

A high-speed photograph of water splashing, creating numerous bubbles and droplets, serving as the background for the top half of the page.

PREPARED FOR:

PREPARED BY:

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HERRIMAN CITY WATER SYSTEM IMPACT FEE FACILITY PLAN

NOVEMBER 2020

HERRIMAN CITY WATER SYSTEM IMPACT FEE FACILITY PLAN

November 2020

Prepared for:



Prepared by:



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EXECUTIVE SUMMARY – IFFP (WATER)

The purpose of an impact fee facilities plan (IFFP) is to identify demands placed upon City facilities by future development and evaluate how these demands will be met by the City. The IFFP is also intended to outline the improvements which may be funded through impact fees.

WHY IS AN IFFP NEEDED?

The IFFP provides a technical basis for assessing updated impact fees throughout the City. This document addresses the future infrastructure needed to serve the City. The existing and future capital projects documented in this IFFP will ensure that level of service standards are maintained for all existing and future residents who reside within the service area. Local governments must pay strict attention to the required elements of the Impact Fee Facilities Plan which are enumerated in the Impact Fees Act.

PROJECTED FUTURE GROWTH

To evaluate the use of existing capacity and the need for future capacity, it is first necessary to calculate the demand associated with existing development and projected growth. Using available information for existing development and growth projections from the City's Capital Facilities Plan, projected growth in system demand is summarized in Table ES-1.

**Table ES-1
Peak Day Demand Projections for City Service Area**

Item	Culinary Indoor Water Use	Culinary Outdoor Water Use	Total Culinary	Secondary Water Service Potential Use¹	Total Water Service
2010 Population (most recent census)	21,785	21,785	--	0	21,785
2010 Peak Day Demand (mgd) ²	2.61	0	11.43	0	11.43
2020 Population	62,010				
2020 Estimated Peak Day Demand (mgd)	4.37	19.40	23.77	6.15	29.92
2020 Estimated Peak Day Demand (gpm)	3,036	13,471	16,506	4,270	20,776
2030 Population	93,465				
2030 Estimated Peak Day Demand (mgd)	6.64	25.88	32.52	12.80	45.32
2030 Estimated Peak Day Demand (gpm)	4,613	17,971	22,584	8,887	31,471
10-Year Population Growth	31,455				
Increase in Peak Day Demand Placed Upon Existing Facilities by New Development (10-year growth) (mgd)	2.27	6.48	8.75	6.65	15.40
Increase in Peak Day Demand Placed Upon Existing Facilities by New Development (10-year growth) (gpm)	1,577	4,501	6,078	4,617	10,695

1 – This is the estimated potential secondary water demand for installed secondary service connections. This is the hypothetical use for installed connections.

2 – 2010 data is included in this table as a baseline for when the secondary water system was not operating.

LEVEL OF SERVICE

Level of service is defined in the Impact Fees Act as “the defined performance standard or unit of demand for each capital component of a public facility within a service area.” To improve the accuracy of this analysis, this impact fee facility plan has divided the system into five different components (water rights, production, pumping, storage, and transmission). Existing and proposed levels of service are summarized for each of these categories in Table ES-2.

Table ES-2
Existing and Proposed Level of Service

	Existing Level of Service¹	Proposed Level of Service
Water Rights		
Indoor Water Right (acre-ft/gpm of peak demand)	1.290	1.290
Outdoor Water Right (acre-ft/gpm of peak demand)	0.605	0.489
Production Capacity		
Production Capacity (gpm/ gpm of peak demand)	1.14	1.00
Pumping Capacity		
Pumping Capacity (gpm/ gpm of peak demand)	1.00	1.00
Storage (gallons/ gpm of peak demand)¹		
Indoor Use (gallons / gpm of peak demand)	1,022	720
Outdoor Use (gallons / gpm of peak demand)	1,616	1,008
Transmission and Distribution		
Culinary Peak Hour Demand Pressure (psi) / Percent of Transmission System that Meets the Standard	45 / 99.6%	45 / 100%
Minimum Available Fire Flow at 20 psi during Peak Day Demand (gpm) ² / Percent of Transmission System that Meets the Standard	1,500 / 98.4%	1,500 / 100%
Culinary Maximum Pipe Velocity (feet per second) / Percent of Transmission System that Meets the Standard	7.0 / 99.6%	7.0 / 100%
Secondary Peak Hour Demand Pressure (psi) / Percent of Transmission System that Meets the Standard	40 / 98.2%	40 / 100%
Secondary Maximum Pipe Velocity (feet per second) / Percent of Transmission System that Meets the Standard	7.0 / 99.7%	7.0 / 100%

¹ Does not include fire storage volumes in calculation.

² This value represents the standard requirement for newer residential connections. In some cases, the Unified Fire Authority may allow fire flows as low as 1,000 gpm for historic homes. For commercial properties, required fire flow may be higher than 1,500 gpm with a residual of 20 psi.

In most cases, the City’s existing level of service exceeds the proposed level of service which indicates there is some excess capacity in the existing system. However, each component in the system must be evaluated individually. Costs for projects to cure current deficiencies will not be included as part of the impact fee.

EXISTING CAPACITY AVAILABLE TO SERVE FUTURE GROWTH

Since the existing system has five different components (water rights, production capacity, pumping capacity, storage, and transmission), each of these components must be evaluated individually to analyze excess capacity.

Water Rights

Table ES-3 summarizes estimated the volume and percentage of existing water rights available to meet future demands.

Table ES-3
Excess Capacity – Water Rights

Type of Water Rights	Existing Rights (acre-ft)	Existing Annual Use (acre-ft)	Use by 10-Year Growth (acre-ft)	Use By Growth Beyond 10 Years (acre-ft)	Percent Use By Existing	Percent Available to 10-Year Growth	Percent Available to Growth Beyond 10 Years
Wells/Springs - Indoor	2,807	2,164	643	0	77.1%	22.9%	0.0%
JVWCD - Indoor	1,334	1,753	911	1,230	100.0%	0.0%	0.0%
Wells/Springs - Culinary Outdoor	53	43	10	0	81.4%	18.6%	0.0%
JVWCD - Outdoor	1,334	6,294	1,435	0	100.0%	0.0%	0.0%
Wells/Springs - Secondary	3,751	1,127	1,218	1,408	30.0%	32.5%	37.5%
Welby Jacobs - Secondary	2,512	960	1,038	513	38.2%	41.3%	20.4%
Total	11,790	12,341	5,255	3,151			

Production

Water production for existing users, 10-year growth, and buildout growth for each of the City's sources is listed in Table ES-4.

**Table ES-4
Excess Capacity – Production**

Wells Springs/JVWCD Connections/Welby Jacobs Capacity¹ (mgd)	Existing Peak Day Use (mgd)	Peak Day Use 10-Year Growth (mgd)	Peak Day Use Growth Beyond 10-Years (mgd)	Percent Use By Existing	Percent Available to 10-Year Growth	Percent Available to Growth Beyond 10 Years
49.7	30	13.1	6.7	60%	26%	13%

¹ Capacity includes the physical connection capacity required at buildout, not necessarily current equipment capacity or contract capacity

Pumping

Peak day demands for existing users, 10-year growth, and buildout growth for each of the City's existing booster station is listed in Table ES-5.

**Table ES-5
Excess Capacity – Pumping**

Pump Station	Existing Capacity¹ (gpm)	Existing Peak Day Demand (gpm)	10-Year Peak Day Demand (gpm)	Buildout Peak Day Demand (gpm)	Percent Use By Existing	Percent Available to 10-Year Growth	Percent Available to Growth Beyond 10-Years
Blackridge Pump Station (Secondary)	4,000	713	1,982	3268	21.8%	38.8%	39.4%
4000 West Pump Station – To Blackridge Reservoir (Secondary Zone 3) ¹	6,000	1,965	3,479	6000	32.7%	25.2%	42.0%
4000 West Pump Station – To Juniper Canyon (Secondary Zone 1-3) ¹	5,200	805	3,155	4,645	17.3%	50.6%	32.1%
Zone 4 Boosters (6400W & Hardlick) ²	7,900	4,826	5,084	5,084	94.9%	5.1%	0.0%
Zone 5 booster (Lookout)	1,500	260	260	282	92.0%	0.0%	8.0%
Cove (Zone 6W)	1,800	923	1,195	1289	71.6%	21.1%	7.3%
Zone 1E	10,800	204	970	5437	3.8%	14.1%	82.2%
Hi-Country Booster ²	180	180	183	438	41.1%	0.8%	58.1%
Total	37,380	9,875	16,307	26,444	37.3%	24.3%	38.3%

Transmission

To calculate the percentage of existing capacity to be used by future growth in existing facilities, existing and future flows were examined in system model for each transmission pipeline. The calculated percentage of existing capacity in the culinary and secondary

distribution system facilities in use by existing and future users is summarized in Table ES-6.

Table ES-6
Percentage Use by Existing and Future Users

Facility	Percent Use By Existing	Percent Available to 10-Year Growth	Percent Available to Growth Beyond 10-Years
Existing Culinary Pipes	54%	27%	19%
Existing Secondary Pipes	30%	32%	38%

*Note that existing customers that may convert to using secondary within the next 10-years have been included as “existing” for purposes of calculating percentages for impact fees.

Storage

The City owns and operates a large number of storage reservoirs. As identified in the master plan, there are no existing storage deficiencies. Tables ES-7 and ES-8 summarize storage capacity that is used by existing and may be used by 10-year growth within the City.

Table ES-7
Excess Capacity – Secondary Storage

Zone	Existing Required Volume (MG)	10-Year Required Volume (MG)	Growth Beyond 10-Year Required Volume (MG)	Percent Use By Existing	Percent Available to 10-Year Growth	Percent Available to Growth Beyond 10-Years
All Zones*	1.60	3.88	9.50	16.8%	24.0%	59.2%

*Because there are no other existing storage reservoirs, all pressure zones rely on Blackridge for existing storage through gravity connections or VFD booster pumps. When additional storage reservoirs are constructed, Blackridge will remain the primary storage facility for secondary water due to its relatively large size (which includes some storage for Riverton City).

Table ES-8
Excess Capacity – Culinary Storage

Zone	Existing Cumulative Required Volume¹(MG)	10-Year Cumulative Required Volume (MG)	Growth Beyond 10-Year Required Volume (MG)	Percent Use By Existing	Percent Available to 10-Year Growth	Percent Available to Growth Beyond 10-Years
Zones 1N – 4	3.02	3.81	9.14	33.1%	8.6%	58.3%
Zone - 5S Lookout	0.19	0.19	0.21	88.8%	2.4%	8.8%
Zone - 6W Cove	0.44	0.46	0.54	81.4%	4.8%	13.8%
Zone 1E	0.10	0.31	1.85	5.2%	11.2%	83.5%
Total*	5.10	6.25	13.08	39.0%	8.8%	52.2%

¹The existing and 10-year storage volumes shown are based on buildout conservation rates assuming all users eventually reach Herriman City conservation goal targets.

REQUIRED SYSTEM IMPROVEMENTS

Beyond available existing capacity, additional improvements required to serve new growth are summarized in Tables ES-9 to ES-10. To satisfy the requirements of state law, Tables ES-9 to ES-10 provide a breakdown of the percentage of the project costs attributed to existing and future users. For future use, capacity has been divided between capacity to be used by growth within the 10-year planning window of this IFFP and capacity that will be available for growth beyond the 10-year window.

Table ES-9
Culinary Water System Improvement Costs, 10-year Planning Window

Project No.	Project Cost*	Estimated Year of Construction	Percent to Existing	Percent to 10-Year	Percent to Growth Beyond 10-Year	Cost to Existing	Cost to 10-Year	Cost to Growth Beyond 10-Year
Planning Costs	\$100,000		0.0%	76.4%	23.6%	\$0	\$76,443	\$23,557
Water Rights	\$8,601,000	2026	52.5%	23.9%	23.6%	\$4,513,228	\$2,059,197	\$2,028,576
Zone 2E Tank	\$3,614,000	2021	13.9%	10.9%	75.2%	\$502,346	\$393,926	\$2,717,728
Zone 3E Tank	\$3,614,000	2021	20.9%	39.0%	40.1%	\$755,326	\$1,409,460	\$1,449,214
Zone 5E Tank	\$1,344,000	2028	0.0%	10.6%	89.4%	\$0	\$142,464	\$1,201,536
Zone 8W Tank	\$1,344,000	2028	0.0%	50.4%	49.6%	\$0	\$677,376	\$666,624
Zone 2E Pump S.	\$1,242,000	2021	13.9%	10.9%	75.2%	\$172,638	\$135,378	\$933,984
Zone 3E Pump S.	\$2,329,000	2021	13.0%	21.3%	65.7%	\$302,770	\$496,077	\$1,530,153
Zone 3N Pump S.	\$1,200,000	2025	28.0%	21.7%	50.3%	\$336,000	\$260,400	\$603,600
Zone 4 N Pump S	\$1,200,000	2025	27.9%	0.7%	71.4%	\$334,800	\$8,400	\$856,800
Zone 4E Pump S.	\$933,000	2025	0.0%	20.8%	79.2%	\$0	\$194,064	\$738,936
Zone 5E Pump S.	\$766,000	2028	0.0%	6.0%	94.0%	\$0	\$45,960	\$720,040
Zone 5C Pump S.	\$1,333,000	2025	16.5%	9.0%	74.5%	\$219,945	\$119,970	\$993,085
CE1.01	\$65,000	2021	0.0%	23.4%	76.6%	\$0	\$15,210	\$49,790
CE1.02	\$45,000	2021	0.0%	23.4%	76.6%	\$0	\$10,530	\$34,470
CE1.03	\$57,000	2023	0.0%	23.4%	76.6%	\$0	\$13,338	\$43,662
CE1.04	\$66,000	2023	0.0%	23.4%	76.6%	\$0	\$15,444	\$50,556
CE1.05	\$316,000	2023	0.0%	14.9%	85.1%	\$0	\$47,084	\$268,916
CE2.01	\$911,000	2023	13.9%	6.4%	79.7%	\$126,629	\$58,304	\$726,067
CE2.02	\$122,000	2023	0.0%	8.9%	91.1%	\$0	\$10,858	\$111,142
CE2.03	\$336,000	2021	0.0%	8.9%	91.1%	\$0	\$29,904	\$306,096
CE2.04	\$428,000	2023	0.0%	8.9%	91.1%	\$0	\$38,092	\$389,908
CE3.01	\$1,525,000	2023	50.8%	16.8%	32.4%	\$774,700	\$256,200	\$494,100
CE3.02	\$135,000	2023	0.0%	34.2%	65.8%	\$0	\$46,170	\$88,830

Project No.	Project Cost*	Estimated Year of Construction	Percent to Existing	Percent to 10-Year	Percent to Growth Beyond 10-Year	Cost to Existing	Cost to 10-Year	Cost to Growth Beyond 10-Year
CE3.03	\$1,439,000	2021	0.0%	34.2%	65.8%	\$0	\$492,138	\$946,862
CE3.04	\$241,000	2028	0.0%	34.2%	65.8%	\$0	\$82,422	\$158,578
CE3.05	\$165,000	2028	0.0%	34.2%	65.8%	\$0	\$56,430	\$108,570
CE3.06	\$260,000	2028	0.0%	34.2%	65.8%	\$0	\$88,920	\$171,080
CE3.07	\$0	2028	0.0%	34.2%	65.8%	\$0	\$0	\$0
CE4.01	\$253,000	2029	0.0%	26.4%	73.6%	\$0	\$66,792	\$186,208
CE4.02	\$120,000	2029	0.0%	26.4%	73.6%	\$0	\$31,680	\$88,320
CE5.01	\$68,000	2029	0.0%	65.1%	34.9%	\$0	\$44,268	\$23,732
CW1.01	\$228,000	2021	0.0%	100.0%	0.0%	\$0	\$228,000	\$0
CW2.01	\$137,000	2021	0.0%	67.3%	32.7%	\$0	\$92,201	\$44,799
CW2.02	\$31,000	2022	0.0%	67.3%	32.7%	\$0	\$20,863	\$10,137
CW2.03	\$286,000	2023	0.0%	67.3%	32.7%	\$0	\$192,478	\$93,522
CW2.04	\$295,000	2024	53.7%	27.2%	19.1%	\$158,415	\$80,240	\$56,345
CW3.01	\$168,000	2023	0.0%	28.1%	71.9%	\$0	\$47,208	\$120,792
CW3.02	\$535,000	2023	0.0%	28.1%	71.9%	\$0	\$150,335	\$384,665
CW3.03	\$119,000	2024	0.0%	28.1%	71.9%	\$0	\$33,439	\$85,561
CW3.04	\$217,000	2024	0.0%	28.1%	71.9%	\$0	\$60,977	\$156,023
CW4.01	\$443,000	2025	0.0%	3.9%	96.1%	\$0	\$17,277	\$425,723
CW4.02	\$71,000	2025	0.0%	3.9%	96.1%	\$0	\$2,769	\$68,231
CW4.03	\$95,000	2023	0.0%	3.9%	96.1%	\$0	\$3,705	\$91,295
CW4.04	\$8,000	2023	0.0%	3.9%	96.1%	\$0	\$312	\$7,688
CW5.01	\$70,000	2025	0.0%	0.0%	100.0%	\$0	\$0	\$70,000
CW7.01	\$16,000	2026	0.0%	69.2%	30.8%	\$0	\$11,072	\$4,928
CW8.01	\$144,000	2027	0.0%	38.2%	61.8%	\$0	\$55,008	\$88,992
Total	\$37,035,000					\$8,196,797	\$8,418,783	\$20,419,420

*Includes inflation at a rate of 3 percent annually.

Table ES-10
Secondary Water System Improvement Costs, 10-year Planning Window

Project No.	Project Cost*	Estimated Year of Construction	Percent to Existing	Percent to 10-Year	Percent to Growth Beyond 10-Year	Cost to Existing	Cost to 10-Year	Cost to Growth Beyond 10-Year
Planning Costs	\$100,000		0.0%	76.4%	23.6%	\$0	\$76,443	\$23,557
Welby Jacob Shares	\$3,286,000		25.0%	27.0%	48.0%	\$820,805	\$887,531	\$1,577,664
Zone 1 - Juniper Canyon Storage	\$4,745,000	2023	40.2%	11.9%	47.9%	\$1,907,490	\$564,655	\$2,272,855
Zone 2 Storage	\$2,982,000	2021	21.2%	30.8%	48.0%	\$632,184	\$918,456	\$1,431,360
Zone 4 - Cove Storage	\$4,343,000	2024	27.3%	10.8%	61.9%	\$1,185,639	\$469,044	\$2,688,317
Zone - 3E Storage	\$3,667,000	2028	0.0%	92.1%	7.9%	\$0	\$3,377,307	\$289,693
4000 West - Juniper (1E) Pump S.	\$233,000	2022	25.3%	50.6%	24.1%	\$58,949	\$117,898	\$56,153
Zone 3N Pump S.	\$1,257,000	2023	0.0%	36.2%	63.8%	\$0	\$455,034	\$801,966
Zone 4N Pump S.	\$1,257,000	2023	0.0%	19.6%	80.4%	\$0	\$246,372	\$1,010,628
Zone 2E Pump S.	\$1,885,000	2023	11.6%	44.0%	44.4%	\$218,660	\$829,400	\$836,940
Zone 3E Pump S.	\$906,000	2024	0.0%	61.0%	39.0%	\$0	\$552,660	\$353,340
Zone 4E Pump S.	\$874,000	2028	0.0%	58.1%	41.9%	\$0	\$507,794	\$366,206
SE1.02	\$3,435,000	2021	23.2%	44.2%	32.6%	\$796,920	\$1,518,270	\$1,119,810
SE1.05	\$10,000	2023	0.0%	9.6%	90.4%	\$0	\$960	\$9,040
SE2.00	\$582,000	2022	0.0%	57.5%	42.5%	\$0	\$334,650	\$247,350
SE2.01	\$1,778,000	2023	58.0%	13.6%	28.4%	\$1,031,240	\$241,808	\$504,952
SE2.02	\$315,000	2023	0.0%	57.5%	42.5%	\$0	\$181,125	\$133,875
SE2.03	\$298,000	2023	0.0%	57.5%	42.5%	\$0	\$171,350	\$126,650
SE2.04	\$273,000	2023	0.0%	57.5%	42.5%	\$0	\$156,975	\$116,025
SE3.01	\$492,000	2023	23.2%	70.8%	6.0%	\$114,144	\$348,336	\$29,520
SE3.02	\$120,000	2023	0.0%	92.2%	7.8%	\$0	\$110,640	\$9,360
SE3.03	\$214,000	2023	0.0%	92.2%	7.8%	\$0	\$197,308	\$16,692

Project No.	Project Cost*	Estimated Year of Construction	Percent to Existing	Percent to 10-Year	Percent to Growth Beyond 10-Year	Cost to Existing	Cost to 10-Year	Cost to Growth Beyond 10-Year
SE3.04	\$32,000	2023	0.0%	92.2%	7.8%	\$0	\$29,504	\$2,496
SE3.05	\$56,000	2023	0.0%	92.2%	7.8%	\$0	\$51,632	\$4,368
SE3.06	\$73,000	2028	0.0%	92.2%	7.8%	\$0	\$67,306	\$5,694
SE4.02	\$22,000	2028	0.0%	58.1%	41.9%	\$0	\$12,782	\$9,218
SW2.01	\$87,000	2021	0.0%	25.3%	74.7%	\$0	\$22,011	\$64,989
SW2.02	\$291,000	2023	11.0%	25.5%	63.5%	\$32,010	\$74,205	\$184,785
SW2.03	\$8,558,000	2023	11.0%	25.5%	63.5%	\$941,380	\$2,182,290	\$5,434,330
SW3.03	\$54,000	2023	0.0%	42.6%	57.4%	\$0	\$23,004	\$30,996
SW3.04	\$530,000	2023	0.0%	28.1%	71.9%	\$0	\$148,930	\$381,070
SW3.06	\$4,978,000	2023	2.3%	32.3%	65.4%	\$114,494	\$1,607,894	\$3,255,612
SW3.07	\$7,438,000	2023	7.1%	27.5%	65.4%	\$528,098	\$2,045,450	\$4,864,452
SW4.01	\$394,000	2025	0.0%	10.1%	89.9%	\$0	\$39,794	\$354,206
SW4.03	\$889,000	2023	2.3%	10.1%	87.6%	\$20,447	\$89,789	\$778,764
Total	\$56,454,000					\$8,402,460	\$18,658,607	\$29,392,933

*Includes inflation at a rate of 3 percent annually.

IMPACT FEE FACILITY PLAN (WATER)

BACKGROUND

Herriman City (City) has retained Bowen Collins & Associates (BC&A) to prepare an impact fee facility plan (IFFP) for the water supply and distribution system provided by the City. The purpose of an IFFP is to identify demands placed upon City facilities by future development and evaluate how these demands will be met by the City. The IFFP is also intended to outline the improvements which may be funded through impact fees. The analysis forming the basis of this IFFP has been taken from the City's water system master plan prepared by BC&A.

Requirements for the preparation of an IFFP are outlined in Title 11, Chapter 36 of the Utah code (the Impact Fees Act). Under these requirements, an IFFP shall accomplish the following for each facility:

1. Identify the existing level of service
2. Establish a proposed level of service
3. Identify excess capacity to accommodate future growth
4. Identify demands of new development
5. Identify the means by which demands from new development will be met
6. Consider the following additional issues
 - a. revenue sources to finance required system improvements
 - b. necessity of improvements to maintain the proposed level of service
 - c. need for facilities relative to planned locations of schools

The following sections of this report have been organized to address each of these requirements.

1.0 EXISTING LEVEL OF SERVICE 11-36A-302(1)(A)(I)

Level of service is defined in the Impact Fees Act as "the defined performance standard or unit of demand for each capital component of a public facility within a service area". This section identifies the existing level of service for water supply and distribution facilities. Before discussing the existing level of service, it is important to discuss the service area and unit of demand to be used in measuring level of service.

1.1 SERVICE AREA

For the City's previous impact fee, four different service areas were used to assess impact fees depending on whether users had access to culinary or secondary water for outdoor irrigation (pressure zones 1 to 4 versus 5 and above) and depending on which part of the City users resided (east or west of 4800 West). However, as development has occurred within the City, geographical distinctions between east versus west and culinary only versus culinary/secondary users have declined because, among other things, interconnections in the water system. Interconnections between east and west largely make it difficult to distinguish an east/west boundary for service areas. In addition, there are areas within Pressure Zones 1 to 4 that previously were planned to have secondary water that may not get secondary water in the future based on the cost/benefit of extending infrastructure to higher density neighborhoods. The level of service provided to residents will remain the same regardless of where users live. As a result, this study considers one service area that includes the full corporate boundaries of the City and annexation areas as identified in the City's General Plan.

1.2 UNIT OF DEMAND

The City historically used equivalent residential connection (ERCs) to define a unit of demand. ERCs were then used to identify the existing and proposed level of service and calculate impact fees. However, because the City has a secondary system that only partially covers the service area of the City, it is difficult to develop an “equivalent residential connection” that is representative of any specific service area. This is because a residential unit with access to secondary water will have significantly different culinary water demands than an area without secondary water. In addition, because the secondary system is relatively new (8 years of operation), there is not sufficient data available for secondary water use to clearly represent a “typical residential unit.”

To be more accurate, the City has elected to measure unit of demand in terms of peak day demand measured in gallons per minute (gpm). The amount of peak day demand for either the culinary or the secondary system can then be calculated independently for each type of connection depending on whether or not it will have access to secondary water in the future. Projected water production requirements for different types of use are summarized in Table 1. The values in this table are based on historic water use patterns as documented in the City’s water master plan.

Table 1
Projected Water Production Requirements for Different Types of Water Use

	Projected Demand
Indoor Production (gpd /resident)	55
Annual Outdoor Production ¹ (acre-ft/irrigated acre)	2.80
Peak Day Outdoor Production ¹ (gpm/irrigated acre)	5.73

¹ Both culinary and secondary outdoor production requirements are estimated to be the same since all outdoor use is metered. This value assumes approximately 8.7 percent conservation from 2010 historic use.

1.3 LEVEL OF SERVICE CATEGORIES

To improve the accuracy of this analysis, this impact fee facility plan has divided the whole system into five different components (water rights, production, pumping, storage, and transmission). Each of these components is discussed in the following subsections. The existing level of service for each component is then identified in a table at the end of this section.

Water Rights

Existing level of service for water rights can be defined as the volume of water currently available to serve demands in the City for both indoor and outdoor use. Although there are many issues that must be considered when performing a comprehensive evaluation of water rights (e.g. type, time, and place of use restrictions), the level of service for this component can best be summarized in terms of annual yield measured in acre-ft. The calculated yield must take into account seasonal limitations in supply availability and reductions in yield because of dry year conditions. For canal shares, the available yield is defined as 20 percent less than average yield to accommodate drought conditions.

Production

Existing level of service for production capacity can be defined as the peak flow rate of water that can currently be produced to serve demands in the City. The calculated flow rate is measured in gallons per minute (gpm) takes into account seasonal limitations in supply availability and reductions in yield because of dry year conditions.

Pumping

Most of the City requires pumps to deliver water from lower pressure zones to higher pressure zones. Existing level of service for pumping capacity can be defined as the peak rate of flow available to deliver water to destination storage reservoirs measured in gpm. Because there are multiple pump stations, this level of service will vary by individual facility.

Storage

Existing level of service for storage can be defined as the volume of storage available serve demands in the City for both indoor and outdoor use. Storage volume is measured in gallons. Because there are multiple storage reservoirs, this level of service can vary by individual facility, but has been reported for overall storage as a whole.

Transmission

There are a number of different ways in which system performance is measured in a transmission and distribution system. Existing level of service for transmission and distribution has been defined as follows.

1. System pressure during peak day demands measured in pounds per square inch (psi).
2. System pressure during peak hour demands measured in psi.
3. Available fire flow in the system while still maintaining greater than 20 psi residual pressure under peak day demand conditions.
4. Peak velocities in pipes during peak hour demand conditions.

Because there are thousands of transmission and distribution elements in this system, these levels of service will vary by individual facility.

1.4 EXISTING LEVEL OF SERVICE

Existing levels of service values for the five component categories are identified in Table 2 below.

Table 2
Existing Level of Service

	Existing Level of Service¹
Water Rights	
Indoor Water Right (acre-ft/gpm of peak demand)	1.290
Outdoor Water Right (acre-ft/gpm of peak demand)	0.605
Production Capacity	
Production Capacity (gpm / gpm of peak demand)	1.14
Pumping Capacity	
Pumping Capacity (gpm / gpm of peak demand)	1.00
Storage (gallons/ gpm of peak demand) ¹	
Indoor Use (gallons / gpm of peak demand)	1,022
Outdoor Use (gallons / gpm of peak demand)	1,616
Transmission and Distribution	
Culinary Peak Hour Demand Pressure (psi) / Percent of System that Meets the Standard	45 / 99.6%
Minimum Available Fire Flow at 20 psi during Peak Day Demand (gpm) ² / Percent of System that Meets the Standard	1,500 / 98.4%
Culinary Maximum Pipe Velocity (feet per second) / Percent of System that Meets the Standard	7.0 / 99.6%
Secondary Peak Hour Demand Pressure (psi) / Percent of System that Meets the Standard	40 / 98.2%
Secondary Maximum Pipe Velocity (feet per second) / Percent of System that Meets the Standard	7.0 / 99.7%

¹ Does not include fire storage volumes in calculation.

² This value represents the standard requirement for residential connections. In some cases, the Unified Fire Authority may allow fire flows as low as 1,000 gpm for historic homes. For commercial properties, required fire flow may be higher than 1,500 gpm with a residual of 20 psi.

2.0 PROPOSED LEVEL OF SERVICE 11-36A-302(1)(A)(II)

The proposed level of service is the performance standard used to evaluate system needs in the future. The Impact Fee Act indicates that the proposed level of service may:

1. diminish or equal the existing level of service; or
2. exceed the existing level of service if, independent of the use of impact fees, the City implements and maintains the means to increase the level of service for existing demand within six years of the date on which new growth is charged for the proposed level of service.

As with existing level of service, this impact fee facility plan has divided the system into five different components (water rights, production capacity, pumping capacity, storage, and transmission) for the definition of proposed level of service:

Water Rights

Water rights must be adequate to satisfy historical demands on both an annual and peak day basis. Water rights must take into account seasonal limitations in supply availability and reductions in yield because of dry year conditions.

Production

Water production, which includes all sources and connections to wholesale providers required to produce water in the City, must be adequate to satisfy peak day demands. Water production must take into account seasonal limitations in supply availability and reductions in yield because of dry year conditions.

Pumping

Most of the City requires pumps to deliver water from lower pressure zones to higher pressure zones. Pumping stations must be sized to deliver flow to destination storage reservoirs such that the level in the reservoirs at the end of a peak day of demand is the same as the level in the reservoir at the beginning of the day. In essence, pump stations must be sized to satisfy peak day demands in their respective service areas.

Storage

Three major criteria are generally considered when sizing storage facilities for a water distribution system: operational or equalization storage, fire flow storage, and emergency or standby storage.

1. **Operational/Equalization Storage:** Operational/equalization storage is the storage required to satisfy the difference between the maximum rate of supply and the rate of demand during peak conditions. Sources, major transmission pipelines, and pump stations are usually sized to convey peak day demands to optimize the capital costs of infrastructure. During peak hour demands, storage is needed to meet the difference in source/conveyance capacity and the increased peak instantaneous demands. Because demands can vary from day to day, operational storage must be adequate to meet the average observed storage fluctuation in each zone with a safety factor of 2.0. Based on the methodology described above and historic water use

patterns, the proposed level of service for operational storage is equal to 25 percent of peak day demand.

2. **Fire Flow Storage (Culinary Only):** Fire flow storage is the amount of water needed to combat fires occurring in the distribution system. This storage is calculated based on the fire flow rate for structures in each area of the system multiplied by a specified duration as required by the fire authority. For the City, the Unified Fire Authority is the governing fire authority. According to the fire authority, typical residential homes require a fire flow of 1,500 gpm for a duration of 2 hours (180,000 gallons). Typical commercial facilities require a fire flow of at least 2,000 gpm for a duration of 2 hours (240,000 gallons). For some buildings in the City, fire authorities require even greater fire flow. The maximum fire flow required in the system is 4,000 gpm for 4 hours (960,000 gallons).
3. **Emergency Storage:** Emergency or standby storage is the storage needed to meet demands in the event of an unexpected emergency situation such as a line break, mechanical or electrical failure of a pump station, or other unexpected event. The emergency or operation volume for reservoirs should be approximately equal to the required equalization volume (25 percent of peak day demand). To avoid duplication of emergency storage, storage in reservoirs in higher pressure zones may be considered for lower pressure zones as long as sufficient conveyance capacity is available to flow from the upper reservoirs to the lower reservoirs at required rates.

Transmission

The following criteria were used as the proposed level of service for major conveyance facilities:

1. The system was evaluated for existing conditions and projected conditions at buildout. Each demand scenario included model runs at both peak day and peak hour demand.
2. Under peak day demand, the system must be capable of maintaining constant levels at all system tanks and reservoirs.
3. Pressure requirements:
 - a. The culinary system should be capable of maintaining 50 psi during peak day demand and 45 psi during peak hour demand.
 - b. The secondary system should be capable of maintaining 40 psi during peak hour demand.
 - c. In general, the maximum pressure should not exceed 120 psi in distribution mains. In areas with surrounding terrain slopes in excess of 5 percent, pressures may be allowed to approach 150 psi as determined by the City Engineer. The maximum pressure should not exceed 150 psi when system pumps are on except on dedicated transmission mains. As a general guideline, fluctuations in pressure at system delivery points from when pumps are off to when pumps are on should not exceed 30 psi.

4. If any major source fails or is off-line, the system must be capable of conveying water from the remaining sources to all points of demand (including the offline source) with demands equal to the production rate of the remaining sources. If any major transmission line fails or is off-line, the system must be capable of delivering water from other delivery points sufficient to satisfy average day demand conditions.
5. Per requirements of the State of Utah, the system must be able to meet fire flow demands and still maintain greater than 20 psi residual pressure in the distribution system under peak day demand conditions. Fire flow demands were set at 1,500 gpm for residential areas, with higher custom fire flows for a few other large structures as established by fire authorities and City planning personnel.
6. Velocities in pipes shall not exceed 7 ft/sec under peak hour demand conditions and 10 ft/sec under peak day demands with fire flow.

Table 3 identifies the proposed level of service for each component. For convenience in comparing values, the existing level of service for each component is also summarized in the table.

**Table 3
Proposed Level of Service**

	Existing Level of Service¹	Proposed Level of Service
Water Rights		
Indoor Water Right (acre-ft/gpm of peak demand)	1.290	1.290
Outdoor Water Right (acre-ft/gpm of peak demand)	0.605	0.489
Production Capacity		
Production Capacity (gpm/ gpm of peak demand)	1.14	1.00
Pumping Capacity		
Pumping Capacity (gpm/ gpm of peak demand)	1.00	1.00
Storage (gallons/ gpm of peak demand)¹		
Indoor Use (gallons / gpm of peak demand)	1,022	720
Outdoor Use (gallons / gpm of peak demand)	1,616	1,008
Transmission and Distribution		
Culinary Peak Hour Demand Pressure (psi) / Percent of Transmission System that Meets the Standard	45 / 99.6%	45 / 100%
Minimum Available Fire Flow at 20 psi during Peak Day Demand (gpm) ² / Percent of Transmission System that Meets the Standard	1,500 / 98.4%	1,500 / 100%
Culinary Maximum Pipe Velocity (feet per second) / Percent of Transmission System that Meets the Standard	7.0 / 99.6%	7.0 / 100%
Secondary Peak Hour Demand Pressure (psi) / Percent of Transmission System that Meets the Standard	40 / 98.2%	40 / 100%
Secondary Maximum Pipe Velocity (feet per second) / Percent of Transmission System that Meets the Standard	7.0 / 99.7%	7.0 / 100%

¹ Does not include fire storage volumes in calculation.

² This value represents the standard requirement for newer residential connections. In some cases, the Unified Fire Authority may allow fire flows as low as 1,000 gpm for historic homes. For commercial properties, required fire flow may be higher than 1,500 gpm with a residual of 20 psi.

In most cases, the City's existing level of service exceeds the proposed level of service which indicates there is some excess capacity in the existing system. However, each component in the system must be evaluated individually. Costs for projects to cure current deficiencies will not be included as part of the impact fee.

3.0 EXCESS CAPACITY TO ACCOMMODATE FUTURE GROWTH 11-36A-302(1)(A)(III)

Since the existing system has five different components (water rights, production capacity, pumping capacity, storage, and transmission), each of these components must be evaluated individually to analyze excess capacity.

Water Rights

Annual source requirements for the City are projected in Table 4 below based on a projection of the estimated amount of Jordan Valley Water Conservancy District (JVWCD) water that will be needed to meet future demands. Available supply for each source type is also shown.

Table 4
10-Year Projection of Annual Source Requirements

Year	Population	Springs¹ (acre-ft)	Culinary Wells² (acre-ft)	JVWCD² (acre-ft)	Total Culinary Use⁴ (acre-ft)	Welby Jacobs³ (acre- ft)	Secondary Wells² (acre-ft)	Total Water Use (acre-ft) (acre-ft)
2020	62,010	111	3,292	6,851	10,254	1,637	450	12,341
2021	65,700	111	3,216	7,440	10,768	1,637	669	13,074
2022	69,327	111	3,139	8,006	11,256	1,637	888	13,781
2023	72,863	111	3,357	8,245	11,714	1,637	1,107	14,458
2024	76,284	111	3,272	8,754	12,136	1,637	1,326	15,099
2025	79,568	111	3,180	9,229	12,520	1,637	1,545	15,702
2026	82,697	111	3,883	8,869	12,863	1,637	1,764	16,264
2027	85,659	111	3,779	9,273	13,163	1,637	1,983	16,783
2028	88,445	111	3,668	9,641	13,419	1,637	2,202	17,258
2029	91,047	111	4,449	9,071	13,631	1,637	2,421	17,689
2030	93,465	111	4,256	9,366	13,733	1,637	2,707	18,077

1 – Annual spring production based on average production from 2000 to 2018

2 – Some of the culinary well use will be transitioning from culinary use to secondary use as more of the secondary system is supported by groundwater wells.

³ – Values for these categories reflect potential secondary demands from existing connections with access to secondary service as discussed previously.

The quantity of JVWCD water needed within the City is based on JVWCD meeting most of growing culinary water demands in the City. Based on the historical water use patterns, Table 5 summarizes the amount of water rights required for indoor and outdoor use per thousand gallons per day of peak day demand.

Table 5
Required Source per gpm of Peak Day Demand for Indoor / Outdoor Service

Water Use Type	Annual Volume Requirement	JVWCD (acre-ft/gpm) ¹	Wells / Springs (acre-ft/gpm)	Welby Jacobs (acre-ft/gpm)	Welby Jacobs (shares/gpm) ²
Indoor	1.290	0.577	0.713	--	
Outdoor Secondary	0.489	0.000	0.264	0.225	0.281
Outdoor Culinary	0.489	0.485	0.003		

1 – required JVWCD water based on the 2065 ratio of JVWCD use compared to annual demand.

2 – Reliable yield for each share of Welby Jacobs water is estimated to be 0.80 acre-ft/share to account for drought conditions.

Based on these projections, Table 6 summarizes the estimated volume and percentage of existing water rights available to meet future demands.

Table 6
Excess Capacity – Water Rights

Type of Water Rights	Existing Rights (acre-ft)	Existing Annual Use (acre-ft)	Use by 10-Year Growth (acre-ft)	Use By Growth Beyond 10 Years (acre-ft)	Percent Use By Existing	Percent Available to 10-Year Growth	Percent Available to Growth Beyond 10 Years
Wells/Springs - Indoor	2,807	2,164	643	0	77.1%	22.9%	0.0%
JVWCD - Indoor	1,334	1,753	911	1,230	100.0%	0.0%	0.0%
Wells/Springs - Culinary Outdoor	53	43	10	0	81.4%	18.6%	0.0%
JVWCD - Outdoor	1,334	6,294	1,435	0	100.0%	0.0%	0.0%
Wells/Springs - Secondary	3,751	1,127	1,218	1,408	30.0%	32.5%	37.5%
Welby Jacobs - Secondary	2,512	960	1,038	513	38.2%	41.3%	20.4%
Total	11,790	12,341	5,255	3,151			

Production

Water production for existing users, 10-year growth, and buildout growth for each of the City's sources is listed in Table 7.

Table 7
Excess Capacity – Production

Wells Springs/JVWCD Connections/Welby Jacobs Capacity¹ (mgd)	Existing Peak Day Use (mgd)	Peak Day Use 10-Year Growth (mgd)	Peak Day Use Growth Beyond 10-Years (mgd)	Percent Use By Existing	Percent Available to 10-Year Growth	Percent Available to Growth Beyond 10 Years
49.7	30	13.1	6.7	60%	26%	13%

¹ Capacity includes the physical connection capacity required at buildout, not necessarily current equipment capacity or contract capacity

Pumping

Peak day demands for existing users, 10-year growth, and buildout growth for each of the City's existing booster station is listed in Table 8.

Table 8
Excess Capacity – Pumping

Pump Station	Existing Capacity¹ (gpm)	Existing Peak Day Demand (gpm)	10-Year Peak Day Demand (gpm)	Buildout Peak Day Demand (gpm)	Percent Use By Existing	Percent Available to 10-Year Growth	Percent Available to Growth Beyond 10-Years
Blackridge Pump Station (Secondary)	4,000	713	1,982	3268	21.8%	38.8%	39.4%
4000 West Pump Station – To Blackridge Reservoir (Secondary Zone 3) ¹	6,000	1,965	3,479	6000	32.7%	25.2%	42.0%
4000 West Pump Station – To Juniper Canyon (Secondary Zone 1-3) ¹	5,200	805	3,155	4,645	17.3%	50.6%	32.1%
Zone 4 Boosters (6400W & Hardlick) ²	7,900	4,826	5,084	5,084	94.9%	5.1%	0.0%
Zone 5 booster (Lookout)	1,500	260	260	282	92.0%	0.0%	8.0%
Cove (Zone 6W)	1,800	923	1,195	1289	71.6%	21.1%	7.3%
Zone 1E	10,800	204	970	5437	3.8%	14.1%	82.2%
Hi-Country Booster ²	180	180	183	438	41.1%	0.8%	58.1%
Total	37,380	9,875	16,307	26,444	37.3%	24.3%	38.3%

¹ – Existing Capacity includes potential to expand with additional pumps in the future. The 4000 West pump station is expandable to 11,200 gpm.

² - All of the existing demand at the Hi-Country Booster Station comes from Hi-Country water users.

³ – Percent to existing, 10-year, and growth beyond year weighted based on size of boosters and use.

Note that existing demand shown for secondary booster stations is based on the theoretical demand that would be placed on the secondary system by installed secondary water services. Many of the secondary connections that do not currently use secondary water create an additional burden on the culinary water system. 10-year growth projections for the culinary system therefore exclude these secondary connections. In reality, if secondary services are not connected to the secondary system within the next 10 years, there may be more excess capacity in the secondary system at the end of 10-years and less excess capacity in the culinary system.

Transmission

To calculate the percentage of existing capacity to be used by future growth in existing facilities, existing and future flows were examined in system model for each transmission pipeline. A summary of the results of this analysis are contained in the appendix of this report. The method used to calculate excess capacity available for use by future flows is as follows:

1. **Calculate Flows** – The peak flow in each facility was calculated in the model for both existing and future flows. The maximum capacity of each facility was also calculated. Defining an absolute maximum capacity in water system facility is difficult because capacity is a function of both pipeline size (with corresponding velocity) and required delivery pressure. In water distribution systems, however, a common design guideline is to limit velocities to less than 7 ft/sec. This has been used as the definition for maximum capacity in this analysis.
2. **Identify Available Capacity** – Where a facility has capacity in excess of projected flows at buildout, the available capacity in the facility was defined as the difference between existing flows and buildout flows. Where the facility has capacity less than projected flows at buildout, the available capacity in the facility was defined as the difference between existing flows and the facility's maximum capacity.
3. **Eliminate Facilities without Excess Capacity** – For the planning window period (in this case, 10 years), the projected growth in flow during the planning window was compared against the facility's available capacity. Where the future flow exceeded the capacity of the facility, the available excess capacity was assumed to be zero. By definition, this corresponds to those facilities with deficiencies that are identified in the facilities plan. By assigning a capacity of zero, this eliminated double counting those facilities against new users. Any facility under an existing reimbursement agreement was also removed from the calculation since payment for excess capacity in these facilities is already dictated by agreement and will be considered as part of the impact fee analysis.
4. **Calculate Percent of Excess Capacity Used in Remaining Facilities** – Where the future flow was less than the capacity of the facility, the percent of excess capacity being used in each facility was calculated by dividing the growth in flow in the facility (future flow less existing flow) by the total capacity (existing flow plus available capacity).
5. **Calculate Excess Capacity for the System as a Whole** – Each pipeline in the system has a different quantity of excess capacity to be used by future growth. To

develop an estimate of excess capacity on a system wide basis, the capacities of each of these pipelines and their contribution to the system as a whole must be considered. To do this, each pipeline must first be weighted based on its estimated cost. For this purpose, each pipeline has been weighted based on the product of its diameter and length (which increase linearly with cost). For example, a pipe that is 27 inches in diameter and is 4,000 ft. long will cost proportionally more than a pipe that is 10 inches in diameter and 300 ft. long. The excess capacity in the system as a whole can then be calculated as the sum of the weighted capacity used by future growth divided by the sum of total weighted capacity in the system.

Based on the method described above, the calculated percentage of existing capacity in the culinary and secondary distribution system facilities in use by existing and future users is summarized in Table 9. These calculations are included in an Appendix to this document.

Table 9
Percentage Use by Existing and Future Users

Facility	Percent Use By Existing	Percent Available to 10-Year Growth	Percent Available to Growth Beyond 10-Years
Existing Culinary Pipes	54%	27%	19%
Existing Secondary Pipes	30%	32%	38%

*Note that existing customers that may convert to using secondary within the next 10-years have been included as “existing” for purposes of calculating percentages for impact fees.

Storage

The City owns and operates a large number of storage reservoirs. As identified in the master plan, there are no existing storage deficiencies. Tables 10 and 11 summarize storage capacity that is used by existing and may be used by 10-year growth within the City.

Table 10
Excess Capacity – Secondary Storage

Zone	Existing Required Volume (MG)	10-Year Required Volume (MG)	Growth Beyond 10-Year Required Volume (MG)	Percent Use By Existing	Percent Available to 10-Year Growth	Percent Available to Growth Beyond 10-Years
All Zones*	1.60	3.88	9.50	16.8%	24.0%	59.2%

*Because there are no other existing storage reservoirs, all pressure zones rely on Blackridge for existing storage through gravity connections or VFD booster pumps. When additional storage reservoirs are constructed, Blackridge will remain the primary storage facility for secondary water due to its relatively large size (which includes some storage for Riverton City).

Table 11
Excess Capacity – Culinary Storage

Zone	Existing Cumulative Required Volume¹(MG)	10-Year Cumulative Required Volume (MG)	Growth Beyond 10-Year Required Volume (MG)	Percent Use By Existing	Percent Available to 10-Year Growth	Percent Available to Growth Beyond 10-Years
Zones 1N – 4	3.02	3.81	9.14	33.1%	8.6%	58.3%
Zone - 5S Lookout	0.19	0.19	0.21	88.8%	2.4%	8.8%
Zone - 6W Cove	0.44	0.46	0.54	81.4%	4.8%	13.8%
Zone 1E	0.10	0.31	1.85	5.2%	11.2%	83.5%
Total*	5.10	6.25	13.08	39.0%	8.8%	52.2%

¹The existing and 10-year storage volumes shown are based on buildout conservation rates assuming all users eventually reach Herriman City conservation goal targets.

4.0 DEMANDS PLACED ON FACILITIES BY NEW DEVELOPMENT AT PROPOSED LEVEL OF SERVICE 11-36A-302(1)(A)(IV)

Use of existing facilities and the need for future facilities will increase as new development increases total water demand on the system. This section provides projections of the increase in future water demand on existing facilities resulting from projected development. Table 12 summarizes projections of peak day demand over the next 10 years.

Table 12
Peak Day Demand Projections for City Service Area

Item	Culinary Indoor Water Use	Culinary Outdoor Water Use	Total Culinary	Secondary Water Service Potential Use ¹	Total Water Service
2010 Population (most recent census)	21,785	21,785	--	0	21,785
2010 Peak Day Demand (mgd) ²	2.61	0	11.43	0	11.43
2020 Population	62,010				
2020 Estimated Peak Day Demand (mgd)	4.37	19.40	23.77	6.15	29.92
2020 Estimated Peak Day Demand (gpm)	3,036	13,471	16,506	4,270	20,776
2030 Population	93,465				
2030 Estimated Peak Day Demand (mgd)	6.64	25.88	32.52	12.80	45.32
2030 Estimated Peak Day Demand (gpm)	4,613	17,971	22,584	8,887	31,471
10-Year Population Growth	31,455				
Increase in Peak Day Demand Placed Upon Existing Facilities by New Development (10-year growth) (mgd)	2.27	6.48	8.75	6.65	15.40
Increase in Peak Day Demand Placed Upon Existing Facilities by New Development (10-year growth) (gpm)	1,577	4,501	6,078	4,617	10,695

1 – This is the estimated potential secondary water demand for installed secondary service connections. This is the hypothetical use for installed connections.

2 – 2010 data is included in this table as a baseline for when the secondary water system was not operating.

It will be noted that Table 12 includes 2010 population and peak day demands. This data has been used as a baseline for projections because Census data is available that year, and data from 2010 excludes interference related to operation of the City's secondary water system which was not active yet.

It should also be noted that projections of secondary demand include a qualifier that refers to "Potential Use". These demands have been calculated with the assumption that existing secondary service connections that are not currently connected to the City's secondary system have already been converted to using secondary. Because these connections already exist and have already paid impact fees, there will be no additional impact fees when these connections move from culinary to secondary service. Thus, for impact fee purposes, these connections can be treated as if they are already connected to the secondary system.

Based on these projections, Table 13 defines the annual supply required by new development for indoor and outdoor demands.

Table 13
Annual Supply Requirement for City Service Area

Type of Demand	Culinary Indoor Water Service¹ (acre-ft/year)	Culinary Outdoor Water Service² (acre-ft/year)	Culinary Total (acre-ft/year)	Secondary Outdoor Water Service² (acre-ft/year)	Total Water Service (acre-ft/year)
2020 Supply Requirements	3,917	6,336	10,254	2,087	12,341
2030 Supply Requirements	5,952	7,781	13,733	4,344	18,077
Increase in Annual Supply Requirements Placed Upon Existing Facilities by New Development (10-year growth)	2,035	1,445	3,479	2,257	5,736

1 - Indoor demands require 0.896 acre-ft per 1,000 gpd of peak day demand based on a peaking factor of 1.25

2 - Outdoor demands require 0.339 acre-ft per 1,000 gpd of peak day demand based on a peaking factor of 3.3.

Based on these total demand projections, the new demand has been added to the City's culinary and secondary water distribution models to evaluate the "demands placed on facilities by new development". The distribution of growth within the models has been based on the City's population projections and distributions of growth based on the City's general plan densities and undeveloped areas. Additional information regarding growth and new development in the City can be found in the City's water master plan.

5.0 INFRASTRUCTURE REQUIRED TO MEET DEMANDS OF NEW DEVELOPMENT 11-36A-302(1)(A)(V)

The City will satisfy the demands of new development by developing system improvement. System improvements required by new development through the next 10-years are identified in Exhibits 1 and 2 and Tables 14 and 15. Projects needed for growth beyond 10-years have not been included in this IFFP to avoid uncertainty surrounding improvements further into the future. In addition, projects intended to cure existing deficiencies or for operational or maintenance needs have not been included. Project costs include only those costs intended to be funded by the City. Project level costs in developing areas that are anticipated to be funded by developers have been omitted from the tables.

Table 14
Culinary Water System Improvement Costs, 10-year Planning Window

Project No.	Project Cost*	Estimated Year of Construction	Percent to Existing	Percent to 10-Year	Percent to Growth Beyond 10-Year	Cost to Existing	Cost to 10-Year	Cost to Growth Beyond 10-Year
Planning Costs	\$100,000		0.0%	76.4%	23.6%	\$0	\$76,443	\$23,557
Water Rights	\$8,601,000	2026	52.5%	23.9%	23.6%	\$4,513,228	\$2,059,197	\$2,028,576
Zone 2E Tank	\$3,614,000	2021	13.9%	10.9%	75.2%	\$502,346	\$393,926	\$2,717,728
Zone 3E Tank	\$3,614,000	2021	20.9%	39.0%	40.1%	\$755,326	\$1,409,460	\$1,449,214
Zone 5E Tank	\$1,344,000	2028	0.0%	10.6%	89.4%	\$0	\$142,464	\$1,201,536
Zone 8W Tank	\$1,344,000	2028	0.0%	50.4%	49.6%	\$0	\$677,376	\$666,624
Zone 2E Pump S.	\$1,242,000	2021	13.9%	10.9%	75.2%	\$172,638	\$135,378	\$933,984
Zone 3E Pump S.	\$2,329,000	2021	13.0%	21.3%	65.7%	\$302,770	\$496,077	\$1,530,153
Zone 3N Pump S.	\$1,200,000	2025	28.0%	21.7%	50.3%	\$336,000	\$260,400	\$603,600
Zone 4 N Pump S	\$1,200,000	2025	27.9%	0.7%	71.4%	\$334,800	\$8,400	\$856,800
Zone 4E Pump S.	\$933,000	2025	0.0%	20.8%	79.2%	\$0	\$194,064	\$738,936
Zone 5E Pump S.	\$766,000	2028	0.0%	6.0%	94.0%	\$0	\$45,960	\$720,040
Zone 5C Pump S.	\$1,333,000	2025	16.5%	9.0%	74.5%	\$219,945	\$119,970	\$993,085
CE1.01	\$65,000	2021	0.0%	23.4%	76.6%	\$0	\$15,210	\$49,790
CE1.02	\$45,000	2021	0.0%	23.4%	76.6%	\$0	\$10,530	\$34,470
CE1.03	\$57,000	2023	0.0%	23.4%	76.6%	\$0	\$13,338	\$43,662
CE1.04	\$66,000	2023	0.0%	23.4%	76.6%	\$0	\$15,444	\$50,556
CE1.05	\$316,000	2023	0.0%	14.9%	85.1%	\$0	\$47,084	\$268,916
CE2.01	\$911,000	2023	13.9%	6.4%	79.7%	\$126,629	\$58,304	\$726,067
CE2.02	\$122,000	2023	0.0%	8.9%	91.1%	\$0	\$10,858	\$111,142
CE2.03	\$336,000	2021	0.0%	8.9%	91.1%	\$0	\$29,904	\$306,096
CE2.04	\$428,000	2023	0.0%	8.9%	91.1%	\$0	\$38,092	\$389,908
CE3.01	\$1,525,000	2023	50.8%	16.8%	32.4%	\$774,700	\$256,200	\$494,100
CE3.02	\$135,000	2023	0.0%	34.2%	65.8%	\$0	\$46,170	\$88,830

Project No.	Project Cost*	Estimated Year of Construction	Percent to Existing	Percent to 10-Year	Percent to Growth Beyond 10-Year	Cost to Existing	Cost to 10-Year	Cost to Growth Beyond 10-Year
CE3.03	\$1,439,000	2021	0.0%	34.2%	65.8%	\$0	\$492,138	\$946,862
CE3.04	\$241,000	2028	0.0%	34.2%	65.8%	\$0	\$82,422	\$158,578
CE3.05	\$165,000	2028	0.0%	34.2%	65.8%	\$0	\$56,430	\$108,570
CE3.06	\$260,000	2028	0.0%	34.2%	65.8%	\$0	\$88,920	\$171,080
CE3.07	\$0	2028	0.0%	34.2%	65.8%	\$0	\$0	\$0
CE4.01	\$253,000	2029	0.0%	26.4%	73.6%	\$0	\$66,792	\$186,208
CE4.02	\$120,000	2029	0.0%	26.4%	73.6%	\$0	\$31,680	\$88,320
CE5.01	\$68,000	2029	0.0%	65.1%	34.9%	\$0	\$44,268	\$23,732
CW1.01	\$228,000	2021	0.0%	100.0%	0.0%	\$0	\$228,000	\$0
CW2.01	\$137,000	2021	0.0%	67.3%	32.7%	\$0	\$92,201	\$44,799
CW2.02	\$31,000	2022	0.0%	67.3%	32.7%	\$0	\$20,863	\$10,137
CW2.03	\$286,000	2023	0.0%	67.3%	32.7%	\$0	\$192,478	\$93,522
CW2.04	\$295,000	2024	53.7%	27.2%	19.1%	\$158,415	\$80,240	\$56,345
CW3.01	\$168,000	2023	0.0%	28.1%	71.9%	\$0	\$47,208	\$120,792
CW3.02	\$535,000	2023	0.0%	28.1%	71.9%	\$0	\$150,335	\$384,665
CW3.03	\$119,000	2024	0.0%	28.1%	71.9%	\$0	\$33,439	\$85,561
CW3.04	\$217,000	2024	0.0%	28.1%	71.9%	\$0	\$60,977	\$156,023
CW4.01	\$443,000	2025	0.0%	3.9%	96.1%	\$0	\$17,277	\$425,723
CW4.02	\$71,000	2025	0.0%	3.9%	96.1%	\$0	\$2,769	\$68,231
CW4.03	\$95,000	2023	0.0%	3.9%	96.1%	\$0	\$3,705	\$91,295
CW4.04	\$8,000	2023	0.0%	3.9%	96.1%	\$0	\$312	\$7,688
CW5.01	\$70,000	2025	0.0%	0.0%	100.0%	\$0	\$0	\$70,000
CW7.01	\$16,000	2026	0.0%	69.2%	30.8%	\$0	\$11,072	\$4,928
CW8.01	\$144,000	2027	0.0%	38.2%	61.8%	\$0	\$55,008	\$88,992
Total	\$37,035,000					\$8,196,797	\$8,418,783	\$20,419,420

*Includes inflation at a rate of 3 percent annually.

Table 15
Secondary Water System Improvement Costs, 10-year Planning Window

Project No.	Project Cost*	Estimated Year of Construction	Percent to Existing	Percent to 10-Year	Percent to Growth Beyond 10-Year	Cost to Existing	Cost to 10-Year	Cost to Growth Beyond 10-Year
Planning Costs	\$100,000		0.0%	76.4%	23.6%	\$0	\$76,443	\$23,557
Welby Jacob Shares	\$3,286,000		25.0%	27.0%	48.0%	\$820,805	\$887,531	\$1,577,664
Zone 1 - Juniper Canyon Storage	\$4,745,000	2023	40.2%	11.9%	47.9%	\$1,907,490	\$564,655	\$2,272,855
Zone 2 Storage	\$2,982,000	2021	21.2%	30.8%	48.0%	\$632,184	\$918,456	\$1,431,360
Zone 4 - Cove Storage	\$4,343,000	2024	27.3%	10.8%	61.9%	\$1,185,639	\$469,044	\$2,688,317
Zone - 3E Storage	\$3,667,000	2028	0.0%	92.1%	7.9%	\$0	\$3,377,307	\$289,693
4000 West - Juniper (1E) Pump S.	\$233,000	2022	25.3%	50.6%	24.1%	\$58,949	\$117,898	\$56,153
Zone 3N Pump S.	\$1,257,000	2023	0.0%	36.2%	63.8%	\$0	\$455,034	\$801,966
Zone 4N Pump S.	\$1,257,000	2023	0.0%	19.6%	80.4%	\$0	\$246,372	\$1,010,628
Zone 2E Pump S.	\$1,885,000	2023	11.6%	44.0%	44.4%	\$218,660	\$829,400	\$836,940
Zone 3E Pump S.	\$906,000	2024	0.0%	61.0%	39.0%	\$0	\$552,660	\$353,340
Zone 4E Pump S.	\$874,000	2028	0.0%	58.1%	41.9%	\$0	\$507,794	\$366,206
SE1.02	\$3,435,000	2021	23.2%	44.2%	32.6%	\$796,920	\$1,518,270	\$1,119,810
SE1.05	\$10,000	2023	0.0%	9.6%	90.4%	\$0	\$960	\$9,040
SE2.00	\$582,000	2022	0.0%	57.5%	42.5%	\$0	\$334,650	\$247,350
SE2.01	\$1,778,000	2023	58.0%	13.6%	28.4%	\$1,031,240	\$241,808	\$504,952
SE2.02	\$315,000	2023	0.0%	57.5%	42.5%	\$0	\$181,125	\$133,875
SE2.03	\$298,000	2023	0.0%	57.5%	42.5%	\$0	\$171,350	\$126,650
SE2.04	\$273,000	2023	0.0%	57.5%	42.5%	\$0	\$156,975	\$116,025
SE3.01	\$492,000	2023	23.2%	70.8%	6.0%	\$114,144	\$348,336	\$29,520
SE3.02	\$120,000	2023	0.0%	92.2%	7.8%	\$0	\$110,640	\$9,360
SE3.03	\$214,000	2023	0.0%	92.2%	7.8%	\$0	\$197,308	\$16,692

Project No.	Project Cost*	Estimated Year of Construction	Percent to Existing	Percent to 10-Year	Percent to Growth Beyond 10-Year	Cost to Existing	Cost to 10-Year	Cost to Growth Beyond 10-Year
SE3.04	\$32,000	2023	0.0%	92.2%	7.8%	\$0	\$29,504	\$2,496
SE3.05	\$56,000	2023	0.0%	92.2%	7.8%	\$0	\$51,632	\$4,368
SE3.06	\$73,000	2028	0.0%	92.2%	7.8%	\$0	\$67,306	\$5,694
SE4.02	\$22,000	2028	0.0%	58.1%	41.9%	\$0	\$12,782	\$9,218
SW2.01	\$87,000	2021	0.0%	25.3%	74.7%	\$0	\$22,011	\$64,989
SW2.02	\$291,000	2023	11.0%	25.5%	63.5%	\$32,010	\$74,205	\$184,785
SW2.03	\$8,558,000	2023	11.0%	25.5%	63.5%	\$941,380	\$2,182,290	\$5,434,330
SW3.03	\$54,000	2023	0.0%	42.6%	57.4%	\$0	\$23,004	\$30,996
SW3.04	\$530,000	2023	0.0%	28.1%	71.9%	\$0	\$148,930	\$381,070
SW3.06	\$4,978,000	2023	2.3%	32.3%	65.4%	\$114,494	\$1,607,894	\$3,255,612
SW3.07	\$7,438,000	2023	7.1%	27.5%	65.4%	\$528,098	\$2,045,450	\$4,864,452
SW4.01	\$394,000	2025	0.0%	10.1%	89.9%	\$0	\$39,794	\$354,206
SW4.03	\$889,000	2023	2.3%	10.1%	87.6%	\$20,447	\$89,789	\$778,764
Total	\$56,454,000					\$8,402,460	\$18,658,607	\$29,392,933

*Includes inflation at a rate of 3 percent annually.

Cost Attributable to Future Growth

Tables 14 and 15 provide a breakdown of the capital facility projects and the percentage of the project costs attributed to existing and new development. Costs attributed to both existing and new development were divided proportionally between existing and new development based on their needs in the facility. These percentages have been calculated based on flows in each facility as calculated in the hydraulic model. As an example, consider the following project from Table 15:

- **Zone 2E Tank** – This project will provide equalization storage to newly developed areas that has heretofore been supplied from the Rosecrest Tank. Existing demand for this area equals approximately 230 gpm of peak day demand. 10-year peak day demand is approximately 411 gpm and buildout demands will be approximately 1,656 gpm. This corresponds to 13.9%, 10.9%, and 75.2 % to existing, 10-year growth, and demand beyond 10-years respectively.

Tables 14 and 15 do not include bond costs related to paying for impact fee eligible improvements nor inflation costs. These costs are calculated as part of the impact fee analysis.

Cost Attributable to 10-Year Growth

Included in Table 14 and Table 15 is a breakdown of capacity associated with growth both at full build-out and through the next 10-years. This is necessary because many of the projects identified in the table will be built with capacity to accommodate flows or service beyond the 10-year growth window. This has been done following the same general process as described above.

Construction Cost Estimates

The costs of construction for projects to be completed within ten years have been estimated based on past City experience with projects of a similar nature and other projects outside of the City.

Water Rights

The 10-year plan described above has focused exclusively on physical infrastructure required to meet the demands of new growth. As summarized previously in Table 6, the City has some excess capacity in water rights to meet a portion of the expected new growth, but will need to secure other rights to meet the remaining growth. The additional water rights needed will vary depending on the type of use:

- **Culinary Water Use** – Culinary demands will be satisfied through a combination of City water rights in wells and springs and contract water from JVVCD. The proportion of water used in 2065 (long-term) used by existing users and futures users has been assumed to apply to existing conditions. This will allow future users to buy in to a portion of existing wells and springs even though they may currently be used by existing users. This assumes that existing users will be required to purchase more JVVCD water as new users are added to the City's system. The City also intends to purchase an additional 2,000 acre-ft of underground water rights to meet the

demands of future growth. This water will be included as part of the mix of additional JVWCD water used to meet City water demands. The estimated purchase cost of underground water right is expected to be \$3,500/acre-ft.

- **Secondary Water Use** – The City has a large block of Welby Jacobs water that can be used by growth in secondary demand as summarized in Table 6. Beyond this volume of available excess capacity, however, the City will need an additional 1,265 acre-ft of Welby Jacobs water to meet projected secondary demands. Purchase costs for Welby Jacobs water is expected to be \$2,200/acre-ft.

ADDITIONAL CONSIDERATIONS

6.0 REVENUE SOURCES 11-36A-302(2)

The City may fund the infrastructure identified in this IFFP through a combination of different revenue sources.

Federal and State Grants and Donations

Impact fees cannot reimburse costs funded or expected to be funded through federal grants and other funds that the City has received for capital improvements without an obligation to repay. Grants and donations are not currently contemplated in this analysis. If grants become available for constructing facilities, impact fees will need to be recalculated and an appropriate credit given. Any existing infrastructure funded through past grants will be removed from the system value during the impact fee analysis.

Bonds

None of the costs contained in this IFFP include the cost of bonding. The cost of bonding required to finance impact fee eligible improvements identified in the IFFP may be added to the calculation of the impact fee. This will be considered in the impact fee analysis.

Interfund Loans

Because infrastructure must generally be built ahead of growth, there often arise situations in which projects must be funded ahead of expected impact fee revenues. In some cases, the solution to this issue will be bonding. In others, funds from existing user rate revenue will be loaned to the impact fee fund to complete initial construction of the project and will be reimbursed later as impact fees are received. Consideration of potential interfund loans will be included in the impact fee analysis and should be considered in subsequent accounting of impact fee expenditures.

Impact Fees

It is recommended that impact fees be used to fund growth-related capital projects as they help to maintain the proposed level of service and prevent existing users from subsidizing the capital needs for new growth. Based on this IFFP, an impact fee analysis will be able to calculate a fair and legal fee that new growth should pay to fund the portion of the existing and new facilities that will benefit new development.

Developer Dedications and Exactions

Developer exactions are not the same as grants. Developer exactions may be considered in the inventory of current and future infrastructure. If a developer constructs a facility or dedicates land within the development, the value of the dedication is credited against that particular developer's impact fee liability.

If the value of the dedication/exaction is less than the development's impact fee liability, the developer will owe the balance of the liability to the City. If the value of the improvements dedicated is worth more than the development's impact fee liability, the City must reimburse the difference to the developer from impact fee revenues collected from other developments. It should be emphasized that the concept of impact fee credits pertains to system level improvements only. For project level improvement (i.e. projects not identified in the impact fee facility plan), developers will be responsible for the construction of the improvements without credit against the impact fee.

**7.0 NECESSITY OF IMPROVEMENT TO MAINTAIN LEVEL OF SERVICE
11-36A-302(3)**

According to State statute, impact fees cannot be used to correct deficiencies in the system and must be necessary to maintain the proposed level of service established for all users. Only those projects or portions of projects that are required to maintain the proposed level of service for future growth have been included in this IFFP. This will result in an equitable fee as future users will not be expected to fund any portion of the projects that will benefit existing residents.

8.0 NOTICING AND ADOPTION REQUIREMENTS 11-36A-502

The Impact Fees Act requires that entities must publish a notice of intent to prepare or modify any IFFP. If an entity prepares an independent IFFP rather than include a capital facilities element in the general plan, the actual IFFP must be adopted by enactment. Before the IFFP can be adopted, a reasonable notice of the public hearing must be published in a local newspaper at least 10 days before the actual hearing. A copy of the proposed IFFP must be made available in each public library within the City during the 10-day noticing period for public review and inspection. Utah Code requires that the City must post a copy of the ordinance in at least three places. These places may include the City offices and the public libraries within the City's jurisdiction. Following the 10-day noticing period, a public hearing will be held, after which the City may adopt, amend and adopt, or reject the proposed IFFP.

9.0 IMPACT FEE CERTIFICATION 11-36A-306(1)

This report has been prepared in accordance with Utah Code Title 11 Chapter 36a (the "Impact Fees Act"), which prescribes the laws pertaining to Utah municipal capital facilities plans and impact fee analyses. The accuracy of this report relies upon the planning, engineering, and other source data, which was provided by the City and their designees.

In accordance with Utah Code Annotated, 11-36a-306(1), Bowen Collins & Associates, makes the following certification:

I certify that this impact fee facility plan:

1. Includes only the cost of public facilities that are:
 - a. allowed under the Impact Fees Act; and
 - b. actually incurred; or
 - c. projected to be incurred or encumbered within six years after the day on which each impact fee is paid;
2. Does not include:
 - a. costs of operation and maintenance of public facilities;
 - b. cost of qualifying public facilities that will raise the level of service for the facilities, through impact fees, above the level of service that is supported by existing residents;
 - c. an expense for overhead, unless the expense is calculated pursuant to a methodology that is consistent with generally accepted cost accounting practices and the methodological standards set forth by the federal Office of Management and Budget for federal grant reimbursement; and
3. Complies in each relevant respect with the Impact Fees Act.

This certification is made with the following caveats:

1. All of the recommendations for implementations of the Impact Fee Facilities Plan (IFFP) made in the IFFP or in the impact fee analysis are followed in their entirety by the City.
2. If all or a portion of the IFFP or impact fee analysis is modified or amended, this certification is no longer valid.
3. All information provided in the preparation of this IFFP is assumed to be correct, complete and accurate. This includes information provided by the City and outside sources.



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