

Providence City Corporation

40-Year Water Rights Plan



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PURPOSE OF STUDY

As Providence City (“the City”) continues to grow and expand, it becomes more critical to protect the City’s water rights to ensure adequate future water supply. The City requested that CRS Engineers evaluate the existing water rights in an effort to preserve the City’s existing resources. This report is also intended to provide the City with a long-term plan to guide the City in protecting existing water rights and obtaining new rights as necessary.

REGULATORY REQUIREMENTS

The Utah State Legislature, with the passage of H. B. 51 in 2008, provided a mechanism for public water suppliers to protect their water rights to meet the reasonable future needs of the public. Utah Code, Sections 73-3-12(2)(a) and (4)(b) and, 73-1-4(2)(f) provide the criteria under which the State Engineer may grant an extension of time beyond 50 years.

More specifically, Section 73-3-12(2)(a) and (4)(b) stipulates:

- (2)(a) *Within the time set by the state engineer under Subsection 73-3-10(5), an applicant shall:*
- (i) *construct works, if necessary;*
 - (ii) *apply the water to beneficial use; and*
 - (iii) *file proof with the state engineer in accordance with Section 73-3-16.*

And,

- (4)(b)(i) *The state engineer may extend the time in which the applicant shall comply with Subsection (2)(a) by setting a date after 50 years from the day on which the application is approved if the applicant:*
- (A) *is:*
 - (I) *a public water supplier; or*
 - (II) *a wholesale electrical cooperative; and*
 - (B) *provides information that shows the water applied for in the application is needed to meet the reasonable future requirements of the public.*
- (ii) *The information provided by a public water supplier shall be in accordance with the criteria listed in Subsection 73-1-4(2)(f).*

- (c) *The state engineer shall extend the time in which to file proof by setting a reasonable date after 50 years from the day on which the application is approved if the applicant:*
- (i) *meets the requirements in Subsection (4)(b); and*
 - (ii) *has:*
 - (A) *constructed works to apply the water to beneficial use; or*
 - (B) *made substantial expenditures to construct the works.*

And further, Section 73-1-4(2)(f) stipulates:

- (2)(f)(i) *The reasonable future water requirement of the public is the amount of water needed in the next 40 years by:*
- (A) *the persons within the public water supplier's projected service area based on projected population growth; or*



- (B) other water use demand.*
- (ii) For purposes of Subsection (2)(f)(i), a community water system's projected service area:*
- (A) is the area served by the community water system's distribution facilities; and*
 - (B) expands as the community water system expands the distribution facilities in accordance with Title 19, Chapter 4, Safe Drinking Water Act.*

SUMMARY OF PROVIDENCE WATER RIGHTS/WATER SHARES

Providence City has 20 active water rights and owns shares in 3 irrigation companies. The City has reached agreements with multiple irrigation companies enabling the City to take water directly out of Broad Hollow Springs for use in their culinary water system. This has allowed the City flexibility to meet the changing needs of the residents. These agreements are summarized in Table 1 and Table 2 along with additional information pertaining to each water right and irrigation company shares.

The status column shows which rights have been certificated, which still require proof of beneficial use and which rights are water claims. Water claims pre-date the requirement to submit proof of beneficial use and thus are not subject to the same certification process. It is important that the City continue to track each right and provide the proper documentation to submit proof for each right. The point of diversion, priority date, diversion rate, volume restrictions, and number of shares are also provided in Tables 1 and 2. Additional information for each right can be found in Appendix A.



Table 1: Summary of Water Rights

Water Right #	Status	Diversion (cfs)	Volume (Acre-Feet)	Point of Diversion	Period of Use	Description	Priority
25-3426	Proposed Determination	3	-	Broad Hollow Spring	Nov. 1-Apr. 1	Winter Use Municipal Water	1961
25-4153	Water Users Claim	1.5	-	Dale's Well	Year Round	Municipal Water	1963
25-5055	Water Users Claim	1.63	-	Dale's Well	Year Round	Municipal Water	1970
25-8706	Certificated	1.33	-	Dale's Well	Year Round	Municipal Water	1985
25-9269	Proof Due 01-31-2021	3.17	-	unnamed well, Last Chance Spring, and Jay's Well	Year Round	Municipal Water	2016
25-8859	Certificated	1.225	-	Alder Well	Year Round	Municipal Water	1987
E844*	Kimball Decree	1.5	-	Broad Hollow Spring	Apr. 1-Sep. 30	Exchange from BSF to Broad Hollow for Municipal Use	1974
a30283**	Proof Due 08-31-2020	2	432	Future Well	Year Round	Municipal Use	2005
25-10509	Proof Due 03-31-2022	-	25	Cemetery Well/Future Well	Year Round	Municipal Use & Cemetery Irrigation	2016
25-4147	Proof Due 08-31-2019	2	159.73	Future Well	Year Round	Municipal Use	2014
25-3374	Water Users Claim	0.2	12	Cemetery Well	Year Round	Cemetery Irrigation	1962
25-6853	Proof Due 10-31-2025	0.078	5.97	Cemetery Well	Year Round	Cemetery Irrigation	2011
25-11417***	Proof Due 01-31-2021	-	620.7	Broad Hollow Spring	Apr. 1-Oct. 31	Municipal Use only in April and October. Irrigation can be used the rest of period.	2016

* The City exchanges 1.5 cfs of Blacksmith Fork irrigation water for 1.5 cfs of culinary water from Broad Hollow Springs.

** Includes Base Water Rights 25-4462, 25-7121, 25-10510, 25-10511, 25-10512, 25-10513, 25-10514, 25-10524

*** The City can take Spring Creek Water Co. water out of Broad Hollow Springs during April and October, and any remaining water can be used for irrigation from May through September.



Table 2: Summary of Irrigation Shares

Diversion per Share	Volume (AF)	Period of Use	Agreement # of Shares
2.73	630.17	Apr 1-Oct 31	227.35
2.18	911.64	Apr 1-Sep 30	250.13
2.77	4.16	Apr 1-Oct 31	0.00

Irrigation Company	Total Shares	Diversion per Share (AF)	Volume (AF)	Period of Use	Agreement # of Shares	Agreement Quantity (AF)	Agreement Diversion Rate (cfs)	Remaining Shares	Remaining Volume (AF)
Spring Creek Irrigation Company*	230.83	2.73	630.17	Apr 1-Oct 31	227.35	620.67	0	3.48	9.50
Providence Blacksmith Fork Irrigation Company**	418.8	2.63	1101.44	Apr 1-Sep 30	207.02	544.46	1.5	211.78	556.98
Providence Pioneer	1.5	2.77	4.16	Apr 1-Oct 31	0.00	0	0	1.5	4.16

* 227.35 shares can be taken out of Broad Hollow Springs during April and October per Water Right 25-11417

** 1.5 cfs can be taken out of Broad Hollow Springs in exchange for water from the Blacksmith Fork Irrigation Company per E844



HISTORIC WATER USE

Providence City’s culinary water system is supplied primarily by three active groundwater wells and the Broad Hollow Spring. The City provides culinary water for indoor and outdoor use to most of the residents. Providing both indoor and outdoor users with a single system puts a significant demand on the system during summer months. However, the City also has water shares in 3 irrigation companies. This additional irrigation water is used to help offset the summer peaks, but due to limited facilities, can only service certain areas of the City. The City’s historic water production is shown in the figure below. Data was not available for all years; however, historic trends were used to estimate water usage for those years.

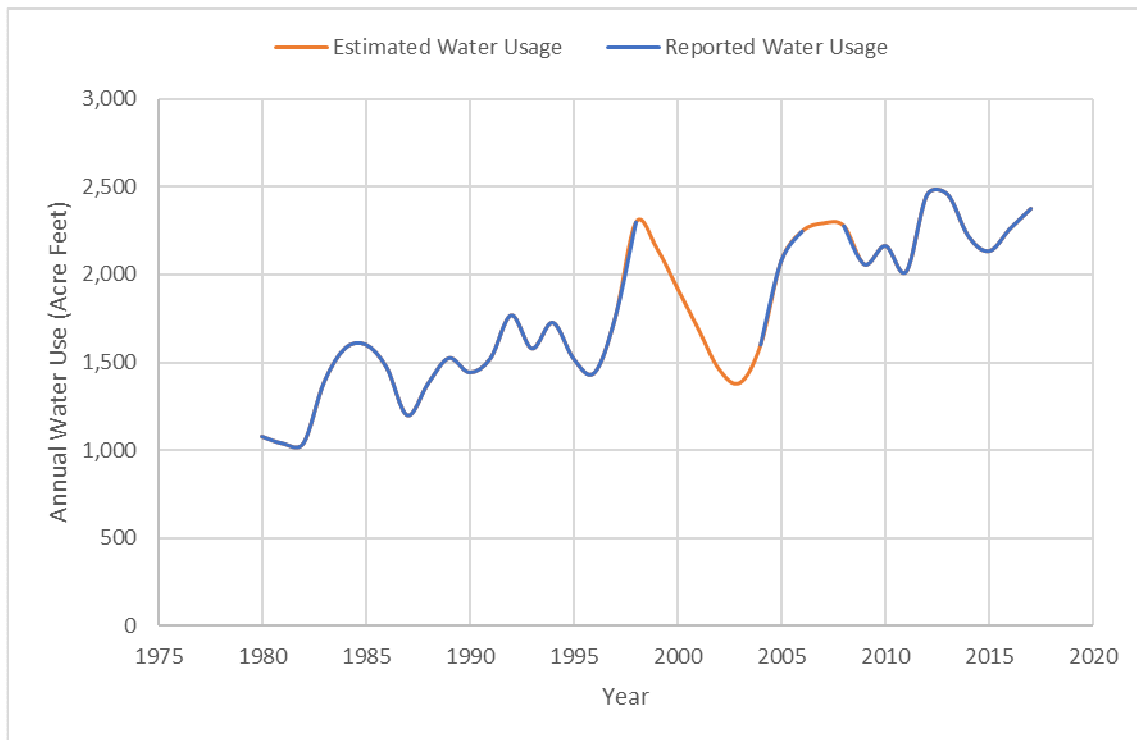


Figure 1: Historic Water Use

As can be seen in Figure 1 above, water production varies from year to year based on variations in temperature and precipitation. Even with the cyclical nature of water use in the City, it is evident that water usage in the City has increased over the past 40 years. By combining this information with the historic populations, water use per capita can be determined. Figure 2 below shows the historic per capita water use.

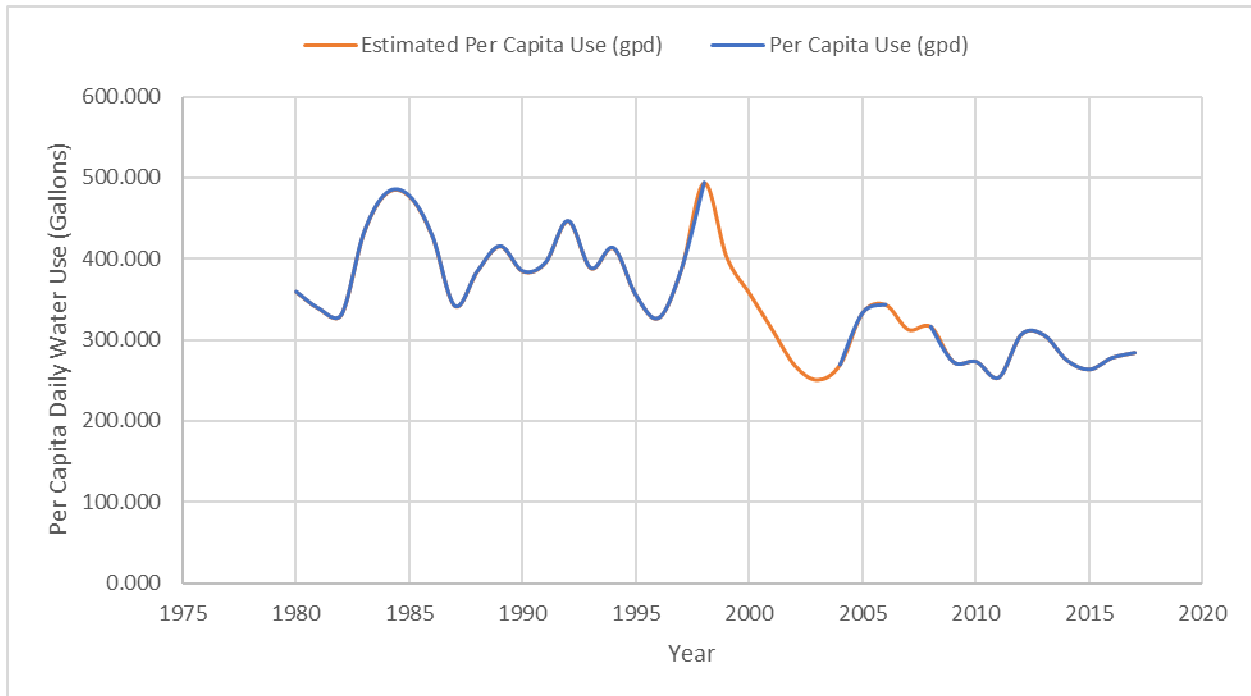


Figure 2: Historic Use Per Capita

As can be seen in Figure 1 and Figure 2, as historic production has increased, water use per capita has decreased. This is consistent with trends seen across the state in this time frame, especially as the message of conservation has become more publicized. The highest recorded use per capita was in 1998 at about 494 gallons per capita per day (1,710 gallons per connection per day). The lowest recorded use during this time was in 2011 at about 253 gallons per capita per day (885 gallons per connection per day) and the average over the last 38 years has been about 353 gallons per capita per day (1,278 gallons per connection per day).

POPULATION PROJECTIONS

In addition to water use patterns we also need to understand population growth. Existing populations are based on the Census Bureau’s population estimates that were provided to the City. Build out projections were calculated using projections from the Governor’s Office of Management and Budget. Figure 3 shows the historic and projected populations for Providence City.

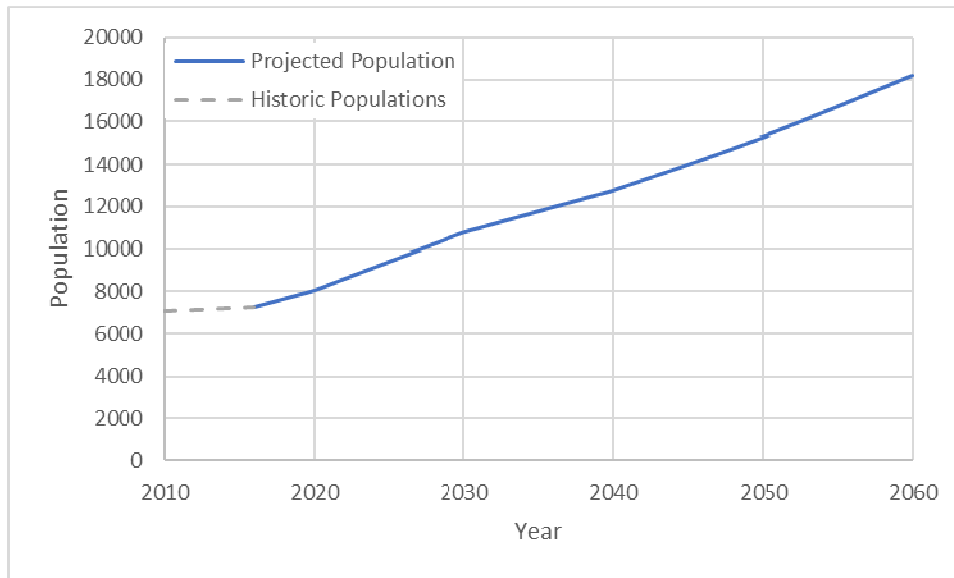


Figure 3: Population Projections

WATER DEMAND PROJECTIONS

Water demands were estimated based on historic water production within the City. Per capita water usage for each month was collected and used to project future water demands. Water demand varies from year to year based on weather patterns. For this reason, we have shown the minimum, maximum, and average water production data in Figure 4. Water production is projected to vary from 4,435 to 6,829 acre-feet per year over the next 40 years.

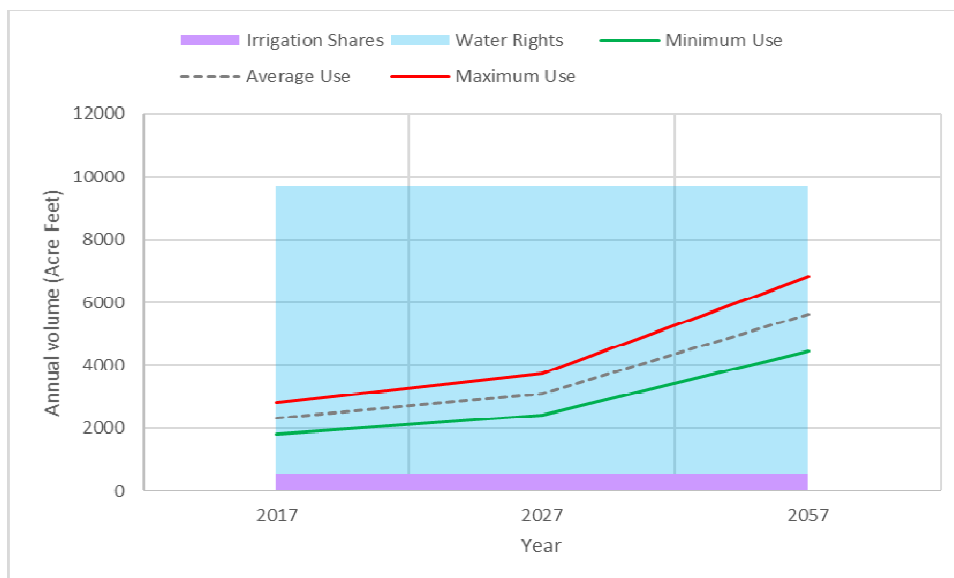


Figure 4: Water Demand and Water Right Comparison



Providence City has used approximately 21-25% use of its total water rights annually since 2009. As the City continues to grow it is important to determine whether the City has enough water rights for the built-out population. Figure 4 shows the City’s current rights compared to the projected water demands over the next 40 years. Currently, the state engineer does not closely monitor or require reporting on cfs limitations for water rights. Most of the City’s water rights are only limited by flow rate and have no volume restrictions. It is anticipated, that as the City files change applications on its rights, annual acre-foot limitation restrictions will be added. Water rights without a volume restriction are shown in Figure 4 as the maximum volume allowed at that flow rate.

WATER DEMANDS ADJUSTED FOR SEASONAL USE

Water usage in the City varies significantly throughout the year due to outdoor water usage. On average winter months in Providence use approximately 5-7 times less water than the peak summer months. As stated previously, most of the City’s water rights do not have an annual volume restriction; however, it is not currently feasible for the City to store such large quantities of water during the winter months for use during the peak summer months. For this reason, it is important that we look at seasonal usage in addition to annual volumes. Seasonal demands vary based on differences in the climate from year to year. Based on historic water usage, an average and max use was calculated per capita for each month as shown in Table 3. Using these values, and population projections future water demands were projected and compared to existing seasonal water rights and City shares in irrigation companies. The results of this comparison can be seen in Figure 5.

Table 3: Historic Monthly Per Capita Water Usage Summary

Month	Minimum Use (gal/month)	Average Use (gal/month)	Maximum Use (gal/month)
January	3,071	3,468	3,715
February	2,878	3,226	3,459
March	3,003	3,449	3,930
April	2,572	3,789	5,075
May	3,956	7,361	11,747
June	9,840	14,517	18,037
July	18,207	20,793	23,955
August	13,849	18,864	21,952
September	11,612	13,022	14,617
October	4,700	5,917	7,856
November	2,791	3,239	4,079
December	3,033	3,527	3,991

* Data is based on the City's annual water production data from 2009-2017

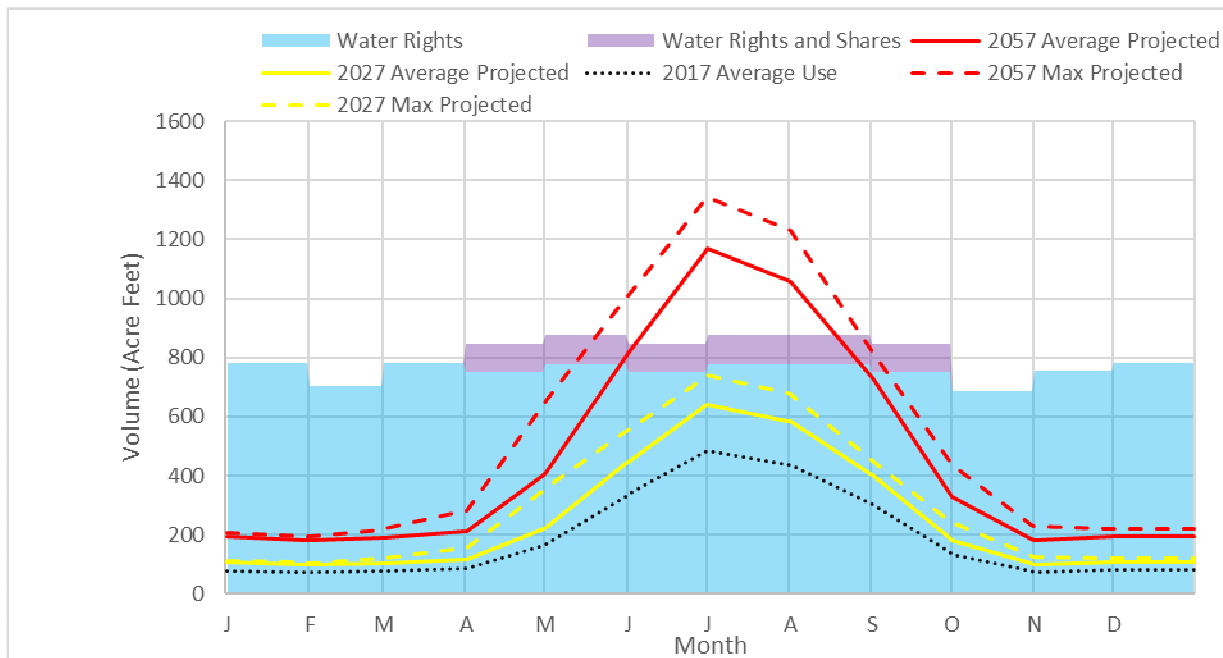


Figure 5: Seasonal Water Demand and Water Right Comparison

Figure 5 shows that the City has adequate water rights to meet the current water demands of the City. However, based on average water usage, it is projected that by 2043 the City will require additional water rights to meet growing demands. Using the maximum historic water usage data, the City would run out of water by 2035. Based on this analysis, the City has done a good job of obtaining water rights to provide for growth in the City for the next several years. However, the City will need to continue to obtain additional water rights to meet the long-term growth of the City. One way to do this is for the City to obtain additional shares in local irrigation companies (which only provide water during summer months) to help meet the peak demand during the summer months. This would be particularly true if the City adds more secondary/irrigation systems to take pressure off the culinary system.

In addition to obtaining more water rights, the City may also be able to manage existing water rights that are quantified by volume to better meet the seasonal water demands throughout the City. This could be done if water rights with volume restrictions were used over the few months of peak usage, rather than averaged over the entire period of use. By doing this, the City could better meet the seasonal peak summer demands. Figure 6 shows an example of how this could work. Adjusting how the City uses its water rights may add flexibility to meet peak water usage. However, the City will still require additional water rights to meet the projected demands over the next 40 years.

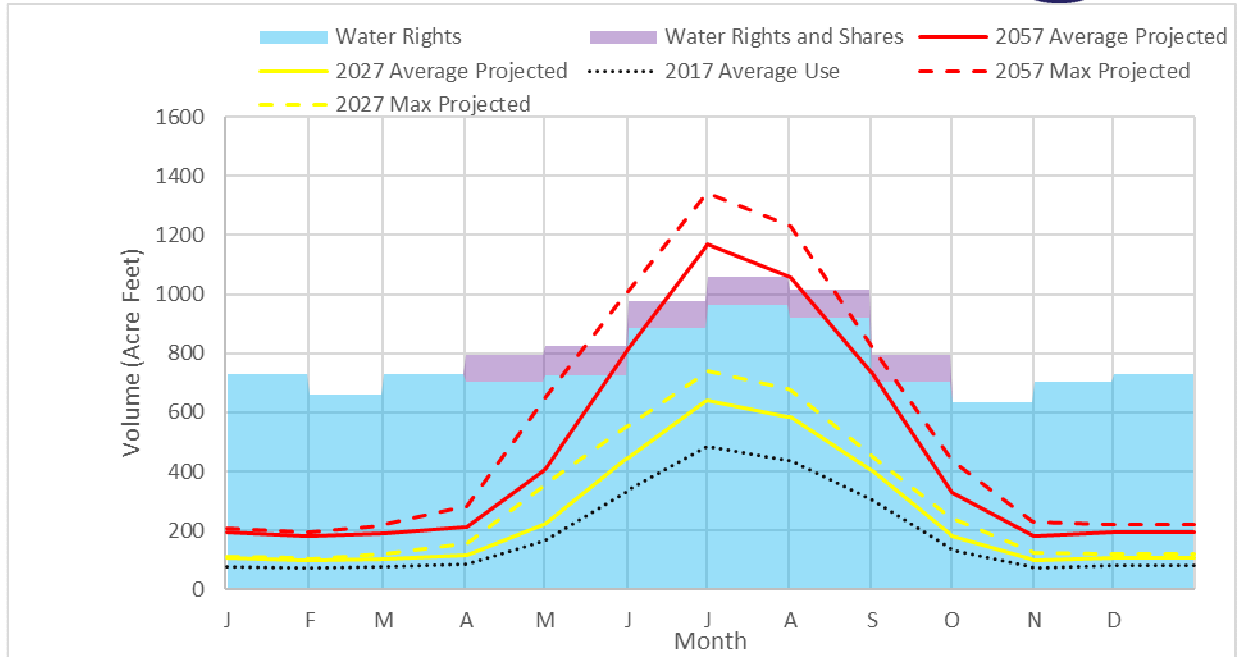


Figure 6: Seasonal Water Demand and Water Right Comparison



CONCLUSIONS AND RECOMMENDATIONS

The City has done a good job obtaining water rights and shares to plan for future growth and development throughout the City. The City currently has enough water rights to meet water use projections through 2035 based on historic maximum water usage or 2043 based on historic average water usage. This is a good place for the City to be as it allows the City time to continue to obtain new water rights to meet the demands for future development even if the climate remains drier.

However, based on the findings of this report, the City will need approximately 110-470 acre feet of additional water to meet the projected demands over the next 40 years. Table 4 summarizes the different scenarios that were considered in this report and are shown in Figures 5 and 6.

Table 4: Additional Water Right Acquisition Scenarios

Scenario	Projected New Water Rights (AF)
Average Demand with Standard Use (Figure 5)	292.2
Max Demand with Standard Use (Figure 5)	468.6
Average Demand with Adjusted Use (Figure 6)	109.3
Max Demand with Adjusted Use (Figure 6)	285.7

We recommend the City continue to follow the current City ordinance which requires the developer to provide water rights to meet the demands of new development. Continuing this process is a good way for the City to obtain the needed water rights for future development while continuing to monitor water use trends.