collection gravel. The perforations were placed on the bottom half of 10" pipe, reducing the risk of sand and gravel falling into the pipe by gravity.

The trench was to be backfilled with native material, with no stones larger than 2 inches within 2 inches of the liner. At a depth of 2 feet, the ground was excavated 15 feet in all directions, covered with another 20-mil polyethylene liner and backfilled with native material.

Figure D-7 shows the plan view of Spring 2 & 3. The plans call for the spring area to be mounded to prevent ponding and to direct surface water away from the spring collection area, along with the construction of diversion channels to be constructed next to a barbed-wire fence. The fence is a minimum of 15 feet away from the downhill side of the spring collection pipes, and 50 feet away from the uphill side of the spring collection pipes.

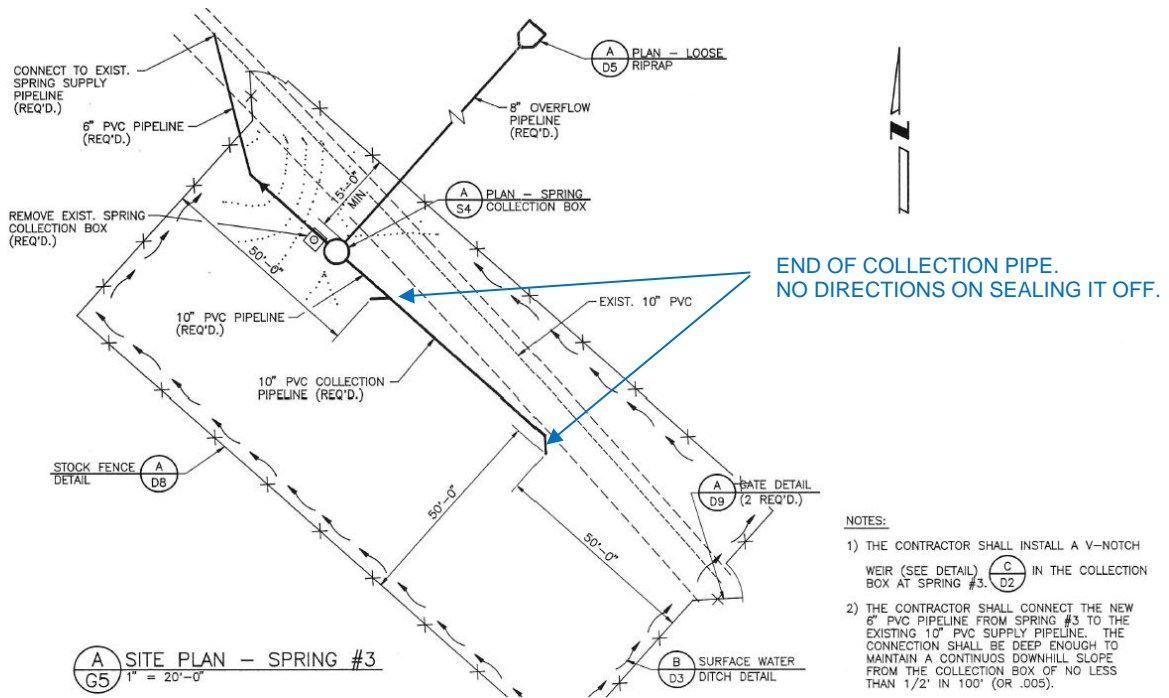
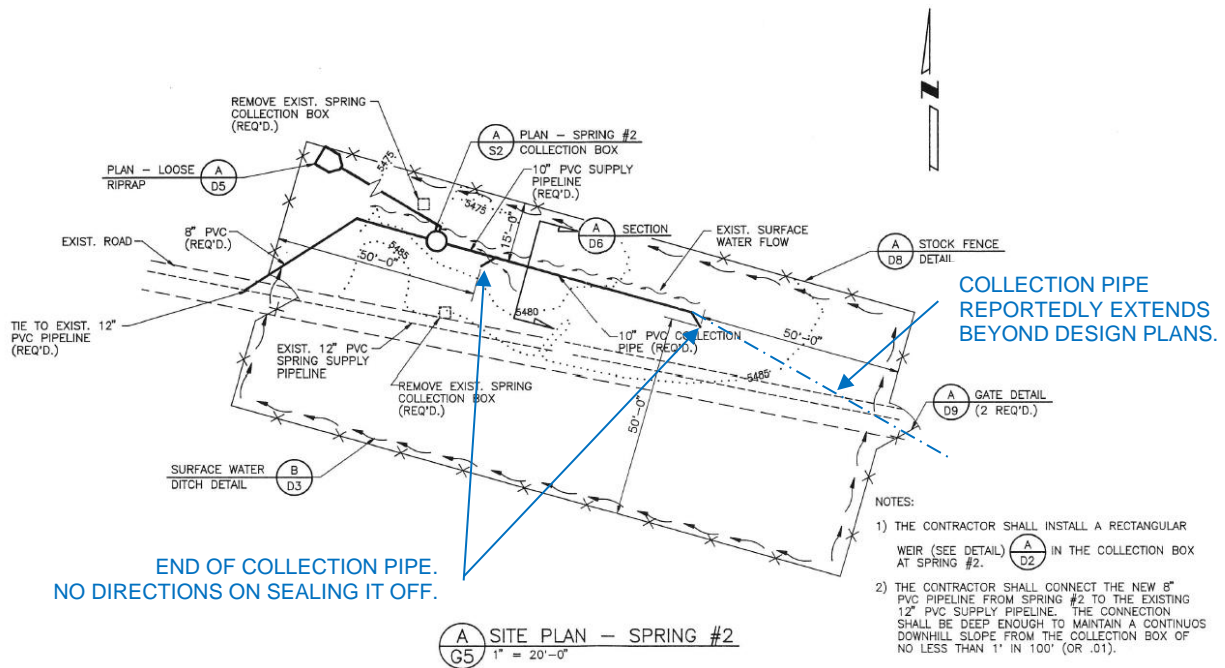


FIGURE D-7: PLAN VIEW OF SPRINGS 2 & 3 DESIGN

Analysis of Spring Plan Drawings

The plans show the locations of six springs but only five collection boxes could be identified in the field. The plans only contain designs for Springs 2 & 3, but Dennis Barnes indicated that the City followed the designs to reconstruct the other springs as much as possible.

Between the depth of the spring collection pipes, the setbacks, and the liners, Springs 2 and 3 appear to have multiple barriers to preventing tree roots from causing problems with the springs. Based on the site inspection, the spring collection pipe for Spring 2 appears to be about 8 to 10 feet below ground, and the collection pipe for Spring 3 appears to be 6 to 8 feet deep.

As shown on Figure D-7, the plans do not specify what happens at each end of the perforated pipe and trench. The plans called for extending the gravel 2 feet above the water bearing formation in order to prevent water from traveling over the top of the gravel, but they do not specify if the gravel was extended horizontally beyond the water bearing zone to reduce the chance of the water flowing horizontally around the collection pipe.

The plans call out the extent of the perforated pipe but failed to specify how the clay wall and liner terminate at these locations. It is assumed the end of the perforated pipe is capped. The plans show a line drawn at a 45-degree angle to the collection line at the end of the collection lines and where the pipe transitions from a perforated pipe to a fully enclosed pipe. Ideally this would indicate that the bentonite wall and liner wrap around to the opposite side of the 5-foot wide trench.

Because the spring collection areas are flat, and Springs 2 & 3 are 6 to 10 feet deep, any water that bypasses the springs would likely surface a significant distance from the collection pipes. The groundwater flow appears to be directed to Summit Creek, which is separated from the spring collection system by a small ridge that rises in elevation to the north/northeast of the collection boxes. Any water that bypasses the springs will most likely surface in Summit Creek, making it difficult to determine if it is happening.

The Utah Division of Drinking Water would have approved the use of a 20-mil liner in 1993, but Utah State Administrative Rules R309-515-7(7)(b) required the liner to have a minimum thickness of 40-mil (DDW, 2014). Part of the reason for the increase in liner thickness is because 20-mil thickness material is easily torn, causing a potential for the native material to be carried into the gravel, introducing contamination, but also possibly plugging the gravel and reducing flow. The site visit did not reveal any sink holes or other indications that this has happened.

The backfill on top of the spring would ideally have 2 feet of impermeable material, but the plans did not specify anything except for screened native material. Dennis Barnes recalled during the site visit that clay material was used on top of the liner to seal off the springs.

As Figure D-7 shows, Dennis Barnes reported that spring collection line for Spring #2 extends beyond the location shown in the plans to an outcrop on the south side of the canyon where water seeped into a cave. Figure D-8 shows that the vegetation changes in the soil covering the 35-foot-wide liner. This pattern extends beyond the area shown on the plans, supporting Dennis's claim.

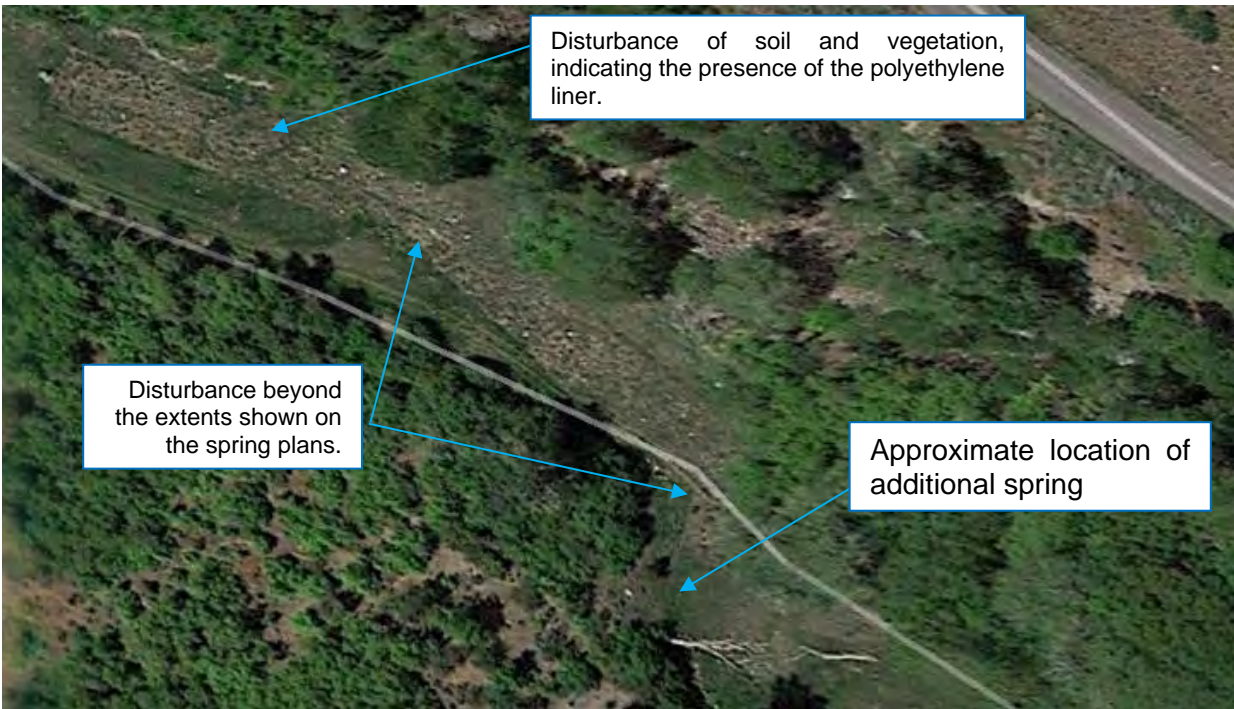


FIGURE D-8 – COLLECTION AREA FOR SPRING 2, MAY 2013 AERIAL PHOTOGRAPH FROM MAY 2013

CONCLUSIONS AND RECOMMENDATIONS

Considerations

The analysis of Springs 2 through 5 indicate that the greatest correlation to reduced spring flows is the below average precipitation for 14 of the past 22 years. A review of the spring construction plans, and site inspection did not reveal any obvious defects in the spring that could be corrected through reconstruction of the springs.

The greatest decrease in spring production is evident in the Springs 2 and 3, which appear to be affected more by local weather patterns. Springs 2 and 3 are in the bottom of the canyon near Summit Creek and were reported to be developed in boggy areas that could experience local recharge. Springs 4 and 5 are located closer to canyon walls and are likely influenced by an aquifer that is much larger and deeper and does not respond as quickly to weather pattern changes.

There appears to be a correlation to decreased spring flows in Springs 4 and 5 that may be related to the Pole Creek/Bald Mountain fires, but further investigation would need to be performed to validate the effect. It is expected as precipitation increases the flows from Springs 2 and 3 would increase, and as precipitation decreases, it would decrease.

Recommendations

HAL makes the following recommendations concerning Springs 2 – 5.

- Consider installing transducers in Springs 2 – 5 collection boxes to measure the flow over the weir on a consistent basis, to have a better understanding of each spring's flow patterns.
- Continue to monitor spring flow in relation to precipitation data for the next 5 years. If annual precipitation increases without an increase in spring flow, consider performing additional investigations and redeveloping the springs.
- Consider sending a camera in the 10-inch collection pipe to see if there are signs of pipe failure, roots, or clogging of the gravel pack.
- Consider increasing the buffer around the spring collection area by cutting down trees that are closest to the spring collection lines.
- Consider developing other springs along Summit Creek, with the understanding that a water rights change application may be protested by other water right holders.
- Uncover the drain/outfall for Spring 2, to provide a 12-inch air gap

REFERENCES

- M L Wine and D Cadol. 2016 *Environ. Res. Lett.* **11** 085006." Hydrologic effects of large southwestern USA wildfires significantly increase regional water supply: fact or fiction"
- Maxwell, Jordan, and Samuel B. St Clair. 2019. Environmental Research Letters, Volume 14, Number 12, "Snowpack properties vary in response to burn severity gradients in montane forests"
- Sunrise Engineering, Inc. 1993. "Santaquin City CDBG Spring Redevelopment Project 1993"
- Sunrise Engineering, Inc. 1999. "Drinking Water Source Protection Plan, Santaquin City Springs No. 2 through No. 5"
- USDA Forest Service Gen. Tech. Rep. RMRS-GTR-42-vol. 4. 2005 "Wildland Fire in Ecosystems Effects of Fire on Soil and Water.
- USGS (United States Geological Survey). 2018. "Coal Hollow-Bald Peak-Pole Creek Fire (Manti-Lasal and Uinta-Wasatch-Cache National Forests, UT)", Accessed August 7, 2020. https://landslides.usgs.gov/hazards/postfire_debrisflow/detail.php?objectid=231
- Utah Climate Center. Santaquin Chlorinator, Accessed August 2020. <https://climate.usu.edu/mapGUI/mapGUI.php>

Attachment A
Photographs from the Inspection of Santaquin's Culinary Water Springs
August 4, 2020



Photo 1 - Spring 2 Collection Box, looking northwesterly down the canyon, perpendicular to groundwater flow.



Photo 2 - Spring #2 Collection Box, looking northeasterly, toward Summit Creek, in the direction of groundwater flow. The land rises before the creek.



Photo 3 – Spring 2 collection area, looking east toward Summit Creek.



Photo 4 – Spring 2 collection area, looking south easterly up the canyon. The spring collection area is located on the left.

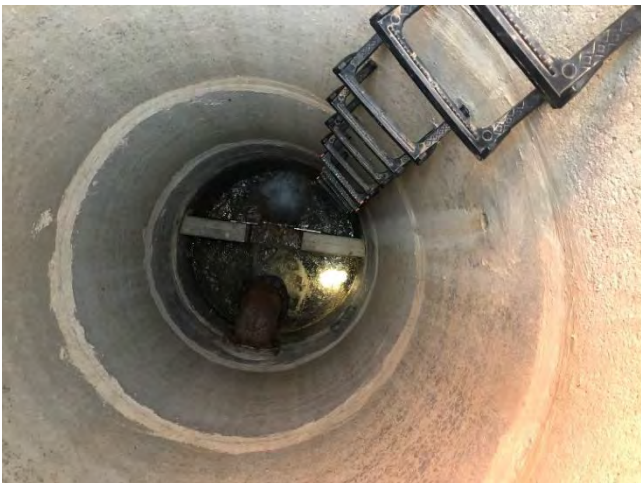


Photo 5 – Spring 2 Collection Box



Photo 6 – Location of Spring 2 overflow and drain line outlet. The outlet is buried, and marked by the black pipe.



Photo 7 – Reported location of undocumented spring that is tied into Spring 2's collection box. The spring was originally located in a small Cave.



Photo 8 – Reported location of undocumented spring that is tied into Spring 2's collection box.



Photo 9 – Collection area for Spring 3, looking northwesterly down the canyon at the spring collection box.



Photo 10 – Drain/Overflow outlet for Springs 3 – 5. No signs of sand, gravel, or hard water deposits.



Photo 11- Spring 3 Collection box and weir



Photo 12- Spring 3 collection area, with Spring 4 on the right and Spring 5 on the left. Looking up the canyon.



Photo 13 – Spring 4 collection box with the collection area on the left, into the slope of the mountain.



Photo 14- Spring 4 collection box.



Photo 15 – Spring 5 collection area, looking up the canyon from the collection box.



Photo 16 – Spring 5 collection box



Photo 17 – Spring 5, looking toward Summit Creek.



Photo 18 – Spring 5, looking down the canyon from the collection box.

APPENDIX E

EPANET 2.0 Hydraulic Models and
Model Calibration Data
(see disk)

APPENDIX F

Capital Facility Plan Cost Estimates

Santaquin City Capital Facility Plan
Drinking Water Recommended Improvements
Preliminary Engineers Cost Estimates

	Item	Unit	Unit Price	Quantity	Total Price
DW 1.	<i>Foothill Village Booster Station</i>				
	Booster Station	LS	\$ 500,000	1	\$ 500,000
	Engineering & Admin. (10%)				\$ 50,000
	Contingency (10%)				\$ 50,000
	Total to Foothill Village Booster Station				\$ 600,000
DW 2.	<i>Northeast Zone 10 transmission</i>				
	Upsize water line from 8" to 10"	LF	\$ 19	2300	\$ 43,700
	Engineering & Admin. (10%)				\$ 4,370
	Contingency (10%)				\$ 4,370
	Total to Northeast Zone 10 transmission				\$ 52,000
DW 3.	<i>Zone 10 tank/Zone 11W source</i>				
	2.5 MG tank	GAL	\$ 1.00	2500000	\$ 2,500,000
	Connections to 16" Pipeline	LS	\$ 10,000	3	\$ 30,000
	Reconfigure Summit Ridge Well	LS	\$ 30,000	1	\$ 30,000
	16" Water Line	LF	\$ 173	700	\$ 121,100
	12" Water Line	LF	\$ 145	1800	\$ 261,000
	Pump Station	LS	\$ 750,000	1	\$ 750,000
	Engineering & Admin. (10%)				\$ 369,210
	Contingency (10%)				\$ 369,210
	Total to Zone 10 tank/Zone 11W source				\$ 4,431,000
DW 4.	<i>Well for redundant source</i>				
	Well drilling and development (2,000 gpm)	LS	\$ 770,000	1	\$ 770,000
	Well equipment and well house	LS	\$ 550,000	1	\$ 550,000
	Engineering & Admin. (10%)				\$ 132,000
	Contingency (10%)				\$ 132,000
	Total to Well for redundant source				\$ 1,584,000
DW 5.	<i>Zone 9N Transmission</i>				
	VFD and Fire Flow Pump Station	LS	\$ 1,000,000	1	\$ 1,000,000
	Upsize water line from 8" to 10"	LF	\$ 19	8900	\$ 169,100
	Engineering & Admin. (10%)				\$ 116,910
	Contingency (10%)				\$ 116,910
	Total to Zone 9N Transmission				\$ 1,403,000
DW 6.	<i>Zone 12E Transmission</i>				
	Upsize water line from 8" to 10"	LF	\$ 19	3500	\$ 66,500
	Engineering & Admin. (10%)				\$ 6,650
	Contingency (10%)				\$ 6,650
	Total to Zone 12E Transmission				\$ 80,000
DW 7.	<i>Zone 9N Transmission</i>				
	12" Water Line	LF	\$ 145	1200	\$ 174,000
	PRV	LS	\$ 25,000	1	\$ 25,000
	Engineering & Admin. (10%)				\$ 17,400
	Contingency (10%)				\$ 17,400
	Total to Zone 9N Transmission				\$ 234,000
DW 8.	<i>Zone 9N Transmission</i>				
	Upsize water line from 8" to 12"	LF	\$ 29	5700	\$ 165,300
	Engineering & Admin. (10%)				\$ 16,530
	Contingency (10%)				\$ 16,530
	Total to Zone 9N Transmission				\$ 198,000
DW 9.	<i>Western Zone 10 Transmission</i>				
	10" Water Line	LF	\$ 128	6300	\$ 806,400
	Engineering & Admin. (10%)				\$ 80,640
	Contingency (10%)				\$ 80,640
	Total to Western Zone 10 Transmission				\$ 968,000

**Santaquin City Capital Facility Plan
Drinking Water Recommended Improvements
Preliminary Engineers Cost Estimates**

	Item	Unit	Unit Price	Quantity	Total Price
DW 10.	Zone 10 tank and transmission				
	20" Water Line	LF	\$ 200	4200	\$ 840,000
	Interstate crossing and utility work	LS	\$ 200,000	1	\$ 200,000
	Tank	GAL	\$ 1.00	2500000	\$ 2,500,000
	Engineering & Admin. (10%)				\$ 354,000
	Contingency (10%)				\$ 354,000
	Total to Zone 10 tank and transmission				\$ 4,248,000
DW 11.	Zone 11W Transmission				
	Upsize water line from 8" to 10"	LF	\$ 19	1900	\$ 36,100
	Upsize water line from 8" to 12"	LF	\$ 29	1600	\$ 46,400
	Engineering & Admin. (10%)				\$ 8,250
	Contingency (10%)				\$ 8,250
	Total to Zone 11W Transmission				\$ 99,000
DW 12.	Northwestern Zone 10 Transmission				
	Upsize water line from 8" to 10"	LF	\$ 19	1700	\$ 32,300
	Engineering & Admin. (10%)				\$ 3,230
	Contingency (10%)				\$ 3,230
	Total to Northwestern Zone 10 Transmission				\$ 39,000
FF 1.	Zone 12E Fire Flow				
	8" Water Line	LF	\$ 109	1900	\$ 207,100
	Engineering & Admin. (10%)				\$ 20,710
	Contingency (10%)				\$ 20,710
	Total to Zone 12E Fire Flow				\$ 249,000
FF 2.	Zone 9N 400 N Fire Flow				
	8" Water Line for Fire Deficiency	LF	\$ 109	1400	\$ 152,600
	Upsize water line from 8" to 12"	LF	\$ 29	1400	\$ 40,600
	Engineering & Admin. (10%)				\$ 19,320
	Contingency (10%)				\$ 19,320
	Total to Zone 9N 400 N Fire Flow				\$ 232,000
FF 3.	Zone 10 14000 S Fire Flow				
	10" Water Line	LF	\$ 136	3100	\$ 421,600
	Engineering & Admin. (10%)				\$ 42,160
	Contingency (10%)				\$ 42,160
	Total to Zone 10 14000 S Fire Flow				\$ 506,000
FF 4.	Center Street Fire Flow				
	8" Water Line	LF	\$ 109	400	\$ 43,600
	Engineering & Admin. (10%)				\$ 4,360
	Contingency (10%)				\$ 4,360
	Total to Center Street Fire Flow				\$ 52,000
Growth-Related Project Costs:					\$ 13,936,000
Fire Flow Project Costs:					\$ 1,039,000
Total Costs					\$ 14,975,000

AVERAGE WATER PIPE COST PER FOOT

Diameter (in)	Diameter (ft)	Outside Diameter (ft)	Pipe Material & Installation (1)	Excavation	Imported Bedding Installed	Hauling Excess Native Mat'l	Trench Backfill Installed (3)	Trench Box per Day (2)	Average Daily Output	Trench Box Cost	Top Trench Width (ft)	Road Repair Width (ft)	Asphalt Cost	Service Lateral Cost	Fire Hydrant Cost	Valves & Fittings Cost	Pipeline Connection Costs	Conflicts (9)	Trench Dewatering (4)	Total Cost per Foot of Pipe	Adjusted Cost per foot	Cost Out of Street (3)	Diameter (in)
4	0.3	0.39	26.00	2.84	9.61	1.20	3.83	210.00	400	0.53	2.99	6.99	28.94	18.11	2.37	0.34	1.20	0.00	8.48	103	90	77	4
6	0.5	0.58	30.50	3.17	11.19	1.43	4.11	210.00	333	0.63	3.18	7.18	29.59	18.11	2.37	0.46	1.36	0.00	9.51	112	98	86	6
8	0.7	0.78	48.00	3.52	12.81	1.68	4.40	210.00	200	1.05	3.38	7.38	30.25	18.11	2.37	0.72	1.53	0.00	12.27	137	119	109	8
10	0.8	0.97	61.50	3.88	14.45	1.95	4.69	210.00	182	1.15	3.57	7.57	30.91	18.11	2.37	1.13	2.23	0.00	13.31	156	136	128	10
12	1.0	1.17	67.00	4.26	16.14	2.24	4.98	210.00	160	1.31	3.77	7.77	31.57	18.11	2.37	0.73	2.94	0.00	14.63	166	145	138	12
14	1.2	1.36	71.00	4.65	17.86	2.55	5.27	210.00	133	1.58	3.96	7.96	32.23	18.11	2.37	1.27	3.22	0.00	16.52	177	154	148	14
16	1.3	1.56	77.00	5.07	19.61	2.88	5.56	210.00	114	1.84	4.16	8.16	32.89	18.11	2.37	1.63	3.52	9.44	18.42	198	173	159	16
18	1.5	1.75	86.50	5.50	21.40	3.23	5.84	210.00	100	2.10	4.35	8.35	33.55	18.11	2.37	2.04	3.80	10.24	20.32	215	187	175	18
20	1.7	1.94	93.00	5.95	23.23	3.60	6.13	210.00	89	2.36	4.54	8.54	34.21	18.11	2.37	2.65	4.10	10.90	22.21	229	200	188	20
24	2.0	2.33	112.00	6.89	26.99	4.41	6.71	210.00	77	2.73	4.93	8.93	35.52	18.11	2.37	4.10	4.68	12.48	25.14	262	229	218	24

Reference: 2018 RS Means Heavy Construction Cost Data Updated by: JKN

\$ 20.85	/CY Native Trench backfill - sec. 31 23 23.16 (0200): Fill by borrow [sand, dead or bank x 1.21 O&P] w/o materials (27.94-18.6) and convert from loose to compacted volume. \$11.20/LCY * 1.39 LCY/ECY (see Note 5)
\$ 59.08	/CY Imported Select Fill - sec. 31 23 23.16 (0200), 31 23 23.20 (4266), 31 23 23.23 (8050): Sand, dead or bank w/ hauling and compaction. (\$33.50/LCY + \$5.10/LCY)*1.39 LCY/ECY + \$5.50/ECY (see Note 5)
\$ 6.10	/CY Excavation - sec. 31 23 16.13 (6372): 10-14 ft deep, 1 CY excavator, Trench Box.
\$ 30.49	/SY 4" Asphalt Pavement - sec. 32 11 23.23 (0390), 31 23 23.20 (4268), 32 12 16.13 (0120), 32 12 16.13 (0380): 9" Bank Run GravelBase Course (\$7.10/SY), 2" Binder (\$9.30/SY), 2" Wear (\$10.40/SY [4"=\$19.80/SY]) and Hauling [Item 4268] (\$7.35/LCY * 1.39LCY/ECY * 0.361CY/SY) (see Note 5)
\$ 2.63	/LF 4" Asphalt cutting - sec. 02 41 19.25 (0015, 0020): Saw cutting asphalt up to 3" deep (\$1.68/LF), each additional inch of depth (\$0.95/LF)
\$ 1,811.32	/EA Service Lateral Connection (see Note 7)
\$ 4,734.51	/EA Fire hydrant assembly including excavation and backfill (see Note 8)
\$ 7.16	/CY Hauling - sec. 31 23 23.20 (4262): 20 CY dump truck, 6 mile round trip and conversion from loose to compacted volume. \$4.13/LCY * 1.39 LCY/ECY (see Note 5)
\$ 210.00	/day Trench Box - sec. 31 52 16.10 (4500): 7' deep, 16' x 8'
\$ 63.32	/CY Stabilization Gravel - sec. 31 23 23.16 (0050), 31 23 23.20 (4266), 31 23 23.23 (8050): Bank Run Gravel (\$36.50/LCY * 1.39 LCY/ECY) plus compaction (\$5.50/ECY) and hauling (\$5.10/LCY * 1.39 LCY/ECY) (see Note 5)
\$ 1,152.00	/day Dewatering - sec. 31 23 19.20 (1000, 1020): 4" diaphragm pump, 8 hrs attended (\$1,025/day). Second pump (\$127/day)

- NOTES:
- (1) Assumes: class 50, 18' lengths, tyton push-on joint for DIP (33 11 13.15 3000-3180); Pressure Pipe class 150, SDR 18, AWWA C900 for PVC <14" & AWWA C905, PR 100, DR 25 for 14" and larger (33 11 13.25 4520-4550 3030-3200); butt fusion joints SDR 21, 40' lengths for HDPE (). DIP and HDPE costs only go up to 24". PVC costs only go up to 48". All costs for pipe larger than 48" are Prestressed Concrete pipe (PCCP), 150 psi, 24' length (Pg 315).
- (2) 7' deep trench box (16' x 8') - on page 263
- (3) Backfill Material & Installation assumes in street. For out of street unit costs, the backfill material cost has been added in place of base course and asphalt.
- (4) Dewatering assumes 1' stabilization gravel at the bottom of the trench plus dewatering pumps
- (5) Conversion from loose to compacted volumes assumes 125 PCF for compacted density and 90 PCF for loose density. Or (125 PCF/ECY)/(90 PCF/LCY) = 1.39 LCY/ECY
- (6) Conversion from cubic yards to square yards for hauling of asphalt paving assumed a total thickness of 13". 3 ft x 3 ft x (13 in)/(12 in/ft) = 0.361 CY/SY
- (7) Service Lateral costs are based on Beaver Dam short and long service connections average (\$1,660.98/connection), with 45.40 for curb replacement, 40.20 for sidewalk replacement, and 158.19 for additional asphalt all added to the short service connection. Used historical cost index to update to current dollars.
- (8) Fire Hydrant assembly costs are based on Beaver Dam Water Projects plus 45.40 for curb replacement and 158.19 for additional asphalt (\$4341.55 per FH). Used historical cost index to update to current dollars.
- (9) Conflicts amounted to be 2% of the cost on the Springville 400 South Pipeline project. Use 5% of total cost per ft.
- (10) Joint Restraint has NOT been included in this spreadsheet.

Abbreviations:		Utah City Cost Indices	
VLF	vertical lineal foot	SLC	88.5
PCF	pounds per cubic foot	Ogden	85.8
LCY	loose cubic yard	Logan	87
ECY	embankment cubic yard	Price	85
		Provo	87.2

APPENDIX G

Checklist for Hydraulic Model Design Elements Report

Content for this appendix will be provided in a subsequent draft.

ORDINANCE 01-02-2021

AN ORDINANCE ADOPTING THE CITY PRESSURE IRRIGATION MASTER PLAN AND CAPITAL FACILITY PLAN; ADOPTING THE CITY PRESSURE IRRIGATION IMPACT FEE FACILITIES PLAN AND IMPACT FEE ANALYSIS; ADOPTING PRESSURE IRRIGATION IMPACT FEES; ADOPTING CERTAIN POLICIES RELATED TO IMPACT FEES; AND ESTABLISHING A SERVICE AREA FOR PURPOSES OF IMPACT FEES.

WHEREAS, Santaquin City (the “City”) is a political subdivision of the State of Utah, authorized and organized under applicable provisions of Utah law; and

WHEREAS, the City has legal authority, pursuant to Title 11, Chapter 36a of the Utah Code Annotated, as amended (“*Impact Fees Act*” or “*Act*”), to impose development impact fees as a condition of development approval, which impact fees are used to defray capital infrastructure costs attributable to new development activity; and

WHEREAS, the City has previously enacted and imposed impact fees for public facilities, as defined in Utah Law, Title 11, Chapter 36a, Section 102, and as more particularly set forth in the Santaquin City Fee Schedule; and

WHEREAS, the City desires to amend its previously adopted Pressure Irrigation Impact Fees in accordance with applicable provisions of the Impact Fees Act in order to appropriately assign capital infrastructure costs to development in an equitable and proportionate manner as more particularly provided herein; and

WHEREAS, the City properly noticed its intent to amend the Pressure Irrigation Master Plan, Impact Fees Facilities Plan and Impact Fee Analysis as required by law and the City has, through its consultants, completed the Pressure Irrigation Master Plan, Impact Fee Facilities Plan and Impact Fee Analysis in accordance with applicable provisions of the Impact Fees Act, which Pressure Irrigation Master Plan, Impact Fee Facilities Plan and Impact Fee Analysis are more particularly described and adopted herein; and

WHEREAS, the City has provided the required notice and held a public hearing before the City Council regarding the proposed Pressure Irrigation Master Plan, Impact Fee Facilities Plan, Impact Fee Analysis and Impact Fees in accordance with applicable provisions of the Impact Fees Act; and

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF SANTAQUIN CITY, STATE OF UTAH, AS FOLLOWS:

SECTION I. PURPOSE

This Pressure Irrigation Master Plan (attached hereto as **Exhibit A**) and Impact Fees Ordinance establishes the City’s Pressure Irrigation Master Plan and establishes Impact Fees policies and procedures and is promulgated pursuant to Title 11, Chapter 36a, Part 4, Enactment of Impact Fees, and other requirements of the Impact Fees Act. This Ordinance adopts the Pressure Irrigation Master Plan and Impact Fees for related facilities within the City Service Area as defined herein, provides a schedule of Pressure Irrigation Impact Fees for development activity, and sets forth direction for challenging,

modifying and appealing Pressure Irrigation Impact Fees. This Ordinance does not replace, supersede, or modify any ordinance regarding impact fees unrelated to Pressure Irrigation facilities and improvements. This Ordinance may be referred to and cited as the “Pressure Irrigation Master Plan and Impact Fees Ordinance.”

SECTION II. STATUTORY AUTHORITY AND RESTRICTIONS

1. *Impact Fees Act Authority.* The City is authorized to impose impact fees subject to and in accordance with applicable provisions of the Impact Fees Act. Impact fees may only be established for public facilities as defined in Section 11-36a-102 that have a life expectancy of 10 or more years and are owned or operated by or on behalf of a local political subdivision. Public facilities for which impact fees may be imposed includes Pressure Irrigation facilities.
2. *Impact Fees Act Restrictions.* Pursuant to Section 11-36a-202 of the Impact Fees Act, the City may not impose an impact fee to: (1) cure deficiencies in public facilities serving existing development; (2) raise the established level of service of a public facility serving existing development; (3) recoup more than the local political subdivision’s costs actually incurred for excess capacity in an existing system improvement; or (4) include an expense for overhead, unless the expense is calculated pursuant to a methodology that is consistent with generally accepted cost accounting practices and the methodological standards set forth by the federal Office of Management and Budget for federal grant reimbursement.

SECTION III. SERVICE AREA

The Impact Fees Act requires the City to establish one or more service areas within which the City will calculate and impose a particular impact fee. The service area within which the proposed Pressure Irrigation Impact Fees will be imposed is described in Santaquin City Code (S.C.C.) § 9.08.040.

SECTION IV. IMPACT FEE FACILITIES PLAN (IFFP)

1. *Impact Fee Facilities Plan Required.* Pursuant to Section 11-36a-301 of the Impact Fees Act, before imposing or amending an impact fee, the City is required to prepare an impact fee facilities plan to determine the public facilities required to serve development resulting from new development activity. The impact fee facilities plan shall identify the demands placed upon existing public facilities by new development activity and the proposed means by which the City will meet those demands.
2. *Pressure Irrigation Impact Fee Facilities Plan.* The City has, through its consultants, researched and analyzed the factors set forth in Section 11-36a-302 of the Impact Fees Act and has caused to be prepared a Pressure Irrigation Impact Fee Facilities Plan (“IFFP”), as more particularly set forth in **Exhibit B**, attached hereto and incorporated herein by this reference. The Pressure Irrigation IFFP has been prepared based on reasonable growth assumptions for the City and general demand characteristics of current and future users of Pressure Irrigation facilities within the City. The City Council finds that the Pressure Irrigation IFFP identifies the impact on system improvements created by development activity and estimates the proportionate share of the costs of impacts on system improvements that are reasonably related to new development activity. As shown in the Pressure Irrigation

IFFP, the City has considered all revenue sources to finance the impacts on system improvements, including grants, bonds, interfund loans, impact fees, and anticipated or accepted dedications of system improvements. The Pressure Irrigation IFFP establishes that impact fees are necessary to maintain a proposed level of service that complies with applicable provisions of Section 11-36a-302 of the Impact Fees Act.

3. *Plan Certification.* The Pressure Irrigation IFFP includes a written certification in accordance with Section 11-36a-306 of the Impact Fees Act.
4. *Adoption of Pressure Irrigation Impact Fee Facilities Plan.* The Pressure Irrigation IFFP as set forth in **Exhibit B**, is hereby adopted in its entirety by the City in accordance with applicable provisions of the Impact Fees Act.

SECTION V. WRITTEN IMPACT FEE ANALYSIS (IFA)

1. *Written Impact Fee Analysis Required.* Pursuant to Section 11-36a-303 of the Impact Fees Act, each local political subdivision intending to impose an impact fee shall prepare a written analysis of each impact fee to be imposed and a summary of the impact fee analysis designed to be understood by a lay person. The impact fee analysis shall identify the anticipated impact on or consumption of any existing capacity of a public facility by the anticipated development activity; identify the anticipated impact on system improvements required by the anticipated development activity to maintain the established level of service for each public facility; demonstrate how the anticipated impacts are reasonably related to the anticipated development activity; estimate the proportionate share of the costs for existing capacity that will be recouped and the costs of impacts on system improvements that are reasonably related to the new development activity; and identify how the impact fee is calculated.
2. *Pressure Irrigation Impact Fee Analysis.* The City has, through its consultants, researched and analyzed the factors set forth in Section 11-36a-304 of the Impact Fees Act, including the proportionate share analysis required therein, and has caused to be prepared a Pressure Irrigation Impact Fee Analysis ("IFA"), as more particularly set forth in **Exhibit B**, attached hereto and incorporated herein by this reference. The City Council finds that the Pressure Irrigation IFA identifies the impacts upon public facilities required by the development activity and demonstrates how those impacts on system improvements are reasonably related to the development activity, estimates the proportionate share of the costs of impacts on system improvements that are reasonably related to the development activity, and identifies how the Pressure Irrigation Impact Fees are calculated.
3. *Analysis Certification.* The Pressure Irrigation IFA includes a written certification in accordance with Section 11-36a-306 of the Impact Fees Act.
4. *Adoption of Pressure Irrigation Impact Fee Analysis.* The Pressure Irrigation IFA as set forth in **Exhibit B**, is hereby adopted in its entirety by the City in accordance with applicable provisions of the Impact Fees Act.

SECTION VI. IMPACT FEE SCHEDULE AND FORMULA

1. *Impact Fee Schedule or Formula Required.* Pursuant to Section 11-36a-402 of the Impact Fees Act, the City is required to provide a schedule of impact fees for each type of development activity that specifies the amount of the impact fee to be imposed for each type of system improvement or the formula that the City will use to calculate each impact fee.
2. *Maximum Pressure Irrigation Impact Fee Schedule.* Based on the Pressure Irrigation IFA, the maximum Pressure Irrigation Impact Fees which the City may impose on development activity within the defined Service Area is based on the following formula and specified fees:

Pressurized Irrigation Impact Fee¹⁸ - \$4,123.00

Note 18 on the fee schedule would read: “One ERU is equivalent to .25 irrigable acres of single-family development. For all other types of development, the following formula will be utilized Step 1: Divide 10,890 (total sf in .25 acres) by impact fee per ERU (\$4,123.00) = \$0.3786 per sf. Step 2: Multiply irrigable area (sf lot size minus sf of hardscape on lot) by Impact Fee per sf \$0.3786) to arrive at impact fee.”

In accordance with Section 11-36a-402 of the Impact Fees Act, the City is authorized to adjust the standard impact fee at the time the fee is charged to respond to: (i) unusual circumstances found in specific cases; or (ii) a request for a prompt and individualized impact fee review for the development activity of the state, a school district, or a charter school and an offset or credit for a public facility for which an impact fee has been or will be collected; to ensure that the impact fees are imposed fairly; or (iii) a developer's studies and data which show how specific adjustments of the fee are applicable to the intended use(s).

3. *Developer Credits.* In accordance with Section 11-36a-402 of the Impact Fees Act, a developer may be allowed a credit against Pressure Irrigation Impact Fees or proportionate reimbursement of Pressure Irrigation Impact Fees if the developer dedicates land for a system improvement, builds and dedicates some or all of a system improvement; or dedicates a public facility that the City and the developer agree will reduce the need for a system improvement; *provided* that the system improvement is: (i) identified in the City's Pressure Irrigation IFFP; and (ii) is required by the City as a condition of approving the development activity. To the extent required in Section 11-36a-402, the City shall provide a credit against Pressure Irrigation Impact Fees for any dedication of land for, improvement to, or new construction of, any system improvements provided by the developer if the facilities are system improvements, as defined herein and included in the Pressure Irrigation IFFP; or are dedicated to the public and offset the need for an identified system improvement.

SECTION VII. CALCULATION OF IMPACT FEES

1. *Impact Fee Calculations.* Pursuant to Section 11-36a-305, in calculating the proposed Pressure Irrigation Impact Fees, the City has based such amounts

calculated on realistic estimates and the assumptions underlying such estimates are more particularly disclosed in the Pressure Irrigation IFA set forth in **Exhibit B**.

2. *Previously Incurred Costs.* To the extent that new growth and development will be served by previously constructed improvements, the City's Pressure Irrigation Impact Fees may include public facility costs and outstanding bond costs related to the Pressure Irrigation improvements previously incurred by the City. These costs may include all projects included in the Pressure Irrigation IFFP, which are under construction or completed but have not been utilized to their capacity, as evidenced by outstanding debt obligations. Any future debt obligations determined to be necessitated by growth activity will also be included to offset the costs of future capital projects.

SECTION VIII. NOTICE AND HEARING

1. *Notice.* All noticing requirements set forth in the Impact Fees Act, including, but not limited to, provisions of Title 11, Chapter 36a, Part 5, have been provided. Copies of the Pressure Irrigation IFFP and Pressure Irrigation IFA, together with a summary designed to be understood by a lay person, and this Impact Fee Ordinance, have been made available to the public by placing said materials, in the Santaquin City Library and the Community Development Offices located in Santaquin City Hall at least ten (10) days before the public hearing. Notice has also been provided in accordance with applicable provisions of *Utah Code Ann.* § 10-9a-205.
2. *Hearing.* The City Council held a public hearing regarding the Pressure Irrigation IFFP, the Pressure Irrigation IFA, and this Pressure Irrigation Impact Fee Ordinance, on January 19, 2021, and a copy of the Ordinance was available in its substantially final form at the City Recorder's Office in the Santaquin City Hall before the date of the hearing, all in conformity with the requirements of *Utah Code Ann.* § 10-9a-205 and applicable noticing provisions of the Impact Fees Act.

Section IX. Miscellaneous Provisions

1. Contrary Provisions Repealed. Any and all other provisions of the Santaquin City Code that are contrary to the provisions of this Ordinance are hereby repealed.
2. Codification, Inclusion in the Code, and Scrivener's Errors. It is the intent of the City Council that the provisions of this ordinance be made part of the Santaquin City Code as adopted, that sections of this ordinance may be re-numbered or re-lettered, that the word ordinance may be changed to section, chapter, or other such appropriate word or phrase in order to accomplish such intent regardless of whether such inclusion in a code is accomplished. Sections of the ordinance may be re-numbered or re-lettered. Typographical errors which do not affect the intent of this ordinance may be authorized by the City without need of public hearing by its filing a corrected or re-codified copy of the same with the City Recorder.
3. Severability. If any section, phrase, sentence, or portion of this ordinance is for any reason held invalid or unconstitutional by any court of competent jurisdiction, such

portion shall be deemed a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions thereof.

4. Other Impact Fees Not Repealed. Except as otherwise specifically provided herein, this Pressure Irrigation Impact Fee Ordinance shall not repeal, modify or affect any impact fee of the City in existence as of the effective date of this Ordinance.

Section X. Effective Date.

The City Recorder shall deposit a copy of this ordinance in the official records of the City on January 19, 2021, and before 5:00 p.m. on that day, shall place a copy of this ordinance in three places within the City. This ordinance shall become effective at 5:00 p.m. on January 20, 2021.

PASSED AND APPROVED this 19th day of January 2021.

By: _____
Mayor Kirk F. Hunsaker

ATTEST:

By _____
K. Aaron Shirley, City Recorder

Voting

Council Member Nick Miller	_____
Council Member Betsy Montoya	_____
Council Member Lynn Mecham	_____
Council Member David Hathaway	_____
Council Member Jennifer Bowman	_____

STATE OF UTAH)
) ss.
COUNTY OF UTAH)

I, K. AARON SHIRLEY, City Recorder of Santaquin City, Utah, do hereby certify and declare that the above and foregoing is a true, full, and correct copy of an ordinance passed by the City Council of Santaquin City, Utah, on the 19th day of January 2021, entitled

“AN ORDINANCE ADOPTING THE CITY PRESSURE IRRIGATION MASTER PLAN AND CAPITAL FACILITY PLAN; ADOPTING THE CITY PRESSURE IRRIGATION IMPACT FEE FACILITIES PLAN AND IMPACT FEE ANALYSIS; ADOPTING PRESSURE IRRIGATION IMPACT FEES; ADOPTING CERTAIN POLICIES RELATED TO IMPACT FEES; AND ESTABLISHING A SERVICE AREA FOR PURPOSES OF IMPACT FEES.”

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the Corporate Seal of Santaquin City Utah this 19th day of January 2021.

K. AARON SHIRLEY
Santaquin City Recorder

(SEAL)

AFFIDAVIT OF POSTING

STATE OF UTAH)
) ss.
COUNTY OF UTAH)

I, **K. AARON SHIRLEY**, City Recorder of Santaquin City, Utah, do hereby certify and declare that I posted in three (3) public places the ordinance, which is attached hereto on the 20th day of January 2021.

The three places are as follows:

1. Zions Bank
2. Post Office
3. City Office

I further certify that copies of the ordinance so posted were true and correct copies of said ordinance.

K. AARON SHIRLEY
Santaquin City Recorder

The foregoing instrument was acknowledged before me this ____ day of _____, 20__,
by K. AARON SHIRLEY.

My Commission Expires:

Notary Public

Residing at: Utah County



PRESSURIZED IRRIGATION WATER IMPACT FEE FACILITY PLAN AND IMPACT FEE ANALYSIS

(HAL Project No.: 415.03.100)

DRAFT

January 2021

SANTAQUIN CITY

**PRESSURIZED IRRIGATION WATER IMPACT FEE FACILITY PLAN
AND IMPACT FEE ANALYSIS**

(HAL Project No.: 415.03.100)

DRAFT

Steven C. Jones, P.E.
Project Manager



January 2021

ACKNOWLEDGEMENTS

Hansen, Allen & Luce thanks the following individuals for their contributions to this project:

Santaquin City Government

Kirk Hunsaker, Mayor
Nicholas Miller, Councilperson
Betsy Montoya, Councilperson
Lynn Mecham, Councilperson
Jennifer Bowman, Councilperson
Dave Hathaway, Councilperson

Santaquin City Staff

Norm Beagley, Assistant City Manager/Engineer
Jon Lundell, City Engineer
Benjamin Reeves, City Manager
Jason Callaway, Public Works Operations Manager
Shannon Hoffman, Admin Service Director/Treasurer
Aaron Shirley, Finance Director/Recorder

Hansen, Allen & Luce, Inc.

Steven C. Jones, P.E., Vice President, Project Manager
Richard M. Noble, Vice President
Ridley J. Griggs, Staff Engineer

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	i
TABLE OF CONTENTS	ii
LIST OF TABLES	iii
LIST OF FIGURES	iii
IMPACT FEE CERTIFICATION	iv
IMPACT FEE SUMMARY	S-1
PURPOSE OF STUDY	S-1
LEVEL OF SERVICE	S-1
IMPACT FEE CALCULATION	S-1
 CHAPTER 1 INTRODUCTION	 1-1
PURPOSE AND SCOPE	1-1
IMPACT FEE COLLECTION	1-1
MASTER PLANNING	1-1
 CHAPTER 2 SYSTEM DEMAND AND CAPACITY	 2-1
GENERAL	2-1
EXISTING IRRIGABLE ACREAGE	2-1
LEVEL OF SERVICE	2-1
METHODOLOGY USED TO DETERMINE EXISTING SYSTEM CAPACITY	2-1
WATER SOURCE AND REMAINING CAPACITY	2-2
STORAGE FACILITIES AND REMAINING CAPACITY	2-3
DISTRIBUTION SYSTEM	2-4
OPERATIONS FACILITY	2-4
 CHAPTER 3 IMPACT FEE FACILITY PLAN AND ANALYSIS	 3-1
GROWTH PROJECTIONS	3-1
COST OF EXISTING FACILITIES	3-1
Source Facilities	3-2
Storage Facilities	3-2
Distribution Facilities	3-3
Operations Facility	3-3
COST OF FUTURE FACILITIES	3-4
IMPACT FEE UNIT CALCULATION	3-4
Source	3-5
Storage	3-6
Distribution	3-6
Planning	3-7
Facilities	3-8
TOTAL IMPACT FEE UNIT CALCULATION	3-8
AREA-BASED IMPACT FEE CALCULATION	3-9
COSTS BY TIME PERIOD	3-9
REVENUE OPTIONS	3-10
General Obligation Bonds through Property Taxes	3-10
Revenue Bonds	3-11
State/Federal Grants and Loans	3-11
User Fees	3-11
Impact Fees	3-12

REFERENCES	R-1
-------------------------	------------

APPENDIX A

Historic Project Costs

LIST OF TABLES

NO.	TITLE	PAGE
S-1	Proposed Impact Fee by Component	S-2
S-2	Proposed Area-Based Impact Fee	S-2
2-1	Existing Pressurized Irrigation Water Sources	2-2
2-2	Existing Pressurized Irrigation Water Pump Stations	2-3
2-3	Existing Storage Capacity	2-3
3-1	Growth Projections	3-1
3-2	Impact Fee Eligible Cost of Existing Source Facilities	3-2
3-3	Impact Fee Eligible Cost of Existing Storage Facilities	3-2
3-4	Impact Fee Eligible Cost of Existing Distribution Facilities	3-3
3-5	Impact Fee Eligible Cost of Existing Operations Facility	3-3
3-6	Estimated Cost of Future Facilities	3-4
3-7	Source Impact Fee Unit Calculation	3-5
3-8	Source Cost by Time Period	3-5
3-9	Storage Impact Fee Unit Calculation	3-6
3-10	Storage Cost by Time Period	3-6
3-11	Distribution Impact Fee Unit Calculation	3-7
3-12	Distribution Cost by Time Period	3-7
3-13	Planning Component of Impact Fee	3-8
3-14	Facilities Impact Fee Unit Calculation	3-8
3-15	Facilities Cost by Time Period	3-8
3-16	Total Proposed Impact Fee	3-9
3-17	Proposed Area-Based Impact Fee	3-9
3-18	Facility Cost by Time Period	3-10

LIST OF FIGURES

NO.	TITLE	PAGE
2-1	Existing Pressurized Irrigation Water System	After 2-1
3-1	Pressurized Irrigation System Impact Fee Facilities Plan	After 3-4

IMPACT FEE CERTIFICATION

An Impact Fee Certification will be included with the final report.

IMPACT FEE SUMMARY

PURPOSE OF STUDY

The **purpose** of the Impact Fee Facility Plan (IFFP) and Impact Fee Analysis (IFA) is to comply with the requirements of the Utah Impact Fees Act by identifying demands placed on the existing pressurized irrigation water system by new development and by identifying the means by which the City will meet these new demands. The Santaquin City Pressurized Irrigation Water System Master Plan has been used in support of this analysis. There are several growth-related capital facilities anticipated to be needed in the next 10 years, so the calculated impact fee is based on anticipated capital facility projects as well as existing excess capacity and documented historic costs.

The impact fee **service area** is the pressurized irrigation water system service area, which includes the current city boundary and potential expansion areas as identified in the City's Pressurized Irrigation Water Master Plan.

LEVEL OF SERVICE

The existing and proposed **level of service** for the pressurized irrigation water system includes the following:

Level of Service

- Peak Day Source Capacity: 8.0 gallons per minute per irrigated acre (gpm/irr-ac)
- Annual Source Volume: 4.0 acre-feet/irr-ac
- Storage Capacity: 9,200 Gallons/irr-ac
- Distribution Capacity: 30 psi minimum during peak instantaneous conditions

IMPACT FEE CALCULATION

The existing system served about 570 irrigated acres at the beginning of 2020. Projected **growth** adds 150 irrigated acres in the next 10 years for a total of 720 irrigated acres.

The **pressurized irrigation water impact fee** is calculated based on the buy-in cost for facilities which have capacity remaining and the estimated cost of projects required to support future growth. These costs were added together and divided by the number of irrigable acres that is projected to be added within the next 10 years.

Components of the impact fee are presented in the table below. The cost for a typical single-family connection (assuming 0.25 irrigable acres per connection) is also included. For lots with more or less than 0.25 irrigable acres, Santaquin City will charge impact fees on a per-irrigable-area basis.

Table S-1
Proposed Impact Fee by Component

Component	Per Irrigable Acre	Per Single Family Connection
Source	\$6,206.90	\$1,551.73
Storage	\$4,352.79	\$1,088.20
Distribution	\$5,357.39	\$1,339.35
Planning	\$206.13	\$51.53
Facilities	\$367.73	\$91.93
Total	\$16,491	\$4,123

For lots with more or less than 0.25 irrigable acres, Santaquin City will charge impact fees on a per-irrigable-area basis, as shown in Table S-2.

Table S-2
Proposed Area-Based Impact Fee

Fee (per irrigable acre)	\$16,491
Square feet per acre	43,560
Fee (per square foot)	\$0.3786

CHAPTER 1 INTRODUCTION

PURPOSE AND SCOPE

Santaquin City is experiencing significant growth. To ensure availability of funds for growth-related infrastructure projects, an Impact Fee Facility Plan (IFFP) and Impact Fee Analysis (IFA) were commissioned by the City.

This report identifies those items that the Utah Impact Fees Act specifically requires, including demands placed upon existing facilities by new development and the proposed means by which the municipality will meet those demands.

IMPACT FEE COLLECTION

An impact fee is a one-time charge on new development to pay for that portion of a public facility that is required to support that new development. Impact fees enable local governments to finance public facility improvements necessary for growth, without burdening existing customers with costs that are exclusively attributable to growth.

In order to determine the appropriate impact fee, the cost of the facilities associated with future development must be proportionately distributed. As a guideline in determining the “proportionate share”, the fee must be found to be roughly proportionate and reasonably related to the impact caused by the new development.

MASTER PLANNING

A Pressurized Irrigation Water System Master Plan was prepared in conjunction with this analysis. The master plan is incorporated by reference into this analysis.

The master plan for the City’s pressurized irrigation water system is more comprehensive than the IFFP and IFA. It provides the basis for the IFA as well as identifies all capital facilities required of the pressurized irrigation water system for the 20-year planning range, including maintenance, repair, replacement, and growth-related projects. The recommendations made within the master plan are in compliance with current City policies and standard engineering practices.

A hydraulic model of the pressurized irrigation water system was prepared to aid in the analyses performed to complete the Pressurized Irrigation Water System Master Plan. The model was used to assess existing performance, to establish a proposed level of service and to confirm the effectiveness of the proposed capital facility projects to maintain the proposed level of service over the next 10 years.

CHAPTER 2 SYSTEM DEMAND AND CAPACITY

GENERAL

The purpose of this section is to identify the current level of service, characterize the facilities of the existing system, and determine the remaining capacity of these facilities.

Santaquin's existing pressurized irrigation water system is comprised of a pipe network, water storage facilities, and water sources. These facilities are found within 6 pressure zones. Figure 2-1 illustrates the existing water system and its service area.

EXISTING IRRIGABLE ACREAGE

Water demands in the pressurized irrigation water system have been determined in terms of irrigable acreage (irr-ac). The use of irrigable acreage is a common engineering practice used to describe the entire system's usage based on a common unit of measurement. Using irrigable acreage for analysis is a way to allocate existing and future demands over many different types of land use.

At the end of 2019, the City was estimated to have 570 irrigable acres served by the pressurized irrigation water system.

LEVEL OF SERVICE

The City has established a level of service for the pressurized irrigation water system. It establishes the sizing criteria for the City's distribution (pipelines), source, storage facilities, and water rights. The level of service standards are shown below:

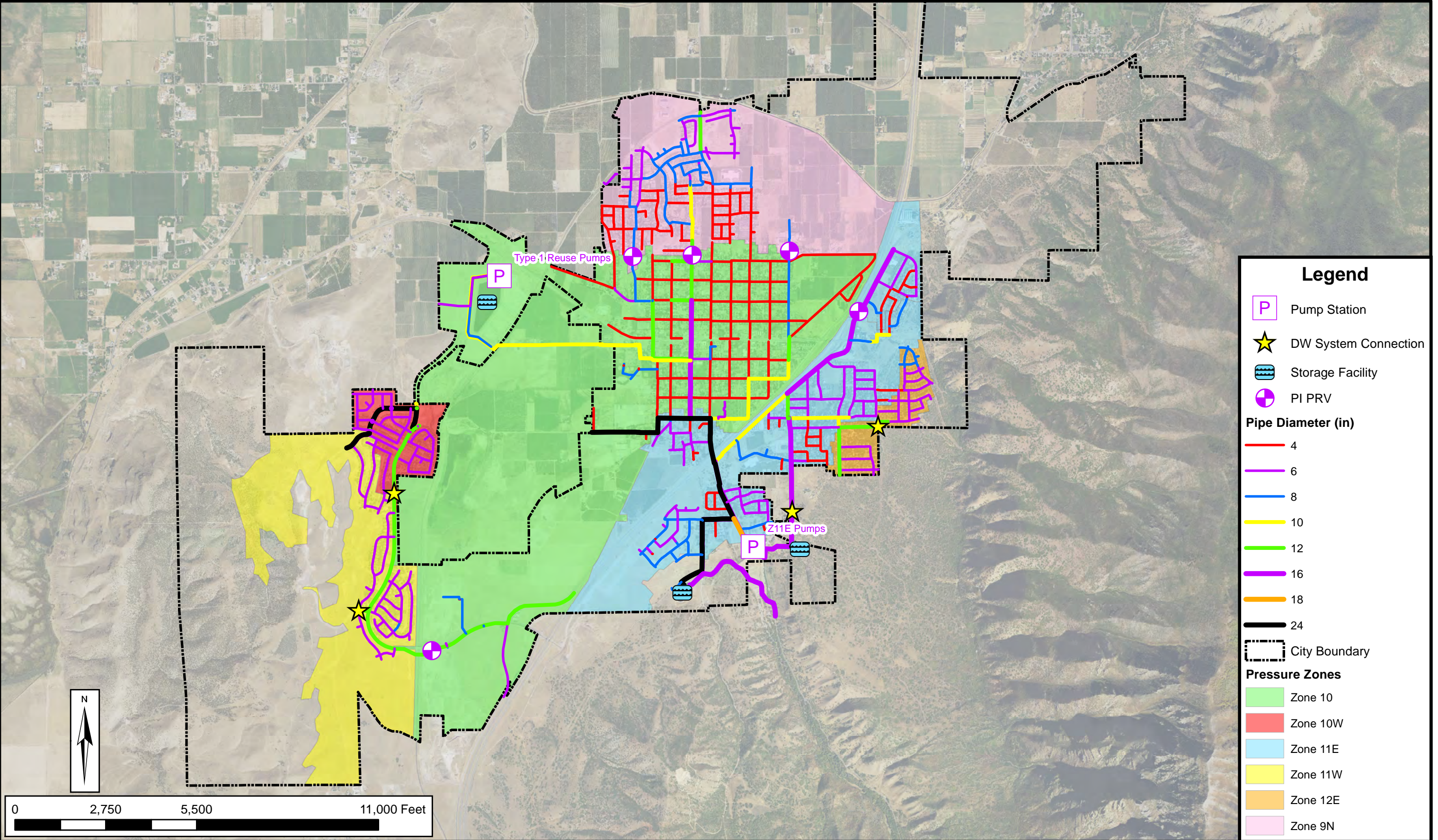
Level of Service

- Peak Day Source Capacity: 8.0 gallons per minute per irrigable acre (gpm/irr-ac)
- Annual Source Volume: 4.0 acre-feet/irr-ac
- Storage Capacity: 9,200 Gallons/irr-ac
- Distribution Capacity: 30 psi minimum pressure during peak instantaneous conditions

METHODOLOGY USED TO DETERMINE EXISTING SYSTEM CAPACITY

Each component of the pressurized irrigation water system was assessed a capacity in terms of gallons per minute (for peak day source), acre-feet per year (for annual source), or gallons (for storage). Demands on each component were computed by applying the level of service to the amount irrigable acreage served by each component. The difference between the capacity of the component and the demand on the component is the component's remaining capacity, which can be used to serve additional irrigable acreage. A hydraulic model was developed for the purpose of assessing system operation and distribution capacity.

Date: 9/11/2020
Document Path: H:\Projects\415 - Santaquin\02.100 - Culinary Water Master Plan\GIS\Working\FFP PI Figure 2-1 Existing System.mxd



Legend

- Pump Station
- DW System Connection
- Storage Facility
- PI PRV

Pipe Diameter (in)

- 4
- 6
- 8
- 10
- 12
- 16
- 18
- 24

City Boundary

Pressure Zones

- Zone 10
- Zone 10W
- Zone 11E
- Zone 11W
- Zone 12E
- Zone 9N

WATER SOURCE AND REMAINING CAPACITY

Pressurized irrigation water sources in Santaquin include Summit Creek Irrigation Company, springs in Santaquin Canyon, the Type 1 reuse pond, and the drinking water system. These sources are described in Table 2-1.

**Table 2-1
Existing Pressurized Irrigation Water Sources**

Source	Pressure Zone(s)	Physical Flow Capacity (gpm)	Peak Day Planning Capacity (gpm)	Annual Flow Capacity (ac-ft)
Center Street Well ¹	10	560	490	390
Drinking Water System ²	10W	392	190	140
Drinking Water System ²	11W	2,450	1,170	180
Drinking Water System ²	12E	1,560	750	120
Drinking Water System ²	11E	900	700	570
Springs 2-5 bypass ³	10	900	0	0
Spring 1	10	200	75	60
SCIC Wells ⁴	10	1,300	575	470
SCIC Stream ⁴	10	3,000		
Type 1 Reuse Ponds ^{1,5}	10	800	700	490
Total			4,650	2,420
Demand at Level of Service			4,560	2,280
Capacity Remaining			+90	+140

1. Assumes that the pump runs 21 hours per day. Center Street Well is a drinking water source, but is listed here because it is generally used in the PI system.
2. Meters were assumed to be at physical capacity when velocity through the meter vault pipes reaches 10 ft/sec. Annual capacity is limited to the demand currently served in these zones. Peak day planning capacity was defined as the physical capacity divided by a diurnal peaking factor of 2.1. Annual capacity was defined as the current level of service demand within the zone served or the available amount, whichever is less.
3. Because the Springs bypass delivers excess drinking water to the PI system, its capacity is included in the capacity listed for the drinking water system in Zone 11E.
4. The City owns 666.5 shares in SCIC. The City reports a low-year flow rate of 0.7 ac-ft/share over a 184-day irrigation season (575 gpm and 470 ac-ft/yr).
5. 490 ac-ft of Type 1 water was used in 2019. This value is expected to increase as the City grows.

When considering excess capacity in the drinking water system, there is a small amount of excess capacity remaining in the pressurized irrigation water system for both peak day and annual flow capacity. However, this excess capacity will eventually be needed within the drinking water system, and will not be available for use within the pressurized irrigation water system.

Table 2-2 summarizes the capacity of the existing pressurized irrigation water pump stations.

**Table 2-2
Existing Pressurized Irrigation Water Pump Stations**

Name	From	To Zone	Pumps	Rated Capacity	Peak Day Demand (gpm)	Surplus (+) or Deficit (-)
400 N 200 W Booster	SCIC	10	2 @ 1,300 gpm	1,300 gpm	N/A ¹	N/A ¹
Canyon Road Booster	Zone 10	11E	2 @ 2,500 gpm	2,500 gpm	920	+1,580
Water Reuse Booster	Storage Ponds	10	2 @ 800 gpm	800 gpm	N/A ¹	N/A ¹

1. The 400 N 200 W booster and the Type 1 reuse booster are sources to the system, and thus were not individually evaluated for capacity, but were evaluated as part of the total system source capacity.

STORAGE FACILITIES AND REMAINING CAPACITY

Santaquin currently operates two storage facilities totaling 45.0 ac-ft. Table 2-3 shows the demand and capacity of each storage facility. Demands were calculated by applying the level of service to the irrigable acreage served by each tank.

**Table 2-3
Existing Storage Capacity**

Facility	Zone	Total Capacity (ac-ft)	Equalization Capacity (ac-ft)	Requirement (ac-ft)	Excess Capacity (ac-ft)
Ahlin Pond ¹	9N	41.5	19.5	9.32	+10.18
	10				
None ²	10W	0	0	1.13	-1.13
None ²	11W	0	0	1.55	-1.55
Z11E PI Tank	11E	10.0	10.0	3.25	+6.75
None ²	12E	0	0	0.85	-0.85
Total		51.5	29.5	16.10	+13.4

1. The top 7 feet of Ahlin pond will be used for equalization capacity, with the remainder required to support aquatic life and recreation. Listed equalization capacity includes only the top 7 feet. Ahlin Pond is located in Zone 10, but supplies Zone 9N through PRVs.
2. Storage capacity for Zones 10W, 11W, and 12E is currently provided in the drinking water system.

While Zones 9N, 10, and 11E have excess capacity remaining, the other zones currently have a deficit which is supported using excess capacity in the drinking water system. However, this capacity will eventually be needed in the drinking water system.

DISTRIBUTION SYSTEM

Pipe diameters range from 4 inches to 24 inches, with the majority being 6 and 8 inches in diameter. The function of the larger pipes in the system is to fill the storage tanks and meet peak day and fire flow demands. Smaller pipes facilitate local distribution. Figure 2-1 illustrates the existing distribution pipelines. A hydraulic model was used to identify areas with existing deficiencies. Deficiencies are described in Chapter 5 of the Master Plan report. Costs to fix these deficiencies are not impact fee-eligible and are not considered in this report. The model was also used to identify pipes required for future growth. These projects are impact fee-eligible and are discussed further in Chapter 3.

OPERATIONS FACILITY

In 2016, Santaquin City constructed a public works operations facility to support the operation and maintenance of the City's drinking water, pressurized irrigation water, sanitary sewer, and street systems.

CHAPTER 3 IMPACT FEE FACILITY PLAN AND ANALYSIS

This section relies on the data presented in the previous sections to calculate a proposed impact fee based on an appropriate buy-in cost of available existing excess capacity previously purchased by the City, and the cost of projects needed to support projected growth.

The projected costs of the pressurized irrigation water system projects are presented. Also included in this section are the possible revenue sources that the City may consider to fund the recommended projects.

GROWTH PROJECTIONS

The development of impact fees requires growth projections over the next ten years. Growth projections for Santaquin were made by incorporating the growth rate presented in the Master Plan. Total growth projections for the City through 2029 are summarized in Table 3-1.

**Table 3-1
Growth Projections**

Year	Irrigable Acreage
2020	570
2021	584
2022	597
2023	611
2024	626
2025	641
2026	656
2027	672
2028	687
2029	704
2030	720
10-year Difference	+150

The existing system served about 570 irrigable acres at the end of 2019. Projected growth adds 150 irrigable acres in the next 10 years for a total of 720 irrigable acres.

COST OF EXISTING FACILITIES

This section contains a discussion of the excess capacity remaining within existing facilities, as well as the portion of the cost of those facilities that is eligible to be repaid using impact fees. Historic costs were obtained from the City's 2013 Pressure Irrigation System Impact Fee Facilities Plan (JUB, 2013) and from Santaquin City Records.

Source Facilities

Capacity in existing source facilities that has not been consumed by existing users is eligible to be reimbursed by impact fees. The impact fee-eligible cost of existing source facilities is summarized in table 3-2.

Table 3-2
Impact Fee Eligible Cost of Existing Source Facilities

Project	Cost	Funded by Santaquin (%)	Capacity Remaining (%)	Impact Fee Eligible Cost
Zone 11E PI Pump Station	\$1,112,903.04	100%	63% ¹	\$703,354.72
Springs 2-5 overflow bypass	\$16,004.88	100%	0% ²	\$0
Zone 11W backflow preventer	\$50,102.07	100%	69% ³	\$34,686.05
Totals	\$1,179,009.99	-	-	\$738,040.77

1. See Table 2-2.
2. Capacity from the overflow bypass is assumed to be loaned from the drinking water system.
3. Remaining capacity was calculated using the peak day capacity listed in Table 2-1 as compared to the peak day demand in the zone (see Table 3-3 of the Pressurized Irrigation Water Master Plan).

Storage Facilities

Capacity in existing storage facilities that has not been consumed by existing users is eligible to be reimbursed by impact fees. The impact fee-eligible cost of existing storage facilities is summarized in table 3-3.

Table 3-3
Impact Fee Eligible Cost of Existing Storage Facilities

Project	Cost	Funded by Santaquin (%)	Capacity Remaining ² (%)	Impact Fee Eligible Cost
Ahlin Pond	\$926,066.12	59% ¹	25%	\$227,165.13
Zone 11E PI Tank	\$2,048,327.11	100%	68%	\$1,382,620.80
Totals	\$2,974,393.23	-	-	\$1,609,785.93

1. A portion of the construction of Ahlin pond was funded by a CUP grant.
2. Calculated capacity remaining is based on capacity in the facility and demands placed upon it by existing customers. See Table 2-3.

Distribution Facilities

Capacity in existing distribution facilities that has not been consumed by existing users is eligible to be reimbursed by impact fees. The impact fee-eligible cost of existing distribution facilities is summarized in Table 3-4.

Table 3-4
Impact Fee Eligible Cost of Existing Distribution Facilities

Project	Cost	Funded by Santaquin (%)	Capacity Remaining ² (%)	Impact Fee Eligible Cost
Series 2012 Bonds Pipelines	\$7,399,224	59% ¹	67%	\$2,918,821.79
Harvest View Drive Pipeline	\$82,100.00	100%	67%	\$54,892.44
Summit Ridge 12" PRV	\$19,869.70	100%	67%	\$13,284.97
Totals	\$7,501,193.70	-	67%	\$2,986,999.21

1. A portion of the construction of the distribution system was funded by a CUP grant.
2. Capacity remaining in existing system distribution facilities was conservatively estimated as the difference between the existing irrigable acreage (570 irr-ac) and the projected irrigable acreage at 2060 (1,720 irr-ac).

Operations Facility

Because the operations facility is a necessary component of the pressurized irrigation water system, the portion of its cost attributable to new development is eligible to be reimbursed by impact fees. The cost of the existing operations facility attributable to the pressurized irrigation water system is summarized in Table 3-5.

Table 3-5
Cost of Existing Operations Facility

Project	Cost	Funded by Santaquin (%)	Attributable to PI System (%)	Cost Attributable to PI System
Totals	\$2,530,000	100%	25%¹	\$632,500

1. 25% of construction costs are considered attributable to the pressurized irrigation water system.

COST OF FUTURE FACILITIES

The facilities and costs presented in Table 3-6 and shown on Figure 3-1 are proposed projects essential to maintain the current level of service while accommodating future growth within the next 10 years. The facility sizing for the future proposed projects was based on the proposed level of service with growth projections provided by the City and hydraulic modeling. The proposed impact fee will be based both on costs of existing projects and the projected cost of future construction projects. Detailed information on these projects and their estimated cost is included in the City's pressurized irrigation water master plan report.

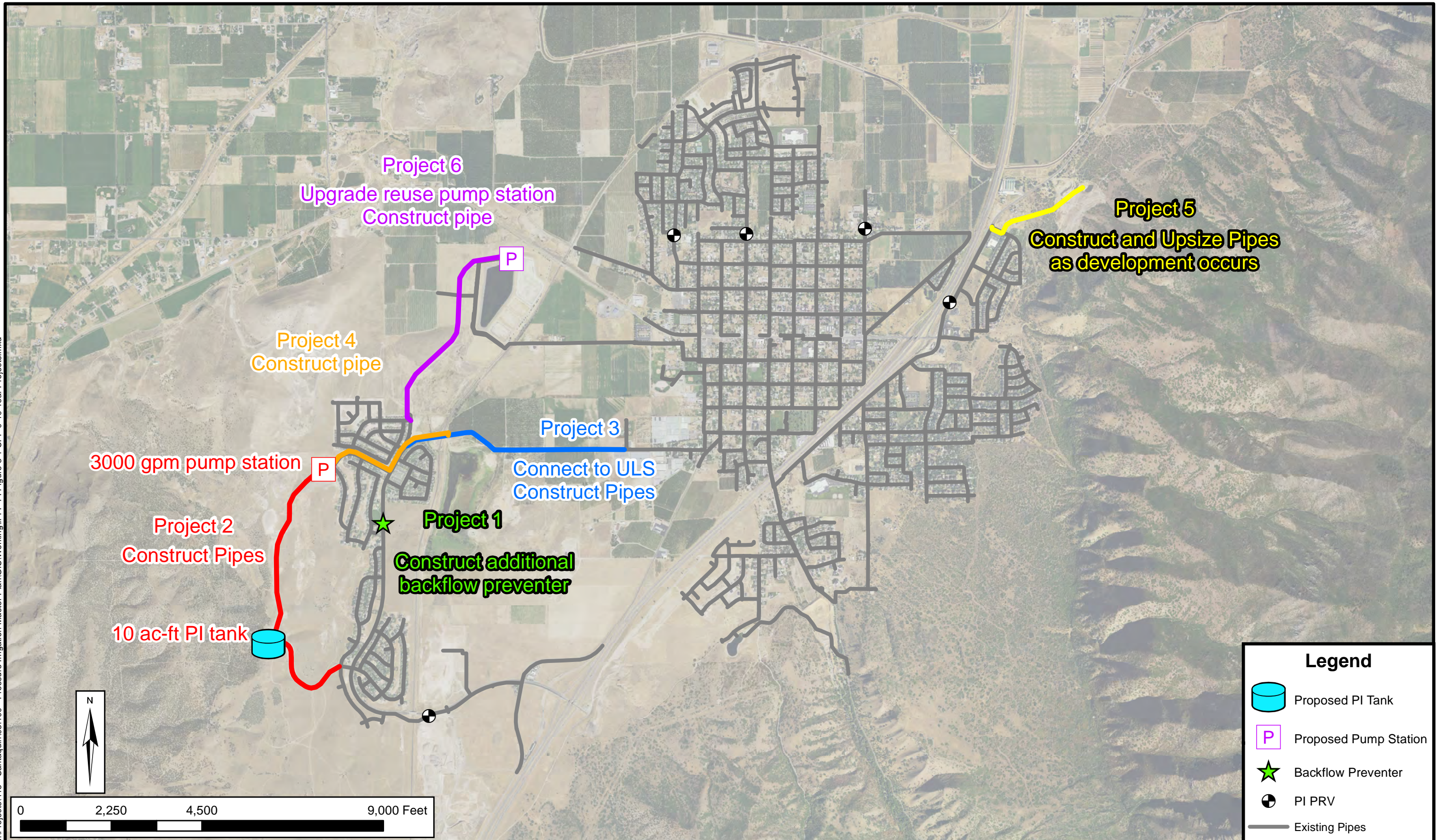
Table 3-6
Estimated Cost of Future Facilities

Project	Map ID*	Source	Distribution	Storage	Total	Capacity Added ¹
Zone 10W Backflow Preventer	1	\$84,000	\$0	\$0	\$84,000	980 gpm source
Zone 11W System Expansion	2	\$900,000	\$1,507,000	\$2,542,000	\$4,949,000	3,000 gpm pumping 10 ac-ft storage Distribution ¹
Zone 10 ULS Expansion	3	\$798,000	\$798,000	\$0	\$1,596,000	3,000 gpm source Distribution ¹
Zone 11W ULS Expansion	4	\$0	\$687,000	\$0	\$687,000	Distribution ¹
Zone 11E Distribution	5	\$0	\$182,000	\$0	\$182,000	Distribution ¹
Upgrade reuse pump station	6	\$1,489,000	\$0	\$0	\$1,489,000	500 gpm source
Total		\$3,271,000	\$3,174,000	\$2,542,000	\$8,987,000	Distribution 4,480 gpm source 3,000 gpm pumping 10 ac-ft storage

1. Transmission capacity for each pipeline is not explicitly accounted for in this table.

IMPACT FEE UNIT CALCULATION

Only those costs attributed to the new growth in the next 10 years can be included in the impact fee. The following sections describe the impact fee calculation for each component.



Source

Projected growth in the system will require the construction of a new PI pump station in Zone 11W, a turnout from the planned future ULS pipeline, and pipelines to convey the source to the system. The source impact fee was calculated by combining the available buy-in capacity and cost of existing source (see Table 3-2) with the capacity and projected cost of the planned future sources (see Table 3-5). This calculation is shown in Table 3-7.

Table 3-7
Source Impact Fee Unit Calculation

	Sources			Pump Stations		
	Existing ¹	Future ²	Total	Existing ³	Future ²	Total
Eligible Cost	\$34,686.05	\$2,731,000	\$2,405,686.05	\$703,354.72	\$900,000	\$1,603,354.72
Capacity (gpm)	1,170	4,480	5,650	1,580	3,000	4,580
Source impact (per gpm) ⁴ :			\$425.79	Pump Impact (per gpm) ⁴ :		\$350.08
Source impact (per irr-ac) ⁵ :			\$3,406.28	Pump Impact (per irr-ac) ⁵ :		\$2,800.62
Total Source Impact (per irr-ac)						\$6,206.90

1. See Tables 2-1 and 3-2

2. See Table 3-6

3. See Tables 2-2 and 3-2

4. Calculated as the sum of existing and future eligible costs divided by the sum of existing and future eligible capacity

5. Calculated at the proposed level of service of 8 gpm/irr-ac

Expected source costs by time period are listed in Table 3-8. Source facilities are expected to support growth for more than 10 years. The portion of their costs attributable to growth outside of the 10-year planning window is not impact fee-eligible.

Table 3-8
Source Cost by Time Period

Time Period	Irr-ac served	Buy-in Cost	Growth Cost	Total Cost
Existing	570	\$440,969.22	\$0.00	\$440,969.22
Next 10 years	150	\$191,652.03	\$739,383.08	\$931,035.11
Beyond 10 years	1,000	\$546,388.74	\$2,531,616.92	\$3,078,005.66
Total	1,720	\$1,179,009.99	\$3,271,000.00	\$4,450,009.99

Storage

Projected growth in the system will require the construction of a new PI storage facility in Zone 11W. Buy-in capacity in the existing storage pond is also available. The storage impact fee was calculated as shown in Table 3-9.

Table 3-9
Storage Impact Fee Unit Calculation

	Existing ¹	Future ²	Total
Eligible Cost	\$1,609,785.93	\$2,542,000.00	\$4,151,785.93
Capacity (ac-ft)	16.93	10	26.93
Storage impact (per ac-ft) ³			\$154,169.55
Storage impact (per irr-ac) ⁴			\$4,352.79

1. See Tables 2-3 and 3-3
2. See Table 3-6
3. Calculated as the sum of existing and future eligible costs divided by the sum of existing and future eligible capacity
4. Calculated at the proposed level of service of 9,200 gal/irr-ac (0.0282 ac-ft/irr-ac)

Expected storage costs by time period are listed in Table 3-10. Storage facilities are expected to support growth for more than 10 years. The portion of their costs attributable to growth outside of the 10-year planning window is not impact fee-eligible.

Table 3-10
Storage Cost by time period

Time Period	Irr-ac served	Buy-in Cost	Growth Cost	Total Cost
Existing	570	\$1,364,607.30	\$0.00	\$1,364,607.30
Next 10 years	150	\$253,158.09	\$399,759.89	\$652,917.98
Beyond 10 years	1,000	\$1,356,627.85	\$2,142,240.11	\$3,498,867.95
Total	1,720	\$2,974,393.23	\$2,542,000.00	\$5,516,393.23

Distribution

Santaquin City funded the construction of a large number of pipes in the PI system when it was first constructed. More recently, the City constructed a PRV and an additional pipeline (see Table 3-4). Additionally, there are several planned distribution projects within the 10-year impact fee planning period (see Table 3-6). The portion of the impact fee to account for these projects was calculated as shown in Table 3-11.

**Table 3-11
Distribution Impact Fee Unit Calculation**

	Existing¹	Future²	Total
Eligible Cost	\$2,986,999.21	\$3,174,000.00	\$6,160,999.21
Capacity (irr-ac) ³	1,150	1,150	1,150
Distribution Impact (per irr-ac)⁴			\$5,357.39

1. See Table 3-4
2. See Table 3-6
3. Distribution infrastructure is sized to accommodate future users through year 2060. A remaining capacity of 1,150 irr-ac was calculated as the projected year 2060 irrigable acreage (1,720) minus irrigable acreage existing at the beginning of year 2020 (570).
4. Calculated as the sum of existing and future eligible costs divided by the sum of existing and future eligible capacity

Expected distribution costs by time period are listed in Table 3-12. Distribution facilities are expected to support growth for more than 10 years. The portion of their costs attributable to growth outside of the 10-year planning window is not impact fee-eligible.

**Table 3-12
Distribution Cost by Time Period**

Time Period	Irr-ac served	Buy-in Cost	Growth Cost	Total Cost
Existing	570	\$4,514,194.49	\$0.00	\$4,514,194.49
Next 10 years	150	\$389,608.59	\$414,000.00	\$803,608.59
Beyond 10 years	1,000	\$2,597,390.62	\$2,760,000.00	\$5,357,390.62
Total	1,720	\$7,501,193.70	\$3,174,000.00	\$10,675,193.70

Planning

The planning portion of the impact fee was calculated as shown in Table 3-13. Portions of the City's 2020 master plan study that are attributable to growth (approximately 50% of total expenditures) are impact fee eligible. 100% of costs associated with the Impact Fee Facility Plan and Impact Fee Analysis are impact fee eligible.

Table 3-13
Planning Component of Impact Fee

Planning Document	Cost	% of Plan Associated with Growth	Cost Associated with Growth	Irr-ac Served	Cost per Irr-ac
2020 PI Master Plan	\$48,566	50%	\$24,283.11	150	\$161.89
2020 IFFP and IFA	\$6,636.75	100%	\$6,636.75	150	\$44.24
Total	\$55,202.96	-	\$30,919.85	150	\$206.13

Facilities

The impact fee cost for the public works facility was calculated as shown in Table 3-14.

Table 3-14
Facilities Impact Fee Unit Calculation

	Existing facility
Eligible Cost ¹	\$632,500
Irr-ac at Year 2060 ²	1,720
Facilities Impact (per irr-ac)³	\$367.73

1. See Table 3-5
2. See Pressurized Irrigation Water Master Plan. The Facility will serve customers throughout the planning horizon.
3. Calculated as the eligible cost divided by remaining capacity

Table 3-15 shows the cost of the public works facility attributable to each time period.

Table 3-15
Facilities Cost by Time Period

Time Period	Irr-ac served	Buy-in Cost
Existing	570	\$209,607.56
Next 10 years	150	\$55,159.88
Beyond 10 years	1,000	\$367,732.56
Total	1,720	\$632,500.00

TOTAL IMPACT FEE UNIT CALCULATION

The proposed pressurized irrigation water system impact fee for one irrigable acre is **\$16,491**. Assuming a typical single-family connection contains 0.25 irrigable acres, the impact fee of a typical single-family connection is **\$4,123**. See Table 3-16.

**Table 3-16
Total Proposed Impact Fee**

Component	Per Irrigable Acre	Per Single Family Connection
Source	\$6,206.90	\$1,551.73
Storage	\$4,352.79	\$1,088.20
Distribution	\$5,357.39	\$1,339.35
Planning	\$206.13	\$51.53
Facilities	\$367.73	\$91.93
Total	\$16,491	\$4,123

AREA-BASED IMPACT FEE CALCULATION

It is recommended that an area-based approach to impact fee calculation is taken for all nonresidential developments and residential developments that do not have 0.25 irrigable acres. The recommended impact fee per irrigable square foot is calculated as shown in Table 3-17.

**Table 3-17
Proposed Area-Based Impact Fee**

Fee (per irrigable acre)	\$16,491
Square feet per acre	43,560
Fee (per square foot)	\$0.3786

COSTS BY TIME PERIOD

Table 3-18 is a summary of the existing and future facility costs by pressurized irrigation water system component and by time period. Existing costs are those costs attributed to capacity currently being used by existing connections. Costs attributed to the next 10 years are costs for the existing capacity or new capacity for the assumed growth in the next 10 years. Costs attributed to beyond 10 years are costs for the existing capacity or new capacity for the assumed growth beyond 10 years.

**Table 3-18
Facility Cost by Time Period**

	Existing	Next 10 Years	Beyond 10 Years	Total
Source	\$440,969.22	\$931,035.11	\$3,078,005.66	\$4,450,009.99
Storage	\$1,364,607.30	\$652,917.98	\$3,498,867.95	\$5,516,393.23
Distribution	\$4,514,194.49	\$803,608.59	\$5,357,390.62	\$10,675,193.70
Planning	\$24,283.11	\$30,919.85	\$0.00	\$55,202.96
Facilities	\$209,607.56	\$55,159.88	\$367,732.56	\$632,500.00
Total Cost	\$6,553,661.71	\$2,473,641.42	\$12,301,996.79	\$21,329,299.88

REVENUE OPTIONS

Utah Code 11-36a-302(2) requires a local political subdivision to generally consider all revenue sources to finance the impacts on system improvements, including grants, bonds, interfund loans, impact fees, and anticipated or accepted dedications of system improvements. This impact fee facilities plan considers each of these options. An expanded discussion on options the City has to generate revenue is included in this section for reference.

Revenue options for the recommended projects include: general obligation bonds, revenue bonds, State/Federal grants and loans, user fees, and impact fees. Although this analysis focuses on impact fees, the City may need to consider a combination of these funding options. The following discussion describes each of these options.

General Obligation Bonds through Property Taxes

This form of debt enables the City to issue general obligation bonds for capital improvements and replacement. General Obligation (G.O.) Bonds would be used for items not typically financed through the Water Revenue Bonds (for example, the purchase of water source to ensure a sufficient water supply for the City in the future). G.O. bonds are debt instruments backed by the full faith and credit of the City which would be secured by an unconditional pledge of the City to levy assessments, charges or ad valorem taxes necessary to retire the bonds. G.O. bonds are the lowest-cost form of debt financing available to local governments and can be combined with other revenue sources such as specific fees, or special assessment charges to form a dual security through the City's revenue generating authority. These bonds are supported by the City as a whole, so the amount of debt issued for the water system is limited to a fixed percentage of the real market value for taxable property within the City. For growth related projects this type of

revenue places an unfair burden on existing residents as they had previously paid for their level of service.

Revenue Bonds

This form of debt financing is also available to the City for utility related capital improvements. Unlike G.O. bonds, revenue bonds are not backed by the City as a whole, but constitute a lien against the water service charge revenues of a Water Utility. Revenue bonds present a greater risk to the investor than do G.O. bonds, since repayment of debt depends on an adequate revenue stream, legally defensible rate structure /and sound fiscal management by the issuing jurisdiction. Due to this increased risk, revenue bonds generally require a higher interest rate than G.O. bonds, although currently interest rates are at historic lows. This type of debt also has very specific coverage requirements in the form of a reserve fund specifying an amount, usually expressed in terms of average or maximum debt service due in any future year. This debt service is required to be held as a cash reserve for annual debt service payment to the benefit of bondholders. Typically, voter approval is not required when issuing revenue bonds. For growth related projects this type of revenue places an unfair burden on existing residents as they had previously paid for their level of service.

State/Federal Grants and Loans

Historically, both local and county governments have experienced significant infrastructure funding support from state and federal government agencies in the form of block grants, direct grants in aid, interagency loans, and general revenue sharing. Federal expenditure pressures and virtual elimination of federal revenue sharing dollars are clear indicators that local government may be left to its own devices regarding infrastructure finance in general. However, state/federal grants and loans should be further investigated as a possible funding source for needed water system improvements.

It is also important to assess likely trends regarding federal / state assistance in infrastructure financing. Future trends indicate that grants will be replaced by loans through a public works revolving fund. Local governments can expect to access these revolving funds or public works trust funds by demonstrating both the need for and the ability to repay the borrowed monies, with interest. As with the revenue bonds discussed earlier, the ability of infrastructure programs to wisely manage their own finances will be a key element in evaluating whether many secondary funding sources, such as federal/state loans, will be available to the City.

Not charging impact fees, or significantly lowering them could be viewed negatively from the perspective of State/Federal funding agencies. Charging a proper impact fee signals to these agencies that the community is using all possible means to finance the projects required to provide vital services to their residents.

User Fees

Similar to property taxes on existing residents, user fees to pay for improvements related to new growth-related projects places an unfair burden on existing residents as they had previously paid for their level of service.

Impact Fees

As discussed in Section 1, an impact fee is a one-time charge to a new development for the purpose of raising funds for the construction of improvements required by the new growth and to maintain the current level of service. Impact fees in Utah are regulated by the Impact Fee Statute and substantial case law. Impact fees are a form of a development exaction that requires a fee to offset the burdens created by the development on existing municipal services. Funding the future improvements required by growth through impact fees does not place the burden on existing residents to provide funding of these new improvements.

REFERENCES

JUB Engineers. 2013. "Santaquin City Pressure Irrigation System Impact Fee Facilities Plan."

APPENDIX A

Historic Project Costs
(JUB, 2013 and City Records)

PI Water Infrastructure Projects (City Records)

Project	Cost to City	Funding Source
Zone 11 E tank	\$ 2,048,327.11	Bond
Main Zone/11 E Booster Pump	\$ 1,112,903.04	
Cypress point backflow preventor and 10" meter	\$ 50,102.07	Impact Fees
Install 8" PI line within Harvest View Drive	\$ 82,100.00	Impact Fees
installed 12" PRV in Summit Ridge Parkway	\$ 19,869.70	Impact Fees
CW Springs Overflow to PI system	\$ 16,004.88	Impact Fees

APPENDIX D – HISTORIC COSTS

Table D-1. Historic Costs of Storage Projects Eligible for Impact Fee Collection

Storage Projects			
Ahlin Pond (Zone 10 Pond (E))			
Year of Construction	2009	Percent funded by City:	59.26%
		Percent to be Used by Growth:	59.44%
Item Description			Amount
Total Construction Costs (Per Final Pay Request)			\$1,003,431.12
Less Pipe Costs (Included in "Historic Pipe Costs")			(\$77,365.00)
Other Fees: Engineering, Legal, Administrative, Finance 25%			\$231,516.53
	Total:		\$1,157,582.65
Historic Cost Eligible for Impact Fee Collection (Total x 59.26% x 59.44%):			\$407,738.12

Table D-2. Historic Costs Calculation for Pipes Eligible for Impact Fee Collection

Transmission and Distribution Piping Work														
Main Line Size	Schedule 1 (Ahlin Pond) 2008		Schedule 2 (South of Main) 2007		Schedule 3 (North of Main) 2007		Schedule 4 (Upper East Side) 2009		Supply Lines (No Schedule) 2008		Total Pipe Length (LF)	Prorated Unit Price	Cost of Pipes	Calculated Unit Price of Piping Related Work ¹
	Total Length (LF)	Unit Price Paid	Total Length (LF)	Unit Price Paid	Total Length (LF)	Unit Price Paid	Total Length (LF)	Unit Price Paid	Total Length (LF)	Unit Price Paid				
4"			20,462	\$8.49	63,934	\$8.82	16,823	\$5.24	60	\$21.00	101,279	\$8.17	\$827,033	\$20.05
6"			593	\$10.71	2,240	\$11.24	21,571	\$6.90	176	\$15.25	24,580	\$7.45	\$183,053	\$18.28
8"			1,845	\$14.34	10,667	\$14.08	2,995	\$10.38	40	\$49.00	15,547	\$13.49	\$209,697	\$33.11
10"			5,958	\$23.63	1,713	\$18.71	5,598	\$13.82			13,269	\$18.86	\$250,202	\$46.29
12"			2,187	\$27.87	3,783	\$24.68	3,402	\$18.20			9,372	\$23.07	\$216,233	\$56.64
16"	360	\$40.71	2,258	\$36.72	1,343	\$36.60	15,362	\$28.21	2,540	\$45.25	21,863	\$31.79	\$695,020	\$78.04
24"	890	\$70.46	4,733	\$60.10			2,581	\$58.29	1,844	\$73.25	10,048	\$62.97	\$632,682	\$154.58
Total Cost of Schedule	\$1,003,431		\$2,017,442		\$3,149,671		\$2,930,136		\$543,992		Total:		\$3,013,919	
Non-Pipe Related	\$926,066		\$203,535		\$631,490		\$467,331		\$17,026					
Pipe Related Items	\$77,365		\$1,813,907		\$2,518,181		\$2,462,805		\$526,967					
Total cost of pipe related items from all schedules is \$7,399,224														
¹ The unit price of piping related work is calculated as follows: The cost of all pipes based on the bid unit prices of the pipes themselves is \$3,013,919. The total cost of all piping related work (excavation, backfill, valves, etc.) is \$7,399,224. The ratio of \$7,399,224 to \$3,013,919 is 2.46, which means that the unit price of all piping related work is 2.46 times the unit price of the pipe itself. We therefore multiply the unit price of the pipe itself by 2.46 to arrive at the calculated unit price of all work associated with piping (ie. for 10" pipe,														



PRESSURIZED IRRIGATION WATER MASTER PLAN AND CAPITAL FACILITY PLAN

(HAL Project No.: 415.03.100)

DRAFT

January 2021

SANTAQUIN CITY

PRESSURIZED IRRIGATION WATER MASTER PLAN

(HAL Project No.: 415.03.100)

DRAFT

Steven C. Jones, P.E.
Principal, Project Manager



January 2021

ACKNOWLEDGEMENTS

Hansen, Allen & Luce thanks the following individuals for their contributions to this project:

Santaquin City Government

Kirk Hunsaker, Mayor
Nicholas Miller, Councilperson
Betsy Montoya, Councilperson
Lynn Mecham, Councilperson
Jennifer Bowman, Councilperson
Dave Hathaway, Councilperson

Santaquin City Staff

Benjamin Reeves, City Manager
Norm Beagley, Assistant City Manager/Engineer
Jon Lundell, City Engineer

Jason Callaway, Public Works Operations Manager
Shannon Hoffman, Admin Service Director/Treasurer
Aaron Shirley, Finance Director/Recorder

Central Utah Water Conservancy District

Mark Breitenbach, Project Manager – Utah Lake Drainage Basin Water Delivery System

Hansen, Allen & Luce, Inc.

Steven C. Jones, P.E., Vice President, Project Manager
Richard M. Noble, Vice President
Ridley J. Griggs, Staff Engineer

TABLE OF CONTENTS

TABLE OF CONTENTS	i
LIST OF TABLES	iv
LIST OF FIGURES	v
ABBREVIATIONS AND UNITS.....	vi
EXECUTIVE SUMMARY	ES-1
PURPOSE OF STUDY	ES-1
PLANNING HORIZONS	ES-1
COMPONENTS OF A WATER DISTRIBUTION SYSTEM	ES-1
METHODS	ES-1
LEVEL OF SERVICE	ES-2
SYSTEM VULNERABILITIES	ES-2
DISTRIBUTION SYSTEM – GENERAL RECOMMENDATIONS.....	ES-4
General Source Recommendations.....	ES-4
General Storage Recommendations.....	ES-4
General Distribution Recommendations	ES-5
CAPITAL FACILITY PLAN	ES-5
CONCLUSIONS	ES-7
 CHAPTER 1 INTRODUCTION.....	 1-1
PURPOSE AND SCOPE	1-1
BACKGROUND.....	1-1
LEVEL OF SERVICE	1-2
MASTER PLANNING METHODOLOGY	1-2
DESIGN AND PERFORMANCE CRITERIA	1-3
PRESSURE ZONES	1-3
 CHAPTER 2 IRRIGABLE ACREAGE.....	 2-1
GROWTH PROJECTIONS.....	2-1
EXISTING AND FUTURE IRRIGABLE ACREAGE	2-1
 CHAPTER 3 WATER SOURCES AND DEMAND	 3-1
EXISTING WATER SOURCES	3-1
EXISTING WATER SOURCE DEMAND.....	3-2
Analysis and Proposed Level of Service.....	3-2
WATER SOURCE REQUIREMENTS	3-3
Existing and Future Peak Day Demand.....	3-3
Existing Pump Stations	3-3
Existing and Future Average Yearly Demand.....	3-4
Comparison of Supply and Demand	3-4
SOURCE - RECOMMENDATIONS.....	3-5
Summit Creek Irrigation and Canal Company	3-6
Wells	3-6
CUWCD Utah Lake System Pipeline	3-6
Canal Shares	3-7
Wastewater reuse	3-7
Future Pump Stations	3-7
 CHAPTER 4 WATER STORAGE	 4-1

EXISTING WATER STORAGE	4-1
EXISTING WATER STORAGE REQUIREMENTS	4-1
FUTURE WATER STORAGE REQUIREMENTS	4-2
WATER STORAGE RECOMMENDATIONS.....	4-3
CHAPTER 5 WATER DISTRIBUTION.....	5-1
HYDRAULIC MODEL	5-1
LEVEL OF SERVICE AND DESIGN PARAMETERS	5-2
ANALYSIS METHODOLOGY.....	5-2
Static Conditions	5-2
Peak Day Pressure Swings	5-3
Peak Instantaneous Pressures	5-3
DISTRIBUTION SYSTEM RECOMMENDATIONS	5-3
Zone 10W	5-3
Distribution Piping	5-3
CHAPTER 6 SYSTEM OPTIMIZATION	6-1
SOURCE PRIORITIZATION	6-1
SCALING AND SEDIMENTATION.....	6-1
NON-REVENUE WATER	6-1
CHAPTER 7 CAPITAL FACILITY PLAN	7-1
INTRODUCTION	7-1
GROWTH PROJECTIONS.....	7-1
Changes to Expected Growth Areas.....	7-1
Large Developments.....	7-1
METHODOLOGY	7-2
RECOMMENDED PROJECTS AND COSTS	7-2
Precision of Cost Estimates	7-3
GROWTH-RELATED PROJECTS	7-3
OPERATIONS AND MAINTENANCE PROJECTS	7-8
FUNDING OPTIONS	7-8
General Obligation Bonds.....	7-8
Revenue Bonds	7-8
State or Federal Grants and Loans.....	7-9
Impact Fees	7-9
REFERENCES	R-1

APPENDIX A

Pressurized Irrigation Water Master Plan System Map

APPENDIX B

Population Projections

APPENDIX C

Water System Data and Calculations

APPENDIX D

Evaluation of Wastewater Reuse

APPENDIX E

Flushing Analysis

APPENDIX F

Computer Model Output (see disk)

APPENDIX G

Cost Estimate Calculations

LIST OF TABLES

NO.	TITLE	PAGE
ES-1	Level of Service Parameters	ES-2
ES-2	Existing or Near-Term System Vulnerabilities.....	ES-3
ES-3	Proposed Solutions to System Vulnerabilities.....	ES-4
ES-4	Operations/Maintenance Projects	ES-5
ES-5	System Growth-Related Capital Projects	ES-6
ES-6	Development-Driven Projects	ES-6
1-1	Level of Service Parameters	1-2
1-2	Key System Design Criteria	1-3
2-1	Irrigation Factors by Land Use Type	2-2
2-2	Existing and Future Irrigable Acreage by Zone	2-3
2-3	Growth Projections.....	2-4
3-1	Existing Pressurized Irrigation Water Sources	3-1
3-2	Historic Irrigation Water Use	3-2
3-3	Existing and Future Pressurized Irrigation Peak Day Demand	3-3
3-4	Existing Pressurized Irrigation Water Pump Stations.....	3-3
3-5	Existing and Future Average Yearly Demand	3-4
3-6	Existing Pressurized Irrigation Water Demand and Source Capacity	3-4
3-7	Future Pressurized Irrigation Water Demand and Source Capacity	3-4
3-8	Planned Future Pressurized Irrigation Water Sources	3-5
3-9	Future Pressurized Irrigation Water Pump Stations	3-8
4-1	Existing Storage Capacity	4-1
4-2	Existing Storage Requirements.....	4-2
4-3	Future Storage Requirements	4-3
4-4	Recommended Future Storage Facilities	4-4
5-1	Compliance of Existing Distribution System with Level of Service.....	5-2
6-1	Non-Revenue Water in the Santaquin PI Water System.....	6-2
7-1	Estimated Costs for Growth-Related Projects.....	7-4
7-2	Recommended Source Projects	7-5
7-3	Recommended Storage Projects	7-6
7-4	Recommended Transmission Projects	7-7
7-5	Recommended Operations Projects	7-8

LIST OF FIGURES

NO.	TITLE	PAGE
1-1	Existing Pressurized Irrigation Water System	After 1-1
1-2	Existing and Future Pressure Zones	After 1-3
2-1	Santaquin Historic and Projected Population	2-1
2-2	Irrigation Factors by Area	After 2-2
3-1	Future ULS Pipeline	After 3-6
5-1	Santaquin Diurnal Curve	5-1
5-2	Modeled Existing Pressures	After 5-2
7-1	Capital Facility Plan (0-20 Years) Projected Areas of Development	After 7-1
7-2	Recommended Capital Projects 0-10 Year Timeframe	After 7-3
7-3	Recommended Capital Projects 10-20 Year Timeframe	After 7-3

ABBREVIATIONS AND UNITS

ac	acre [area]
ac-ft	acre-foot (1 ac-ft = 325,851 gal) [volume]
CIP	Capital Improvement Plan
CFP	Capital Facilities Plan
CUWCD	Central Utah Water Conservancy District
CWP	Central Water Project
DBP	disinfection byproduct
EPA	U.S. Environmental Protection Agency
EPANET	EPA hydraulic network modeling software
ERC	Equivalent Residential Connection
ft	foot [length]
ft/s	feet per second [velocity]
gal	gallon [volume]
gpd	gallons per day [flow rate]
gpm	gallons per minute [flow rate]
HAL	Hansen, Allen & Luce, Inc.
hp	horsepower [power]
hr	hour [time]
IFA	Impact Fee Analysis
IFFP	Impact Fee Facilities Plan
in.	inch [length]
irr-ac	irrigable acreage
kgal	thousand gallons [volume]
kW	kilowatt [power]
kWh	kilowatt hour [energy]
MG	million gallons [volume]
mg/L	milligram per liter [concentration]
µg/L	microgram per liter [concentration]
mi	mile [length]
PRV	Pressure Reducing Valve
psi	pounds per square inch [pressure]
s	second [time]
SCADA	Supervisory Control And Data Acquisition
SHLC	Strawberry High Line Canal
ULS	CUWCD Utah Lake System projects
UV	ultraviolet radiation (disinfection method)
wsfu	water supply fixture unit
yr	year[time]

EXECUTIVE SUMMARY

PURPOSE OF STUDY

The purpose of this study is to help Santaquin City provide efficient and reliable pressurized irrigation water service to its customers, both now and into the future, at the lowest cost.

PLANNING HORIZONS

The ultimate planning horizon for this study is the year 2060. However, this report provides guidance applicable at various time scales:

1. Near future: low-cost actions and best practices the City can implement to reduce costs and improve operations.
2. 10-year: system improvements needed within 10 years to provide capacity for anticipated new development. The cost of these improvements will be used to set impact fees and guide the formulation of near-term budgets.
3. 20-year: system improvements needed within 20 years for anticipated new development. These improvements are included in the capital facility plan to guide the formulation of longer-term budgets.
4. Future: all system improvements necessary to serve the City at year 2060, when it is developed at the density defined by the City's current general plan and zoning ordinances (except for remaining agricultural lands). These recommendations will help the City secure key pieces of land and work with developers to properly plan for infrastructure that is compatible with the future system.

COMPONENTS OF A WATER DISTRIBUTION SYSTEM

The following three components of a pressurized water system were analyzed to determine the capacity and ability of the water system to meet existing and future water demands:

1. Source – the water used to supply the system
2. Storage – a location to store water between the time it is delivered to the system, and the time it is used by a customer
3. Distribution – pipelines used to deliver water from sources or storage locations to the customer

Each of these components must have enough capacity and capability to serve existing and future customers. To ensure adequate capacity, this study proposes a level of service as a design standard for new development (as discussed in the following section).

METHODS

Water usage and water system data were used to develop a responsible level of service for each component (source, storage, and distribution) of the water system. The level of service was used to evaluate the existing system, identify existing deficiencies, and develop a computer model of the existing system.

The land use element of the general plan, population projections, development concept plans, and the proposed level of service were used to forecast the magnitude and locations of future

water demands in the City. Computer modeling and other tools were used to determine what infrastructure is necessary to best meet these demands.

LEVEL OF SERVICE

Level of Service is the standard of performance that the pressurized irrigation system is designed to meet. It includes components of pressure, storage, and water delivery. The level of service was developed using water billing and production data, input from City personnel, and industry best practices. The level of service is based on irrigable acreage.

Table ES-1 shows the levels of service defined for this study. Pressure requirements are expressed in units of pounds per square inch (psi). Other requirements are expressed in units of demand (gallons per minute [gpm]) or volume (gallons [gal] and acre-feet [ac-ft]) per irrigable acre (irr-ac).

Table ES-1
Level of Service Parameters

Parameter	Level of Service
Minimum system pressure	30 psi
Peak Day Demand	8.0 gpm/irr-ac
Average Yearly Demand	4.0 ac-ft/irr-ac
Storage	9,200 gal/irr-ac

These level of service parameters were used to quantify system demand and compare it to system capacity. This allowed the project team to identify vulnerabilities in the water system and make plans for future growth.

SYSTEM VULNERABILITIES

The system was analyzed to identify vulnerabilities in the existing system and areas which need improvements in order to support future growth. Table ES-2 contains a summary of existing or near-term (0 – 10 years) system vulnerabilities. Further information about these vulnerabilities is described in subsequent sections.

Table ES-2
Existing or Near-Term (0 – 10 Years) System Vulnerabilities

ID	Description	Notes
V1	Zone 10W Source and Storage	Growth in Zone 10W has led to high pressure swing and pressures which are near the minimum level of service. This is chiefly due to high head losses through the single 4-inch diameter backflow preventer that serves this zone. Additionally, Zone 10W borrows capacity from the drinking water system, which is becoming increasingly limited as development continues.
V2	Zone 11W Source and Storage	Pressure Zone 11W borrows capacity from the drinking water system, which is becoming increasingly limited as development continues.
V3	Limited Source Capacity	During dry years, there is minimal excess peak day source capacity available in the PI system. Continued development will place further strain on the irrigation water supply. Backup capacity in the drinking water system is becoming increasingly limited as development continues.
V4	Increased Wastewater Effluent	Because the City does not have a sewer effluent discharge permit, there is a need to use as much reclaimed wastewater as is available. As wastewater influent continues to increase, the existing reuse pumps will not have adequate capacity to supply it to the PI system.

Recommended solutions to these vulnerabilities are summarized in Table ES-3 and discussed in detail in Chapter 7.

**Table ES-3
Proposed Solutions to System Vulnerabilities**

Description	Notes	Vulnerabilities Addressed
Additional 10W Backflow Preventer	Construct an additional backflow preventer to assist the existing 4-inch backflow preventer in supplying adequate flow and pressure to Zone 10W.	V1
Drinking Water Projects	Projects included in the Drinking Water Master Plan will provide increased source and storage capacity to areas of the system currently supplied by the drinking water system. While the chief purpose of drinking water projects is to provide capacity for indoor use, they will assist the City in supplying the PI system until water is available in the future ULS pipeline.	V1, V2, V3
ULS Source Project	Construct pipelines to convey source from the future ULS source pipeline (currently under construction) to the system, including Zone 10W.	V1, V3
Upgraded Reuse Pump Station	Add capacity to the existing wastewater reuse pump station.	V3, V4
Zone 11W Source and Storage	Construct a PI pump station and storage facility to provide capacity and support future growth in Zone 11W.	V2, V3

DISTRIBUTION SYSTEM – GENERAL RECOMMENDATIONS

The following subsections contain general recommendations for Santaquin to follow to ensure continued water service at the lowest cost, into the future.

General Source Recommendations

The following are recommended actions for Santaquin to take to ensure adequate source capacity into the future:

1. Continue to require developers to provide the City with water rights as a condition of development.
2. To the extent possible, use surface water from Summit Creek Irrigation Company as the preferred irrigation source. Reuse water should be used as the next preferred irrigation source. Reserve groundwater for use in the drinking water system or for periods when minimal surface water is available.

General Storage Recommendations

The following are recommended actions for Santaquin to take to ensure adequate storage capacity into the future:

1. Construct additional storage tanks/ponds to support growth. Recommended sizes and locations are shown on the Master Plan map in Appendix A.

General Distribution Recommendations

The following are recommended actions for Santaquin to take to ensure adequate distribution capacity into the future:

1. Upsize pipes to master plan size as development occurs. Master plan pipe sizes are shown on the Master Plan map in Appendix A.
2. Keep a record of the age of system pipes. Replace pipes which are experiencing frequent leaks.

CAPITAL FACILITY PLAN

Projects necessary to support growth over the next 20 years are identified and described in the Capital Facility Plan. Conceptual-level cost estimates were prepared for each project. Costs were classified as either (1) An operations/maintenance project; or (2) A project attributable to growth. Projects attributable to growth are eligible to be paid for by impact fees.

Table ES-4 briefly summarizes the estimated costs of the recommended operations/maintenance project. This project should be pursued as resources allow and according to the priorities of the City.

Table ES-4
Operations/Maintenance Projects

Project	Estimated Cost
Two PI Flush Stations	\$16,000
Total	\$16,000

System growth will necessitate four major capital projects within the next 20 years. These projects have an estimated cost of **\$11,018,000** (see Table ES-5 and further details in Chapter 7). These costs will be eligible to be paid by impact fees.

**Table ES-5
System Growth-Related Capital Projects (0 – 20 Years)**

Type & Year	Map ID	Recommended Project	Cost
Source 10-20 Years	2	Drill and equip a well to serve the western portion of Zone 10.	\$701,000
Source, Distribution 2021	3	Install approximately 5700 feet of 24-inch diameter pipe to provide source conveyance to the western portion of the City and from the future planned ULS pipeline.	\$1,596,000
Source, Storage, Distribution 2021	4	Construct a pump station, storage pond/tank, and associated distribution mains to provide service to Zone 11W.	\$4,949,000
Distribution 2026	5	Install approximately 3600 feet of 16-inch diameter pipeline to provide a direct connection from the ULS pipeline to Zone 11W.	\$687,000
Source 5-10 Years	7	Increase the capacity of the Type 1 reuse booster station to accommodate increasing sewer inflows and provide additional source to the PI system. Install approximately 5800 feet of 12-inch diameter pipe.	\$1,489,000
Distribution 10-20 Years	10	Install approximately 2,700 feet of 12-inch diameter pipe to provide increased conveyance to Zones 10 and 9N.	\$470,000
Source 10-20 Years	15	Install a pump station and approximately 1300 feet of 12-inch pipe to pump out of the City's planned south Type 1 reuse storage facility.	\$1,126,000
TOTAL			\$11,018,000

Development will necessitate that a number of pipes be installed or upsized throughout the 20-year planning period to provide continuing service and future capacity. A brief summary of these costs is included in Table ES-6, with more details included in Chapter 7.

**Table ES-6
Development-Driven Projects (0 – 20 Years)**

Project	Estimated Cost
Pipe Upsizing and Installation (0 – 10 Years)	\$182,000
Source Facilities (0-10 Years)	\$84,000
Pipe Upsizing and Installation (10 – 20 Years)	\$2,249,000
Source Facilities (10 – 20 Year)	\$1,015,000
Total	\$3,530,000

CONCLUSIONS

It is recommended that the City take the following actions immediately in order to ensure safe, reliable, cost-effective, and financially responsible water service into the future:

1. Immediately begin planning and budgeting for the projects outlined in the Capital Facility Plan.
2. Use the master plan to review each new development, to ensure properly sized and located infrastructure is constructed as development progresses. Doing so will eliminate the need for guesswork, help the City use its resources most effectively, and ensure excellent performance of the PI system, both now and into the future.

CHAPTER 1 INTRODUCTION

PURPOSE AND SCOPE

The purpose of this master plan is to provide direction to the City of Santaquin regarding decisions that will be made to provide an adequate pressurized irrigation water system for its customers at the most reasonable cost. Recommendations are based on demand data, growth projections, standards outlined by the Utah Administrative Code, and standard engineering practices. The planning horizon for the master plan is 40 years, or approximately 2060.

The master plan is a study of the City's pressurized irrigation water system and customer outdoor water use. The following topics are addressed herein: general planning, growth projections, water rights, water rates, impact fees, source requirements, storage requirements, and distribution system requirements. Operational parameters for the City's pressurized irrigation water system were reviewed and are recommended to be optimized based on stability, ease of use, and cost. Based on this study, needed capital improvements have been identified and conceptual-level cost estimates for the recommended improvements have been provided.

The results of the study are limited by the accuracy of growth projections, data provided by the City, and other assumptions used in preparing the study. It is expected that the City will review and update this master plan every 5–10 years as new information about development, system performance, or water use becomes available.

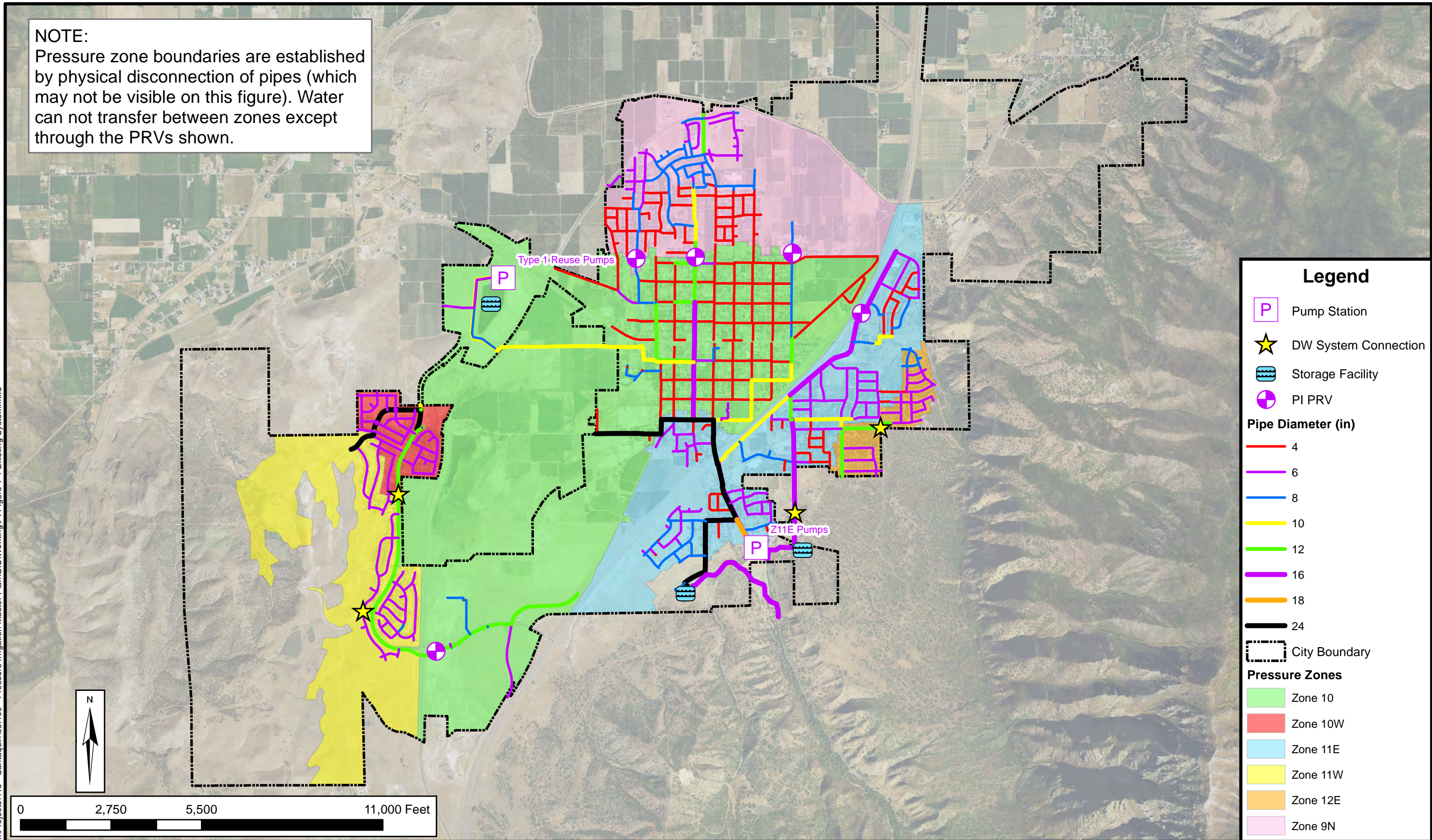
BACKGROUND

Santaquin City was first settled in late 1851 and is located about 70 miles south of Salt Lake City in Utah County. Although its history lies mostly in agriculture, its population today also has a substantial number of commuters who work in Provo, Spanish Fork, and other nearby cities. Utah County has experienced rapid growth in recent decades, and this growth has extended to Santaquin as population centers have expanded and property values have increased. From 2010–2018, Santaquin grew at a rate of 34.1% from a population of 9,128 to an estimated 12,274 (U.S. Census Bureau). In 2019, the City provided pressurized irrigation water service to 3,299 connections.

The existing pressurized irrigation water system includes three storage facilities, three pump stations, five pressure zones, and about 69 miles of pipe with diameters ranging from 4 inches to 24 inches. See Figure 1-1. About 16 miles of these pipes are currently served by crossovers from the drinking water system. The City recognizes that its continued growth necessitates proactively planning additional pressurized irrigation water facilities to maintain an acceptable level of service for outdoor water use.

The Santaquin pressurized irrigation system is master planned to be an independent system, but is currently supplemented by excess capacity in the drinking water system. Separate drinking water and pressurized irrigation water pipelines exist in nearly all areas of the system. As the excess capacity in the drinking water system is needed for future growth, pressurized irrigation water system facilities will be constructed to increase the capacity of the pressurized irrigation water system, thus freeing up capacity for future drinking water demands. The drinking water system is addressed in a separate master plan document.

NOTE:
Pressure zone boundaries are established by physical disconnection of pipes (which may not be visible on this figure). Water can not transfer between zones except through the PRVs shown.



Legend

- P Pump Station
- ★ DW System Connection
- ⋈ Storage Facility
- ⊕ PI PRV

Pipe Diameter (in)

- 4
- 6
- 8
- 10
- 12
- 16
- 18
- 24

City Boundary

Pressure Zones

- Zone 10
- Zone 10W
- Zone 11E
- Zone 11W
- Zone 12E
- Zone 9N

LEVEL OF SERVICE

The level of service (LOS) is the standard of performance, including water supply and service pressure, that the pressurized irrigation (PI) water system is designed to meet. Because state codes do not regulate the LOS of a PI system, it must be selected based on sound engineering judgment and incorporate appropriate safety factors. The LOS for the Santaquin City PI water system was selected based on a review of aerial imagery and of secondary water production and meter data for the past three years. Safety factors, City preferences, and input from City personnel were also incorporated.

It is important to plan for and design a water system based on a consistent unit of measurement. For this study, irrigable acres were selected as the basis of planning and design. Although different types of vegetation require varying amounts of water, the vast majority of irrigated area in Santaquin is turf grass or garden with a similar water requirement. Thus, the amount of water required on a per-area basis can safely be considered uniform over the entire city. This study was not based on Equivalent Residential Connections (ERCs) or lot numbers, since lot sizes in Santaquin vary considerably.

The LOS parameters in this study are designed to produce an effective water system that performs well in varying states of system operation. However, they are not necessarily designed for every “worst-case” scenario. For instance, Santaquin City does not intend to enable wasteful watering. Rather than design a system capable of meeting excessive water demands, the City prefers to take actions to keep landscape watering at an appropriate level. To that end, the City has implemented mandatory time-of-day watering restrictions and is working to implement a tiered rate structure that will encourage conservation. The planned tiered rate structure, together with the LOS parameters, are intended to result in the design of a responsible system.

The LOS parameters used for this study are summarized in Table 1-1. The development of each LOS parameter is described in later chapters.

Table 1-1
Level of Service Parameters

Parameter	Level of Service
Minimum system pressure	30 psi
Peak Day Demand	8.0 gpm/irr-ac
Average Yearly Demand	4.0 ac-ft/irr-ac
Storage	9,200 gal/irr-ac

MASTER PLANNING METHODOLOGY

Pressurized irrigation water systems consist of water sources, storage facilities, distribution pipes, pump stations, and other components. Design and operation of the individual components must be coordinated so that they operate efficiently under a range of demands and conditions. The system must be capable of responding to daily and seasonal variations in demand.

Identifying present and future water system needs is essential in the management and planning of a water system. For this study, existing water demands are based on the level of service defined by the City as a part of the master planning process. This report addresses sources, storage, distribution, minimum pressures, hydraulic modeling, capital improvements, funding, and other topics pertinent to the Santaquin pressurized irrigation water system.

A computer model of the City's pressurized irrigation water system was prepared to simulate the performance of facilities under existing and future conditions. System improvement recommendations were prepared from the analysis and are presented in this report.

DESIGN AND PERFORMANCE CRITERIA

Summaries of the key design criteria and demand requirements for the pressurized irrigation water system are included in Table 1-2. The design criteria were used in evaluating system performance and in recommending future improvements.

Table 1-2
Key System Design Criteria

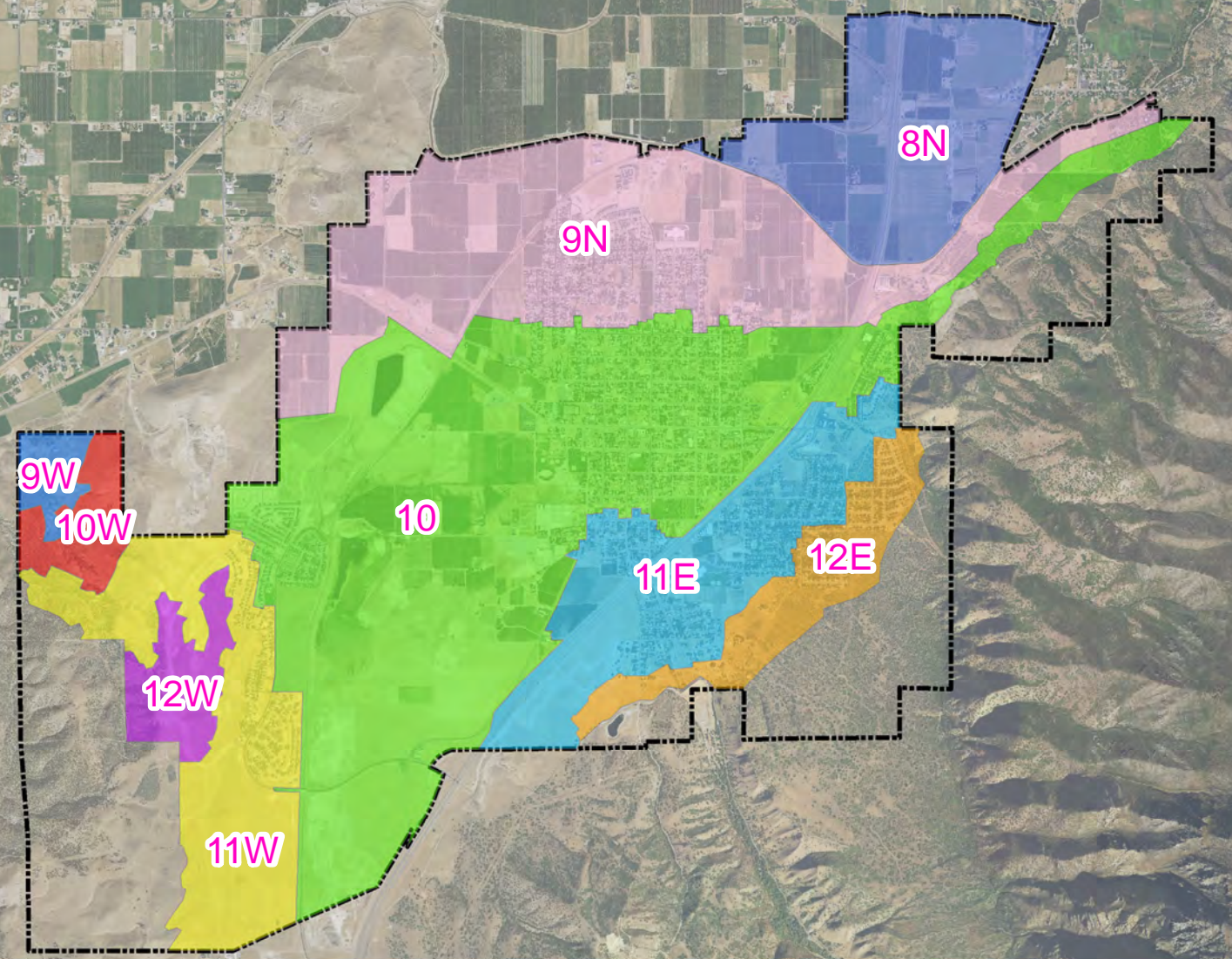
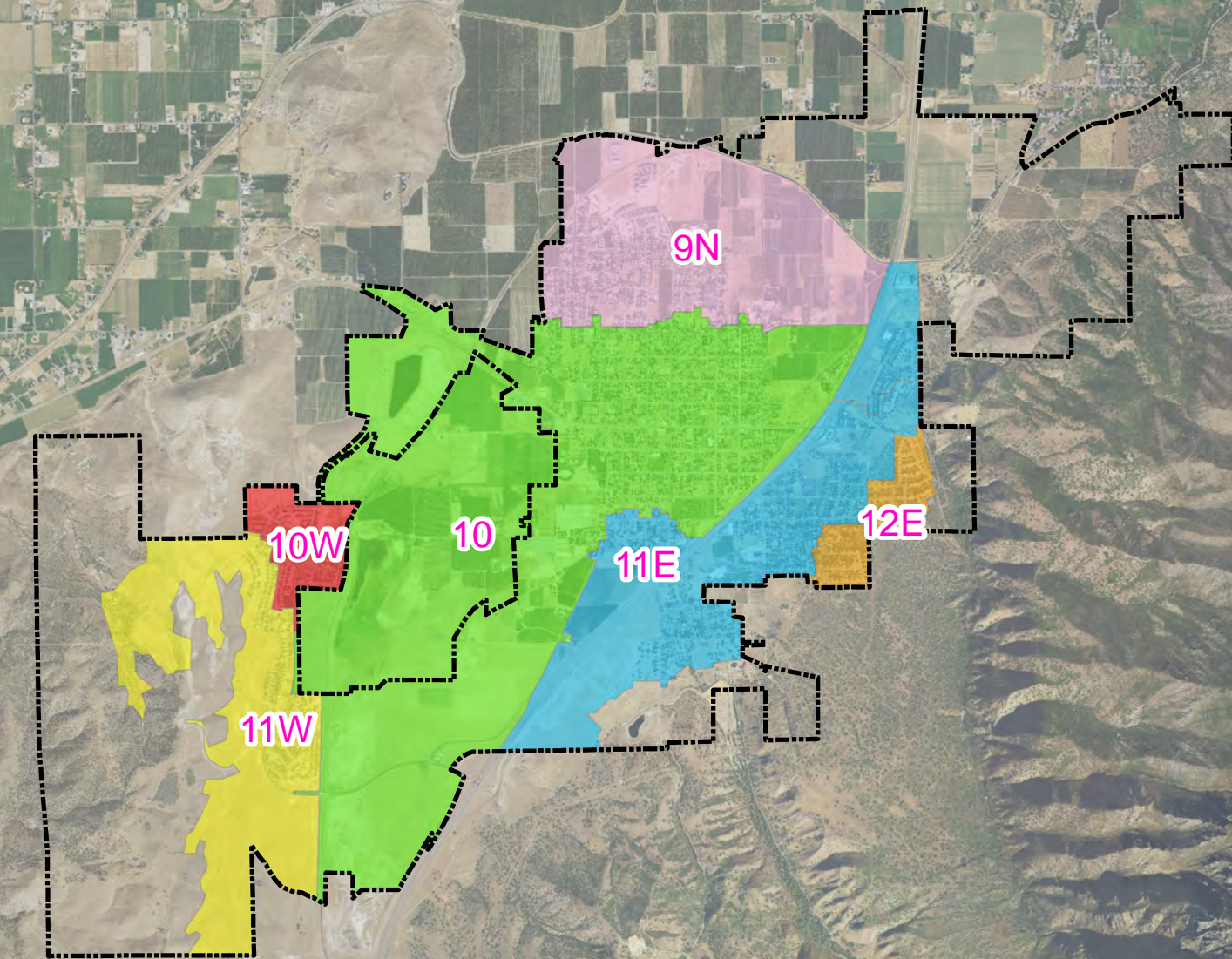
	Criteria	Existing Requirements	Estimated Future Requirements
Irrigable Acreage	Existing and Planned Irrigable acreage	570	1,720
Source Peak Day Demand Average Yearly Demand	Level of Service Level of Service	4,560 gpm 2,280 acre-ft	13,760 gpm 6,880 acre-ft
Storage	Level of Service	16.09 ac-ft	48.56 ac-ft
Distribution Peak Instantaneous Max. Operating Pressure Min. Operating Pressure	2.1 × Peak Day Demand City Preference Level of Service	9,576 gpm 130 psi 30 psi	28,896 gpm 130 psi 30 psi

PRESSURE ZONES

Source, storage, and distribution requirements are organized in this report based on system pressure zones. Boundaries for future pressure zones were drawn in order to keep pressures within level of service criteria and keep pressurized irrigation pressures below drinking water pressures. Existing and proposed future pressure zone boundaries are shown in Figure 1-2. These are shown to provide context for the tables in subsequent chapters. The master plan map in Appendix A shows additional proposed infrastructure, including pipelines, PRVs, sources, and storage facilities.

Existing

Future



CHAPTER 2 IRRIGABLE ACREAGE

GROWTH PROJECTIONS

The development of impact fees requires growth projections over the next ten years. In addition to impact fee projects, this report will also highlight anticipated projects 10-20 years out in the Capital Facilities Plan section of this report (Chapter 7). Growth projections for Santaquin were evaluated as a part of this master planning effort.

City input and growth projections made by the Governor's Office of Management and Budget (GOMB), Mountainland Association of Governments (MAG), and a market-driven growth analysis prepared for Envision Utah were considered in the development of growth projections used for this study. Detailed information is included in Appendix B. Figure 2-1 shows the historic and projected population for Santaquin through 2060.

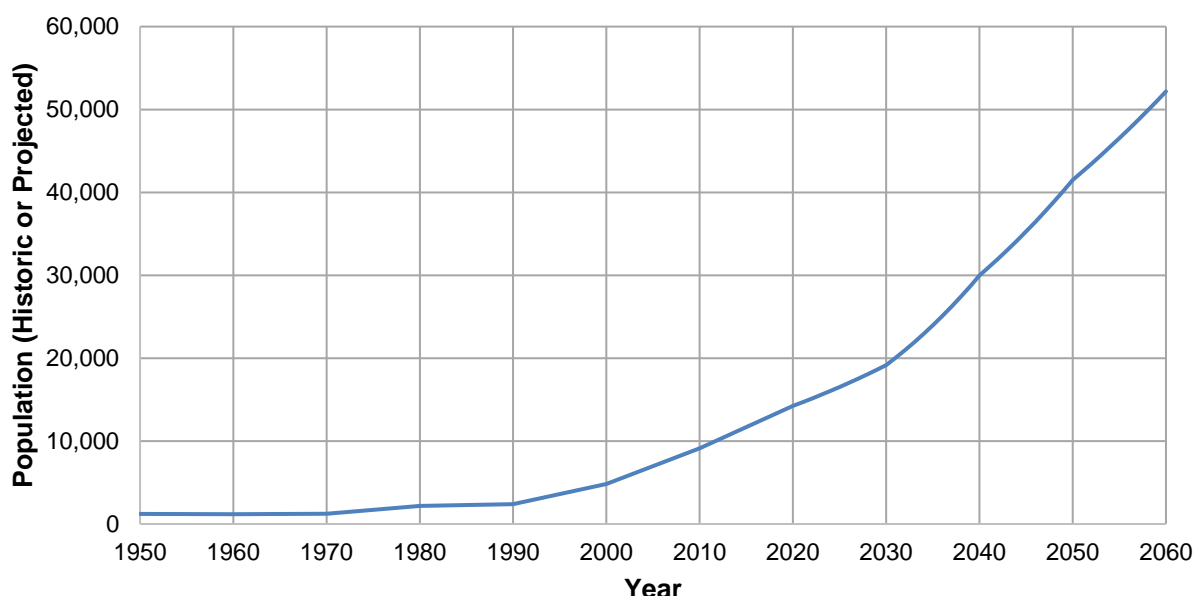


Figure 2-1: Santaquin Historic and Projected Population

Although growth projections are important for planning purposes, it should be noted that land use changes will ultimately serve as the triggers for expansion of the PI system. Population projections will be used to help predict when and where these land use changes will occur.

EXISTING AND FUTURE IRRIGABLE ACREAGE

Outdoor water demands are based on irrigable acreage (irr-ac). Existing irrigable acreage in Santaquin was determined based on an analysis of aerial imagery. For purposes of this report, "Existing" will refer to development constructed as of January 1, 2020.

Future irrigable acreage was calculated by starting with the existing irrigable acreage and adding to it the area of land that is expected to be irrigated at year 2060. Future projections were based on the future land use plans. For each planned land use, an irrigation factor was determined based on similar surrounding developments and requirements in City land use code (Title 10). Figure 2-2 shows the assumed irrigation factor for each area within the Master Plan study area, which was defined by Santaquin City personnel based on the existing City boundary, approved development concepts, and other areas identified as likely to develop within the planning horizon of the study. Table 2-1 presents the irrigation factors for each land use type.

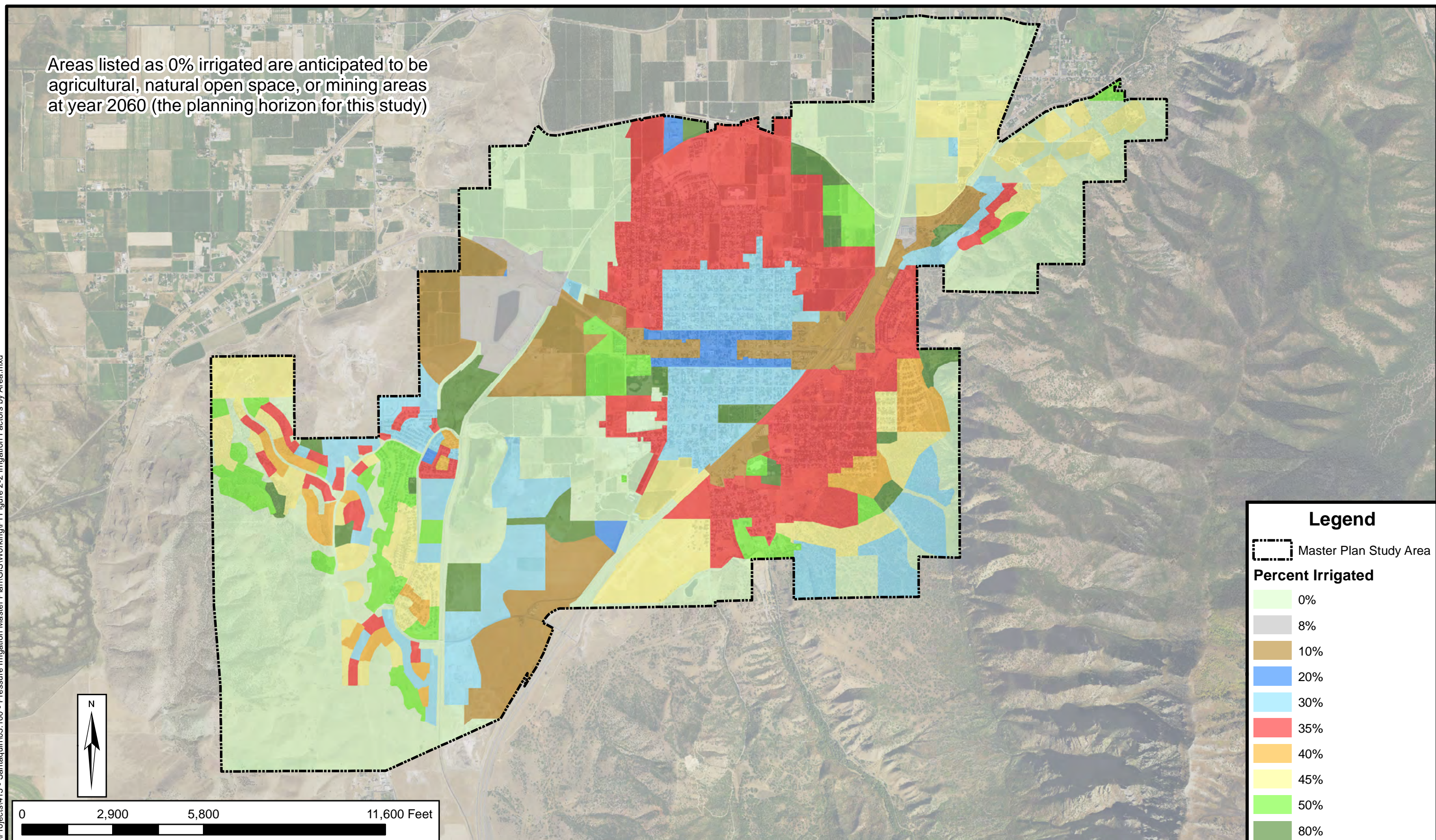
Table 2-1
Irrigation Factors by Land Use Type

Land Use	Irrigation Factor
Business Park	0.10
Central Business District	0.20
Commercial	0.10
Industrial	0.08
Main Street Commercial	0.10
Multi-family Residential	0.30
Park	0.80
Public Facilities	0.20
R-8 Residential	0.30
R-10 Residential	0.35
R-12 Residential	0.40
R-15 Residential	0.45
R-20 Residential	0.50
R-43 Residential	0.30
School	0.50

Table 2-2 provides a breakdown of the existing and future irrigable acreage by pressure zone.

Areas listed as 0% irrigated are anticipated to be agricultural, natural open space, or mining areas at year 2060 (the planning horizon for this study)

Date: 7/21/2020
 Document Path: H:\Projects\415 - Santaquin\03.100 - Pressure Irrigation Master Plan\GIS\Working\PI Figure 2-2 Irrigation Factors by Area.mxd



Legend

Master Plan Study Area

Percent Irrigated

0%
8%
10%
20%
30%
35%
40%
45%
50%
80%

**Table 2-2
Existing and Future Irrigable Acreage by Zone**

Zone	Existing Irrigable Acreage	Future Irrigable Acreage
8N	0	65
9N	110	335
9W	0	35
10	220	630
10W	40	50
11W	55	220
11E	115	260
12E	30	125
Total	570	1,720

Table 2-3 contains the projected population and irrigable acreage through 2040. These projections are used to develop the Capital Facility Plan in Chapter 7.

**Table 2-3
Growth Projections**

Year	Projected Population	Projected Irr-ac
2020	14,242	570
2021	14,671	584
2022	15,113	597
2023	15,568	611
2024	16,037	626
2025	16,520	641
2026	17,017	656
2027	17,530	672
2028	18,058	687
2029	18,602	704
2030	19,162	720
2031	20,039	747
2032	20,957	774
2033	21,916	802
2034	22,920	831
2035	23,969	861
2036	25,066	893
2037	26,214	925
2038	27,414	959
2039	28,669	994
2040	29,982	1030

CHAPTER 3 WATER SOURCES AND DEMAND

This chapter presents an overview of existing and future source requirements and makes recommendations that will help the City meet these requirements as it grows.

EXISTING WATER SOURCES

Santaquin City has a wide array of sources that are used in the pressurized irrigation system as demand dictates and as supply allows. However, not all sources reliably produce on the day of peak demand. Sources can be limited by water rights, hydrologic capacity, or regulatory capacity. As such, it is important to define a reliable supply of water available during the period of peak demand and over the course of a season.

Key sources used in the system include surface water and well water from Summit Creek Irrigation Company, springs in Santaquin Canyon, Type 1 wastewater reuse, and Center Street Well. Physical infrastructure capacity, and peak day planning values, are summarized in Table 3-1 for each source.

**Table 3-1
Existing Pressurized Irrigation Water Sources**

Source	Pressure Zone(s)	Physical Flow Capacity (gpm)	Peak Day Planning Capacity (gpm)	Annual Flow Capacity (ac-ft)
Center Street Well ¹	10	560	490	390
Drinking Water System ²	10W	392	190	140
Drinking Water System ²	11W	2,450	1,170	180
Drinking Water System ²	12E	1,560	750	120
Drinking Water System ²	11E	900	700	570
Springs 2-5 bypass ³	10	900	0	0
Spring 1	10	200	75	60
SCIC Wells ⁴	10	1,300	575	470
SCIC Stream ⁴	10	3,000		
Type 1 Reuse Ponds ^{1,5}	10	800	700	490
Total		-	4,650	2,420

1. Assumes that the pump runs 21 hours per day
2. Meters were assumed to be at physical capacity when velocity through the meter vault pipes reaches 10 ft/sec. Annual capacity is limited to the demand currently served in these zones. Peak day planning capacity was defined as the physical capacity divided by a diurnal peaking factor of 2.1. Annual capacity was defined as the current level of service demand within the zone served or the available amount, whichever is less.
3. Because the Springs bypass delivers excess drinking water to the PI system, its capacity is included in the capacity listed for the drinking water system in Zone 11E.
4. The City owns 666.5 shares in SCIC. The City reports a low-year flow rate of 0.7 ac-ft/share over a 184-day irrigation season (575 gpm and 470 ac-ft/yr).
5. 490 ac-ft of Type 1 water was used in 2019. This value is expected to increase as the City grows.

EXISTING WATER SOURCE DEMAND

Aerial imagery and water use data from Santaquin City were used to determine the pressurized irrigation water demand on a per-irrigable acre basis. Historic water use data is shown in Table 3-2.

Table 3-2
Historic Irrigation Water Use

Water Use Variable	Year		
	2017	2018	2019
Irrigable Acreage	540	555	570
<u>Average Yearly Demand</u>			
Total (ac-ft)	2,079	1,935	1,946
Per irr-ac (ac-ft/irr-ac)	3.85	3.49	3.41
Per irr-ac (gpd/irr-ac) ¹	6,818	6,174	6,046
Per irr-ac (gpm/irr-ac) ¹	4.7	4.3	4.2
<u>Peak Day Demand</u>			
Total (gpm) ²	4,487	4,541	4,325
Per irr-ac (gpd/irr-ac)	11,964	11,783	10,926
Per irr-ac (gpm/irr-ac)	8.3	8.2	7.6

1. The average yearly demand shown assumes a 184-day irrigation season.
2. Calculated as the peak month average, with a factor of safety to account for the difference between peak month and peak day demands.

Analysis and Proposed Level of Service

While Santaquin City intends to provide adequate water supply to support healthy turf grass, the City does not intend to enable wasteful watering. The City has expressed willingness and desire to modify the existing billing structure to encourage residents to be more conservation-minded. While historic data is informative, the City is more interested in a level of service which is responsible and appropriate without being too restrictive or too excessive. As such, the following level of service parameters are proposed:

- **Average yearly source: 4.0 ac-ft/irr-ac.** This level of service is greater than the historical water use for years 2018 and 2019 and is consistent with irrigation duties accepted by the State of Utah.
- **Peak day source: 8.0 gpm/irr-ac.** This level of service is greater than the historical water use for 2019, and other cities which have implemented conservation-oriented rate structures have observed peak day source production well below it. This level of service is adequate without being excessively high or low.

This level of service is generally consistent with the City's current water dedication policy, with the exception of high-density residential developments. Chapter 3 of the drinking water system includes recommended revisions to the City's water dedication policy.

WATER SOURCE REQUIREMENTS

Existing and Future Peak Day Demand

Peak day demand is the water demand on the day of the year with the highest water use. It is used to determine required source capacity under existing and future conditions. Table 3-3 shows a summary of existing and future peak day demand requirements.

Table 3-3
Existing and Future Pressurized Irrigation Peak Day Demand

Pressure Zone	Existing		Future	
	Irrigable Acreage	Demand (gpm)	Irrigable Acreage	Demand (gpm)
8N	0	0	65	520
9N	110	880	335	2,680
9W	0	0	35	280
10	220	1,760	630	5,040
10W	40	320	50	400
11W	55	440	220	1,760
11E	115	920	260	2,080
12E	30	240	125	1,000
Total	570	4,560	1720	13,760

Existing Pump Stations

Santaquin City operates three PI pump stations. The Canyon Road Booster is the sole source of water to Zone 11E, while the SCIC and Type 1 reuse boosters supply source to Zone 10 and the system as a whole. The existing Santaquin PI pump stations are shown in Table 3-4.

Table 3-4
Existing Pressurized Irrigation Water Pump Stations

Name	From	To Zone	Pumps	Rated Capacity	Peak Day Demand (gpm)	Surplus (+) or Deficit (-)
400 N 200 W Booster	SCIC	10	2 @ 1,300 gpm	1,300 gpm	N/A ¹	N/A ¹
Canyon Road Booster	Zone 10	11E	2 @ 2,500 gpm	2,500 gpm	920	+1,580
Water Reuse Booster	Storage Ponds	10	2 @ 800 gpm	800 gpm	N/A ¹	N/A ¹

1. The 400 N 200 W booster and the Type 1 reuse booster are sources to the system, and thus were not individually evaluated for capacity, but were evaluated as part of the total system source capacity.

Existing and Future Average Yearly Demand

Average yearly demand is the volume of water used during an entire year, and is used to ensure the sources have enough volume to meet demand under existing and future conditions. Table 3-5 is a summary of the existing and future average yearly demand.

Table 3-5
Existing and Future Average Yearly Demand

Time Period	Irrigable Acreage	Average Yearly Demand (ac-ft)
Existing	570	2,280
Future	1,720	6,880

Comparison of Supply and Demand

Tables 3-6 and 3-7 show a comparison of demand and available source capacity for peak day and average yearly demand. Source capacity being used from the drinking water system is included in these tables, though excess drinking water capacity is not.

Table 3-6
Existing Pressurized Irrigation Water Demand and Source Capacity

Parameter	Peak Day (gpm)	Average Yearly (ac-ft)
Demand	4,560	2,220
Capacity	4,650	2,420
Surplus (+) or Deficit (-)	+90	+200

Table 3-7
Future Pressurized Irrigation Water Demand and Source Capacity

Parameter	Peak Day (gpm)	Average Yearly (ac-ft)
Demand	13,760	6,880
Existing Capacity	4,650	2,420
Surplus (+) or Deficit (-)	-9,110	-4,460

Table 3-7 demonstrates that the City needs more water shares to meet future peak day and average yearly demands. Santaquin City code specifies that developers must convey water rights to the City, or pay cash in lieu of water rights, in order to receive final approval. It is recommended that this practice continue to ensure sufficient water is available to meet average yearly demands. Further guidance on water rights is available in the City's water rights 40-year plan report. More source capacity is also needed to meet future peak day demands.

SOURCE - RECOMMENDATIONS

This section recommends water sources the City may pursue to ensure adequate capacity through year 2060. Table 3-8 shows a summary of the future sources required to meet estimated future demands at the level of service. Discussions on each source are included in the subsequent subsections.

Table 3-8
Planned Future Pressurized Irrigation Water Sources

Source	Pressure Zone(s)	Physical Flow Capacity (gpm)	Peak Day Planning Capacity (gpm)	Annual Flow Capacity (ac-ft)
Center Street Well ¹	10	560	490	390
Drinking Water System ²	-	-	0	0
East Side Well ¹	11E	320	280	220
Springs 2-5 bypass ³	10	900	0	0
Spring 1	10	200	70	60
SCIC Wells ⁴	10	1,300	890	720
SCIC Stream ⁴	10	3,000		
Type 1 Reuse	10	3,000	2,600	2,060 ⁵
ULS pipeline (shares owned)	10	-	9,170	908.5
ULS Pipeline or Canals (additional shares that must be acquired)	10			2,311.5
West Side Well ¹	10	300	260	210
Total		-	13,760	6,880

1. Assumes that the pump runs 21 hours per day
2. The PI system is planned to be fully independent, without relying on the drinking water system to provide source.
3. It is anticipated that the springs will not overflow by year 2060 due to increased drinking water demands.
4. The City expects to own about 1,030 shares in SCIC by year 2060. The City reports a low-year flow rate of 0.7 ac-ft/share over a 184-day irrigation season.
5. Projections for annual capacity are based on growth projections in the City's wastewater master plan. While the City has rights to reuse up to 5,300 ac-ft of water per year, it is not expected that the City will have sufficient inflows to the plant to reuse more than about 2,060 ac-ft/yr at the end of the 40-year planning horizon of this study. See Appendix D for more details on wastewater reuse.

Summit Creek Irrigation and Canal Company

Santaquin City anticipates obtaining approximately 49% of the total shares in SCIC by year 2060. Planning values listed in Table 3-8 are listed assuming a low-year supply of 0.7 ac-ft per share, although the amount supplied will be much greater in some years. Water in SCIC will be used to the extent that it is available.

Wells

Santaquin City requested an evaluation of two existing wells for use in the PI system.

The East Side Well is located in Zone 11E and was previously used in the drinking water system before water quality became unsuitable. It has a capacity of 320 gpm and a static water level of approximately 320 ft below ground surface. Approximately 300 ft of 10-inch pipe would need to be constructed through existing City streets before the well could be used.

The West Side Well is located near the City's existing Summit Ridge sports fields. It has a capacity of 300 gpm and a static water level of approximately 200 ft below ground surface. Approximately 700 ft of 8-inch pipe would need to be constructed through open space before the well could be used. The City has reported that the West Side Well would likely need to be re-drilled in order to be used.

Both wells are recommended for use in the PI system, although lower-cost water should be prioritized when it is available. Wells used to take advantage of water reuse will be discussed in the subsequent "Wastewater Reuse" section.

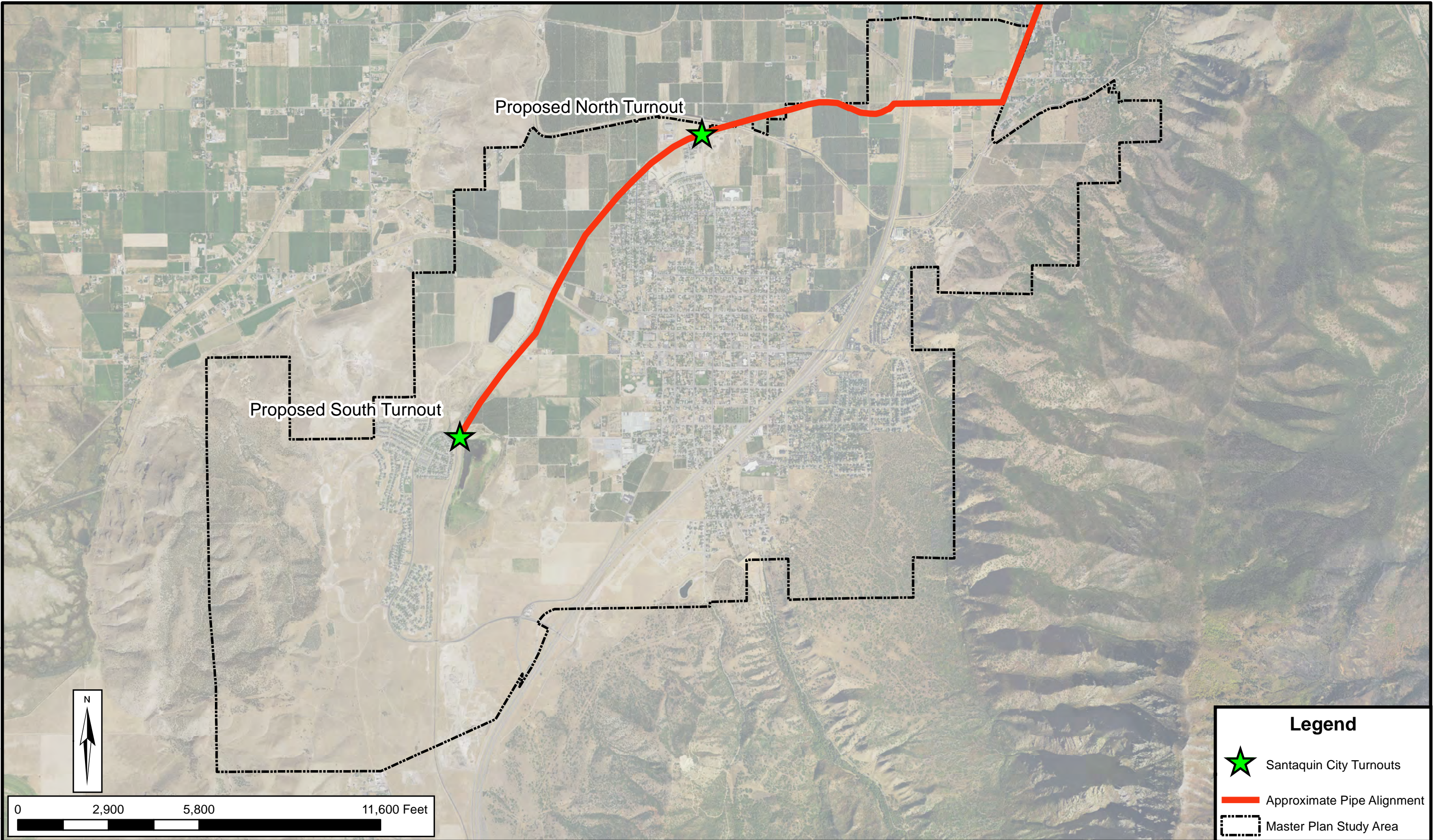
CUWCD Utah Lake System Pipeline

CUWCD is planning to construct a pipeline for untreated water that will extend from the mouth of Spanish Fork Canyon to Santaquin City. This pipeline is more commonly known as the Utah Lake System pipeline, or ULS pipeline, and is expected to be completed within 6-10 years. The ULS pipeline will be pressurized at a head that will allow the City to fill water sources significantly higher than the pipeline itself. Figure 3-1 shows the proposed alignment of the ULS pipeline and the locations of future pipeline turnouts. The ULS pipeline appears to be the best source of water for areas of the City which have not historically been irrigated.

Santaquin has entered into an agreement with CUWCD to pay for a portion of the ULS pipeline's construction cost. The agreement specifies that Santaquin will pay this cost over a period of 50 years, starting with the year the ULS pipeline is operational. However, the agreement allows Santaquin City to delay their use of ULS water, and their payment, by up to 10 years, with no interest. Doing so would result in a larger annual payment, as the cost would be amortized over 40 years rather than 50. Because Santaquin does not have many other options for PI source water, delaying usage and payment is not recommended.

Under current agreements, Santaquin has been allocated 908.50 ac-ft of water to be delivered through the ULS pipeline. However, as shown in Table 3-8, the City is expected to require much more capacity than is currently owned. It is recommended that Santaquin explore opportunities to lease ULS water from other municipalities that have ownership.

Date: 7/21/2020
Document Path: H:\Projects\415 - Santaquin\03.100 - Pressure Irrigation Master Plan\GIS\Working\PI Figure 3-1 Future ULS Pipeline.mxd



SANTAQUIN PRESSURIZED IRRIGATION MASTER PLAN

FUTURE ULS PIPELINE INFRASTRUCTURE

**FIGURE
3-1**

Item # 11.

Canal Shares

It is recommended that the City consider acquiring shares from companies that can transfer water into the Strawberry High Line Canal (SHLC) as a source of water for the PI system. To use these shares, a turnout pond and pump station would need to be constructed at the north end of Zone 9. Such shares would be less expensive than water from the ULS pipeline, and could be used as a source of water for Zones 8 and 9.

As per current regulations, shares in the Strawberry High Line Canal Company (SHLCC) may not be used to irrigate land located outside of the original project boundary for the SHLC. The vast majority of Santaquin City is located outside of this project boundary, and presently cannot be served by shares in SHLCC. Thus, canal shares in other companies should be prioritized if the City opts to acquire shares in canal companies.

Wastewater reuse

The City's ability to reuse treated wastewater will expand as the population grows and influent to the wastewater treatment plant increases. It is recommended that the City maintain sufficient pumping capacity to use the full annual volume of treated wastewater. Several projects (discussed in detail in Chapter 7) are recommended to increase the City's ability to use treated wastewater.

Santaquin City has filed recharge and recovery applications to the State Engineer, in an attempt to use treated wastewater in City wells. The State has approved the recharge application, but not the recovery application. If the City is able to obtain approval for reuse, assumptions in this master plan need to be re-evaluated, as it may be more effective to use recovery wells.

The Type 1 reuse pump station has a capacity of 800 gpm. In 2019, the average pumped flow from the Winter Storage Ponds was about 600 gpm. As the City grows, wastewater influent will exceed the capacity of the existing Type 1 reuse pump station. Upgrades to the pump station are recommended in the Capital Facility Plan in Chapter 7.

Santaquin City has rights to reuse up to 5,300 ac-ft of treated wastewater. However, growth projections from the City's wastewater master plan indicate that the amount available for reuse will be far less than this throughout the planning period of this study. Details on the analysis of wastewater reuse supply and capacity are included in Appendix D.

Future Pump Stations

Recommended future pump stations are shown in Table 3-9.

**Table 3-9
Future Pressurized Irrigation Water Pump Stations**

Name	From Zone	To Zone	Peak Day Flow Served (gpm)	Peak Instantaneous Requirement (gpm)	Recommended Pumping Configuration
Zone 11W	10 ¹	11W	2,440	2,440	2 @ 3,000 gpm
Zone 12E	11E	12E	1,000	2,100	1 @ 500 gpm 2 @ 1000 gpm VFD

1. The pump will be located in existing Zone 10W, which is planned to be part of future Zone 10

The Canyon Road pump station is currently equipped with two 2,500 gpm pumps, and has a bay in place for a third. An additional pump will eventually need to be installed.

CHAPTER 4 WATER STORAGE

EXISTING WATER STORAGE

The City's existing pressurized irrigation water system includes two irrigation storage facilities with a total equalization storage capacity of 45.0 ac-ft. See Table 4-1.

**Table 4-1
Existing Storage Capacity**

Facility	Zone	Total Capacity (ac-ft)	Equalization Capacity (ac-ft)
Ahlin Pond ¹	10	41.5	19.5
Z11E PI Tank	11E	10.0	10.0
Total		51.5	29.5

1. The City has indicated a preference to use the top 7 feet of Ahlin Pond for equalization capacity. The remainder is reserved for recreation and to sustain aquatic life.

Ahlin pond is located in a City park and is used as a community fishery. To support aquatic life and recreation, the City has expressed a desire to utilize the top 7 feet of Ahlin Pond for equalization capacity, with the remainder being reserved as recreational capacity. As such, only 19.5 out of its total 41.5 ac-ft of capacity are available for use as equalization storage in the PI system.

EXISTING WATER STORAGE REQUIREMENTS

The purpose of the ponds in the PI system is to provide equalization storage for those periods where demand exceeds the source supply. The equalization storage requirement in the Santaquin PI system was defined as 80% of the peak day volume of water used at the level of service. This provides sufficient water to meet peak demands and incorporates additional safety to account for unforeseen high uses, decisions made by SCIC, and other unusual circumstances. The level of service for the PI system is 9,200 gal/irr-ac.

Equalization storage requirements were based on irrigable acreage and the proposed level of service. Therefore, under existing conditions, with 555 irrigable acres and a level of service of 9,200 gallons per irrigable acre, the required storage is 15.67 ac-ft. A breakdown of the required equalization storage by pressure zone is shown in Table 4-2.

**Table 4-2
Existing Storage Requirements**

Zone	Irr- ac	Storage Requirement (ac-ft)	Existing Capacity (ac-ft)	Given through PRVs (ac-ft)	Supplied from PRVs (ac-ft)	Supplied from DW System (ac-ft)	Deficiency (-) or Surplus (+) (ac-ft)
9N	110	3.11	0.0	0	3.11	0	+0.00
10	220	6.21	19.5	3.11	0	0	+10.18
10W	40	1.13	0.0	0	0	1.13	+0.00
11W	55	1.55	0.0	0	0	1.55	+0.00
11E	115	3.25	10.0	0	0	0	+6.75
12E	30	0.85	0.0	0	0	0.85	+0.00
Total	570	16.09	29.5	3.11	3.11	3.53	+16.94

Much of the existing equalization storage capacity is being provided by the drinking water system through crossover connections. However, this storage will eventually be needed in the drinking water system. The apparent surplus listed in Table 4-2 does not account for the fact that storage provided by the drinking water system is limited, and that, unlike in the drinking water system, zones in the PI system with higher elevation generally cannot supply zones of lower elevations, and therefore, cannot be counted as city-wide capacity.

FUTURE WATER STORAGE REQUIREMENTS

Table 4-3 presents the future irrigation storage requirements based on HAL's analysis of developed and developable area in each pressure zone.

**Table 4-3
Future Storage Requirements**

Zone	Irrigable Acreage	Storage Required (ac-ft)	Existing Capacity (ac-ft)	Surplus (+) or Deficiency (ac-ft)
8N	65	1.84	0.00	-1.84
9N	335	9.46	0.00	-9.46
9W	35	0.99	0.00	-0.99
10	630	17.79	19.50	+1.71
10W	50	1.41	0.00	-1.41
11W	220	6.21	0.00	-6.21
11E	260	7.34	10.00	+2.66
12E	125	3.53	0.00	-3.53
Total	1720	48.56	29.50	-19.06

Table 4-3 shows a future requirement of 3.53 ac-ft in Zone 12E and a future available surplus of 2.66 ac-ft in Zone 11E. Because all storage requirements for Zone 12E (which will be a boosted zone with no storage facility of its own) must be contained in Zone 11E facilities, this calculation shows a possible future deficiency in the system. However, modeling shows that the facility will operate properly under future conditions due to the safety factors built into the level of service and the ability to borrow equalization capacity in Zone 10 using the Canyon Road booster station. Accordingly, no projects to address this are proposed.

WATER STORAGE RECOMMENDATIONS

Two additional storage facilities are recommended for buildout conditions. Table 4-4 contains a summary of key attributes of these facilities.

**Table 4-4
Recommended Future Storage Facilities**

Zone	Minimum Size (ac-ft)	Approximate HGL when Full (ft)	Notes
10 ¹	20.0	5200	20.0 ac-ft of capacity is recommended to provide capacity beyond 2060 and allow for better operation of the ULS pipeline. More capacity may be required, and the construction timeframe may need to be moved forward substantially, if additional areas to the north and/or west of the study area begin to develop. A detailed design review should be conducted prior to construction.
11W	10.0	5302	The City may wish to build additional capacity to provide flexibility and an increased possibility to serve future developments and proposed annexation areas to the northwest. A detailed design review should be conducted prior to construction.

1. The storage facility will be located in existing Zone 10W, which is planned to be a part of future Zone 10

Approximate locations for the proposed ponds are shown on the master plan map in Appendix A. Details on the construction timeframe of these projects are included in the Capital Facility Plan and discussed in detail in Chapter 7.

CHAPTER 5 WATER DISTRIBUTION

Santaquin’s pressurized irrigation water distribution system consists of all pipelines, valves, fittings, and other appurtenances used to convey water from sources and storage tanks to water users. The existing water system contains approximately 69 miles of pipe with diameters of 4 inches to 24 inches. About 16 miles of these pipes are currently isolated from the PI system and are supplied from the drinking water system. Four pressure zones comprise the current system (Figure 1-1).

HYDRAULIC MODEL

Detailed information about hydraulic model development, model components, model demands, and model analysis methodology is included in the Santaquin City 2020 Drinking Water Master Plan Report. Information contained in that report is generally applicable to the PI model and is not repeated in this report document.

The pattern of water demand over a 24-hour period is called the diurnal curve or daily demand curve. HAL developed a diurnal curve for peak day conditions using SCADA data. The peaking factor is the ratio of peak instantaneous demand to peak day average demand. The diurnal curve used in this study is presented in Figure 5-1. The diurnal curve was input into the model to simulate changes in the water system throughout the day.

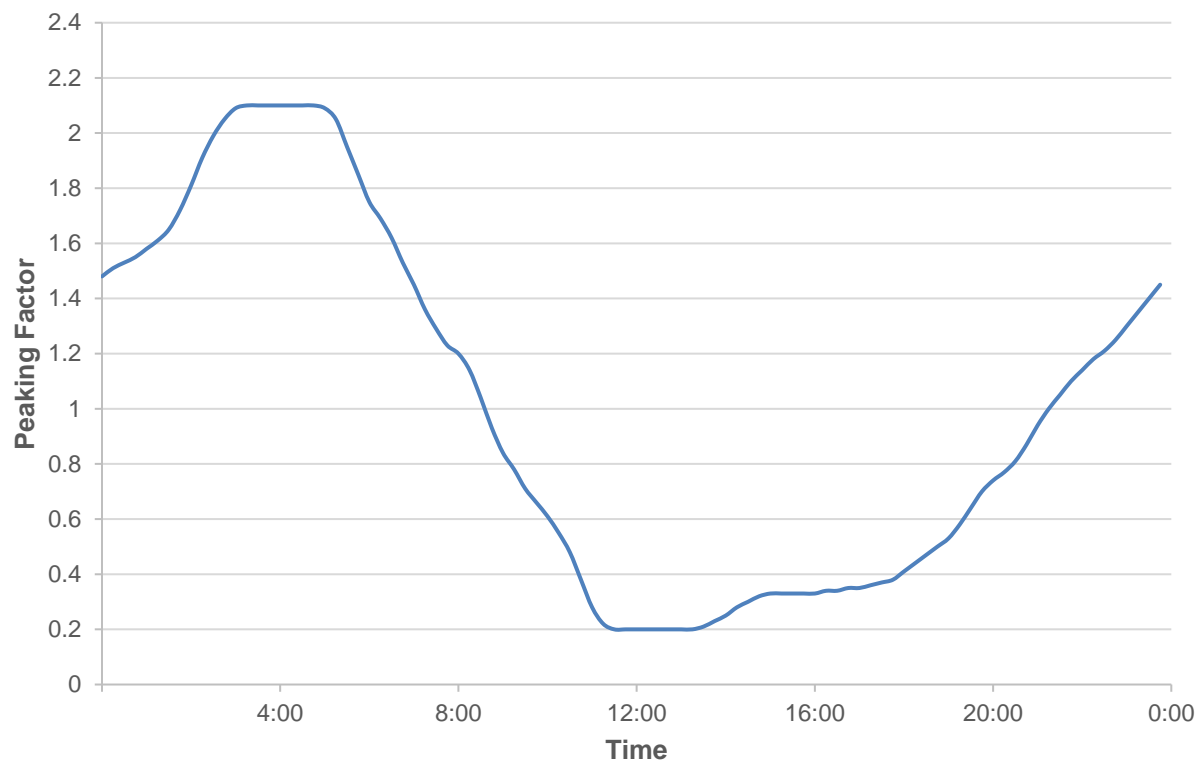


Figure 5-1: Santaquin Diurnal Curve

The City's time-of-day watering restrictions effectively curb midday water use, but also result in higher peak flows than might be seen in cities that do not have time-of-day restrictions. This leads to greater pressure swings and greater utilization of equalization storage. In general, watering activity is high from 10:00 PM to 8:00 AM.

LEVEL OF SERVICE AND DESIGN PARAMETERS

The level of service for distribution is to maintain a minimum pressure of 30 psi at peak instantaneous demand.

In designing the future system, pressure zones boundaries were defined with the intent to keep most pressures below 130 psi. Pipes were generally sized to keep diurnal pressure variation less than 20 psi. However, these are not considered to be strict level of service parameters.

ANALYSIS METHODOLOGY

HAL used the extended-period model to analyze the performance of the water system with current and projected future demands. An extended-period model represents system behavior over a period of time: tanks filling and draining, pumps turning on or off, pressures fluctuating, and flows shifting in response to demands. The model was used to analyze conditions, controls, operation, performance, and energy efficiency. Recommendations for existing and future conditions were checked with the extended-period model to confirm adequacy.

The model was used to analyze peak day, and peak instantaneous conditions. Each of these conditions represent an extreme condition. If level of service parameters are met under these extreme conditions, they will also be met under all other conditions the system will experience. Each operating condition is discussed in Table 5-1.

Table 5-1
Compliance of Existing
Distribution System with Level of Service

Condition	Requirement ¹	System Design Flow ²	Status of Existing System ³
Peak Instantaneous	Minimum 30 psi service pressure	9,324 gpm	System meets level of service; however, portions of Zone 10W nearly do not due to high head losses through the existing 4-inch diameter backflow preventer.

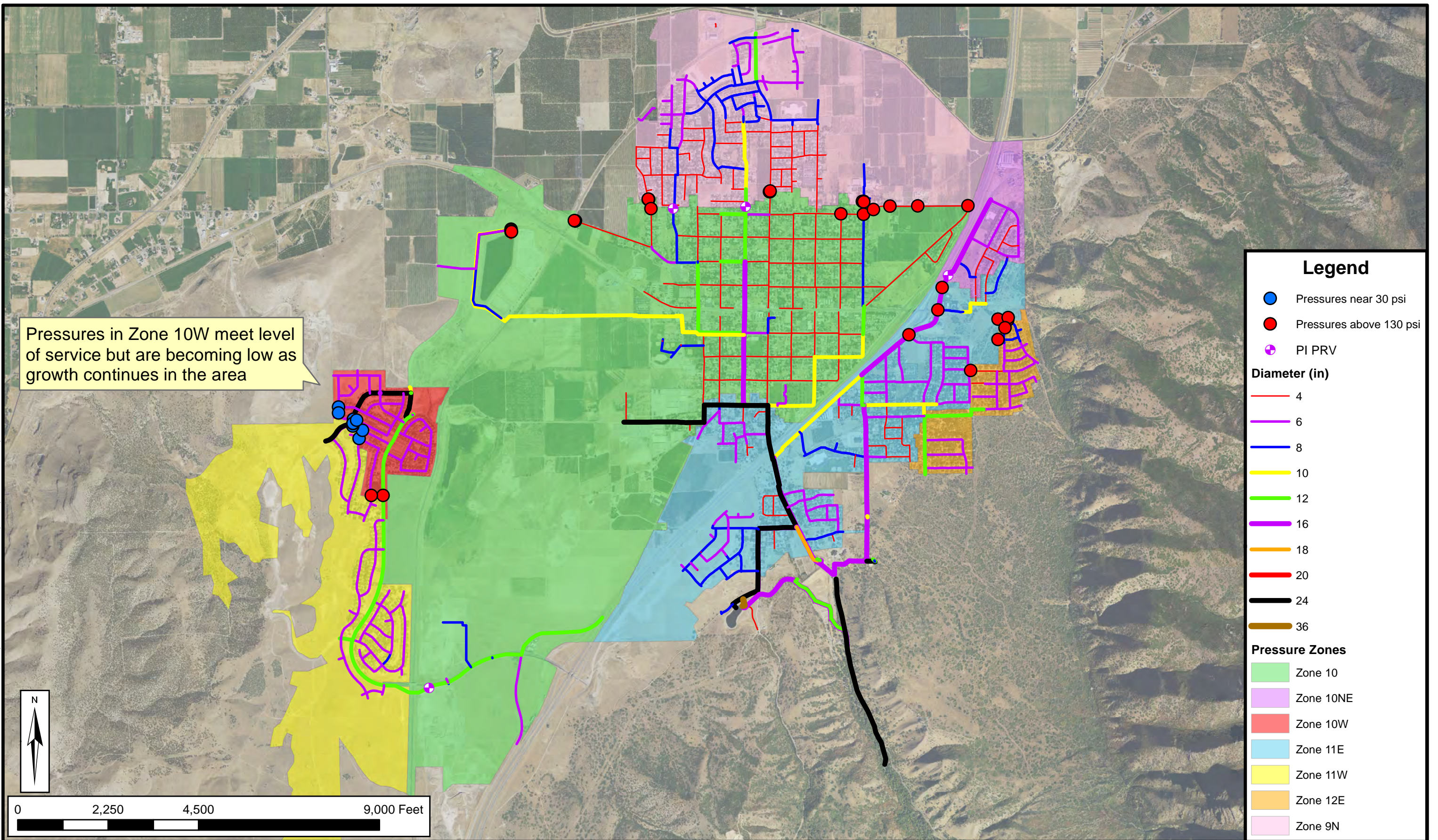
1. Requirements for PI systems are not governed by Utah law. The level of service parameter was set to produce acceptable performance for customers.
2. Peak day system flows are discussed in Chapter 3. Peak day flow was multiplied by a factor of 2.1, per the existing diurnal curve, to produce peak instantaneous flow.
3. For this study, irrigable acreage as of January 1, 2020 was established as the baseline for existing conditions

Figure 5-2 shows the modeled existing minimum and maximum system pressures.

Static Conditions

Future areas of the system will be designed to keep static pressures below 130 psi. No actions to correct existing high pressures are proposed in this master plan, because operators and existing customers are accustomed to these pressures.

Date: 9/11/2020
Document Path: H:\Projects\415 - Santaquin\03.100 - Pressure Irrigation Master Plan\GIS\Working\PI Figure 5-2 Existing Pressures.mxd



SANTAQUIN PRESSURIZED IRRIGATION MASTER PLAN

MODELED EXISTING HIGH AND LOW PRESSURES

FIGURE
5-2

Peak Day Pressure Swings

Large diurnal pressure fluctuations make it difficult for customers to design and operate sprinkler systems. To provide acceptable performance, the future system was generally designed to limit the maximum diurnal pressure swing to 20 psi on the peak day.

Modeling indicates that Zone 10W experiences pressure swings in excess of 20 psi due to high head losses through the single 4-inch diameter backflow preventer feeding the zone. This is anticipated to improve in the future as additional facilities are constructed.

Peak Instantaneous Pressures

Modeling indicates that Zone 10W experiences the lowest peak instantaneous pressures. At the higher elevations of the zone, peak instantaneous pressures approach 30 psi due to high head losses through the single 4-inch diameter backflow preventer feeding the zone. This is anticipated to improve in the future as additional facilities are constructed.

DISTRIBUTION SYSTEM RECOMMENDATIONS

Recommendations are based on output from the hydraulic model, which was calibrated using SCADA and field-measured data. Results from the model are available on a CD in Appendix F. Recommendations for distribution improvements were based on modeling results, as well as guidance provided by City personnel.

Zone 10W

Constructing a parallel 10-inch diameter backflow preventer to supplement the existing 4-inch diameter backflow preventer is recommended. This will allow the City to maintain the level of service as growth continues in this area. Details about this proposed project are included in the Capital Facility Plan in Chapter 7.

Distribution Piping

Pipes should be installed at a proper size as developments and master plan source and storage facilities are constructed. Careful review of proposed developments and projects is needed to ensure that their proposed water pipes are in compliance with the master plan.

CHAPTER 6 SYSTEM OPTIMIZATION

SOURCE PRIORITIZATION

To maximize energy efficiency and operational ease in the PI system, the recommended source prioritization scheme is as follows:

1. Surface water from Spring 1 and SCIC should be used to the extent that it is available.
2. Though it is expensive, Type 1 reuse water should be the next preferred source of water simply because the City is not able to discharge it, and it must be used.
3. Well water from SCIC should be the next preferred source.
4. Center Street Well should be the next preferred source.
5. Water from the drinking water system (including from the Springs 2-5 bypass) should be used only when other options are exhausted or not available. This water is more energy-intensive and will be needed in the drinking water system, especially as growth continues.

SCALING AND SEDIMENTATION

The City has reported deposits on pipe walls that are thin, brown, and somewhat hard. Testing has shown it to be primarily calcium carbonate (water hardness). Upstream of the City's PRVs, scales of this material (which are washed loose from upstream locations) accumulate, causing excessive head loss and difficulty operating some PRVs. In these problem areas, flushing is a recommended solution. A detailed flushing analysis is provided as a part of this master planning effort. It is included in Appendix E.

NON-REVENUE WATER

Every water system loses some water or at least cannot account for the fate of all water produced. This water, which is not billed for, is commonly known as non-revenue water. Mechanisms for non-revenue water include the following:

- Leaks from pipes or at tanks
- Water line breaks
- System flushing
- Pumping to waste
- Unmetered users

Water production data and billing data for years 2017 through 2019 was analyzed to quantify the non-revenue water produced in the Santaquin City PI water system. Results are summarized in Table 6-1.

Table 6-1
Non-Revenue Water in the Santaquin PI Water System

Year	Water Produced (ac-ft)	Water Billed	Non-Revenue Water (ac-ft)	Non-Revenue Percentage
2017	2,079	1,422	656	32%
2018	1,935	1,612	324	17%
2019	1,946	1,471	475	24%

The United States Environmental Protection Agency reports a typical rate of non-revenue water of 16% (EPA 2013). HAL often sees non-revenue water percentages of 15-30% in Utah. Water loss in the Santaquin PI system appears to fall within these limits. It is assumed that evaporation off irrigation ponds and leakage are the main sources of non-revenue water.

It is recommended that the City continue to put emphasis on accurately metering PI production and usage, in order to increase confidence in the data and to help prioritize improvements. It is also recommended that Santaquin plan to replace aging pipes, as this will prevent and repair leaks.

A water loss audit was performed as a part of this master planning effort. More detailed information on water loss is included in Appendix C.

CHAPTER 7 CAPITAL FACILITY PLAN

INTRODUCTION

The purpose of this section is to identify the pressurized irrigation facilities that are required, for the 20-year planning period, to meet the demands placed on the system by future development. Proposed facilities were sized to meet master plan requirements and located to accommodate 20-year growth projections. Each capital facility plan project will require a detailed design analysis before construction to ensure that the location and sizing is appropriate for the actual growth that has taken place since this Capital Facility Plan (CFP) was developed. Specific projects with estimated costs are presented at the end of this chapter.

GROWTH PROJECTIONS

Areas of expected growth within 10 years and within 20 years were identified based on existing development patterns, population projections, and discussions with City personnel. These areas are shown on Figure 7-1.

Most development pressure in Santaquin is occurring in the Summit Ridge Development, on the East Bench, and on the northern end of the City. Growth in each of these areas is expected to continue for more than 20 years. Scattered infill and redevelopment within the main town are also expected.

Changes to Expected Growth Areas

The Master Plan is intended to incorporate a reasonable degree of flexibility. Minor developments or infill developments not anticipated in the City's growth projections can generally be served after a site-level evaluation, without substantial changes to the master plan. If growth patterns change substantially from those predicted, however, it is recommended that the assumptions in this master plan be re-evaluated to ensure the City is planning properly for the growth that actually occurs.

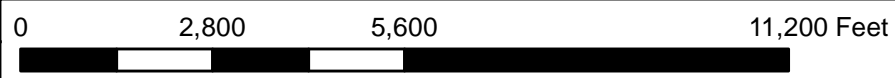
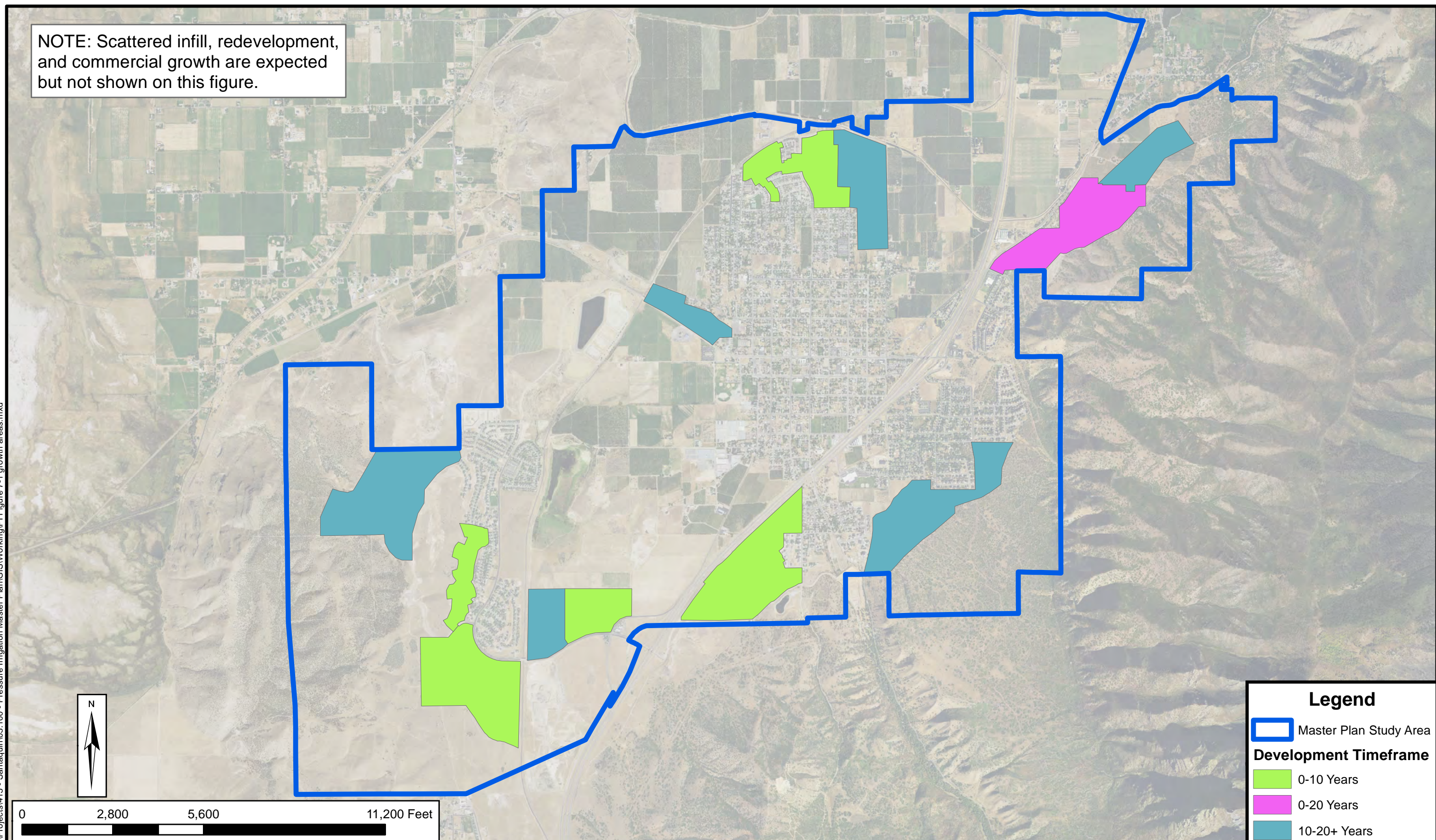
Large Developments

For large developments that will be constructed in a number of phases over a number of years, it is recommended that the City require a utilities phasing plan as part of the development agreement. A utilities phasing plan clearly defines when and how key infrastructure will be constructed within the development. The utilities phasing plan should be negotiated in such a way that it will protect the City's financial interests and hold the developer responsible for supporting growth in that development – even if ownership changes.


In Santaquin, it is recommended that utilities phasing plans be required for the following types of developments:

- Developments larger than 10 acres
- Developments that will be constructed in multiple phases or issued multiple plats
- Areas being evaluated for annexation


NOTE: Scattered infill, redevelopment, and commercial growth are expected but not shown on this figure.





Legend

 Master Plan Study Area

Development Timeframe

 0-10 Years

 0-20 Years

 10-20+ Years

In a typical utilities phasing plan, the construction of infrastructure is tied directly to the number of residential units (or square footage of nonresidential space) permitted to be constructed within the development. An ideal utilities phasing agreement for PI water might include the following components:

- PI water storage capacity must be provided before more than [#] units are permitted to be constructed within the development.
- Certain distribution pipes must be constructed before more than [#] units are permitted to be constructed within the development.

METHODOLOGY

Growth projections were used to forecast future water demands on a year-by-year basis, which were then compared to the capacity of existing source and storage facilities. When this analysis showed that existing facilities would not have capacity for the 20-year planning period, solutions were identified to ensure that the City can meet demands at the proposed level of service.

A hydraulic model, calibrated using SCADA and field-measured data, was developed for the purpose of assessing the system operation and capacity with future demands added to the system. The model was used to identify problem areas in the system and to identify the most efficient way to make improvements to distribution pipelines, sources, pumps, and storage facilities. Solutions and alternatives were discussed with City staff.

The drinking water system supplements the PI water system in certain areas of the City. This is intended to be a temporary arrangement, as drinking water supply is limited and will be increasingly needed to meet indoor demands. Some PI projects are recommended chiefly to relieve demands presently being placed on the drinking water system, and free up capacity for future growth within the drinking water system. Likewise, components of some planned drinking water projects will serve the PI system for a time. **This pressurized irrigation water capital facility plan assumes that all projects listed herein and in the drinking water capital facility plan (presented in a separate document) will be constructed in a timely manner, as identified in their respective master plans.** If this is not the case, the PI water projects in this chapter need to be re-evaluated.

The future system was evaluated in the same manner as the existing system, by modeling (1) peak instantaneous demands and (2) peak day demands.

RECOMMENDED PROJECTS AND COSTS

As discussed in previous chapters, source, storage and distribution system capacity expansion will be needed to meet the demands of future growth. Cost estimates have been prepared for the recommended projects and are summarized in the following tables and included in detail in Appendix G.

Unit costs for the construction cost estimates are based on conceptual level engineering. Sources used to estimate construction costs include:

1. "Means Heavy Construction Cost Data," 2019
2. Price quotes from equipment suppliers
3. Recent construction bids for similar work

All costs are presented in 2020 dollars.

Precision of Cost Estimates

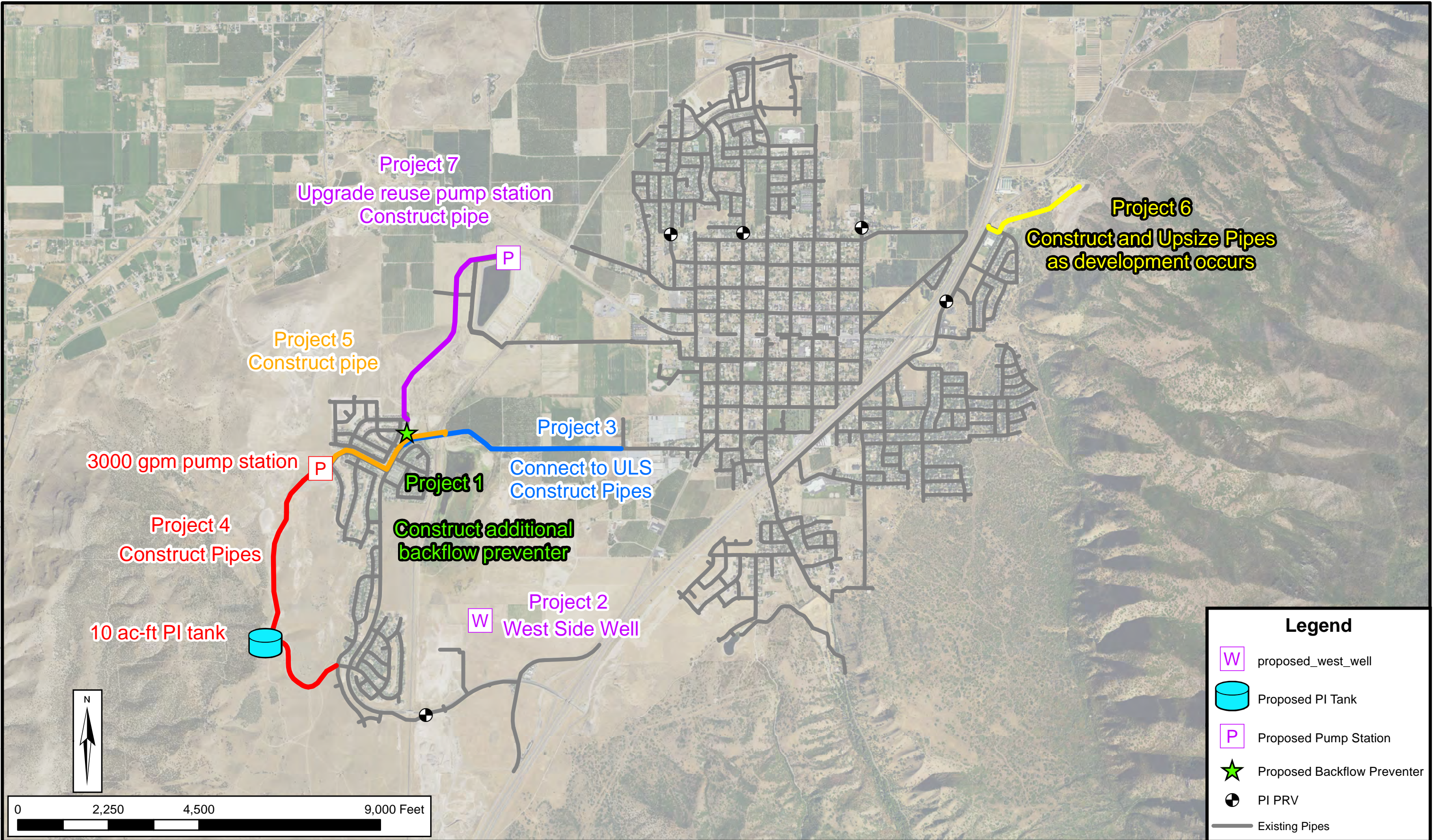
Master plan projects are a high-level representation of the infrastructure the City will need to construct in order to correct deficiencies or meet growth. However, due to the many unknown factors at this stage of design (such as alignment and depth of pipelines, utility conflicts, the cost of land and easements, construction methodology, types of equipment and material to be used, interest and inflation rates, permitting requirements, etc.), there is a significant level of uncertainty in estimated costs.

Every effort has been made to produce cost estimates which will help the City prepare a responsible budget that will meet the City's needs without being excessive or unreasonable. However, it is recommended that the City plan additional contingency into the budget when preparing to complete individual projects.

GROWTH-RELATED PROJECTS

A summary of the estimated cost of each growth-related project is included in Table 7-1. Projects are shown on Figures 7-2 and 7-3. Tables 7-2 through 7-4 include more detailed descriptions of the recommended projects, organized by project type (source, storage, or distribution).

Date: 10/23/2020
Document Path: H:\Projects\415 - Santaquin\03.100 - Pressure Irrigation Master Plan\GIS\Working\PI Figure 7-2 CFP 0-10 Year Projects.mxd



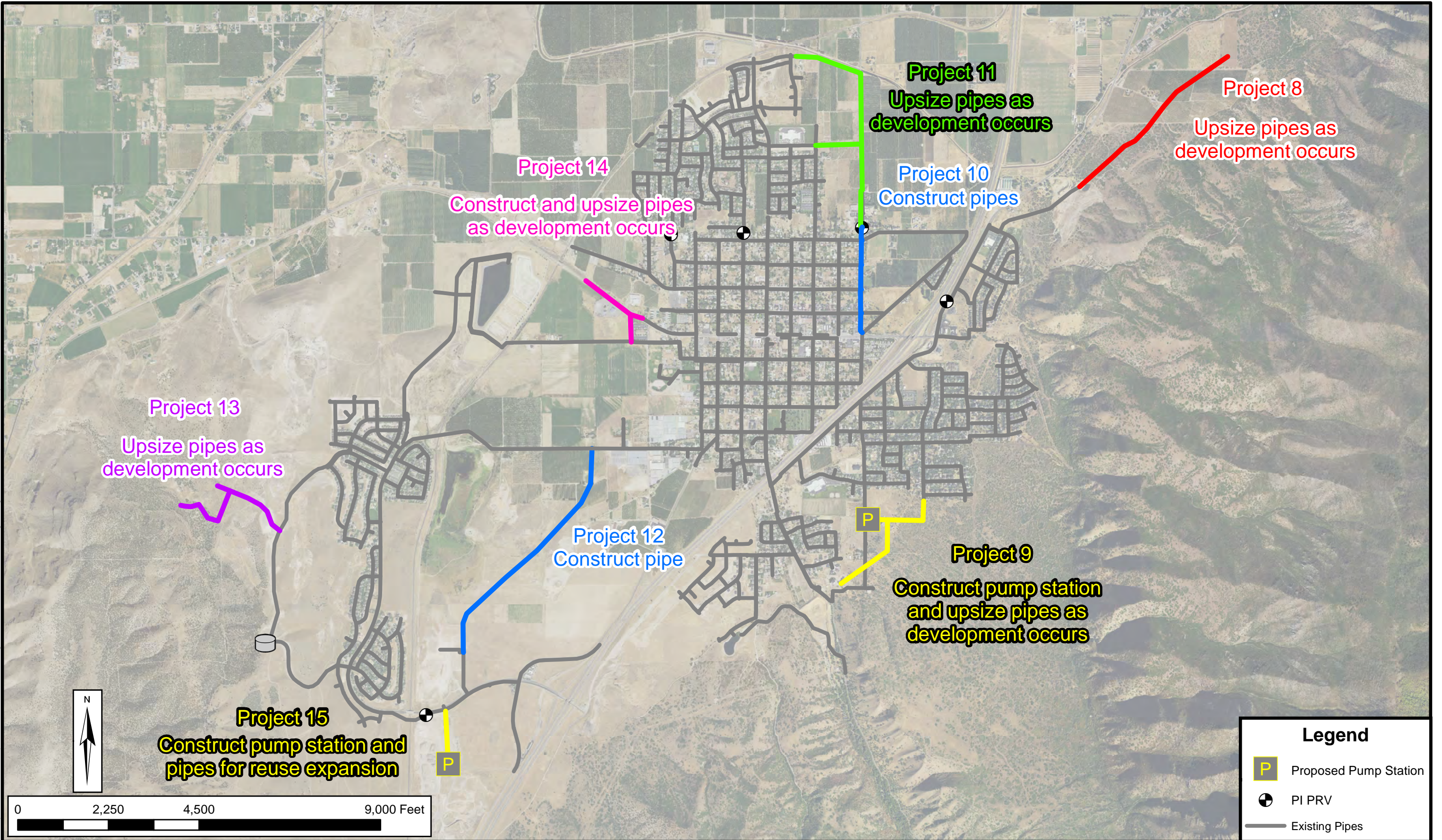
SANTAQUIN PRESSURIZED IRRIGATION MASTER PLAN

RECOMMENDED CAPITAL PROJECTS 0 - 10 YEAR TIMEFRAME

FIGURE
7-2

Item # 11.

Date: 10/23/2020
Document Path: H:\Projects\415 - Santaquin\03.100 - Pressure Irrigation Master Plan\GIS\Working\PI Figure 7-3 CFP 10-20 Year Projects.mxd



SANTAQUIN PRESSURIZED IRRIGATION MASTER PLAN

RECOMMENDED CAPITAL PROJECTS 10 - 20 YEAR TIMEFRAME

FIGURE
7-3

Item # 11.

**Table 7-1
Estimated Costs for Growth-Related Projects**

Trigger	Figure Number	Map ID ¹	Project Type(s) Included ²	Estimated Phasing Year ³	Cost
Development	7-2	1	Source	2021	\$84,000
System Growth	7-2	2	Source	0-5 Years	\$701,000
System Growth	7-2	3	Source, Distribution	2021	\$1,596,000
System Growth	7-2	4	Source, Storage, Distribution	2021	\$4,949,000
System Growth	7-2	5	Distribution	2026	\$687,000
Development	7-2	6	Distribution	0-10 Years	\$182,000
System Growth	7-2	7	Source	5-10 Years	\$1,489,000
Development	7-3	8	Distribution	10-20 Years	\$235,000
Development	7-3	9	Source, Distribution	10-20 Years	\$1,194,000
System Growth	7-3	10	Distribution	10-20 Years	\$470,000
Development	7-3	11	Distribution	10-20 Years	\$338,000
Development	7-3	12	Distribution	10-20 Years	\$1,096,000
Development	7-3	13	Distribution	10-20 Years	\$267,000
Development	7-3	14	Distribution	10-20 Years	\$134,000
System Growth	7-3	15	Source	10-20 Years	\$1,126,000
Subtotal 0 – 10 Years					\$9,688,000
Subtotal 10 – 20 Years					\$4,860,000
Total					\$14,548,000

1. ID refers to the ID on Figures 7-2 and 7-3. Projects may be constructed in a different order than listed in the table, depending on the needs and priorities of the City.
2. See table 7-2 for source projects, 7-3 for storage projects and 7-4 for distribution projects. Some projects have source and/or storage and/or distribution components to them that must all be constructed concurrently.
3. The phasing year for development-driven projects is estimated, but development-driven projects are not necessary until the area develops. This may occur earlier or later than listed in this document.

Recommended source projects are shown in Table 7-2 and on Figures 7-2 and 7-3.

Table 7-2
Recommended Source Projects

Phasing Year	Figure Number	Map ID	Recommended Project	Cost
Development Driven	7-2	1	Construct an additional backflow preventer in Zone 10W to support new development.	\$84,000
0-5 Years	7-2	2	Drill and equip a well to serve the western portion of Zone 10.	\$701,000
2021	7-2	3	Install approximately 5700 ft of 24-inch water line in 500 W to provide source conveyance to the western portion of the City, and connect to the planned future ULS pipeline (when it is constructed). Half of the cost of this project is attributable to source conveyance, while half is attributable to distribution.	\$798,000
2021	7-2	4	Construct a pump station to supply Zone 11W from Zone 10W. This pump station must be capable of taking source from the Zone 10 drinking water system during times that ULS water is unavailable. Must be constructed along with the storage and distribution components of project 4 (see Tables 7-3 and 7-4).	\$900,000
5-10 Years	7-2	7	Increase the capacity of the Type 1 reuse booster station to accommodate increasing sewer inflows and provide additional source to the PI system. Includes approximately 5800 ft of 12-inch diameter pipeline.	\$1,489,000
Development Driven	7-3	9	Construct a booster station to serve Zone 12E with PI water (includes approximately 600 feet of 16-inch pipe). Must be constructed along with the distribution component of project 9 (see Table 7-4).	\$1,015,000
10-20 Years	7-3	15	Install a pump station to provide source from the planned south Type 1 reuse storage facility. Includes approximately 1300 feet of 12-inch pipe.	\$1,126,000
TOTAL				\$6,113,000

One storage project to support growth was identified and is shown in Table 7-3 and on Figure 7-2.

**Table 7-3
Recommended Storage Project**

Phasing Year	Figure Number	Map ID	Recommended Project	Cost
2021	7-2	4	Construct a 10 ac-ft PI tank or pond to serve Zone 11W. Must be constructed along with the source and distribution components of project 4 (see Tables 7-2 and 7-4).	\$2,542,000
TOTAL				\$2,542,000

Recommended distribution projects (including PRVs) are shown in Table 7-4 and on Figures 7-2 and 7-3.

**Table 7-4
Recommended Distribution Projects**

Phasing Year	Figure Number	Map ID	Recommended Project	Cost
2021	7-2	3	Install approximately 5700 ft of 24-inch water line in 500 S to connect to the future planned ULS connection and provide distribution capacity between the eastern and western portions of the system. Must be constructed along with the source component of Project 3 (see Table 7-2). Half of the cost of this project is attributable to source conveyance, while half is attributable to distribution.	\$798,000
2021	7-2	4	Install approximately 7900 feet of 16-inch diameter pipeline to connect the planned Zone 11W storage and pumping facilities and provide distribution to the zone. Must be constructed along with the source and storage components of Project 4 (see Tables 7-2 and 7-3).	\$1,507,000
2026	7-2	5	Install approximately 3600 feet of 16-inch diameter pipeline to provide a direct connection from the ULS pipeline to Zone 11W, to allow the City to bypass pumping.	\$687,000
Development Driven	7-2	6	Install approximately 300 feet of 12-inch diameter pipe (to replace undersized lines) and upsize approximately 2300 feet of pipe to 12-inch diameter to provide service and future capacity in Zone 11E.	\$182,000
Development Driven	7-3	8	Upsize approximately 1100 feet of pipe to 12-inch diameter and 3800 feet of pipe to 10-inch diameter to serve the northeastern portion of Zone 10.	\$235,000
Development Driven	7-3	9	Upsize approximately 1400 feet of pipe to 12-inch diameter and 2200 feet of pipe to 10-inch diameter to serve Zone 12E. Must be constructed along with the source component of Project 9 (see Table 7-2).	\$179,000
10-20 Years	7-3	10	Install approximately 2700 feet of 12-inch diameter pipe to provide increased conveyance to Zones 10 and 9N.	\$470,000
Development Driven	7-3	11	Upsize approximately 5500 feet of pipe to 12-inch diameter and upsize approximately 1100 feet of pipe to 8-inch diameter to serve Zone 9N.	\$338,000
10-20 Years	7-3	12	Install approximately 6300 feet of 12-inch diameter pipeline in a planned future road to serve the western portion of Zone 10.	\$1,096,000
Development Driven	7-3	13	Upsize approximately 1700 feet of pipe to 16-inch diameter, 800 feet of pipe to 12-inch diameter, and 1500 feet of pipe to 10-inch diameter to serve growth and provide future capacity in Zone 11W.	\$267,000
Development Driven	7-3	14	Install approximately 700 feet of 8-inch diameter pipe and upsize approximately 1700 feet of pipe to 8-inch diameter to serve growth and provide future capacity to the northwestern portion of Zone 10.	\$134,000
TOTAL				\$5,893,000

OPERATIONS AND MAINTENANCE PROJECTS

To assist the City in operating their PRVs and removing hard water scaling from the PI system, two PI flushing stations are recommended (see Appendix E for details). An estimated cost for this project is described in Table 7-5.

Table 7-5
Recommended Operations Projects

Phasing Year	Recommended Project	Cost
City Priority	Install two flushing stations in the PI system.	\$16,000
TOTAL		\$16,000

FUNDING OPTIONS

Funding options for the recommended projects, in addition to water use fees, include: general obligation bonds, revenue bonds, State/Federal grants and loans, and impact fees. In reality, the City may need to consider a combination of these funding options. The following discussion describes each of these options.

General Obligation Bonds

This form of debt enables the City to issue general obligation bonds for capital improvements and replacement. General Obligation (G.O.) bonds would be used for items not typically financed through the Water Revenue Bonds (for example, the purchase of water source to ensure a sufficient water supply for the City in the future). G.O. bonds are debt instruments backed by the full faith and credit of the City which would be secured by an unconditional pledge of the City to levy assessments, charges or ad valorem taxes necessary to retire the bonds. G.O. bonds are the lowest-cost form of debt financing available to local governments and can be combined with other revenue sources such as specific fees, or special assessment charges to form a dual security through the City's revenue generating authority. These bonds are supported by the City as a whole, so the amount of debt issued for the water system is limited to a fixed percentage of the real market value for taxable property within the City. G.O. bonds must be approved by a citizen vote.

Revenue Bonds

This form of debt financing is also available to the City for utility related capital improvements. Unlike G.O. bonds, revenue bonds are not backed by the City as a whole, but constitute a lien against the water service charge revenues of a Water Utility. Revenue bonds present a greater risk to the investor than do G.O. bonds, since repayment of debt depends on an adequate revenue stream, legally defensible rate structure, and sound fiscal management by the issuing jurisdiction. Due to this increased risk, revenue bonds generally require a higher interest rate than G.O. bonds, although currently interest rates are quite low. This type of debt also has very specific coverage requirements in the form of a reserve fund specifying an amount, usually expressed in terms of

average or maximum debt service due in any future year. This debt service is required to be held as a cash reserve for annual debt service payment to the benefit of bondholders. Typically, voter approval is not required when issuing revenue bonds.

State or Federal Grants and Loans

Historically, both local and county governments have experienced significant infrastructure funding support from state and federal government agencies in the form of block grants, direct grants in aid, interagency loans, and general revenue sharing. Federal expenditure pressures and virtual elimination of federal revenue sharing dollars are clear indicators that local government may be left to its own devices regarding infrastructure finance in general. However, state or federal grants and loans should be further investigated as a possible funding source for needed water system improvements.

It is also important to assess likely trends regarding state or federal assistance in infrastructure financing. Future trends indicate that grants will be replaced by loans through a public works revolving fund. Local governments can expect to access these revolving funds or public works trust funds by demonstrating both the need for and the ability to repay the borrowed monies, with interest. As with the revenue bonds discussed earlier, the ability of infrastructure programs to wisely manage their own finances will be a key element in evaluating whether many pressurized irrigation funding sources, such as federal/state loans, will be available to the City.

Impact Fees

The Utah Impact Fees Act, codified in Title 11, Chapter 36a, of the Utah Code, authorizes municipalities to collect impact fees to fund public facilities. An impact fee is “a payment of money imposed upon new development activity . . . to mitigate the impact of the new development on public infrastructure” (Subsection 11-36a-102(8)). Impact fees enable local governments to finance infrastructure improvements without burdening existing development with costs that are exclusively attributable to growth.

Impact fees can be applied to water-related facilities under the Utah Impact Fees Act. The Act is designed to provide a logical and clear framework for establishing new development assessments. It is also designed to establish the basis for the fee calculation which the City must follow in order to comply with the statute. The fundamental objective for the fee structure is the imposition on new development of only those costs associated with providing or expanding water infrastructure to meet the capacity needs created by that specific new development. Impact fees cannot be applied retroactively.

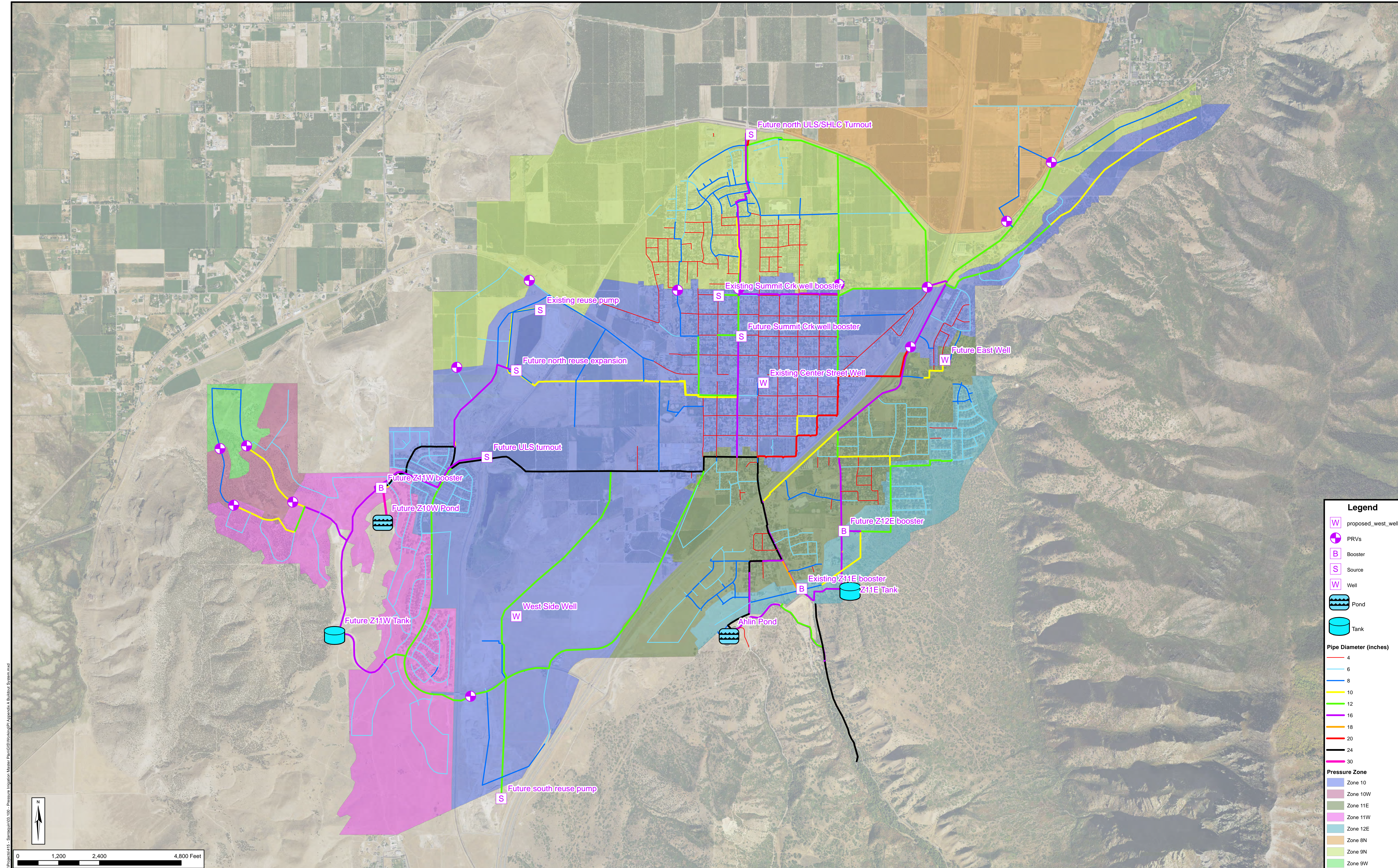
An impact fee analysis has taken place as part of the 2020 master planning effort. It is described in a separate document.

REFERENCES

- DWRi (Utah Division of Water Rights). 2020. Public Water Supplier Information, Santaquin City. Accessed April 20.
https://www.waterrights.utah.gov/asp_apps/viewEditSEC/secView.asp?SYSTEM_ID=11419.
- EPA (U.S. Environmental Protection Agency). 2019. "EPANET: Application for Modeling Drinking Water Distribution Systems." EPA. Accessed April 20.
<http://www.epa.gov/nrmrl/wswrd/dw/epanet.html>.
- Kem C. Gardner Policy Institute. 2016. "The Beehive Shape: Provisional 50-Year Demographic and Economic Projections for the State of Utah, 2015 – 2065." Accessed April 20.
https://gardner.utah.edu/wp-content/uploads/2016/11/2016_10_07_StateProjections-Final-Nov-3.pdf.
- Rossman, Lewis A. 2000. *EPANET 2 User's Manual*. EPA/600/R-00/057. Cincinnati, Oh.: U.S. Environmental Protection Agency, National Risk Management Research Laboratory.
<http://nepis.epa.gov/Adobe/PDF/P1007WWU.pdf>.
- State of Utah. 2019a. Utah Administrative Code, Section R309-105: Administration: General Responsibilities of Public Water Systems. In effect Mar. 1. Accessed Apr. 20.
<https://rules.utah.gov/publicat/code/r309/r309-105.htm>.
- . 2019b. Utah Administrative Code, Section R309-510: Facility Design and Operation: Minimum Sizing Requirements. In effect Mar. 1. Accessed Apr. 20.
<https://rules.utah.gov/publicat/code/r309/r309-510.htm>.
- . 2014c. Utah Code Annotated, Section 11-36: Impact Fees Act. Accessed Apr. 20.
https://le.utah.gov/xcode/Title11/Chapter36A/11-36a.html?v=C11-36a_1800010118000101.

APPENDIX A

Pressurized Irrigation Water Master Plan Map



Legend

- proposed_west_well
- PRVs
- Booster
- Source
- Well
- Pond
- Tank

Pipe Diameter (inches)

- 4
- 6
- 8
- 10
- 12
- 16
- 18
- 20
- 24
- 30

Pressure Zone

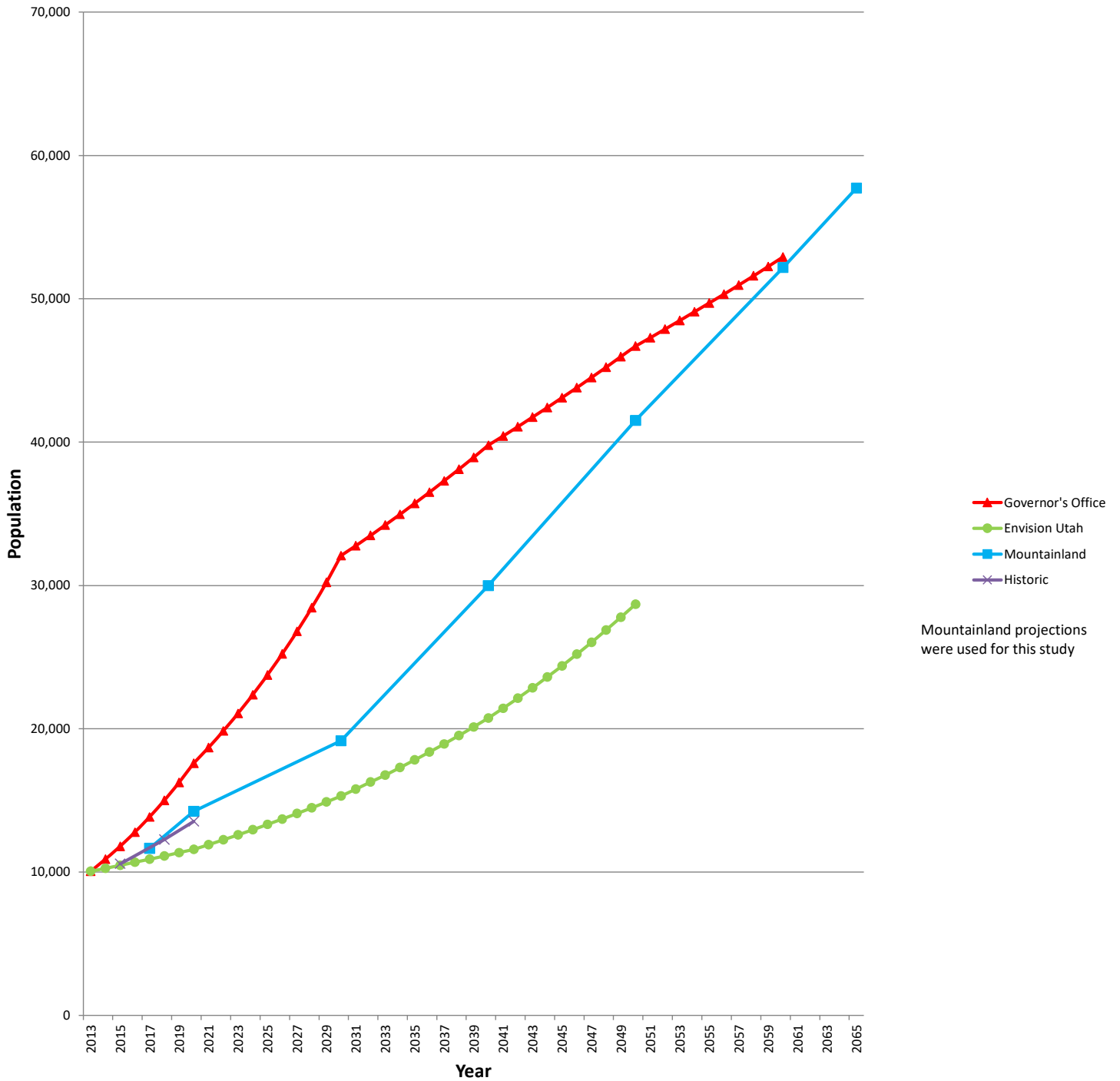
- Zone 10
- Zone 10W
- Zone 11E
- Zone 11W
- Zone 12E
- Zone 8N
- Zone 9N
- Zone 9W

H:\Projects\415 - Santaquin\03_100 - Pressure Irrigation Master Plan\GIS\Work\PIP Appendix A Bulked System.mxd
Date: 03/27/2024
Hansen Allen & Luce, Inc.
ENGINEERS

APPENDIX B

Population Projections

Santaquin Population Projection by Year



APPENDIX C

Water System Data and Calculations

Santaquin City
2020 Pressurized Irrigation System Master Plan
Existing and Future Requirements
09/11/2020 RJG

Level of Service Parameter	Per irr-ac
Peak Day Source (gpm)	8
Average Yearly Source (ac-ft)	4
Storage (gal)	9200

Service (Irr-ac)

Pressure Zone	Existing Irr-ac	10-yr Irr-ac	20-yr Irr-ac	2060 Irr-ac
8N	0	0	0	65
9N	110	135	225	335
9W	0	0	0	35
10	220	243	285	630
10W	40	40	40	50
11W	55	118	220	220
11E	115	138	155	260
11NE	0	0	0	0
12W	0	0	0	0
12E	30	30	89	125
12S	0	16	16	0
13E	0	0	0	0
14E	0	0	0	0
Totals	570	720	1030	1720

Peak Day Demand (gpm)

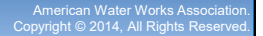
Pressure Zone	Existing	10-yr	20-yr	2060
8N	0	0	0	520
9N	880	1080	1800	2680
9W	0	0	0	280
10	1760	1944	2280	5040
10W	320	320	320	400
11W	440	944	1760	1760
11E	920	1104	1240	2080
11NE	0	0	0	0
12W	0	0	0	0
12E	240	240	712	1000
12S	0	128	128	0
13E	0	0	0	0
14E	0	0	0	0
Totals	4560	5760	8240	13760

Average Yearly Demand (ac-ft)

Pressure Zone	Existing	10-yr	20-yr	2060
8N	0	0	0	260
9N	440	540	900	1340
9W	0	0	0	140
10	880	972	1140	2520
10W	160	160	160	200
11W	220	472	880	880
11E	460	552	620	1040
11NE	0	0	0	0
12W	0	0	0	0
12E	120	120	356	500
12S	0	64	64	0
13E	0	0	0	0
14E	0	0	0	0
Totals	2280	2880	4120	6880

Storage (ac-ft)

Pressure Zone	Existing	10-yr	20-yr	2060
8N	0.00	0.00	0.00	1.84
9N	3.11	3.81	6.35	9.46
9W	0.00	0.00	0.00	0.99
10	6.21	6.86	8.05	17.79
10W	1.13	1.13	1.13	1.41
11W	1.55	3.33	6.21	6.21
11E	3.25	3.90	4.38	7.34
11NE	0.00	0.00	0.00	0.00
12W	0.00	0.00	0.00	0.00
12E	0.85	0.85	2.51	3.53
12S	0.00	0.45	0.45	0.00
13E	0.00	0.00	0.00	0.00
14E	0.00	0.00	0.00	0.00
Totals	16.09	20.33	29.08	48.56

Reporting Worksheet 1



AWWA Free Water Audit Software: System Attributes and Performance Indicators

WAS v5.0

American Water Works Association.
Copyright © 2014, All Rights Reserved.

Water Audit Report for: **Santaquin**

Reporting Year: **2019** **1/2019 - 12/2019**

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 65 out of 100 ***

System Attributes:

Apparent Losses:	8.515	acre-ft/yr
+ Real Losses:	453.095	acre-ft/yr
= Water Losses:	461.610	acre-ft/yr

? Unavoidable Annual Real Losses (UARL): **86.55** acre-ft/yr

Annual cost of Apparent Losses: **\$2,025**

Annual cost of Real Losses: **\$19,465**

Valued at **Variable Production Cost**

[Return to Reporting Worksheet to change this assumption](#)

Performance Indicators:

Financial:

Non-revenue water as percent by volume of Water Supplied: **25.0%**

Non-revenue water as percent by cost of operating system: **2.2%** Real Losses valued at Variable Production Cost

Operational Efficiency:

Apparent Losses per service connection per day: **2.30** gallons/connection/day

Real Losses per service connection per day: **122.61** gallons/connection/day

Real Losses per length of main per day*: **N/A**

Real Losses per service connection per day per psi pressure: **1.38** gallons/connection/day/psi

From Above, Real Losses = Current Annual Real Losses (CARL): **453.10** acre-feet/year

? Infrastructure Leakage Index (ILI) [CARL/UARL]: **5.24**

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline



AWWA Free Water Audit Software: User Comments

WAS v5.0

American Water Works Association.
Copyright © 2014. All Rights Reserved.

Use this worksheet to add comments or notes to explain how an input value was calculated, or to document the sources of the information used.

General Comment:

Audit Item	Comment
Volume from own sources:	https://waterrights.utah.gov/asp_apps/viewEditSEC/secView.asp?SYSTEM_ID=11419
Vol. from own sources: Master meter error adjustment:	
Water imported:	
Water imported: master meter error adjustment:	
Water exported:	
Water exported: master meter error adjustment:	
Billed metered:	https://waterrights.utah.gov/asp_apps/viewEditSEC/secView.asp?SYSTEM_ID=11419
Billed unmetered:	
Unbilled metered:	
Unbilled unmetered:	

Audit Item	Comment
Unauthorized consumption:	
Customer metering inaccuracies:	
Systematic data handling errors:	
Length of mains:	As reported in Master Plan report.
Number of active AND inactive service connections:	3,299 active connections. The City reported that they have very few or no inactive connections.
Average length of customer service line:	
Average operating pressure:	Provided by the model.
Total annual cost of operating water system:	Provided by the City.
Customer retail unit cost (applied to Apparent Losses):	https://www.santaquin.org/government/fee_schedule
Variable production cost (applied to Real Losses):	Calculated from City's energy billing data. Calculated by Ridley.



AWWA Free Water Audit Software: Water Balance

WAS v5.0

American Water Works Association.
Copyright © 2014, All Rights Reserved.Water Audit Report for: **Santaquin**Reporting Year: **2019****1/2019 - 12/2019**Data Validity Score: **65**

Own Sources (Adjusted for known errors) 1,945.940	Water Exported 0.000	Billed Water Exported				
	Water Supplied 1,945.940	Authorized Consumption 1,484.330	Billed Authorized Consumption 1,460.006	Billed Metered Consumption (water exported is removed) 1,460.006	Revenue Water 1,460.006	
				Billed Unmetered Consumption 0.000		
			Unbilled Authorized Consumption 24.324	Unbilled Metered Consumption 0.000	Non-Revenue Water (NRW)	
				Unbilled Unmetered Consumption 24.324		
		Water Losses 461.610	Apparent Losses 8.515	Unauthorized Consumption 4.865	485.934	
				Customer Metering Inaccuracies 0.000		
				Systematic Data Handling Errors 3.650		
		Water Imported 0.000		Real Losses 453.095	Leakage on Transmission and/or Distribution Mains Not broken down	
	Leakage and Overflows at Utility's Storage Tanks Not broken down					
Leakage on Service Connections Not broken down						



AWWA Free Water Audit Software: Dashboard

WAS v5.0

American Water Works Association.
Copyright © 2014, All Rights Reserved.

The graphic below is a visual representation of the Water Balance with bar heights proportional to the volume of the audit components

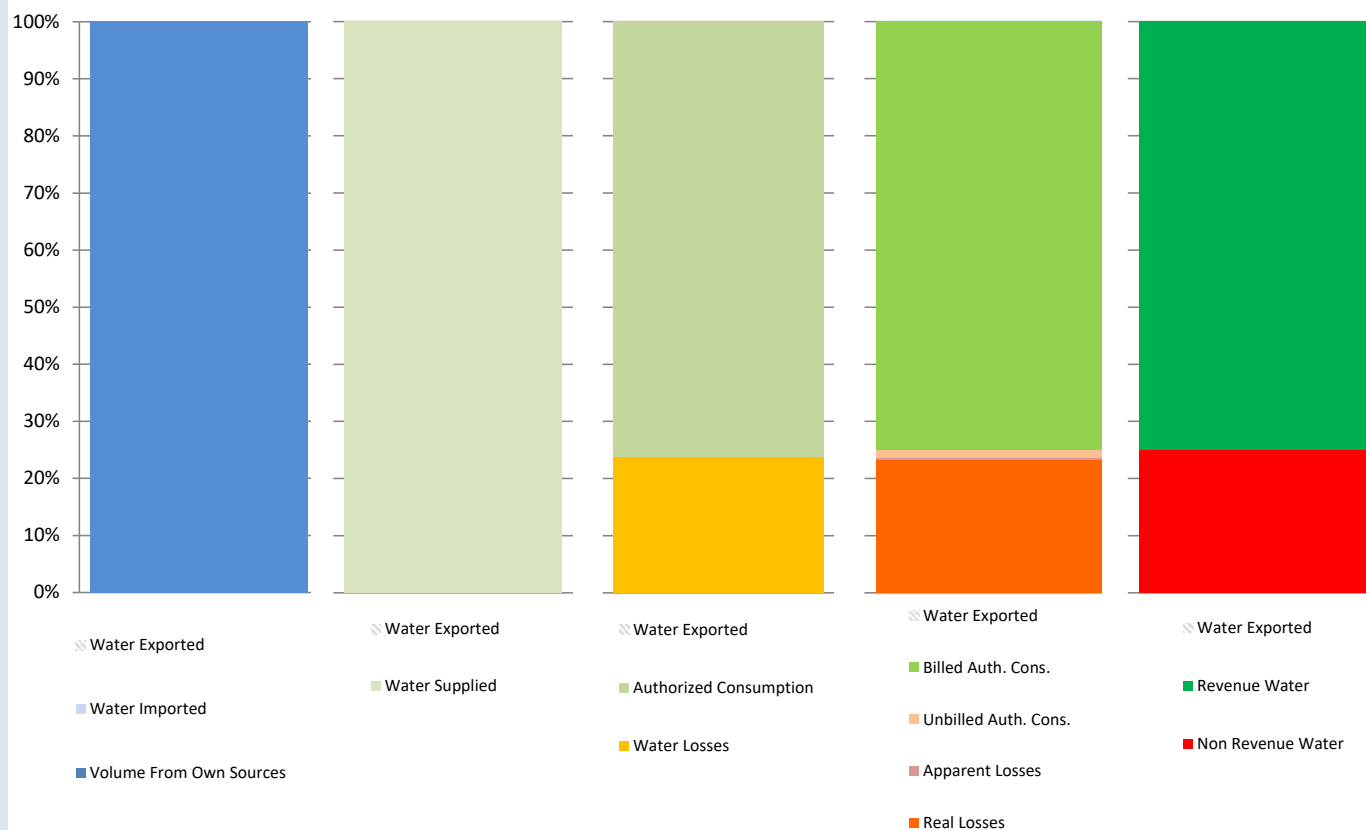
Water Audit Report for: **Santaquin**

Reporting Year: **2019** **1/2019 - 12/2019**

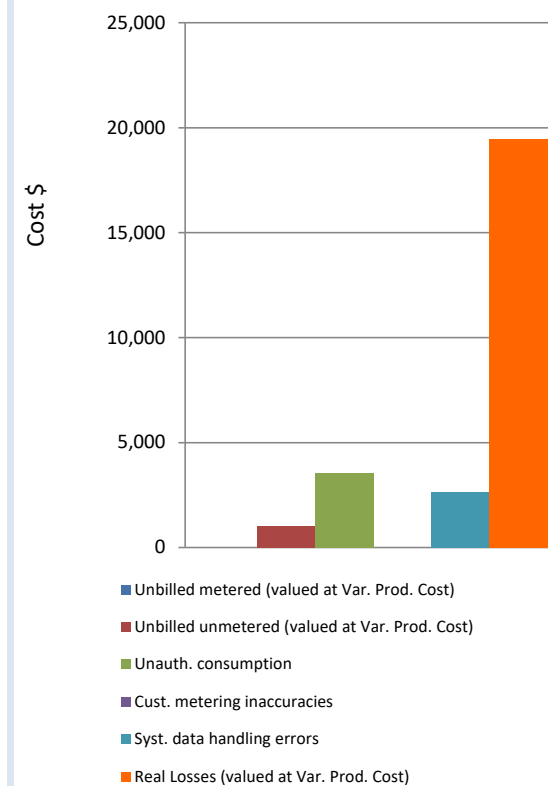
Data Validity Score: **65**

☐ Show me the VOLUME of Non-Revenue Water

☒ Show me the COST of Non-Revenue Water



Total Cost of NRW = \$26,726





AWWA Free Water Audit Software: Determining Water Loss Standing

WAS v5.0

American Water Works Association.
Copyright © 2014, All Rights Reserved.Water Audit Report for: **Santaquin**Reporting Year: **2019** **1/2019 - 12/2019**Data Validity Score: **65**

Water Loss Control Planning Guide

Functional Focus Area	Water Audit Data Validity Level / Score				
	Level I (0-25)	Level II (26-50)	Level III (51-70)	Level IV (71-90)	Level V (91-100)
Audit Data Collection	Launch auditing and loss control team; address production metering deficiencies	Analyze business process for customer metering and billing functions and water supply operations. Identify data gaps.	Establish/revise policies and procedures for data collection	Refine data collection practices and establish as routine business process	Annual water audit is a reliable gauge of year-to-year water efficiency standing
Short-term loss control	Research information on leak detection programs. Begin flowcharting analysis of customer billing system	Conduct loss assessment investigations on a sample portion of the system: customer meter testing, leak survey, unauthorized consumption, etc.	Establish ongoing mechanisms for customer meter accuracy testing, active leakage control and infrastructure monitoring	Refine, enhance or expand ongoing programs based upon economic justification	Stay abreast of improvements in metering, meter reading, billing, leakage management and infrastructure rehabilitation
Long-term loss control		Begin to assess long-term needs requiring large expenditure: customer meter replacement, water main replacement program, new customer billing system or Automatic Meter Reading (AMR) system.	Begin to assemble economic business case for long-term needs based upon improved data becoming available through the water audit process.	Conduct detailed planning, budgeting and launch of comprehensive improvements for metering, billing or infrastructure management	Continue incremental improvements in short-term and long-term loss control interventions
Target-setting			Establish long-term apparent and real loss reduction goals (+10 year horizon)	Establish mid-range (5 year horizon) apparent and real loss reduction goals	Evaluate and refine loss control goals on a yearly basis
Benchmarking			Preliminary Comparisons - can begin to rely upon the Infrastructure Leakage Index (ILI) for performance comparisons for real losses (see below table)	Performance Benchmarking - ILI is meaningful in comparing real loss standing	Identify Best Practices/ Best in class - the ILI is very reliable as a real loss performance indicator for best in class service
For validity scores of 50 or below, the shaded blocks should not be focus areas until better data validity is achieved.					

Once data have been entered into the Reporting Worksheet, the performance indicators are automatically calculated. How does a water utility operator know how well his or her system is performing? The AWWA Water Loss Control Committee provided the following table to assist water utilities in gauging an approximate Infrastructure Leakage Index (ILI) that is appropriate for their water system and local conditions. The lower the amount of leakage and real losses that exist in the system, then the lower the ILI value will be.

Note: this table offers an approximate guideline for leakage reduction target-setting. The best means of setting such targets include performing an economic assessment of various loss control methods. However, this table is useful if such an assessment is not possible.

General Guidelines for Setting a Target ILI
(without doing a full economic analysis of leakage control options)

Target ILI Range	Financial Considerations	Operational Considerations	Water Resources Considerations
1.0 - 3.0	Water resources are costly to develop or purchase; ability to increase revenues via water rates is greatly limited because of regulation or low ratepayer affordability.	Operating with system leakage above this level would require expansion of existing infrastructure and/or additional water resources to meet the demand.	Available resources are greatly limited and are very difficult and/or environmentally unsound to develop.
>3.0 -5.0	Water resources can be developed or purchased at reasonable expense; periodic water rate increases can be feasibly imposed and are tolerated by the customer population.	Existing water supply infrastructure capability is sufficient to meet long-term demand as long as reasonable leakage management controls are in place.	Water resources are believed to be sufficient to meet long-term needs, but demand management interventions (leakage management, water conservation) are included in the long-term
>5.0 - 8.0	Cost to purchase or obtain/treat water is low, as are rates charged to customers.	Superior reliability, capacity and integrity of the water supply infrastructure make it relatively immune to supply shortages.	Water resources are plentiful, reliable, and easily extracted.
Greater than 8.0	Although operational and financial considerations may allow a long-term ILI greater than 8.0, such a level of leakage is not an effective utilization of water as a resource. Setting a target level greater than 8.0 - other than as an incremental goal to a smaller long-term target - is discouraged.		
Less than 1.0	If the calculated Infrastructure Leakage Index (ILI) value for your system is 1.0 or less, two possibilities exist. a) you are maintaining your leakage at low levels in a class with the top worldwide performers in leakage control. b) A portion of your data may be flawed, causing your losses to be greatly understated. This is likely if you calculate a low ILI value but do not employ extensive leakage control practices in your operations. In such cases it is beneficial to validate the data by performing field measurements to confirm the accuracy of production and customer meters, or to identify any other potential sources of error in the data.		

APPENDIX D

Evaluation of Wastewater Reuse

Evaluation of Wastewater Reuse Flow Data

Influent and Effluent flow measurements from the Santaquin Water Reclamation Facility (WRF) were analyzed for year 2019 to determine the difference between the amount of wastewater treated and the amount used in the PI system. Key attributes of this data are summarized in Table 1.

Table 1: 2019 Water Reuse Data

Parameter	Quantity
Annual WRF influent (ac-ft)	711.39
Annual WRF effluent (ac-ft)	692.01
Annual Type 1 use (ac-ft)	490.26
Difference between influent and use (ac-ft)	221.13
Difference between influent and use (%)	31%

The wastewater reuse pump station has a capacity of 800 gpm and operates for approximately 165 days per year. Operating at this capacity, the maximum annual capacity of the pump station is about 583 ac-ft/yr.

Growth projections consistent with those in this master plan were used to identify which year will require an upgrade of the reuse pump station. A summary table of near-term growth is shown in Table 2.

Table 2: WRF Influent Projections

Year	Projected growth rate	Historic or Projected Influent (ac-ft/yr)	Historic or Projected Use (ac-ft/yr)	Pump Station Capacity	Surplus (+) or Deficit (-)
2019	3.5%	711.39	490	583	+93
2020	3.5%	733	505	583	+78
2021	3.5%	755	520	583	+63
2022	3.5%	777	536	583	+47
2023	3.5%	801	552	583	+31
2024	3.5%	825	568	583	+15
2025	3.5%	849	585	583	-2

As demonstrated in Table 2, capacity in the reuse pump station is exhausted after year 2024. By using the second pump to provide additional capacity, the City would be able to extend this capacity for another few years as needed. Accordingly, **it is recommended that the reuse pump stations be modified to add capacity between years 2025 and 2030**, depending on the needs and priorities of the City.

APPENDIX E

Flushing Analysis

MEMORANDUM

DATE: September 16, 2020
TO: Norm Beagley, P.E.
Santaquin City Engineering
1215 North Center Street
Santaquin, Utah 84655

FROM: Steven C. Jones, P.E.
Hansen, Allen & Luce, Inc. (HAL)
859 West So. Jordan Pkwy – Suite 200
South Jordan, Utah 84095

SUBJECT: PI System Flushing Analysis
PROJECT NO.: 415.03.100

DRAFT

PURPOSE

The purpose of this analysis is to provide recommendations to Santaquin City to help improve operations and manage sediment within the pipes of the City's pressurized irrigation (PI) system.

BACKGROUND

Santaquin City chiefly supplies Pressure Zone 9N through two PRVs; one located at approximately 400 N and 100 W, and the other located at approximately 400 N and 400 W. Each PRV is equipped with a strainer to prevent sediment and large obstructions from interfering with their operation. The Public Works operations crew typically cleans these strainers out once per week during the summer irrigation season. Failure to do so can result in impaired flows and pressures to Zone 9N, and interference with the operation of the PRVs. Although available data is limited, pressure data collected in Summer 2020 suggests that cleaning even once per week may not be frequent enough to maintain adequate service pressures during periods of high demand. Other PRVs within the PI system can also experience problems due to sedimentation, but problems typically occur on a much smaller scale, and those PRVs are cleaned less frequently.

Cleaning the PRV strainers is labor-intensive and time-consuming, so the City commissioned this study to explore ways to more effectively manage sediment within the system and improve operations.

AVAILABLE DATA AND ANALYSIS

The sediment that accumulates at the City's PRVs tends to be flat and thin. Its appearance suggests that it accumulates along a smooth surface and is later dislodged in small flakes. It is greenish brown in color and hard enough to break after bending slightly.

In July 2020, the Public Works crew performed a burn test on the sediment, and determined that it is almost entirely inorganic. HAL investigated the chemical properties of the sediment and discovered that it has properties consistent with calcium carbonate (water hardness). Considering Santaquin's water sources, this is not surprising.

Over the years, the City has observed two time periods during which the sedimentation problem is at its worst:

1. Shortly after the PI system is charged in the spring
2. Shortly after demands reach their summer peak

Jason Callaway reported to HAL in late August 2020 that the sedimentation problem at the PRVs appeared to have diminished, compared to earlier in the summer.

Several conclusions can be drawn from the above observations:

1. The sediment is not organic in origin
2. The sediment forms within the system pipes
3. Draining the PI system in the fall most likely causes the sediment to dry out and flake
4. Refilling the PI system in the spring most likely causes substantial amounts of the sediment to come loose from the walls of system pipes
5. High pipe velocities tend to mobilize the sediment and bring it to the PRVs
6. The sediment appears to form each year in a finite quantity (as evidenced by the fact that problems diminish in the late summer)

The following are still unknown:

1. The spatial extent of the area(s) where the sediment forms and dislodges
2. The source(s) of water which contribute(s) most to the formation of sediment

EVALUATION OF ALTERNATIVES

Table 1 shows some actions the City could take that could help manage sedimentation in the PI system, as well as their respective advantages and disadvantages.

Table 1
Potential Actions to Address Sedimentation

Actions	Advantages	Disadvantages
Treat source water to remove hardness	Treats root cause of sedimentation	Expensive to implement and maintain, would not address other types of sediment
Flush the system to remove sediment	Relatively easy to implement	Uses a significant amount of water, strainers still require some cleaning
Install self-cleaning filters upstream of the PRVs	Reduces maintenance time, improves PRV operations	Expensive to implement, site conditions may impose constraints

Treating source water is not recommended, as it would be more difficult and expensive to implement and maintain than simply cleaning the strainers each week. Self-cleaning filters would be an effective solution, and it is recommended that the City consider this as an option for future PRV stations, but cost and site constraints would likely make this option unfeasible for the existing PRVs. For those reasons, flushing is the recommended solution for existing PRVs.

FLUSHING - CONSIDERATIONS

The following should be carefully considered before implementing any flushing program:

- **Flooding** – Discharging large amounts of water to the street may flood private property. This concern cannot be ignored in Santaquin, where large areas of town do not have curb, gutter, and storm drainage pipes. Prior to constructing a flush station, it is recommended that Santaquin City test the drainage of the area in consideration using drinking water hydrants.
- **Traffic Impacts** – Flushing can interfere with traffic.
- **Water Hammer** – Crews that perform flushing must open and close flush valves with proper speed, to avoid water hammer.
- **Public Perception** – Without proper education, the public may perceive flushing as wasteful or irresponsible.
- **Service Pressures** – Flushing reduces customer service pressures. Flushing should be scheduled to minimize this impact.
- **Source and Storage Capacity** – The system must have enough source and storage capacity to supply water for flushing.
- **Effectiveness** – Flushing is a tool that is often used along with other methods to achieve a complete result. Flushing will most likely not eliminate the need for Santaquin to clean the strainers upstream of the PRVs. However, it will hopefully reduce the required frequency of cleaning.

PROPOSED LOCATIONS FOR FLUSHING STATIONS

Flushing stations are recommended to be located on the pipes directly upstream of the Zone 9N PRVs. Flushing through PRVs is not recommended, as it may cause their components to wear out faster. Prior to installing a flushing assembly, the City should ensure adequate drainage is available by testing with a fire hydrant.

These two flush stations will allow the City to flush a sizable portion of northern Zone 10 at a relatively low expense. If the City wishes to cover a wider spatial extent with the flushing program, additional flush stations will need to be installed.

DESIGN CRITERIA

The City's hydraulic models indicate that velocities through the Zone 9N PRVs can reach nearly 5 ft/sec during times of peak demand. The fact that sediment regularly accumulates at these PRVs is evidence that velocities of 5 ft/sec are sufficient to mobilize the sediment. For that reason, flushing will be designed with the goal of achieving pipe velocities between 5 ft/sec and 10 ft/sec.

There will be some trial and error involved in determining the frequency of flushing required, and the volume of water that should be flushed each time. As a general rule, many flushing programs attempt to turn the volume of target pipelines over two or three times per flush. Santaquin may need to adjust flushing times upward or downward from this benchmark to achieve desired results. Drainage capacity may limit the amount of water that can be discharged at one time.

FLUSHING STATIONS

A standard fire hydrant assembly is the recommended form of the flush station, as it will deliver flows up to and beyond those required to achieve the target velocity. The crew can easily attach a hose to the assembly to direct water to ideal drainage locations. The hydrant should be painted black to indicate to firefighters that it should not be used for firefighting. The estimated cost for installation is \$8,000 each, or \$16,000 for the two recommended flushing stations.

IMPLEMENTATION OF THE FLUSHING PROGRAM

The following are recommended when flushing:

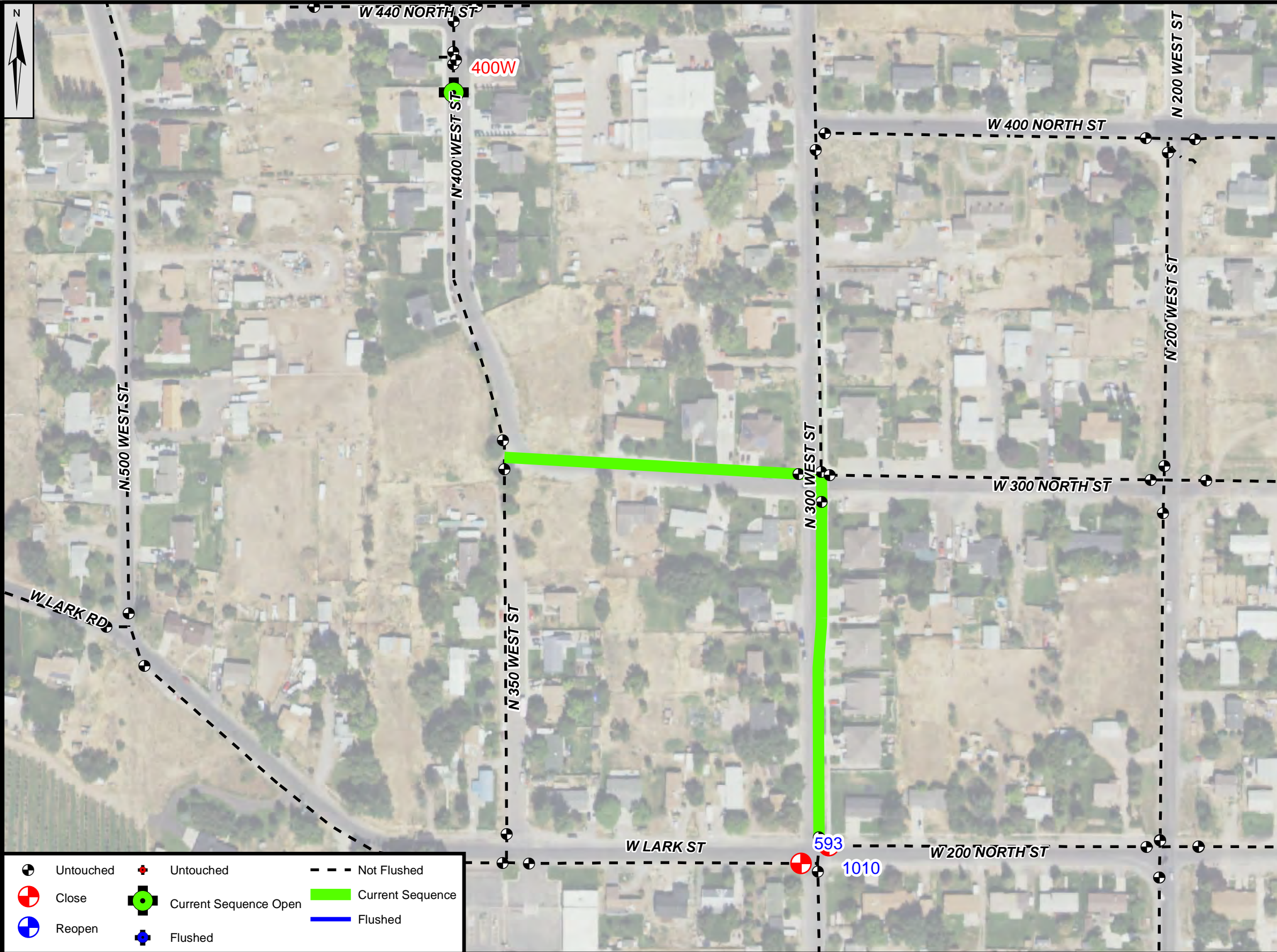
- Flushing should be avoided after recent rain or during any other times when drainage may be impaired
- Flushing should occur between the hours of 10:00 AM and 6:00 PM to take advantage of higher pressures and avoid disrupting service to customers
- The 400 N 200 W booster station from Summit Creek Irrigation Company should be turned off throughout the duration of flushing
- Crew members should carefully track which valves are open and which valves are closed, and ensure that all valves are reopened when flushing is complete
- Crew members should take detailed notes throughout flushing and take note of anything that appears effective, ineffective, or unexpected.

PROPOSED FLUSHING PLAN

The proposed flushing plan for Santaquin City is composed of seven sequences and is explained on the attached seven sheets. It was designed with an attempt to balance cost and effort with effectiveness in scouring pipes in the general area of the Zone 9N PRVs. The City should evaluate the proposed flushing plan and consider the following questions:

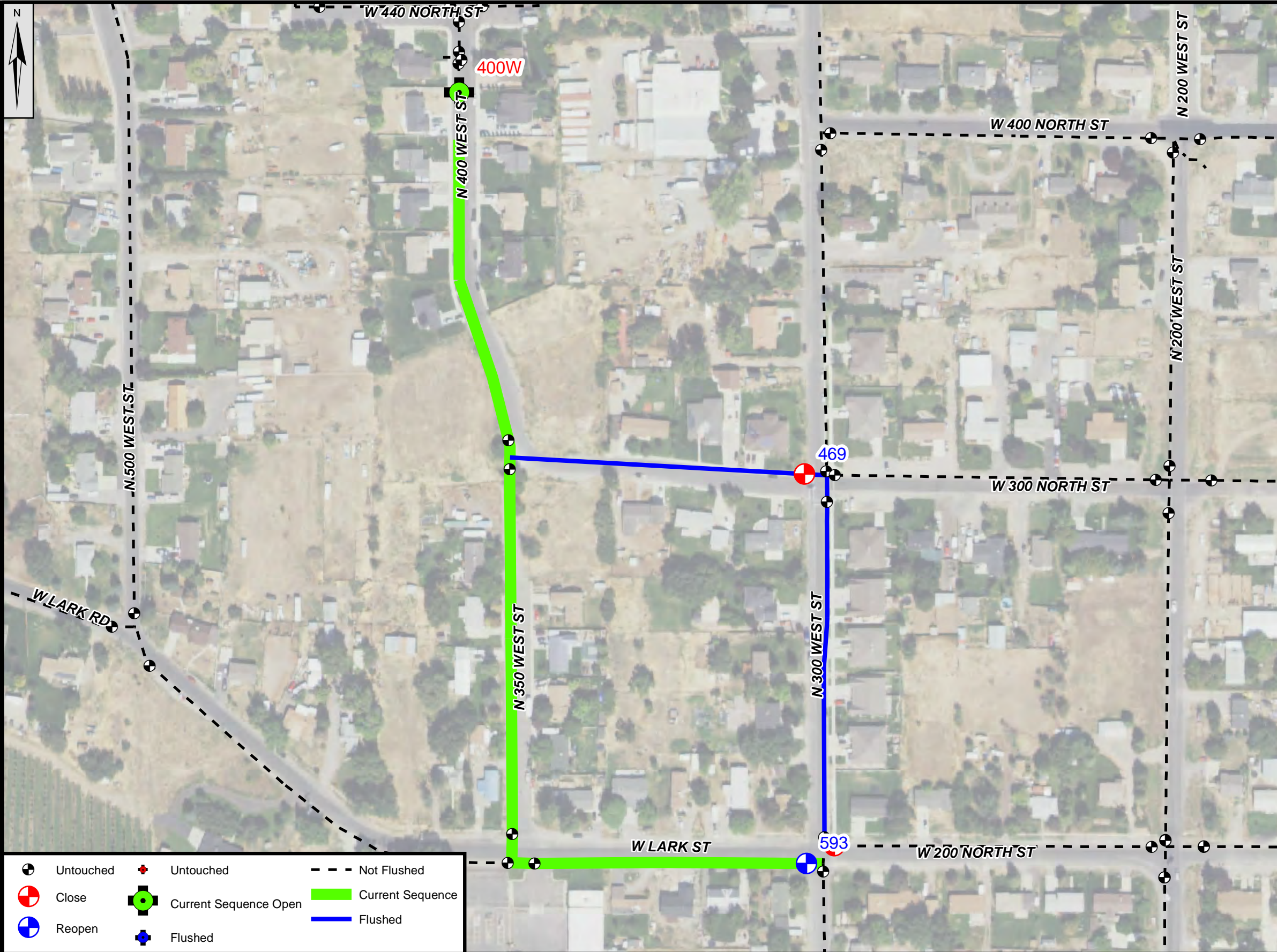
- Is adequate drainage available in the area of the proposed flush stations? If not, where can they be located?
- Does the proposed flushing program cover a wide enough spatial extent?
- Would it be beneficial to install additional flush stations and flush additional areas?

The proposed flushing plan can be modified to meet the needs of the City.

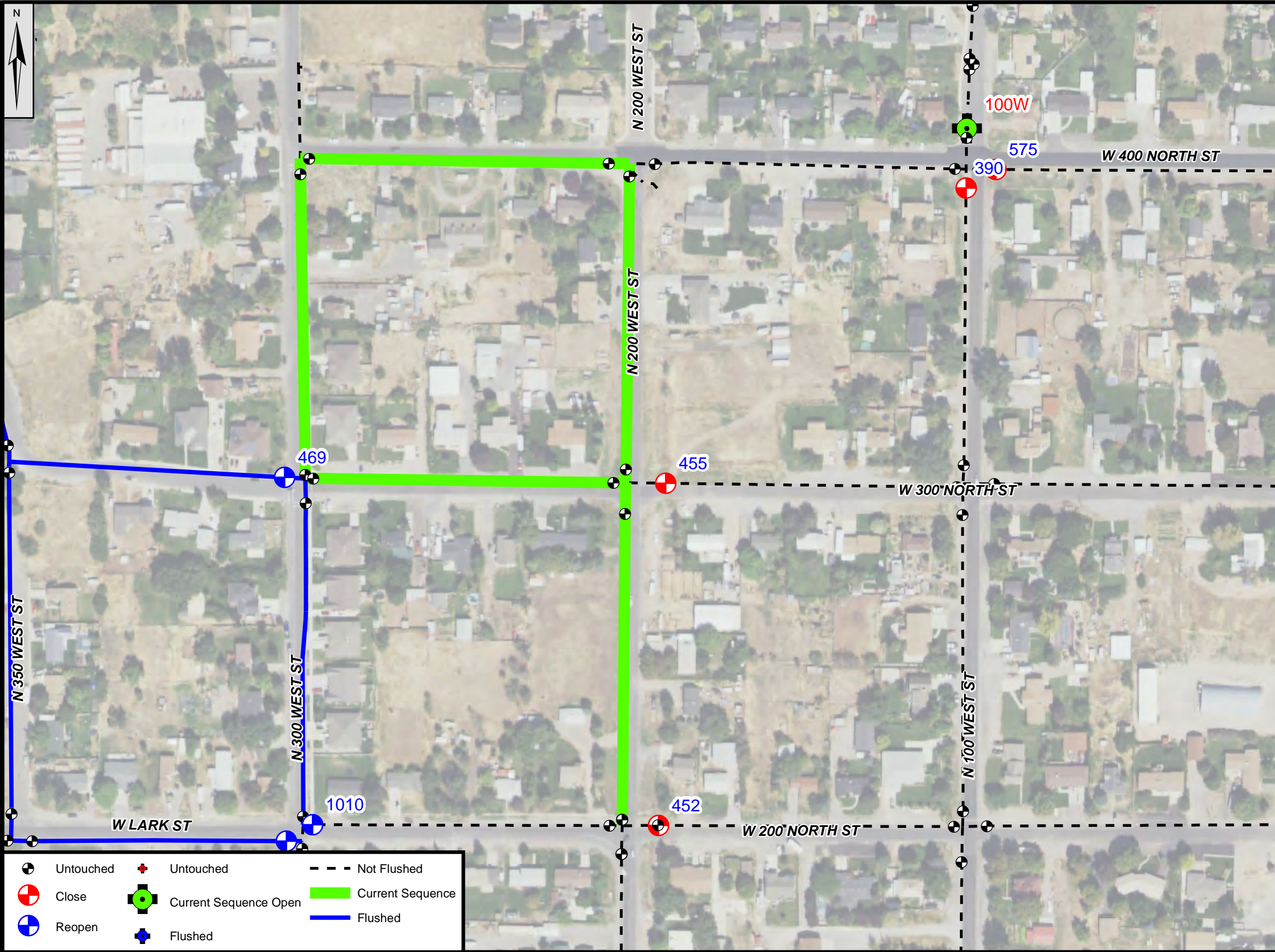


GENERAL		
Pipe Length (ft)	1147	
Volume Used (gal)	1499	
Volume Turnovers	2.0	
Flushing Duration (minutes)	6	
Date		
Start Time		
Stop Time		
HYDRAULICS	PREDICTED	FIELD
Flush Hydrant psi (pre)	129	
Residual Hydrant psi (begin)	78	
Residual Hydrant psi (end)	78	
Flush Hydrant psi (post)	129	
Flow Rate (gpm)	500	
Average Flush Velocity (fps)	7.1	
WATER QUALITY	INITIAL	FINAL
Turbidity		
Disinfection Residual		
pH		
Iron		
Manganese		
Odor		
HPC		
Color		
Other		
OPERATION		
VALVES TO OPEN	FIELD NOTES	
VALVES TO CLOSE	COLOR	
593 (593 in)		
1010 (1010 in)		
HYDRANTS TO OPEN		
400W (1.5 in)		

Flush at 500 gpm max

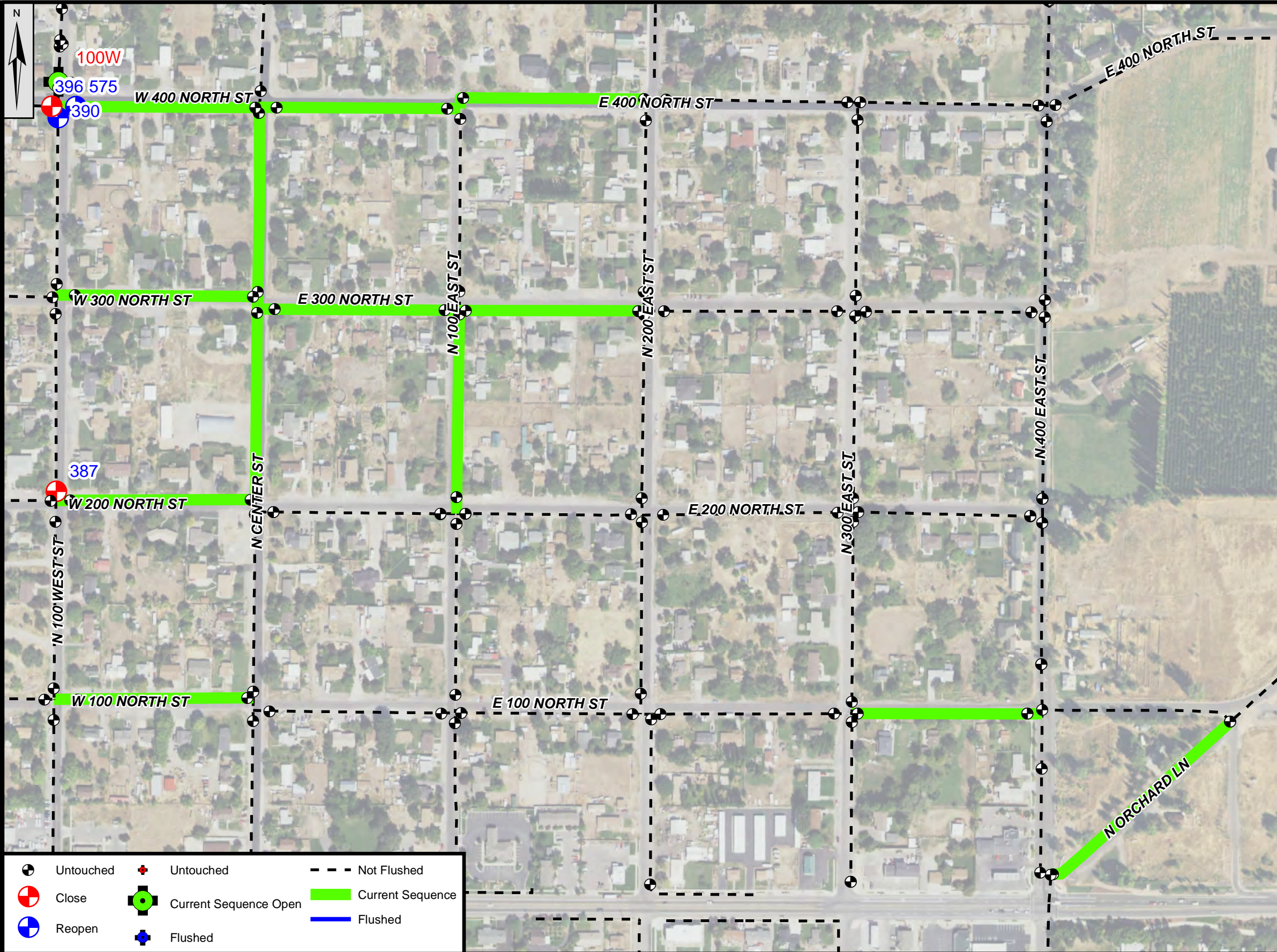


GENERAL		
Pipe Length (ft)	1817	
Volume Used (gal)	9493	
Volume Turnovers	2.0	
Flushing Duration (minutes)	6	
Date		
Start Time		
Stop Time		
HYDRAULICS	PREDICTED	FIELD
Flush Hydrant psi (pre)	129	
Residual Hydrant psi (begin)	89	
Residual Hydrant psi (end)	89	
Flush Hydrant psi (post)	129	
Flow Rate (gpm)	1590	
Average Flush Velocity (fps)	10.2	
WATER QUALITY	INITIAL	FINAL
Turbidity		
Disinfection Residual		
pH		
Iron		
Mangenese		
Odor		
HPC		
Color		
Other		
OPERATION		
VALVES TO OPEN	FIELD NOTES	
593 (593 in)		
VALVES TO CLOSE		
469 (469 in)	COLOR	
HYDRANTS TO OPEN		
400W (2.5 in)		
Flush at 1500 gpm max		



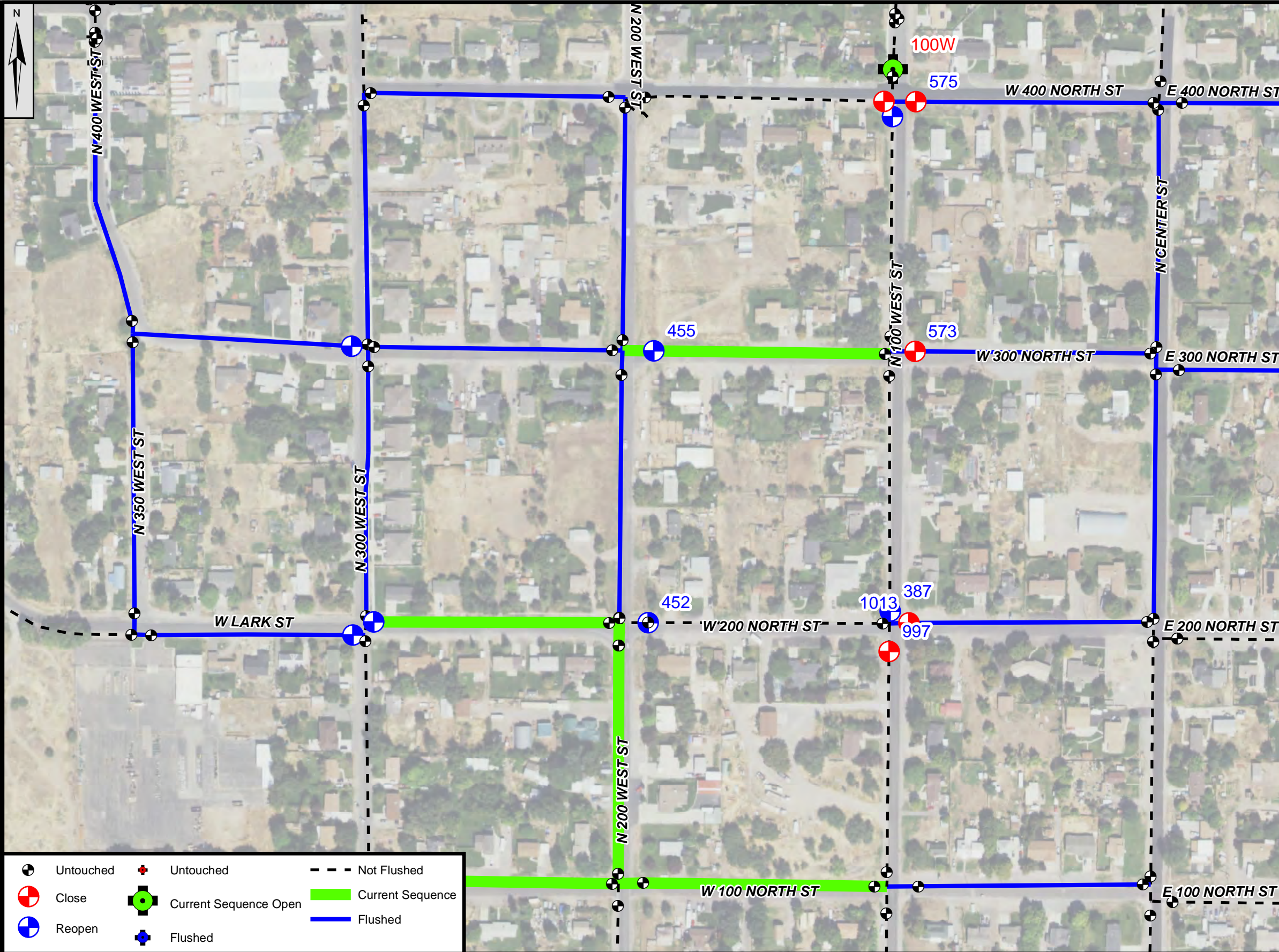
GENERAL		
Pipe Length (ft)	2913	
Volume Used (gal)	3804	
Volume Turnovers	2.0	
Flushing Duration (minutes)	12	
Date		
Start Time		
Stop Time		
HYDRAULICS	PREDICTED	FIELD
Flush Hydrant psi (pre)	125	
Residual Hydrant psi (begin)	62	
Residual Hydrant psi (end)	62	
Flush Hydrant psi (post)	125	
Flow Rate (gpm)	900	
Average Flush Velocity (fps)	8.2	
WATER QUALITY	INITIAL	FINAL
Turbidity		
Disinfection Residual		
pH		
Iron		
Mangenese		
Odor		
HPC		
Color		
Other		
OPERATION		
VALVES TO OPEN	FIELD NOTES	
469 (469 in)		
1010 (1010 in)		
VALVES TO CLOSE		
452 (452 in)		
455 (455 in)		
390 (390 in)	COLOR	
575 (575 in)		
HYDRANTS TO OPEN		
100W (2.0 in)		

Flush at 900 gpm max

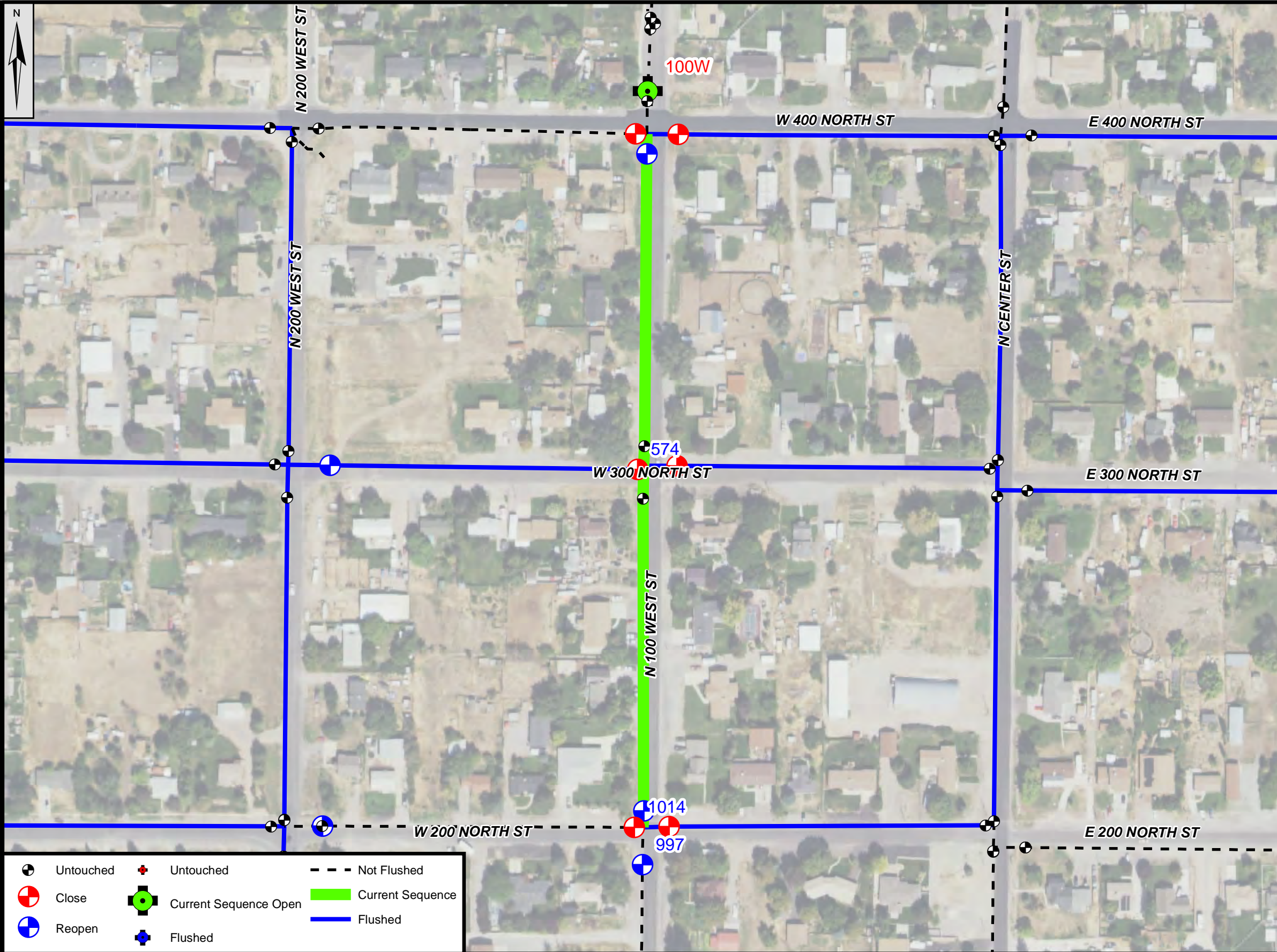


GENERAL		
Pipe Length (ft)	7764	
Volume Used (gal)	11114	
Volume Turnovers	2.0	
Flushing Duration (minutes)	34	
Date		
Start Time		
Stop Time		
HYDRAULICS	PREDICTED	FIELD
Flush Hydrant psi (pre)	125	
Residual Hydrant psi (begin)	45	
Residual Hydrant psi (end)	45	
Flush Hydrant psi (post)	125	
Flow Rate (gpm)	1100	
Average Flush Velocity (fps)	7.6	
WATER QUALITY	INITIAL	FINAL
Turbidity		
Disinfection Residual		
pH		
Iron		
Manganese		
Odor		
HPC		
Color		
Other		
OPERATION		
VALVES TO OPEN	FIELD NOTES	
575 (575 in)		
390 (390 in)		
VALVES TO CLOSE		
396 (396 in)		
387 (387 in)		
HYDRANTS TO OPEN		
100W (2.5 in)		

Flush at 1100 gpm max



GENERAL		
Pipe Length (ft)	2923	
Volume Used (gal)	3816	
Volume Turnovers	2.0	
Flushing Duration (minutes)	13	
Date		
Start Time		
Stop Time		
HYDRAULICS	PREDICTED	FIELD
Flush Hydrant psi (pre)	125	
Residual Hydrant psi (begin)	76	
Residual Hydrant psi (end)	76	
Flush Hydrant psi (post)	125	
Flow Rate (gpm)	1100	
Average Flush Velocity (fps)	7.8	
WATER QUALITY	INITIAL	FINAL
Turbidity		
Disinfection Residual		
pH		
Iron		
Mangenesese		
Odor		
HPC		
Color		
Other		
OPERATION		
VALVES TO OPEN	FIELD NOTES	
387 (387 in)		
452 (452 in)		
455 (455 in)		
VALVES TO CLOSE		
997 (997 in)		
1013 (1013 in)		
573 (573 in)	COLOR	
575 (575 in)		
HYDRANTS TO OPEN		
100W (2.5 in)		
Flush at 1100 gpm max		



Untouched

Close

Reopen

Untouched

Current Sequence Open

Flushed

Not Flushed

Current Sequence

Flushed

GENERAL		
Pipe Length (ft)	1246	
Volume Used (gal)	14648	
Volume Turnovers	2.0	
Flushing Duration (minutes)	8	
Date		
Start Time		
Stop Time		
HYDRAULICS	PREDICTED	FIELD
Flush Hydrant psi (pre)	125	
Residual Hydrant psi (begin)	119	
Residual Hydrant psi (end)	119	
Flush Hydrant psi (post)	125	
Flow Rate (gpm)	1800	
Average Flush Velocity (fps)	5.3	
WATER QUALITY	INITIAL	FINAL
Turbidity		
Disinfection Residual		
pH		
Iron		
Mangenese		
Odor		
HPC		
Color		
Other		
OPERATION		
VALVES TO OPEN	FIELD NOTES	
997 (997 in)		
VALVES TO CLOSE		
1014 (1014 in)		
574 (574 in)		
	COLOR	
HYDRANTS TO OPEN		
100W (2.5 in)		

Flush at 1800 gpm max

APPENDIX F

EPANET 2.0 Hydraulic Models and
Model Calibration Data
(see disk)

APPENDIX G

Cost Estimate Calculations

Santaquin City Capital Facility Plan
Pressurized Irrigation Water Recommended Improvements
Preliminary Engineers Cost Estimates

	Item	Unit	Unit Price	Quantity	Total Price
PI 1.	Install Parallel Z10W Backflow Preventer				
	Install Backflow Preventer	LS	\$ 50,000	1	\$ 50,000
	Piping to keep box out of street	LS	\$ 20,000	1	\$ 20,000
	Engineering & Admin. (10%)				\$ 7,000
	Contingency (10%)				\$ 7,000
	Total to Install Parallel Z10W Backflow Preventer				\$ 84,000
PI 2.	Zone 11W PI infrastructure				
	10 ac-ft PI tank	Gal	\$ 0.65	3258510	\$ 2,118,032
	Zone 11W Pump Station	LS	\$ 750,000	1	\$ 750,000
	16" Water Line	LF	\$ 159	7900	\$ 1,256,100
	Engineering & Admin. (10%)				\$ 412,413
	Contingency (10%)				\$ 412,413
	Total to Zone 11W PI infrastructure				\$ 4,949,000
PI 3.	Zone 10 ULS infrastructure				
	Connect to ULS pipeline	LS	\$ 25,000	1	\$ 25,000
	24" Water line	LF	\$ 229	5700	\$ 1,305,300
	Engineering & Admin. (10%)				\$ 133,030
	Contingency (10%)				\$ 133,030
	Total to Zone 10 ULS infrastructure				\$ 1,596,000
PI 4.	Connect Zone 11W to ULS				
	16" Water Line	LF	\$ 159	3600	\$ 572,400
	Engineering & Admin. (10%)				\$ 57,240
	Contingency (10%)				\$ 57,240
	Total to Connect Zone 11W to ULS				\$ 687,000
PI 5.	Zone 11E Transmission				
	12" Water line	LF	\$ 145	300	\$ 43,500
	Upsize water line to 12"	LF	\$ 47	2300	\$ 108,100
	Engineering & Admin. (10%)				\$ 15,160
	Contingency (10%)				\$ 15,160
	Total to Zone 11E Transmission				\$ 182,000
PI 6.	North Reuse Expansion				
	Upgrade Pump Station	LS	\$ 400,000	1	\$ 400,000
	12" Water Line	LF	\$ 145	5800	\$ 841,000
	Engineering & Admin. (10%)				\$ 124,100
	Contingency (10%)				\$ 124,100
	Total to North Reuse Expansion				\$ 1,489,000
PI 7.	Zone 11E Transmission				
	Upsize water line to 10"	LF	\$ 38	3800	\$ 144,400
	Upsize water line to 12"	LF	\$ 47	1100	\$ 51,700
	Engineering & Admin. (10%)				\$ 19,610
	Contingency (10%)				\$ 19,610
	Total to Zone 11E Transmission				\$ 235,000
PI 8.	Zone 12E Source and Transmission				
	Zone 12E VFD Booster Station	LS	\$ 750,000	1	\$ 750,000
	16-inch Water line	LF	\$ 159	600	\$ 95,400
	Upsize water line to 10"	LF	\$ 38	2200	\$ 83,600
	Upsize water line to 12"	LF	\$ 47	1400	\$ 65,800
	Engineering & Admin. (10%)				\$ 99,480
	Contingency (10%)				\$ 99,480
	Total to Zone 12E Source and Transmission				\$ 1,194,000
PI 9.	Zone 10 Transmission				
	12-inch Water line	LF	\$ 145	2700	\$ 391,500
	Engineering & Admin. (10%)				\$ 39,150
	Contingency (10%)				\$ 39,150
	Total to Zone 10 Transmission				\$ 470,000
PI 10.	Zone 9N Transmission				

Santaquin City Capital Facility Plan
Pressurized Irrigation Water Recommended Improvements
Preliminary Engineers Cost Estimates

	Item	Unit	Unit Price	Quantity	Total Price
	Upsize water line to 8"	LF	\$ 21	1100	\$ 23,100
	Upsize water line to 12"	LF	\$ 47	5500	\$ 258,500
	Engineering & Admin. (10%)				\$ 28,160
	Contingency (10%)				\$ 28,160
	Total to Zone 9N Transmission				\$ 338,000
PI 11.	Western Zone 10 transmission				
	12" Water Line	LF	\$ 145	6300	\$ 913,500
	Engineering & Admin. (10%)				\$ 91,350
	Contingency (10%)				\$ 91,350
	Total to Western Zone 10 transmission				\$ 1,096,000
PI 12.	Zone 11W Transmission				
	Upsize water line to 10"	LF	\$ 38	1500	\$ 57,000
	Upsize water line to 12"	LF	\$ 47	800	\$ 37,600
	Upsize water line to 16"	LF	\$ 75	1700	\$ 127,500
	Engineering & Admin. (10%)				\$ 22,210
	Contingency (10%)				\$ 22,210
	Total to Zone 11W Transmission				\$ 267,000
PI 13.	Northwestern Zone 10 Transmission				
	Upsize water line to 8"	LF	\$ 21	1700	\$ 35,700
	8" Water Line	LF	\$ 109	700	\$ 76,300
	Engineering & Admin. (10%)				\$ 11,200
	Contingency (10%)				\$ 11,200
	Total to Northwestern Zone 10 Transmission				\$ 134,000
PI 14.	South Reuse Expansion				
	Booster Station	LS	\$ 750,000	1	\$ 750,000
	12" Water Line	LF	\$ 145	1300	\$ 188,500
	Engineering & Admin. (10%)				\$ 93,850
	Contingency (10%)				\$ 93,850
	Total to South Reuse Expansion				\$ 1,126,000
PI 15.	West Side Well				
	Drilling and development (500 gpm)	LS	\$ 384,000	1	\$ 384,000
	Equipment and well house	LF	\$ 200,000	1	\$ 200,000
	Engineering & Admin. (10%)				\$ 58,400
	Contingency (10%)				\$ 58,400
	Total to West Side Well				\$ 701,000
Total Costs					\$ 14,548,000

AVERAGE WATER PIPE COST PER FOOT

Diameter (in)	Diameter (ft)	Outside Diameter (ft)	Pipe Material & Installation (1)	Excavation	Imported Bedding Installed	Hauling Excess Native Mat'l	Trench Backfill Installed (3)	Trench Box per Day (2)	Average Daily Output	Trench Box Cost	Top Trench Width (ft)	Road Repair Width (ft)	Asphalt Cost	Service Lateral Cost	Fire Hydrant Cost	Valves & Fittings Cost	Pipeline Connection Costs	Conflicts (9)	Trench Dewatering (4)	Total Cost per Foot of Pipe	Adjusted Cost per foot	Cost Out of Street (3)	Diameter (in)
4	0.3	0.39	26.00	2.84	9.61	1.20	3.83	210.00	400	0.53	2.99	6.99	28.94	18.11	2.37	0.34	1.20	0.00	8.48	103	90	77	4
6	0.5	0.58	30.50	3.17	11.19	1.43	4.11	210.00	333	0.63	3.18	7.18	29.59	18.11	2.37	0.46	1.36	0.00	9.51	112	98	86	6
8	0.7	0.78	48.00	3.52	12.81	1.68	4.40	210.00	200	1.05	3.38	7.38	30.25	18.11	2.37	0.72	1.53	0.00	12.27	137	119	109	8
10	0.8	0.97	61.50	3.88	14.45	1.95	4.69	210.00	182	1.15	3.57	7.57	30.91	18.11	2.37	1.13	2.23	0.00	13.31	156	136	128	10
12	1.0	1.17	67.00	4.26	16.14	2.24	4.98	210.00	160	1.31	3.77	7.77	31.57	18.11	2.37	0.73	2.94	0.00	14.63	166	145	138	12
14	1.2	1.36	71.00	4.65	17.86	2.55	5.27	210.00	133	1.58	3.96	7.96	32.23	18.11	2.37	1.27	3.22	0.00	16.52	177	154	148	14
16	1.3	1.56	77.00	5.07	19.61	2.88	5.56	210.00	114	1.84	4.16	8.16	32.89	18.11	2.37	1.63	3.52	9.44	18.42	198	173	159	16
18	1.5	1.75	86.50	5.50	21.40	3.23	5.84	210.00	100	2.10	4.35	8.35	33.55	18.11	2.37	2.04	3.80	10.24	20.32	215	187	175	18
20	1.7	1.94	93.00	5.95	23.23	3.60	6.13	210.00	89	2.36	4.54	8.54	34.21	18.11	2.37	2.65	4.10	10.90	22.21	229	200	188	20
24	2.0	2.33	112.00	6.89	26.99	4.41	6.71	210.00	77	2.73	4.93	8.93	35.52	18.11	2.37	4.10	4.68	12.48	25.14	262	229	218	24

Reference: 2018 RS Means Heavy Construction Cost Data Updated by: JKN

\$ 20.85	/CY Native Trench backfill - sec. 31 23 23.16 (0200): Fill by borrow [sand, dead or bank x 1.21 O&P] w/o materials (27.94-18.6) and convert from loose to compacted volume. \$11.20/LCY * 1.39 LCY/ECY (see Note 5)
\$ 59.08	/CY Imported Select Fill - sec. 31 23 23.16 (0200), 31 23 23.20 (4266), 31 23 23.23 (8050): Sand, dead or bank w/ hauling and compaction. (\$33.50/LCY + \$5.10/LCY)*1.39 LCY/ECY + \$5.50/ECY (see Note 5)
\$ 6.10	/CY Excavation - sec. 31 23 16.13 (6372): 10-14 ft deep, 1 CY excavator, Trench Box.
\$ 30.49	/SY 4" Asphalt Pavement - sec. 32 11 23.23 (0390), 31 23 23.20 (4268), 32 12 16.13 (0120), 32 12 16.13 (0380): 9" Bank Run GravelBase Course (\$7.10/SY), 2" Binder (\$9.30/SY), 2" Wear (\$10.40/SY [4"=\$19.80/SY]) and Hauling [Item 4268] (\$7.35/LCY * 1.39LCY/ECY * 0.361CY/SY) (see Note 5)
\$ 2.63	/LF 4" Asphalt cutting - sec. 02 41 19.25 (0015, 0020): Saw cutting asphalt up to 3" deep (\$1.68/LF), each additional inch of depth (\$0.95/LF)
\$ 1,811.32	/EA Service Lateral Connection (see Note 7)
\$ 4,734.51	/EA Fire hydrant assembly including excavation and backfill (see Note 8)
\$ 7.16	/CY Hauling - sec. 31 23 23.20 (4262): 20 CY dump truck, 6 mile round trip and conversion from loose to compacted volume. \$4.13/LCY * 1.39 LCY/ECY (see Note 5)
\$ 210.00	/day Trench Box - sec. 31 52 16.10 (4500): 7' deep, 16' x 8'
\$ 63.32	/CY Stabilization Gravel - sec. 31 23 23.16 (0050), 31 23 23.20 (4266), 31 23 23.23 (8050): Bank Run Gravel (\$36.50/LCY * 1.39 LCY/ECY) plus compaction (\$5.50/ECY) and hauling (\$5.10/LCY * 1.39 LCY/ECY) (see Note 5)
\$ 1,152.00	/day Dewatering - sec. 31 23 19.20 (1000, 1020): 4" diaphragm pump, 8 hrs attended (\$1,025/day). Second pump (\$127/day)

- NOTES:
- (1) Assumes: class 50, 18' lengths, tyton push-on joint for DIP (33 11 13.15 3000-3180); Pressure Pipe class 150, SDR 18, AWWA C900 for PVC <14" & AWWA C905, PR 100, DR 25 for 14" and larger (33 11 13.25 4520-4550 3030-3200); butt fusion joints SDR 21, 40' lengths for HDPE (). DIP and HDPE costs only go up to 24". PVC costs only go up to 48". All costs for pipe larger than 48" are Prestressed Concrete pipe (PCCP), 150 psi, 24' length (Pg 315).
- (2) 7' deep trench box (16' x 8') - on page 263
- (3) Backfill Material & Installation assumes in street. For out of street unit costs, the backfill material cost has been added in place of base course and asphalt.
- (4) Dewatering assumes 1' stabilization gravel at the bottom of the trench plus dewatering pumps
- (5) Conversion from loose to compacted volumes assumes 125 PCF for compacted density and 90 PCF for loose density. Or (125 PCF/ECY)/(90 PCF/LCY) = 1.39 LCY/ECY
- (6) Conversion from cubic yards to square yards for hauling of asphalt paving assumed a total thickness of 13". 3 ft x 3 ft x (13 in)/(12 in/ft) = 0.361 CY/SY
- (7) Service Lateral costs are based on Beaver Dam short and long service connections average (\$1,660.98/connection), with 45.40 for curb replacement, 40.20 for sidewalk replacement, and 158.19 for additional asphalt all added to the short service connection. Used historical cost index to update to current dollars.
- (8) Fire Hydrant assembly costs are based on Beaver Dam Water Projects plus 45.40 for curb replacement and 158.19 for additional asphalt (\$4341.55 per FH). Used historical cost index to update to current dollars.
- (9) Conflicts amounted to be 2% of the cost on the Springville 400 South Pipeline project. Use 5% of total cost per ft.
- (10) Joint Restraint has NOT been included in this spreadsheet.

Abbreviations:		Utah City Cost Indices	
VLF	vertical lineal foot	SLC	88.5
PCF	pounds per cubic foot	Ogden	85.8
LCY	loose cubic yard	Logan	87
ECY	embankment cubic yard	Price	85
		Provo	87.2

ORDINANCE NO. 01-03-2021

AN ORDINANCE GRANTING A FRANCHISE TO QWEST COMMUNICATIONS D/B/A CENTURYLINK QC ON BEHALF OF ITSELF AND ITS OPERATING AFFILIATES ("CENTURYLINK") TO OPERATE AND MAINTAIN A TELECOMMUNICATIONS SYSTEM ("THE SYSTEM") IN THE CITY OF SANTAQUIN, UTAH ("THE CITY").

WHEREAS, Santaquin City as a municipality and political subdivision of the state of Utah owns and controls certain public ways and rights-of-way for the health, safety and welfare of the City and its residents; and

WHEREAS, CenturyLink is a telecommunications company that provides certain telecommunications products and service to customers through a network of transmission facilities (the "System"); and

WHEREAS, the Utah Legislature enacted legislation including the Utah Municipal Telecommunications Tax Act (the "Act"), which allows municipalities and telecommunications companies to enter into franchise agreements governing the imposition and collection of franchise taxes in exchange for a telecommunication company's use of certain public rights-of way; and

WHEREAS, the City desires now to adopt an ordinance granting CenturyLink a franchise to operate the System pursuant to an agreement containing certain terms and conditions including the payment of franchise taxes in accordance with the provisions of the Act;

NOW THEREFORE, be it ordained by the City Council of Santaquin City that it is in the public interest to grant CenturyLink a Franchise to operate the System pursuant to the terms and conditions contained herein.

SECTION 1. Grant of Franchise. The City hereby grants to CenturyLink the right, privilege and authority to install, construct, maintain, operate, upgrade, repair, relocate and remove its cables and related appurtenances ("Facilities") in, under, along, over and across the present and future streets, alleys and other public ways in the City ("Public Ways", or in the singular "Public Way"), for the purpose of providing telecommunication services to the City's inhabitants and other customers of CenturyLink located within the City's corporate limits.

SECTION 2. Acceptance by CenturyLink. Within sixty (60) days after the passage of this Ordinance by the City, CenturyLink shall file an unqualified written acceptance thereof with the City; otherwise the Ordinance and the rights granted herein shall be null and void.

SECTION 3. Term. The initial term of this Franchise is ten (10) years commencing on the date of Acceptance by CenturyLink as set forth above in Section 2 and shall thereafter automatically renew from year-to-year unless either party gives advance written notice to the other party at least 120 days prior to expiration of the initial term or subsequent annual term requesting the parties enter into good faith discussions to reach terms of a new agreement.

SECTION 4. Records Inspection. CenturyLink shall make available to the City at a CenturyLink office, upon reasonable advance written notice of no fewer than sixty (60) days and not more often than once every two (2) years, such relevant information pertinent only to enforcing the terms of this Ordinance in such form and at such times as CenturyLink can reasonably make available. Subject to applicable laws, any information that CenturyLink provides to the City, except as otherwise provided herein, is confidential and proprietary and shall not be disclosed or used for any purpose other than verifying compliance with the terms of this Ordinance. Except as otherwise provided herein,

any such information provided to the City shall be returned to CenturyLink following review, without duplication, unless CenturyLink grants the City written permission to duplicate the information, which reasonable permission shall not be unreasonably withheld.

SECTION 5. Non-Exclusive Franchise. The right to use and occupy the Public Ways shall be nonexclusive, and the City reserves the right to use the Public Ways for itself or any other entity. The City's and other entities' use, however, shall not unreasonably interfere with CenturyLink's Facilities or the rights granted CenturyLink herein. Neither shall CenturyLink unreasonably interfere with the uses of the City or other authorized users of the public rights-of-way.

SECTION 6. City Regulatory Authority. The City reserves the right to adopt such additional ordinances and regulations as may be deemed necessary in the exercise of its police power for the protection of the health, safety and welfare of its citizens consistent with applicable federal and state law. The City agrees to notify CenturyLink of any such changes potentially applicable to this Franchise.

SECTION 7. Indemnification. The City shall not be liable for any property damage or loss or injury to or death of any person that occurs as the result of the construction, operation or maintenance by CenturyLink of its Facilities. CenturyLink shall indemnify, defend and hold the City harmless from and against claims, demands, liens and all liability or damage of whatsoever kind on account of CenturyLink's use of the Public Ways. The City shall: (a) give prompt written notice to CenturyLink of any such claim, demand or lien with respect to which the City seeks indemnification hereunder; and (b) permit CenturyLink to assume the defense of such claim, demand, or lien with legal counsel of CenturyLink's selection. CenturyLink shall not be subject to liability for any settlement or compromise made without its prior written consent. Notwithstanding the other provisions contained herein, CenturyLink shall in no event be required to indemnify the City for any claims, demands, or liens arising from the negligence or wrongful actions or inactions of the City, its officials, boards, commissions, agents, contractors, and/or employees.

SECTION 8. Insurance Requirements. CenturyLink will maintain in full force and effect for the Term of the Franchise, at CenturyLink's expense, a comprehensive liability insurance policy written by a company authorized to do business in the State of Utah, or will provide self-insurance reasonably satisfactory to the City, protecting it against liability for loss, personal injury and property damage occasioned by the operation of the System, including the Facilities, by CenturyLink. Such insurance will be in an amount not less than \$2,500,000.00. CenturyLink will also maintain Worker's Compensation coverage throughout the term of this Franchise as required by law. Evidence of such insurance is available at www.centurylink.com/moi.

SECTION 9. Plan, Design, Construction and Installation of CenturyLink's Facilities.

9.1 All Facilities under authority of this Ordinance shall be used, constructed and maintained in accordance with applicable law.

9.2 CenturyLink shall, prior to commencing new construction or major reconstruction work in Public Ways or other public places, apply for a permit from the City, which permit shall not be unreasonably withheld, conditioned, or delayed. CenturyLink will provide plans of new facilities to be placed in the Public Ways pursuant to a permit issued by the City. CenturyLink will abide by all applicable ordinances and reasonable rules, regulations and requirements of the City consistent with applicable law, and the City may inspect the manner of such work and require remedies as may be reasonably necessary to assure compliance. Notwithstanding the foregoing, CenturyLink shall not be obligated to obtain a permit to perform emergency repairs or for normal maintenance of its facilities that will not materially impact use of the Public Ways by others.

9.3 To the extent practical and consistent with any permit issued by the City, all Facilities shall be located so as to cause minimum interference with the Public Ways and shall be constructed, installed, maintained, cleared of vegetation,

renovated or replaced in accordance with applicable rules, ordinances and regulations of the City.

9.4 If, during the course of work on its Facilities, CenturyLink causes damage to or alters the Public Way or other public property, CenturyLink shall replace and restore such Public Way or public property at CenturyLink's expense to a condition reasonably comparable to the condition that existed immediately prior to such damage or alteration, normal wear and tear excepted.

9.5 CenturyLink shall have the right to excavate the Public Ways subject to reasonable conditions and requirements of the City. Before installing new underground facilities or replacing existing underground facilities, CenturyLink shall first obtain a permit from the City in accordance with subsection 10.2 hereof.

9.6 Nothing in this Ordinance shall be construed to prevent the City from constructing, maintaining, repairing, or relocating municipal infrastructure, including but not limited to its sewers, streets, water distribution lines, sidewalks, or other public property. However, before commencing any work within a Public Way that may affect CenturyLink's Facilities, the City shall give written notice to CenturyLink, and all such work shall be done, insofar as practicable, in such a manner as not to obstruct, injure, or prevent the free use and operation of CenturyLink's poles, wires, conduits, conductors, pipes, and appurtenances.

9.7 CenturyLink shall not attach to, or otherwise use or commit to use, any pole owned by City until a separate pole attachment agreement has been executed by the parties.

SECTION 1011. Relocation of Facilities.

10.1 Relocation for the City. CenturyLink shall, upon receipt of advance written notice of not fewer than ninety (90) days, protect, support, temporarily disconnect, relocate, or remove any CenturyLink property located in a Public Way when required to do so by the City for municipal projects. CenturyLink shall be responsible for any costs associated with these obligations to the same extent as other users of the respective Public Way.

10.2 Relocation for a Third Party. CenturyLink shall, at the request of any person holding a lawful permit issued by the City, protect, support, raise, lower, temporarily disconnect, relocate in or remove from Public Ways, as applicable and if possible, any CenturyLink property, provided that the cost of such action is borne by the person requesting it and CenturyLink is given reasonable advance written notice and sufficient time to take the appropriate action. In such situation, CenturyLink may also require advance payment. For purposes of this subsection, "reasonable advance written notice" shall mean no fewer than forty-five (45) days for a temporary relocation, and no fewer than one hundred twenty (120) days for a permanent relocation.

10.3 Alternatives to Relocation. CenturyLink may, after receipt of written notice requesting a relocation of Facilities, submit to the City written alternatives to such relocation. Such alternatives shall include the use and operation of temporary transmitting facilities in adjacent Public Ways. The City shall promptly evaluate such alternatives and advise CenturyLink in writing if one or more of the alternatives are suitable. If requested by the City, CenturyLink shall promptly submit additional information to assist the City in making such evaluation. The City shall consider each alternative proposed by CenturyLink. In the event the City ultimately determines that there is no other reasonable alternative, CenturyLink shall relocate the Facilities as otherwise provided herein. Notwithstanding the foregoing, CenturyLink shall in all cases have the right to abandon the Facilities.

SECTION 11. Vegetation Management. CenturyLink shall have the authority to trim trees and other growth in the Public Ways in order to access and maintain the Facilities in compliance with applicable law and industry standards.

SECTION 12. Payment by CenturyLink.

12.1 For and in consideration of the Franchise, and as fair and reasonable compensation to the City for the use by the Franchisee of the City's Right-of-Way, the Franchisee will pay to the State of Utah for the benefit of the City an annual franchise fee (the "Franchise Fee"), in an amount equal to, and consisting of, the maximum municipal telecommunications license tax (the "Municipal Telecommunications Tax") authorized pursuant to the Utah Municipal Telecommunications License Tax Act, Title 10, Chapter 1, Part 4, Utah Code Annotated 1953, as amended (the "Municipal Telecommunications Tax Act"). Such Franchise Fee shall be calculated in the manner provided in the Municipal Telecommunications Tax Act, and shall be paid by the Franchisee to the Utah State Tax Commission, as agent for the City under an Interlocal Cooperation Agreement by and among the City, the Utah State Tax Commission, and others, at the times and in the manner prescribed in the Municipal Telecommunications Tax Act, and any rules and regulations promulgated thereunder. Compliance by the Franchisee with the terms and provisions of the Municipal Telecommunications Tax Act, and any rules and regulations promulgated thereunder, shall satisfy all requirements of this Franchise with respect to the calculation and payment of the Franchise Fee.

12.2 A customer may not bring a cause of action against a telecommunications provider on the basis that the telecommunications provider erroneously recovered from the customer municipal telecommunications license taxes authorized by this part unless the customer meets the same requirements that a purchaser is required to meet to bring a cause of action against a seller for a refund or credit as provided in Utah Code Ann. § [59-12-110.1\(3\)](#).

SECTION 13. Revocation of Franchise for Noncompliance.

13.1 In the event that the City believes that CenturyLink has not materially complied with the terms of the Franchise, the City shall informally discuss the matter with CenturyLink. If these discussions do not lead to resolution of the problem, the City shall notify CenturyLink in writing of the exact nature of the alleged noncompliance.

13.2 CenturyLink shall have thirty (30) days from receipt of the written notice described in subsection 14.1 to either respond to the City, contesting the assertion of noncompliance, or otherwise initiate reasonable steps to remedy the asserted noncompliance issue, notifying the City of the steps being taken and the projected date that they will be completed.

13.3 In the event that CenturyLink does not comply with subsection 14.2, above, unless the parties agree to an extension of the time provided in subsection 14.2, above, the City shall schedule a public hearing to address the asserted noncompliance issue. The City shall provide CenturyLink at least twenty (20) days' prior written notice of, and the opportunity to be heard, at the hearing.

13.4 Subject to applicable federal and state law, in the event the City, after the hearing set forth in subsection 14.3, determines that CenturyLink is noncompliant with this Ordinance, the City may:

- A. Seek specific performance of any provision which reasonably lends itself to such remedy, as an alternative to damages; or
- B. Commence an action at law for monetary damages or other equitable relief; or
- C. In the case of substantial noncompliance with a material provision of the Ordinance, seek to revoke the Franchise in accordance with subsection 14.5.

13.5 Should the City seek to revoke the Franchise after following the procedures set forth above, the City shall give written notice to CenturyLink including a statement of all reasons for such revocation. CenturyLink shall have ninety (90) days from receipt of such notice to object in writing and state its reason(s) for such objection. Thereafter, the City

may seek revocation of the Franchise at a public hearing. The City shall cause to be served upon CenturyLink, at least thirty (30) days prior to such public hearing, a written notice specifying the time and place of such hearing and stating its intent to revoke the Franchise. At the designated hearing, the City shall give CenturyLink an opportunity to state its position on the matter, after which the City shall determine whether or not the Franchise shall be revoked. CenturyLink may appeal the City 's determination to an appropriate court, which shall have the power to review the decision of the City *de novo*. Such appeal must be taken within sixty (60) days of the issuance of the City 's determination. The City may, at its sole discretion, take any lawful action which it deems appropriate to enforce its rights under this Ordinance in lieu of revocation.

13.6 Notwithstanding the foregoing provisions in this Section 14, CenturyLink does not waive any of its rights under applicable law.

SECTION 14. No Waiver of Rights. Neither the City nor CenturyLink shall be excused from complying with any of the terms and conditions contained herein by any failure of the other, or any of its officers, employees, or agents, upon any one or more occasions to insist upon or to seek compliance with any such terms and conditions. Each party expressly reserves any and all rights, remedies, and arguments it may have at law or equity, without limitation, and to argue, assert, and/or take any position as to the legality or appropriateness of any provision in this Ordinance that is inconsistent with State or Federal law, as may be amended.

SECTION 15. Transfer of Franchise. CenturyLink's right, title, or interest in the Franchise shall not be sold, transferred, assigned, or otherwise encumbered without prior notice to and prior approval by the City, such approval shall not to be unreasonably withheld, conditioned or delayed. Notwithstanding the foregoing, when said sale, transfer, assignment, or encumbrance is to an entity controlling, controlled by, or under common control with CenturyLink, or for any rights, title, or interest of CenturyLink in the Franchise or Facilities in order to secure indebtedness, or to an entity that acquires substantially all the assets or equity of CenturyLink by sale, merger, consolidation or reorganization, approval by the City shall not be required.

SECTION 16. Amendment. Amendments to the terms and conditions contained herein shall be mutually agreed upon in writing by the City and CenturyLink.

SECTION 17. Notices. Any notice required or permitted to be given hereunder shall be deemed sufficient if given by a communication in writing and shall be deemed to have been received upon actual receipt or refusal of delivery if sent by (a) personal delivery, (b) United States Mail, postage prepaid, certified, return receipt requested, or (c) nationally recognized overnight courier, and addressed to the Parties as set forth below:

The City:

CITY NOTICE ADDRESS

Santaquin City
ATTN: City Manager
275 West Main Street
Santaquin, Utah 84655

with a copy to:

Brett B. Rich, City Attorney
Nielsen & Senior

1145 South 800 East, Suite 110
Orem, UT 84097

To CenturyLink:

CenturyLink
ATTN: ROW/NIS Manager
100 CenturyLink Drive
Monroe, LA 71203

with a copy to:

CenturyLink
ATTN: Legal Department
931 14th Street
Denver, CO 80202

SECTION 18. Severability. If any section, sentence, paragraph, term or provision hereof is for any reason determined to be illegal, invalid, or superseded by other lawful authority, including any state or federal regulatory authority having appropriate jurisdiction thereof, or unconstitutional, illegal or invalid by any court having appropriate jurisdiction thereof, such portion shall be deemed a separate, distinct, and independent provision, and such determination shall have no effect on the validity of any other section, sentence, paragraph, term or provision hereof, all of which will remain in full force and effect for the term of the Franchise or any renewal or renewals thereof.

CONSIDERED and APPROVED this _____ day of _____, 2021.

THE CITY OF SANTAQUIN, UTAH

By: _____
Kirk F. Hunsaker, Mayor

Attest: K. Aaron Shirley, City Recorder

ACCEPTED BY CENTURYLINK:

QWEST COMMUNICATIONS D/B/A CENTURYLINK QC

BY: _____

TITLE: _____

DATE: _____

PRN: