



PREPARED FOR:

PREPARED BY:



MURRAY CITY

OCTOBER 2024

# WATER CONSERVATION PLAN

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## TABLE OF CONTENTS

	<b>Page</b>
INTRODUCTION .....	1
SYSTEM PROFILE .....	1
Murray City Water System Service Area.....	1
Population .....	1
System Connections.....	3
Current Billing Rates.....	4
SUPPLY INFORMATION .....	6
Annual Supply .....	7
WATER MEASUREMENT .....	9
WATER PRODUCTION, SALES, AND SYSTEM LOSS.....	9
Historic Water Use .....	9
System Losses .....	9
Historic Per Capita Water Use.....	9
Current Per Capita Water Use .....	12
CONSERVATION GOAL WITH MILESTONES .....	12
Measuring Savings from Conservation .....	13
EFFECT OF CONSERVATION ON FUTURE WATER SUPPLY AND DEMAND .....	15
WATER CONSERVATION PRACTICES .....	18
Current Conservation Practices.....	18
New Conservation Practices Planned for Implementation .....	21
WATER CONSERVATION COORDINATOR.....	24
WATER CONSERVATION PLAN AUTHOR(S) .....	24
MURRAY CITY CONTACTS .....	24

## LIST OF TABLES

<b>No.</b>	<b>Title</b>	<b>Page</b>
1	FY 2023 Water Usage by Connection Type <sup>a</sup> .....	3
2	Estimated Production -- Murray City Dry and Average Water Years .....	7
3	Murray City Existing Source Annual Capacity Summary .....	8
4	Historic Per Capita Water Culinary Production, Sales, and System Loss .....	10
5	Water Demands for Existing Conditions.....	12
6	Conservation Goal with Milestones Through 2065 .....	13
7	Murray City Historic and Projected Population Estimates.....	15
8	Murray City Historic and Projected Population Estimates.....	16
9	2022 Water Demands for Residential and Non-Residential Use <sup>1</sup> .....	16
10	Implementation Schedule, Estimated Costs & Measurement of Progress .....	23

## TABLE OF CONTENTS (continued)

### LIST OF FIGURES

No.	Title	Page
1	Murray City General Land Use Plan .....	2
2	Current Culinary Delivery Type.....	4
3	Current Murray City Tiered Water Rate Structure .....	5
4	Murray City Culinary and Secondary Water Sources .....	6
5	Historic Per Capita Water Production.....	11
6	Culinary Demand with and without Conservation .....	13
7	Historic & Future Conservation Goal Per Capita Water Use .....	14
8	Historic & Future Conservation goal Per Capita Water Use.....	17

### ABBREVIATIONS

AMI .....	Advanced Metering Infrastructure
AMR.....	Automated Meter Reading
DWRi.....	Division of Water Rights
GPCD .....	Gallons per Capita per Day
JVWCD .....	Jordan Valley Water Conservancy District
SLC .....	Salt Lake City
SLCPU .....	Salt Lake City Public Utilities

### UNIT CONVERSIONS

GALLONS = ACRE FEET × 325,850  
 ACRE-FEET = GALLONS ÷ 325,850  
 MILLION GALLONS = ACRE-FEET ÷ 3.069  
 ACRE-FEET = MILLION GALLONS × 3.069  
 GPCD = GALLONS ÷ DAYS OF USAGE ÷ POPULATION

## INTRODUCTION

Attitudes toward water supplies are changing. Water is no longer seen as a boundless resource, but as a valuable commodity that needs to be managed carefully. With this shift in attitude, conservation is becoming a larger part of water suppliers' plans to meet future water needs. Many water suppliers throughout the country have adopted conservation programs. Benefits of these programs include:

- Using existing water supplies more efficiently.
- Maximization of existing water conveyance, treatment, and distribution facilities.
- Delaying or deferring the expense of construction or capital improvement projects.
- Reducing the need for additional water supplies.

Murray City recognizes the benefits of conservation programs. The City recognizes that per capita use will be at higher levels without emphasis and a clear plan on conservation. It also recognizes that there are still many benefits of further conservation efforts. Since sustained water conservation efforts will be an important component in the City's plans for future water use, this report will evaluate the City's current conservation program and will discuss additional measures that will allow further conservation of water.

## SYSTEM PROFILE

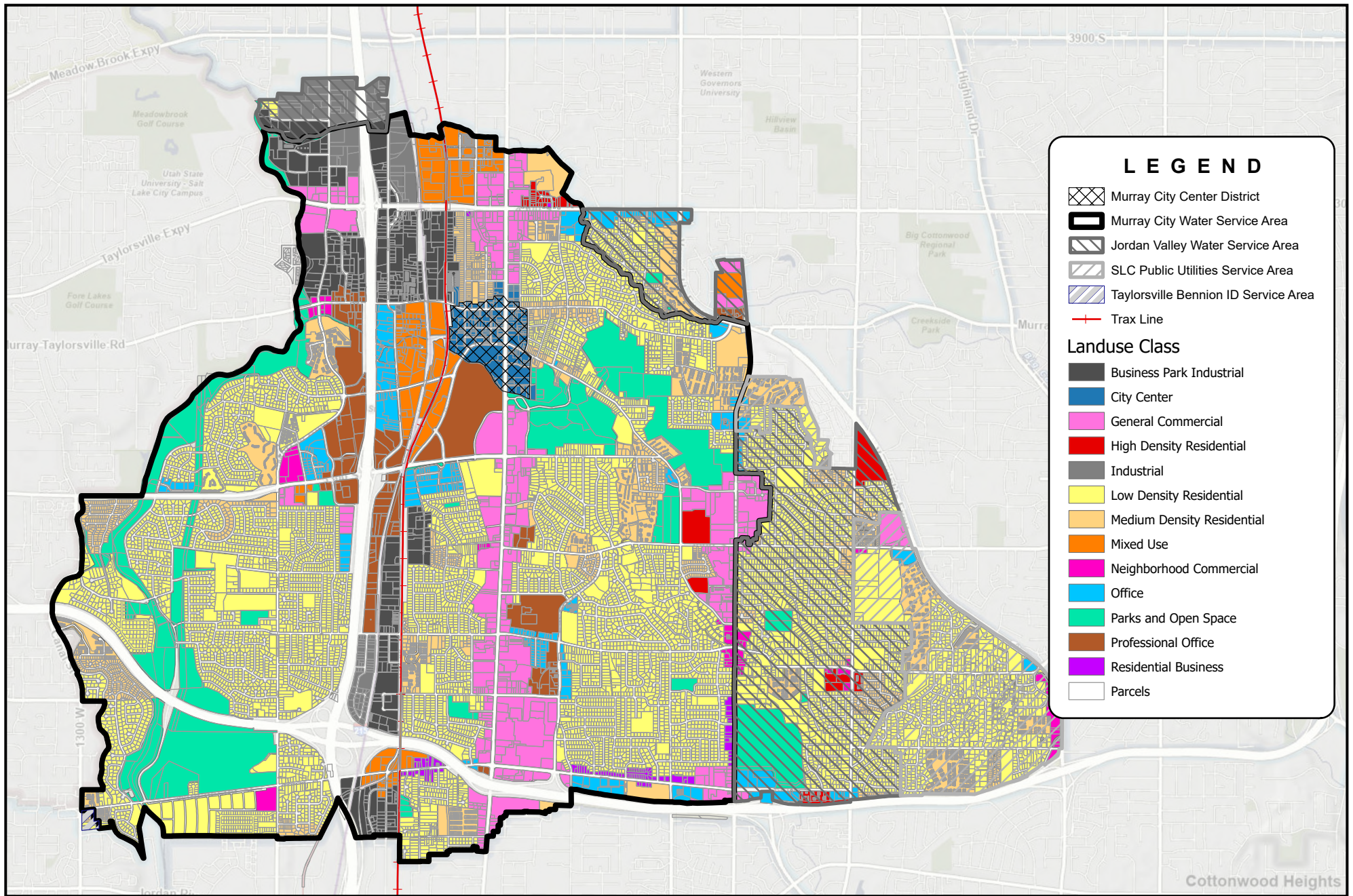
### Murray City Water System Service Area

Murray City's corporate boundaries include an area larger than the City's water system service area. As a result, projecting water demands requires identifying the service area's population and population growth. Figure 1 shows the existing Murray City corporate boundary, water system service boundary, and the City's general plan for land use. The Murray City water system service area serves approximately 80 percent of the City area. The Jordan Valley Water Conservancy District (JVWCD) supplies approximately 13 percent of the City area while Salt Lake City Public Utilities (SLCPU) supplies the remaining 7 percent area. Taylorsville Bennion Improvement District serves an area less than 0.5 percent of the total Murray City area at the southwest portion of the City (near Winchester Dr and 1300 West). Murray City has no plans to expand its existing water service area to serve the Jordan Valley or Salt Lake water service areas in the future. Therefore, all future demand projections in this report are based on the population within the Murray City Water System Service Area.

### Population

Murray is in Salt Lake County and has a population of roughly 41,539 residents based on the city's corporate boundaries. Murray has both culinary and secondary water systems, but most of the water demand is on the culinary system with only one well, Germania Well, providing secondary water. The existing Murray City corporate boundary, water system service boundary, and the city's general plan for land use are shown in Figure 1. Murray City's corporate boundaries include an area larger than the City's water system service area with the Murray City water system service area serving approximately 80% of the City area.





### LEGEND

- Murray City Center District
- Murray City Water Service Area
- Jordan Valley Water Service Area
- SLC Public Utilities Service Area
- Taylorsville Bennion ID Service Area
- Trax Line

### Landuse Class

- Business Park Industrial
- City Center
- General Commercial
- High Density Residential
- Industrial
- Low Density Residential
- Medium Density Residential
- Mixed Use
- Neighborhood Commercial
- Office
- Parks and Open Space
- Professional Office
- Residential Business
- Parcels

## System Connections

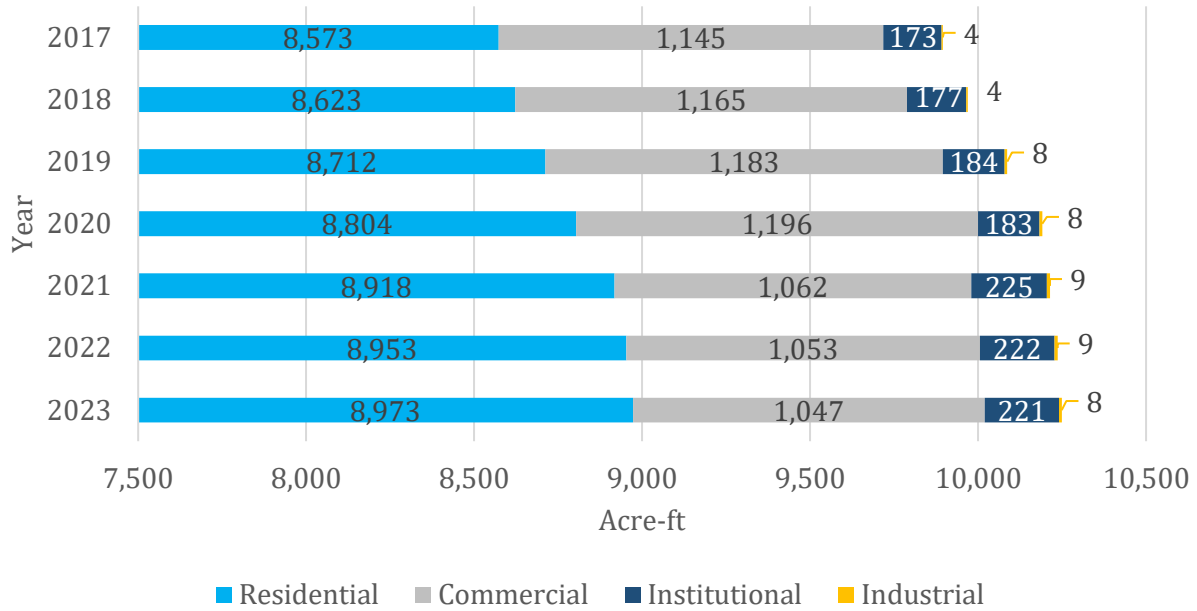
The Murray City water system includes residential, commercial, industrial, and institutional connections. To help evaluate and quantify the amount of water that can reasonably be conserved in Murray, an analysis of current water use patterns has been performed. Usage among different classes of customers for the year 2020 is shown in Figure 2. Secondary connections are assumed to be included in the accounts of culinary users. Murray City has minimal secondary water usage with only one well, Germania Well, used to irrigate City parks.

Roughly 88 percent of the meters in Murray City are residential connections, accounting for 62 percent of the total water use. Hence, residential water use represents the largest single area for potential conservation. However, Murray also has a significant number of commercial and industrial connections. While comprising only about 10 percent of the total number of meters, commercial and industrial customers accounted for roughly 20 percent of Murray City water use. Institutional water use is not far behind commercial and industrial water use accounting for about 18% of the water use with only 2 percent of the total connections. Thus, non-residential accounts should not be overlooked as potential contributors to future conservation efforts.

**Table 1**  
**FY 2023 Water Usage by Connection Type<sup>a</sup>**

Customer Class	Accounts	Percent of Connections	Culinary Annual Water Use (acre-ft)	Secondary Annual Water Use (acre-ft)	Total Water Use (acre-ft)	Percent of Total Water Use
Residential	8,973	87.6%	6,318	0	6,318	62.2%
Commercial	1,047	10.2%	1,982	0	1,982	19.5%
Industrial	8	0.08%	37	0	37	0.4%
Institutional	221	2.2%	1,050	765	1,815	17.9%
Unmetered	0	0	0	0	0	0
<b>TOTAL</b>	<b>10,249</b>	<b>100.00%</b>	<b>9,387</b>	<b>765</b>	<b>10,152</b>	<b>100.00%</b>

<sup>a</sup> Water usage by connection type data obtained from the Utah Division of Water Rights Public Water Supplier Information for 2023.



**Figure 2: Current Culinary Delivery Type**

### Current Billing Rates

In 2018 the City established a new tiered rate structure to encourage water conservation (full rate schedule is in Figure 3). All water connections are charged a monthly base rate dependent on the meter size with no monthly water allowance included in the base rate. Each tier in the structure charges a higher rate based on the quantity of water being used. It is recommended that the current billing rates be updated.





3" Meter			2018	2019	2020	2021	2022
Base Fee			\$38.50	\$40.81	\$43.26	\$45.86	\$48.15
Tier	Minimum HCF	Maximum HCF					
1	0	120	\$0.95	\$1.01	\$1.07	\$1.13	\$1.19
2	121	375	1.15	1.22	1.29	1.37	1.44
3	376	735	1.40	1.48	1.57	1.67	1.75
4	736	1,185	1.75	1.86	1.97	2.08	2.19
5	1,186	Above	2.50	2.65	2.81	2.98	3.13

3/4"-1" Meter			2018	2019	2020	2021	2022
Base Fee			\$10.00	\$10.60	\$11.24	\$11.91	\$12.51
Tier	Minimum HCF	Maximum HCF					
1	0	8	\$0.95	\$1.01	\$1.07	\$1.13	\$1.19
2	9	25	1.15	1.22	1.29	1.37	1.44
3	26	49	1.40	1.48	1.57	1.67	1.75
4	50	79	1.75	1.86	1.97	2.08	2.19
5	80	Above	2.50	2.65	2.81	2.98	3.13

4" Meter			2018	2019	2020	2021	2022
Base Fee			\$61.30	\$64.98	\$68.88	\$73.01	\$76.66
Tier	Minimum HCF	Maximum HCF					
1	0	200	\$0.95	\$1.01	\$1.07	\$1.13	\$1.19
2	201	625	1.15	1.22	1.29	1.37	1.44
3	626	1,225	1.40	1.48	1.57	1.67	1.75
4	1,226	1,975	1.75	1.86	1.97	2.08	2.19
5	1,976	Above	2.50	2.65	2.81	2.98	3.13

1 1/2" Meter			2018	2019	2020	2021	2022
Base Fee			\$15.70	\$16.64	\$17.64	\$18.70	\$19.63
Tier	Minimum HCF	Maximum HCF					
1	0	32	\$0.95	\$1.01	\$1.07	\$1.13	\$1.19
2	33	100	1.15	1.22	1.29	1.37	1.44
3	101	196	1.40	1.48	1.57	1.67	1.75
4	197	316	1.75	1.86	1.97	2.08	2.19
5	317	Above	2.50	2.65	2.81	2.98	3.13

2" Meter			2018	2019	2020	2021	2022
Base Fee			\$22.54	\$23.89	\$25.32	\$26.84	\$28.19
Tier	Minimum HCF	Maximum HCF					
1	0	64	\$0.95	\$1.01	\$1.07	\$1.13	\$1.19
2	65	200	1.15	1.22	1.29	1.37	1.44
3	201	392	1.40	1.48	1.57	1.67	1.75
4	393	632	1.75	1.86	1.97	2.08	2.19
5	633	Above	2.50	2.65	2.81	2.98	3.13

6" Meter			2018	2019	2020	2021	2022
Base Fee			\$118.31	\$125.41	\$132.93	\$140.91	\$147.95
Tier	Minimum HCF	Maximum HCF					
1	0	400	\$0.95	\$1.01	\$1.07	\$1.13	\$1.19
2	401	1,250	1.15	1.22	1.29	1.37	1.44
3	1,251	2,450	1.40	1.48	1.57	1.67	1.75
4	2,451	3,950	1.75	1.86	1.97	2.08	2.19
5	3,951	Above	2.50	2.65	2.81	2.98	3.13

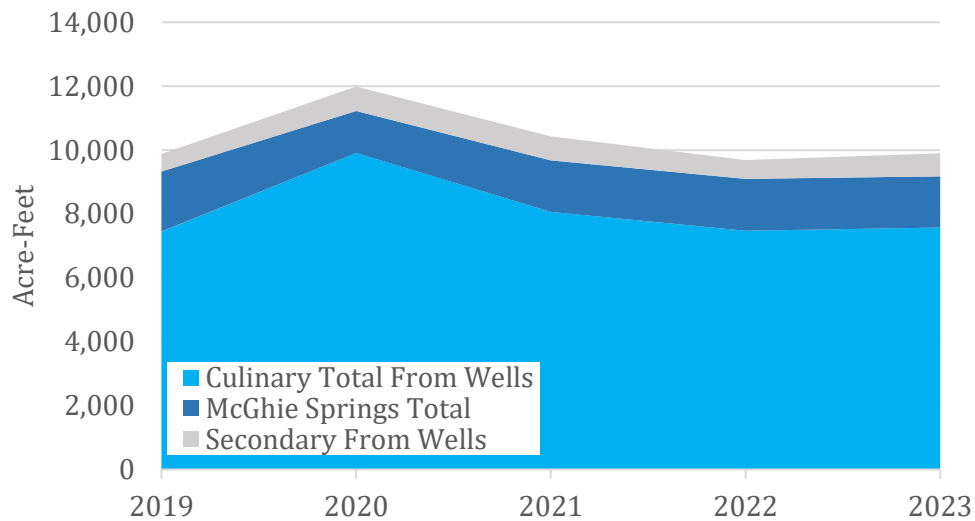
  

8" Meter			2018	2019	2020	2021	2022
Base Fee			\$186.73	\$197.93	\$209.81	\$222.39	\$233.51
Tier	Minimum HCF	Maximum HCF					
1	0	1,120	\$0.95	\$1.01	\$1.07	\$1.13	\$1.19
2	1,121	3,500	1.15	1.22	1.29	1.37	1.44
3	3,501	6,860	1.40	1.48	1.57	1.67	1.75
4	6,861	11,060	1.75	1.86	1.97	2.08	2.19
5	11,061	Above	2.50	2.65	2.81	2.98	3.13

**Figure 3: Current Murray City Tiered Water Rate Structure**

## SUPPLY INFORMATION

A summary of Murray city's current and historical water supply is contained here. For additional information on water supply the reader should refer to Murray City's Water Master Plan. The Murray City water system relies on well water as its predominant supply source producing about 84 percent of annual system water demand. McGhie Springs, located near the mouth of Big Cottonwood Canyon, makes up the remaining 16 percent of annual water production. Figure 4 shows the volume the City has used from each system as reported to the Division of Water rights (DWRi) Website from 2019 to 2023. An exchange agreement with Salt Lake City provides additional water supply in an emergency, up to 1%. The City also has a physical connection to the JWCD system. However, this connection has not been used since 1988 and is not considered part of the City's water system service area water supply. Note in recent years Murray City has combined some water rights to allow for more flexibility in moving rights to and from wells depending on production capacity and demands. Additionally, in 2022 and 2023 Murray City purchased 15.47 and 10.87 acre-ft from Salt Lake City (SLC) Corporation. This water was used at the McGhie Springs property and an adjacent property and was not used in the Murray City water system. Murray Water does not consider part of its water system.



\*Note: In 2022 and 2023 Murray City purchased 15.47 and 10.87 acre-ft from SLC Corporation

**Figure 4: Murray City Culinary and Secondary Water Sources**

## Annual Supply

Murray's annual source supply is summarized in Table 2 for both dry and average water years.

**Table 2**  
**Estimated Production -- Murray City Dry and Average Water Years**

<b>Supply Category</b>	<b>Estimated Production - Dry Year (acre-feet)<sup>1</sup></b>	<b>Estimated Production - Average Year (acre-feet)<sup>2</sup></b>
Wells	9,910	7,974
McGhie Springs	1,315	1,788
Purchased	0	3
Exchanged	0	0
<b>Total</b>	<b>10,460</b>	<b>9,765</b>

<sup>1</sup> Dry year production was based on 2020 because 2020 was the most recent dry year without drought mitigation measures in place.

<sup>2</sup> Average production was based on 2017 through 2022.

The difference in total water supply during dry and average years is 695 acre-feet of water. Total estimated water supply during dry years will be used as Murray City's annual water supply capacity for planning purposes.

On the following page, Table 3 summarizes the City's current culinary and secondary water supply for both max historic production and estimated reliable annual yield, as well as a summary of the water rights. Annual yield has been estimated by calculating 80% of the max well production from 2017 to 2022. This calculation assumes that the current well production rates are sustainable and not depleting the aquifer. It is recommended that Murray City conduct a well sustainability study to improve understanding of the recharge and depletion of the aquifer.

**Table 3**  
**Murray City Existing Source Annual Capacity Summary**

Source Name	Max Historic Production <sup>a</sup> (acre-ft)	Appropriated		Estimated Reliable Annual Well Yield (acre-ft)
		cfs	mgd	
<b>Wells</b>				
Powerhouse	518.87	5.000	3.23	415
600 West	340.77	2.490	1.61	273
500 East	265.71	3.017	1.95	213
Howe	560.64	1.500	0.97	449
300 West	401.04	3.510	2.27	321
Grant	1,811.99	3.000	1.94	1,450
Vine Street	979.75	2.389	1.54	784
700 West	528.08	2.500	1.62	422
900 East	695.77	2.017	1.30	557
Reservoir	359.60	4.600	2.97	288
Whitmore West	1,695.52	5.000	3.23	1,356
Whitmore East	1,489.07	2.000	1.29	1,191
McGhie	1,015.21	3.750	2.42	0 <sup>c</sup>
360 West	130.29	3.010	1.95	104
Millrace	140.66	2.635	1.70	113
Park	418.20	1.892	1.22	335
4500 South	238.40	1.250	0.81	191
Monroc	807.33	3.899	2.52	646
Hi-land	260.52	1.250	0.81	208
<b>Other Sources</b>				
McGhie Springs	1,509.32	5.562	3.59	
SLC Exchange	0.00 <sup>b</sup>	1.250	0.81	0
Purchased from SLC Corporation	15.47	0	0	0
Germania Well (Irrigation)	764.64	0.5	0.03	612
<b>TOTALS</b>	<b>14,946.85</b>	<b>62.071</b>	<b>39.79</b>	<b>9,925</b>

<sup>a</sup> Historic data ranges from 2017 to 2022 and was gathered from the Division of Water Rights website.

<sup>b</sup> SLC exchange has not been used since 1988.

<sup>c</sup> McGhie Springs Well reliable yield is calculated with the McGhie Springs because of their influence on each other

## **WATER MEASUREMENT**

Currently, all culinary and secondary water connections in the Murray City water system service area are metered. In 2010 the City began a meter replacement program which is now completed. This program should be maintained to replace all older meters so that no meter exceeds 25 years in operation. The City is transitioning to an advanced metering infrastructure (AMI) system and is almost complete with the changeover from automated meter reading (AMR). AMI systems automate collection of meter data around the City and can actively measure use, identify leaks, and educate customers on use. Installation requires construction of central towers to collect the data. Generally, AMI technology can help encourage water conservation more for each customer by helping customers proactively monitor water use.

## **WATER PRODUCTION, SALES, AND SYSTEM LOSS**

### **Historic Water Use**

Historic water use from 2010 to 2022 is summarized in Table 4 and includes both water production (water produced by each source and delivered to the system) and water sales (metered use out of the system) for the culinary system. For both categories, per capita water use has been calculated. Data for this table comes from production records and water sales records provided from the City to the Division of Water Rights, and recent population.

### **System Losses**

Murray City water system losses have been estimated with historic water production and historic water sales in Table 4. On average since 2010, the City water system losses have been approximately 7.6% of the annual water production (Table 4).

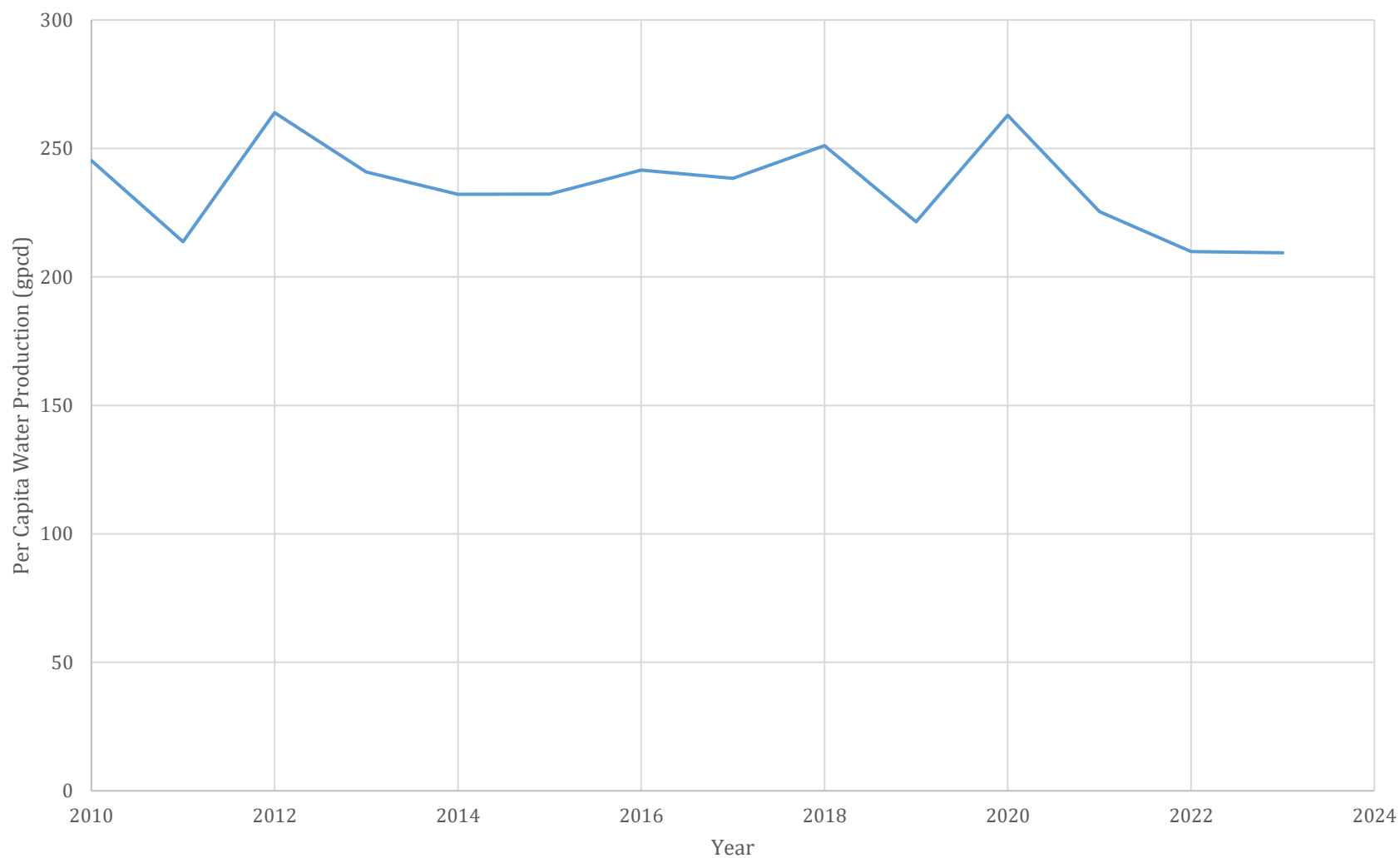
In 2016, the City performed an AWWA water loss audit and found that 212.9 MG/yr were lost out of the 3,077.2 MG/yr supplied in 2016. Roughly 6.9% of the water supplied was lost in the system with 32.7% of that loss due to unavoidable annual real losses. Revenue loss associated with the real and apparent losses are \$15,954 and \$83,816 respectively. The City plans to continue performing AWWA water loss audits to identify areas within the water system that require improvements and to make plans to improve those areas. See “Conservation Practices” for further discussion of the city efforts to minimize system losses including prevention activities and activities to locate and eliminate existing leaks.

### **Historic Per Capita Water Use**

As summarized in Table 4, the historic per capita water production ranges from 264 gallons per capita per day (gpcd) in 2012 to a low 209 gpcd in 2023. The change in per capital water use is shown in Figure 5.

**Table 4**  
**Historic Per Capita Water Culinary Production, Sales, and System Loss**

Year	Water Service Area Residential Population	Historic Water Production Culinary (acre-ft)	Historic Water Production Irrigation (acre-ft)	Per Capita Production Without Irrigation (gpcd)	Per Capita Production Combined (gpcd)	Historic Water Sales (acre-ft)	Per Capita Water Use (gpcd)	System Loss without Irrigation (acre-ft)	System Loss without Irrigation %	System Loss Combined (acre-ft)	System Loss Combined %
2010	35,000	9,281	336	237	245	8,255	211	1,026	12.4%	1,362	16.5%
2011	36,000	8,265	352	205	214	7,597	188	667	8.8%	1,019	13.4%
2012	36,000	10,127	517	251	264	9,421	234	706	7.5%	1,223	13.0%
2013	36,000	9,252	461	229	241	8,654	215	598	6.9%	1,060	12.2%
2014	36,000	8,875	485	220	232	8,338	207	538	6.4%	1,023	12.3%
2015	36,680	9,031	512	220	232	8,340	203	691	8.3%	1,203	14.4%
2016	36,990	9,444	569	228	242	8,702	210	741	8.5%	1,310	15.1%
2017	37,010	9,403	478	227	238	8,726	210	677	7.8%	1,155	13.2%
2018	37,500	9,840	710	234	251	8,945	213	895	10.0%	1,605	17.9%
2019	37,595	8,771	554	208	221	8,206	195	566	6.9%	1,120	13.6%
2020	38,110	10,461	765	245	263	9,433	221	1,029	10.9%	1,793	19.0%
2021	38,340	8,931	750	208	225	8,293	193	638	7.7%	1,388	16.7%
2022	38,723	8,514	588	196	210	7,616	176	898	11.8%	1,486	19.5%
2023	39,111	8,450	724	193	209	7,667	175	783	10.2%	1,507	19.6%



**Figure 5: Historic Per Capita Water Production**



Figure 5 shows the City's per capita total (culinary & irrigation only) water production has an overall downward trend from 2010 to 2023. The highest per capita production of water was in 2012 likely due to extreme dry weather. The City's conservation efforts will need to consider the effect of drought and dry weather on water use demands so that future conservation goals can be achieved, even under dry weather conditions. Overall, Figure 5 indicates that since 2010, Murray City has had a downward trend of per capita water sales.

### Current Per Capita Water Use

An analysis of Murray City's current culinary water use was completed. Water use for 2023 is summarized in Table 5.

**Table 5**  
**Water Demands for Existing Conditions**

		<b>2023 (Existing)</b>
<b>Total Water Use (Residential + Non-Residential)</b>	<i>mg</i>	3,175
<b>Residential Population</b>		42,002
<b>Average Day Demand (ADD)</b>	<i>mgd</i>	8.7
	<i>gpm</i>	6,040
	<i>gpcd</i>	207
<b>Peak Day Demand (PDD)</b>	<i>mgd</i>	22.0
	<i>gpm</i>	15,244
	<i>gpcd</i>	523
<b>Peak Hour Demand (PHD)</b>	<i>mgd</i>	31.0
	<i>gpm</i>	21,495
	<i>gpcd</i>	737
<b>Peak Day Factor</b>		2.52
<b>Peak Hour Factor</b>		3,175

### CONSERVATION GOAL WITH MILESTONES

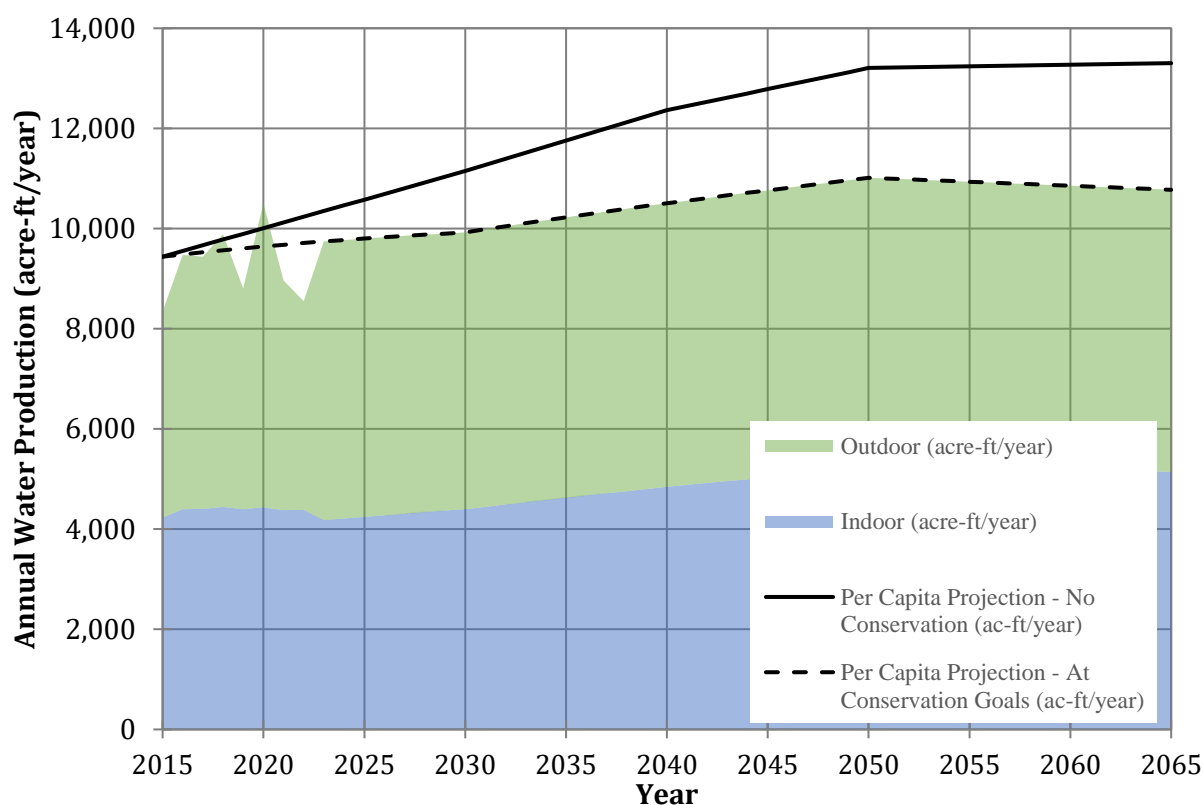
The State of Utah recently adopted regional water conservation goals for the State of Utah that focus on regions of water use driven primarily by dominant river drainages. Murray city is part of the Salt Lake regional area. The adopted goals establish 2015 as the baseline year to compare to for conservation. Murray City's desired conservation goals are summarized in Table 6. Figure 6 shows the City's culinary water projection with and without conservation.

The City recognizes that the per capita goal for 2030 is less than the Salt Lake Regional goal. This is primarily because the City's baseline starting point is significantly higher than the Salt Lake Regional baseline. This may be a result of a large commercial base in Murray City and/or due to larger lot sizes in the City that are typical of the older single family homes within the City. For example, the City's standard for service connections has been 1-inch for many years because smaller services were found to have inadequate capacity for the larger lot sizes. As higher densities are developed within the City, the long-term Salt Lake region goals can be met; but it may take longer to reach proposed goals than for the region as a whole.

**Table 6**  
**Conservation Goal with Milestones Through 2065**

Year	Salt Lake Regional (gpcd)	Murray Per Capita Water Use Goal (gpcd)	Murray Percent Reduction Goal
2015	210	220 <sup>1</sup> (Baseline)	0%
2030	187	196	11%
2040	178	187	15%
2065	169	167	24%

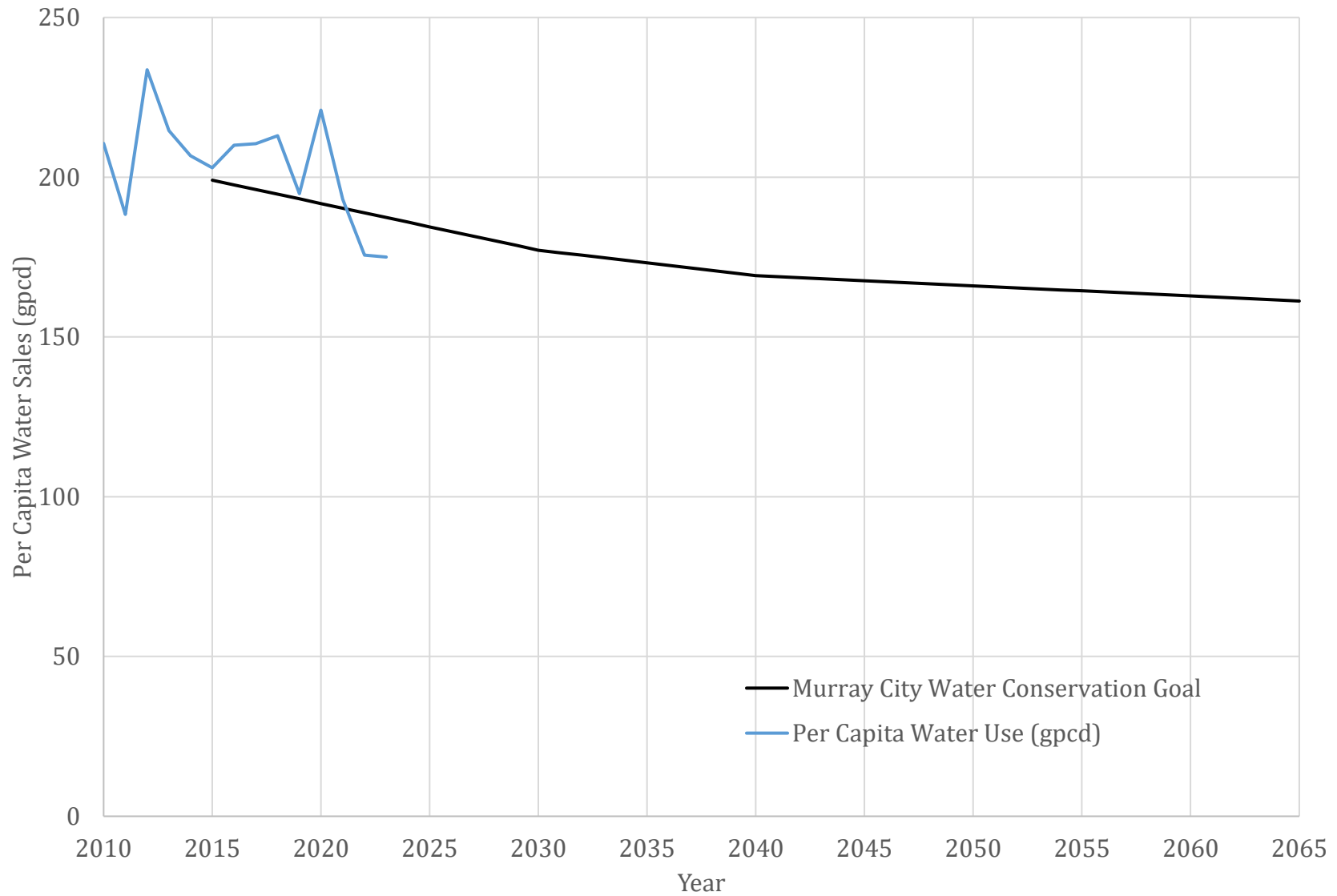
<sup>1</sup> The baseline is based on the City's approximate 10-year average annual demand per capita per day. The 10-year average was used instead of the 2015 annual demand because 2015 was an unusually low water use year for the city.



**Figure 6: Culinary Demand with and without Conservation**

### Measuring Savings from Conservation

Figure 7 shows historic culinary water production on a per capita basis compared to the historic and proposed City conservation goal. As can be seen, Murray City is on track with their per capita conservation goals with some expected variation in dry years. To track how well the City is doing in achieving its conservation goal in the future, the City will continue to annually estimate per capita water demands based on yearly metered sales data and an updated population estimate as a function of new system connections.



**Figure 7: Historic & Future Conservation Goal Per Capita Water Use**

## EFFECT OF CONSERVATION ON FUTURE WATER SUPPLY AND DEMAND

The City has experienced large amounts of growth in the past and Murray City planning personnel estimate an average growth rate of 1 percent for the next 10 years, followed by slow and steady growth until buildout. The historic and projected population estimates for the Murray City water service area are shown in Table 7.

**Table 7**  
**Murray City Historic and Projected Population Estimates**

Year	Murray City Overall Population Projection <sup>1</sup>	Water Service Area Residential Population	Water Service Area Projected Growth Rate
2010	46,746 <sup>2</sup>	34,269 <sup>2</sup>	-
2015	49,250 <sup>2</sup>	36,105 <sup>2</sup>	1.05%
2020	50,637	38,340	1.21%
2025	54,904	42,927	2.29%
2030	57,540	46,969	1.82%
2035	60,241	51,011	1.66%
2040	62,941	55,053	1.54%
2045	69,011	59,095	1.43%
2050	75,080	63,137	1.33%
2055	77,090	64,632	0.47%
2060	79,100	66,127	0.46%
2065	81,110	67,622	0.45%

<sup>1</sup> Population projections are for the City's corporate boundary (larger than Murray Water service area)

<sup>2</sup> Based on 2015 Water Master Plan.

As Murray City continues to develop at higher densities through redevelopment, reductions in per capita demand are anticipated as a result of reduced per capita outdoor demand. This is because outdoor irrigated areas are not anticipated to increase significantly over time and may actually decrease. For the purpose of this conservation and the water master plan, it has been assumed that minor increases in outdoor demands will continue through 2025 and will plateau at approximately 17.6 mgd of peak day outdoor demand.

As housing densities increase within the Murray City Water service area, additional reductions in per capita use are anticipated as a result of reduced per capita outdoor demands and conservation. Figure 8 shows the projected annual demands in the Murray Water Service area through 2065 given indoor demands and outdoor demands. Outdoor demand projections are extrapolated from outdoor demands recorded in 2020 (a relatively dry and warm climate year without major conservation efforts) while accounting for future conservation.

Outdoor conservations efforts alone are expected to reduce per capita demands by 24% to 167 gallons per capita per day between 2015 and 2065. During this time indoor demands increase. Therefore, additional indoor conservation would result in an even lower per capita demand. Table 8 summarizes the existing and future water demands given outdoor conservation efforts. Table 8 also calculates existing and future peak day and peak hour factors. Peak day and peak hour factors are expected to decrease in the future due to outdoor conservation efforts. Peak water demands typically

occur in the summer due to high irrigation demand. If irrigation demands are reduced, because of outdoor conservation efforts, we can expect peaking factors to reduce in tandem.

Table 8 shows the per capita demand for residential and non-residential customers, and the State defined per capita demand using the State of Utah's calculation method. Each calculation method was included in Table 9 because only about half of Murray's total water use is used by residential connections.

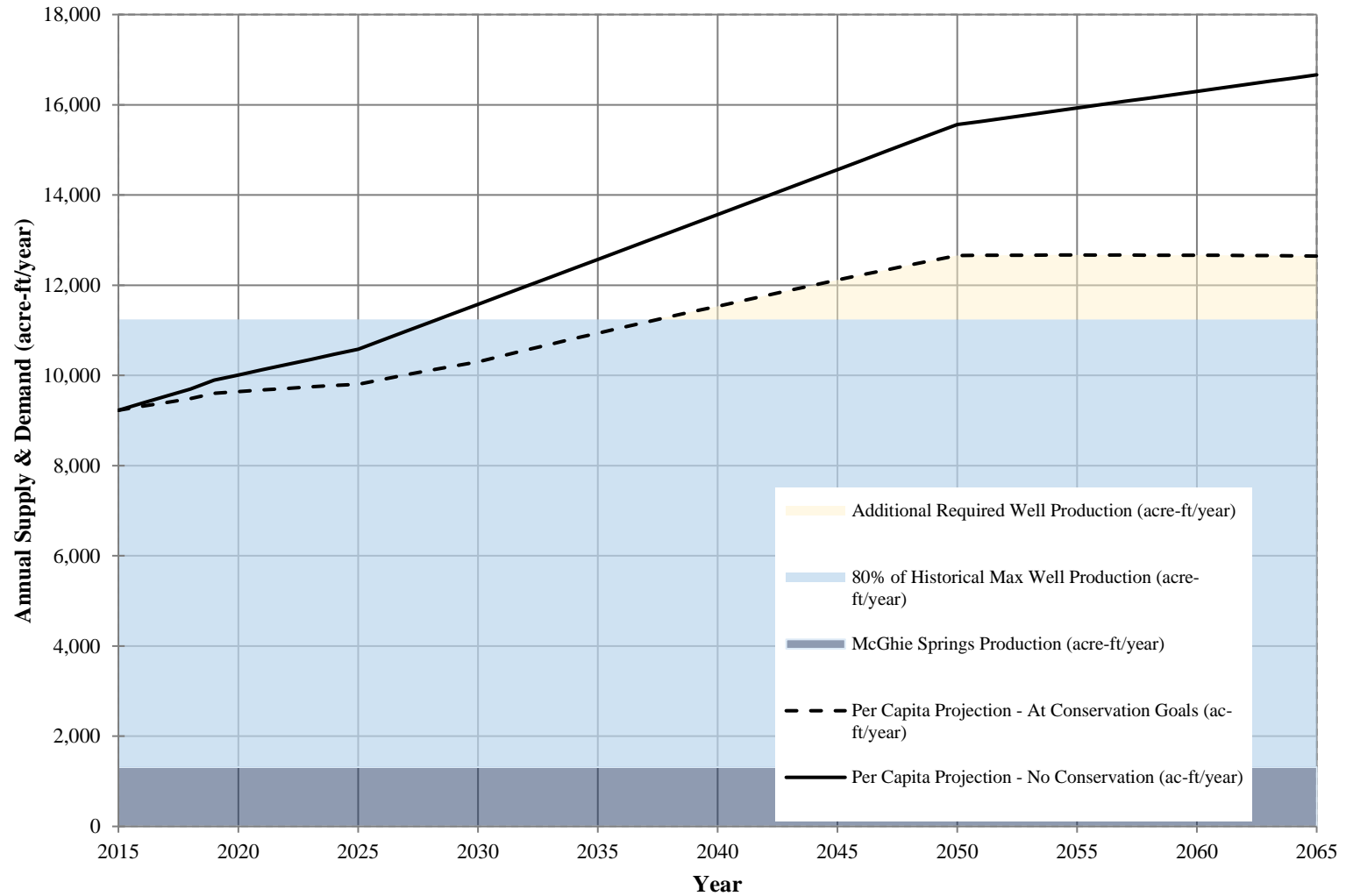
**Table 8**  
**Murray City Historic and Projected Population Estimates**

		<b>2023 (Existing)</b>	<b>2065 (Build Out)</b>
<b>Total Water Use (Residential + Non-Residential)</b>	<i>mg</i>	3,175	4,120
<b>Residential Population</b>		42,002	67,622
<b>Average Day Demand (ADD)</b>	<i>mgd</i>	8.7	11.29
	<i>gpm</i>	6,040	7,839
	<i>gpcd</i>	207	167
<b>Peak Day Demand (PDD)</b>	<i>mgd</i>	22.0	26.20
	<i>gpm</i>	15,244	18,197
	<i>gpcd</i>	523	387
<b>Peak Hour Demand (PHD)</b>	<i>mgd</i>	31.0	36.95
	<i>gpm</i>	21,495	25,657
	<i>gpcd</i>	737	546
<b>Peak Day Factor</b>		2.52	2.32
<b>Peak Hour Factor</b>		3,175	3.16

**Table 9**  
**2022 Water Demands for Residential and Non-Residential Use<sup>1</sup>**

<b>Demand</b>	<b>Residential</b>	<b>Non-Residential</b>
Average Day Demand (gpcd)	150	56
Indoor Demand (gpcd)	61	23
Peak Day Demand (gpcd)	327	123
Peaking Factor (PDD/ADD)	2.18	2.18
Indoor Peaking Factor	1.25	1.25
Peak Indoor Demand (gpcd)	76	29
Average Household Size	2.51	-
Peak Day Demand for Average Household (gpd)	821	-
Peak Day Indoor Demand for Average Household (gpd)	191	-

<sup>1</sup> 2022 data was used in this analysis because a breakdown of residential versus non-residential water use in 2023 was not yet available.



\*McGhie Springs production is based on dry year production (2020) for reliable spring yield.

\*Reliable yield for wells was calculated at 80% of the maximum annual well production for each well between 2017 and 2022. The non-potable Germania well accounts for 612 acre-ft of the reliable well yield.

**Figure 8: Projected Supply/ Demand with and without Conservation**

Because most growth in the City will primarily increase indoor water demands, annual use of well supplies is anticipated to go up as wells will be used more throughout the year to meet indoor demands. This is shown in Figure 8 as densities increase in the City and annual demands increase with residential and nonresidential indoor demands. Fortunately, peak day demands are not anticipated to be above available peak day supply. With the implementation of their conservation goals (Table 6) the City has sufficient supply for their projected demands. Although the City has sufficient water rights for predicted increases in annual demand, there is still concern about groundwater sustainability over time.

Conservation will help the City be better prepared for potential supply reductions associated with climate change, groundwater depletion, and/or drought years. Figure 8 illustrates why water conservation is essential to Murray City's long-term water supply plan.

## **WATER CONSERVATION PRACTICES**

The following sections document both existing and proposed water conservation practices in the City. To organize the information, each section groups conservation practices by the following major conservation categories:

- Conservation Public Awareness Practices
- Education and Training Practices
- Rebates, Incentives, and Rewards
- Ordinances and Standards
- Water Pricing
- Improvements to Physical System

### **Current Conservation Practices**

Each water conservation program that Murray City is currently implementing is discussed in detail below (organized by major conservation categories):

#### **Conservation Public Awareness Practices:**

- ***Elementary Education Program (Water Wise Kids)*** – Murray City has partnered with the National Energy Foundation (NEF) to implement a water wise education program for all 4<sup>th</sup> grade students in the Murray School District. The program includes classroom presentations to these students on water and conservation. The City provides the students with a take home water kit that includes toilet leak detector tablets, a dual spray swivel aerator and a shower timer. The City also holds a drawing contest that coincides with the WaterSense “Fix a Leak Week” that the students participate in and awards prizes to winners from each of the schools. The overall winner of the contest wins a pizza party for their entire class. Participating teachers have evaluated this program with very high reviews and responded that they would conduct this program again and recommend it to their colleagues.
- ***“Tap Into Murray Quality” Campaign*** – Murray City's ongoing “Tap Into Murray Quality” campaign has helped the City develop and maintain a relationship with its customers so they can better understand the quality of the water and the services they are receiving. A large part of this campaign includes conservation activities.
- ***Public Outreach Booths*** – The City's water department is actively involved in providing public outreach booths at various community events including the Farmers Market, youth soccer games or sporting events, 4<sup>th</sup> of July activities and other local activities. The City uses



these opportunities to distribute water conserving materials and educate the community members about conservation and the City's water system.

- **Earth Day** – Each year to help celebrate Earth Day the City holds an event for 4<sup>th</sup> grade students and teaches the kids ways they can help conserve water around their home. After a short presentation, the students receive water bottles and backpacks with the City's conservation logo on them.
- **WaterSense Program Partner** – WaterSense is a voluntary partnership program created by the United States Environmental Protection Agency (EPA) with a goal of protecting the nation's water supply by promoting and enhancing the market for water-efficient products and services and consistently spreading the message of water efficiency. Murray City has utilized many of the tools provided by WaterSense. The City also participates in many of the events including Fix A Leak Week and Shower Better Week.
- **Consumer Confidence Report** – Each year, water conservation information is included in the consumer confidence report. This report is sent to all Murray City customers and is posted on the City's web site. The report also includes information on the City's water sources, water quality information, and conservation tips.
- **Online/Social Media** – The City's website provides information about conservation as well as links to other conservation-oriented websites. Conservation messaging is also posted on and distributed through social media.
- **Water Wise Landscaping** – Many of the City's landscapes have been converted to water wise landscaping. The increased use of water wise landscaping and the installation of rain sensors has helped the City conserve water and demonstrate outdoor water conserving practices.
- **Water-Waster Notification Program** – The City maintains a water-waster notification program where citizens can call in and report an observed water-waster. As water wasters are identified, an employee of Murray Water Department contacts the customer and provides tips on indoor and outdoor water conservation to help the customers reduce their usage.
- **High Consumption Notices** – The City sends "high consumption/possible leak" notices to customers when their monthly consumption is higher than normal.

#### **Education & Training Practices:**

- **Fix a Leak Week** – For Fix a Leak Week the City partnered with Lowe's and local plumbers to help encourage residents to find and fix water leaks. As part of Fix a Leak Week the City set up a public outreach booth at Lowe's to advertise the WaterSense Rebate Program and gave away WaterSense labeled toilets, faucets, and shower heads. The City distributed leak test kits for toilets, Murray City Water t-shirts and water bottles. The City also partnered with local plumbers who gave special discounts to customers and encouraged community members to take advantage of the rebate program.
- **Shower Better Month** – As part of Shower Better Month the City had showerhead giveaways, encouraged residents to replace inefficient showerheads and take advantage of our WaterSense Rebate program.

#### **Rebates, Incentives & Rewards:**

- **WaterSense Rebate Program** – The City actively participates in the WaterSense Rebate Program. Rebates are valued at \$150 per toilet and \$25 per showerhead for customers who replaced their existing toilet/showerhead with a new EPA WaterSense labeled version. Over

the years customers have taken advantage of the rebates and have replaced 332 toilets and 86 for shower heads with new, more efficient ones.

- ***Flip Your Strip Program*** – This program encourages the removal of turf grass in parking strips as the primary landscape feature. Replacement of turf with more drought tolerant options is encouraged. Eligible customers can receive a discount of \$1.50 per square foot of converted park strip.
- ***Utah Rivers Council's RainHarvest Program*** – The City has partnered with Utah Rivers Council RainHarvest program to reduce the cost of the rain barrels for their residents. This program encourages community members to collect rainwater, reduce culinary water use and improve water quality of rivers, streams, and lakes.
- ***Toilet Replacement*** – Residents can receive up to \$150 by replacing an old toilet (manufactured before 1994) with a WaterSense labeled toilet.
- ***Smart Controller*** – Residents can receive a rebate up to \$100 when they purchase an eligible WaterSense labeled smart controller. Smart controllers encourage conservation by automatically adjusting landscape watering based on local weather and landscape conditions.
- ***Showerhead*** – Residents can receive rebates of up to \$25 per showerhead when replacing a showerhead with a new EPA WaterSense labeled version. The use of WaterSense labeled showerheads conserves water at the use point.
- ***Turf Trade*** – The City started its participation in this program in 2024. Murray City provides offer Turfgrass Water Conservation Alliance (TWCA) seed to our residents at cost. This grass seed requires 30% less water than typical Kentucky Bluegrass. Residents can purchase this from Murray City Water every Friday from the first Friday in April through the last Friday in September. In 2024, 211 residents participated and 620 five lb bags of seed were distributed, enough to replace over 7 acres of typical Kentucky Bluegrass.

### **Ordinances & Standards:**

Murray City has some existing ordinances intended to encourage water conservation:

- ***Ordinance 13.08.140: Executive orders of mayor Limiting Use of Water*** – This ordinance states that in the event of scarcity of water, the Mayor has the power to place restrictions on water use and provide penalties for those not in compliance.
- ***Ordinance 13.08.120: Wasting Water Prohibited*** – This ordinance prohibits the pressurized irrigation of landscape between the hours of ten o' clock (10:00) A.M. and six o' clock (6:00) P.M. any violation of this ordinance results in a penalty for those not in compliance.

### **Water Pricing:**

- ***Tiered Water Pricing Schedule*** – In 2018 the City established a new tiered rate structure to encourage water conservation (full rate schedule is in Figure 3). All water connections are charged a monthly base rate based on the meter size with no monthly water allowance included in the base rate. Each tier in the structure charges a higher rate based on the quantity of water being used.

**Improvements to Physical System:**

- **Mainline Replacement Program:** Murray City has repaired and replaced 1 percent of Murray City's distribution pipe network on an annual basis.
- **Upgraded SCADA Control System:** There are continuous improvements to the SCADA system to increase the overall water system operating and reporting efficiency. The City is currently transitioning their Automated Meter Reading (AMR) system to an Advanced Metering Infrastructure (AMI) system. Completion of this project is underway to be completed by 2025. AMI systems automate collection of meter data around the City and can actively measure use, identify leaks, and educate customers on use. Generally, AMI technology can help encourage water conservation more for each customer by helping customers proactively monitor water use. The customer portal provides 24-hour leak detection notifications to customers.
- **Smart Controls:** Some City -owned landscapes have been equipped with smart controls. Smart controls automatically adjust the time and frequency a landscape is irrigated based on local weather and landscape conditions to reduce waste.
- **Rain Sensors** – Some City-owned landscapes have been equipped with rain sensors. These devices can detect rainfall events and send messages to the central control computer, indicating how much precipitation has been received at the site and can terminate a watering cycle when the precipitation makes irrigation unnecessary.

**New Conservation Practices Planned for Implementation**

There are several new conservation practices that the City has either recently started to implement or will implement in the next five years. The following sections describe each conservation practice and Table 10 summarizes the implementation schedule, estimated costs, and measurement of progress for each practice.

**Conservation Public Awareness Practices:**

- **Public Outreach.** Murray City plans to maintain existing programs including:
  - Active participation and outreach at community events such as the 4<sup>th</sup> of July and Earth Day activities
  - Elementary Education Program (Water Wise Kids)
  - WaterSense Program Partner
  - Consumer Confidence Report
  - Social Media Updates
  - Water Waster Notification Program
  - High Consumption Notices
- **Water Conservation Plan** – Update the Water Conservation Plan by 2029 in adherence with ordinances to update water conservation plans every five years.

**Education & Training Practices:**

- **Public Education Efforts.** Public education efforts will consist of maintaining the existing programs including:

- Shower Better Month

### **Rebates, Incentives & Rewards.**

- **Potential Rebates** – Murray City plans to maintain existing rebate, incentive, and reward programs including:
  - Flip Your Strip
  - Utah Rivers Council's RainHarvest program
  - Toilet Replacement
- Smart Controller
- Shower Head

### **Ordinances & Standards:**

- **Utah Water Savers Program Efficiency Standards.** Murray City Council has had discussions on whether to adopt the Utah Water Savers Program efficiency standards. These standards encourage the use of native landscaping to decrease the outdoor water demands and aid in water conservation. These standards should be reconsidered.
- **Minimum service size.** Murray City to consider a new ordinance to allow and promote 3/4" meters and services for Multifamily units with no irrigation responsibilities. The City's current minimum service size for new development is 1". This has the following benefits:
  - Customers who share the cost of water via master meters are not able to correct water wasting behaviors or leaks because they do not know or cannot quantify if they are wasting water.
  - Billing each meter allows individual users to benefit from conservation or conversely pay for higher use if they are a high-volume user.

### **Water Pricing:**

- **Update Tiered Water Rate Pricing to Further Incentivize Conservation** – Murray City currently has a tiered water rate structure that encourages conservation. This water rate has not been updated since 2018 and a new water rate study needs to be completed to ensure that the pricing of the water system is self-sustaining for the water utilities.

### **Improvements to Physical System:**

- **AWWA Water Audit Program** – Participate in the AWWA Water Audit Program. This program helps water suppliers quantify system water loss and associated revenue losses. The City will participate in at least one additional water audit by 2026.
- **Pipe Replacement Program:** Replace and repair 1 percent of Murray City's distribution pipe network on an annual basis so that the entire system is replaced within the 100-year service life of a pipe network.
- **Well Sustainability Study** – Murray City plans to conduct a well sustainability study specifically to determine a reliable aquifer yield to ensure no serious aquifer depletion is occurring. Wells are the main source of water supply in Murray City and as such ensuring sustainable use of aquifer is paramount to water supply for future growth.
- **Investigate Leak Detection Technologies** – Murray City will meet with advanced leak detection equipment vendors to explore options to identify leaks via new technologies. A budget or plan will be created if research shows merit to available options.

**Table 10**  
**Implementation Schedule, Estimated Costs & Measurement of Progress**

<b>New Conservation Practices</b>	<b>Implementation Timeline</b>	<b>Estimated Cost</b>	<b>Measurement of Progress</b>
Maintain Public Outreach Programs	Ongoing	Varied	Completion of any of the listed activities (See New Conservation Practices)
Water Conservation Plan	Complete by 2024 & 2029	\$10,000	Completion of Report
Public Education Efforts	Ongoing	Varied	Completion of any of the associated tasks recommended (See New Conservation Practices)
Promote Rebates	Ongoing	Varied	Complete any of the associated tasks recommended (See New Conservation Practices)
Utah Water Savers Program Efficiency Standards	Complete by 2029	\$0	Ordinance adopted
Water Rates Study	Complete by 2024	\$20,000	New adopted water rates
AWWA Water Audit Program	Complete by 2026	\$5,000	Completed audit score and record
Pipe Replacement Program	Ongoing	\$3 million/year	Completion of associated tasks recommended (See New Conservation Practices)
Leak Detection technology Investigation	Complete 2025	\$0	Meet with at least three vendors
Well Sustainability Study	Complete by 2029	\$70,000	Completion of aquifer reliable yield report

## **WATER CONSERVATION COORDINATOR**

All water conservation coordination, implementation, monitoring, and reporting initiatives set forth by the department are assigned to the Water Division of the Murray City Public Works Department.

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This plan was prepared by Bowen Collins & Associates at the Draper office with feedback from City staff:

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