



Prepared for:

Goshen Valley Local District

Prepared by:

Bowen, Collins & Associates

Goshen Valley Local District 40-Year Plan

Date: July 2023

GOSHEN VALLEY LOCAL DISTRICT

40-YEAR PLAN

July 2023

(Stamped January 2024)



Prepared For:

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**GOSHEN VALLEY
LOCAL DISTRICT**

**BOWEN COLLINS
& ASSOCIATES**

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INTRODUCTION

UTAH CODE

Utah Code 73-2-12 outlines the limitations and requirements for the extension of time on water rights held by water supply entities. Of specific focus for this report are sections 73-3-12 (4)(b)(i) & (ii) which allow an extension beyond 50 years for a public water supplier if sufficient proof is demonstrated regarding the need for the water to meet the reasonable future needs of the public for 40 years using the criteria of 73-1-4 (2)(f). Paragraph 73-3-12 (4) reads as follows:

- (4) (a) If the works are constructed with which to make beneficial use of the water applied for, the state engineer may, upon showing of that fact, extend the time in which to file proof by setting a date after 50 years from the day on which the application is approved.
- (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

Under the code, public suppliers can obtain an extension beyond 50 years to meet the reasonable future water requirements of the public without the risk of lapsing for lack of diligence, as long as the water is not in excess of the projected quantity of water it needs within the next 40 years by persons within the projected service area of the supplier. Water in excess of that requirement remains potentially vulnerable to forfeiture.

DOCUMENT PURPOSE

The purpose of this report is to document the 40-year water supply plan for the service area of Goshen Valley Local District (GVLD) with the particular focus on the use of the District's water assets in that plan. Bowen, Collins & Associates (BC&A) was hired to evaluate the supply and demand of GVLD and use this as the basis to prepare this 40-year plan.

40-YEAR PLAN

PROJECTED DEMAND

Projected demand in GVLD was estimated by determining the future service area, growth rate, and use rates for the area. A detailed description of the process used to project demands is contained in Appendix 1 (*Goshen Valley Local District 40-year Water Rights Plan – Projected Demands*, 18 July, 2023, BC&A). Major results and conclusions from this evaluation are as follows:

- The future projected service area is bound by the Tintic Mountains on the south and west, by Currant Creek on the east, and the Clyde Knoll on the north. This service area can be seen on Figure 1 in Appendix 1.
- The growth in GVLD is based on a 2015 *Utah School and Institutional Trust Land Administration (SITLA) and Farmland Reserve, Inc* study which showed significant growth in GVLD beginning around 2030 and growing steadily until the area approaches buildout conditions.
- The study split water use into four categories: residential, retail, office, and industrial. Water use was estimated for each of these categories for indoor, outdoor and process water needs.
- The analysis resulted in a total demand in 2065 of 19,455 acre-feet as shown in Table 2 and Figure 1 in Appendix 1.

While the projected demands from this memorandum provides a starting point, correctly identifying planning demand for this 40-year plan must also consider future conservation and water source reliability and redundancy.

CONSERVATION

Projections contained in the demand memorandum are based on historical observed patterns of demand. With limited water resources available, the State of Utah has placed significant emphasis on reducing demands in the future. To account for this effort, planning demands in the GVLD service area should reflect reasonable reductions in water use that will come through conservation. Table A shows the recommended conservation percentages that will be used for planning in the GLVD service area as part of this analysis. The recommended conservation percentages are based on the State of Utah Regional Conservation Goals with adjustments for the type and nature of development expected to be seen in GVLD.

Table A
Goshen Valley Local District Conservation Goals

Conservation Year	Conservation Percent
Conservation Goal by 2030	11%
Conservation goal by 2040	15%
Conservation goal by 2065	19%

RELIABILITY AND REDUNDANCY

In addition to accounting for conservation in this 40-year plan, projected demands must incorporate a variability factor to account for potential risk, unforeseen changes, and other factors that can affect system supply. Many of these factors are difficult to quantify, and when taken singly or combined can have a significant impact on the ability to meet demands. Factors that should be considered when assessing the reliability of water resources include the following:

- **Storage Variability** – A major portion of the District’s water supply comes from storage in Utah Lake and Mona Reservoir. The availability of water from storage from year to year is a function of at least three issues. First, available storage is a function of upstream runoff and is subject to the variability of streamflow. Second, available storage depends on a complex set of contracts and the Utah Lake Management Plan. Depending on conditions in any given year, these agreements may result in storage availability that may be different than otherwise expected. Third, storage availability generally depends on the performance of manmade facilities include the reservoirs, diversion, pipelines, etc. A loss of any one of these facilities may significantly affect storage availability.
- **Earthquake** – The water supply facilities and service area of the District are located in areas with significant potential for earthquakes. An earthquake could result in long-term damage to existing facilities and result in extended periods of reduced yield from existing sources.
- **Groundwater Contamination** – Natural or human induced degradation of water quality in underground aquifers can result in the long-term loss of some sources. Contamination of ground water is a particularly difficult challenge because once contamination enters the ground water system and is absorbed into the soil matrix, it can be a slow and costly process to clean up. In many cases, cleanup of the aquifer is cost prohibitive and a source will be permanently lost. To illustrate this point, many communities along the Wasatch Front have lost multiple wells to perchloroethylene (PCE) and other contaminants.
- **Long-Term Climate Change** – While the exact effects of climate change are unknown, several possible scenarios will likely have a negative effect on the District’s sources and demands. From review of the available literature, the following issues have been suggested as possible local effects of global climate changes:
 - **Changed Nature of Precipitation** –Based on most climate change models, (Global Climate Change Impacts in the United States – US Global Change Research Program; 2009), average temperatures in Utah are projected to rise. While each study varies in the projected range of temperature increases, the overall increase in average temperatures in these studies is projected to result in an increased amount of precipitation falling as rain rather than snow. As a result of these precipitation changes, existing stream flow patterns are anticipated to have higher flows in fall and early spring periods and lower than average flows in summer months (as a result of less snowmelt). The overall effect is a “flattening” of stream flow hydrographs with decreased peak flows and increases in stream base flows outside of peak snowpack runoff times.
 - **Increased Drought Severity and Duration** – Some current climate models project that water supplies will decline in Utah during the 21st century (Climate Change and Utah, the Scientific Consensus; 2007) and that drought periods will increase in length and severity. Some climate models project that, while some portions of the country will see increases in precipitation resulting from warming temperatures, Utah may have up to a 20 percent reduction in total snowmelt runoff (Global Climate Change Impacts in the United States – US Global Change Research Program; 2009). If Utah does experience a 20% reduction in snowmelt runoff, it would result in longer and more severe droughts than those currently observed in the historical record.

- **Increased Demands** – Irrigation demands are a complicated function of temperature, precipitation, wind speed, relative humidity, and human behavior. In general, however, an increase of average temperatures would likely increase the District’s overall water demand. As a result, future increased demands could be the result of not only population growth, but also potential climate changes. A preliminary evaluation of demand on the Wasatch Front indicated that increases in temperature could result in increases in demand for an area similar in size to the District of up to 500 AF/°F (Planning for an Uncertain Future, Earth Interactions, 2013). Correspondingly, this could result in increases in demand of more than 2,000 AF¹ at 2065, even with conservation.

Given the lack of historic data within GVLD as well as the issues discussed above, it is important that GVLD have sufficient flexibility to provide a reliable future water supply. Therefore, as part of this 40-year plan, it is recommended that GVLD include a 20 percent safety factor for supply redundancy and reliability to the projected demands.

PLANNING DEMAND

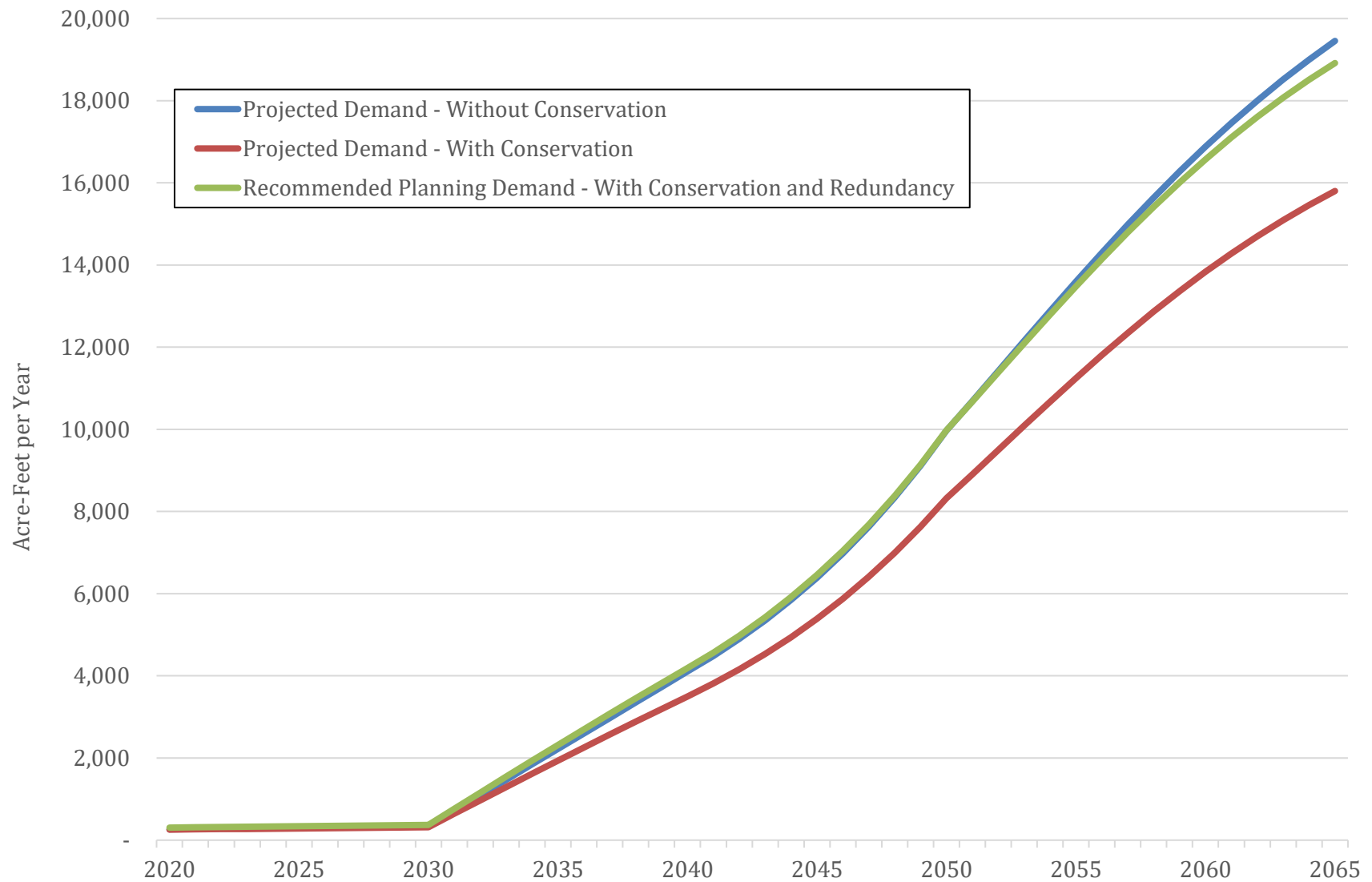
With the impacts of projected conservation and a prudent safety factor for redundancy and reliability, recommended planning demands are summarized in Table B and shown in Figure A. The demand that includes both conservation and a reliability and redundancy safety factor will be the planning demand used for subsequent evaluation of available water assets. After accounting for conservation and variability, GVLD will need a supply of almost 19,000 acre-feet by 2065 as summarized in Table B and Figure A.

Table B
Goshen Valley Local District Water Demands

Year	2020	2025	2035	2065
Projected Demand – Without Conservation (ac-ft)	266	306	2,223	19,455
Projected Demand – With Conservation (ac-ft)	256	285	1,940	15,802
Recommended Planning Demand – With Conservation and Redundancy (ac-ft)	305	338	2,320	18,917

¹ Based on an increase in temperature of 4° F. Models for mid-century warming are generally in the range of 2° to 6° F (Planning for an Uncertain Future, Earth Interactions, 2013).

Figure A
Goshen Valley Local District Water Demands



PROJECTED SUPPLY

Projected available supply in GVLD was determined by taking an inventory of GVLD's available water assets using data from GVLD as well as available assets from the Church of Jesus Christ of Latter-day Saints (CHC). A detailed summary of this inventory is contained in Appendix 2 (*Goshen Valley Local District 40-Year Water Rights Plan – Projected Supply*, 18 July. 2023, BC&A). Major results and conclusion from this inventory are as follows:

- GVLD is using or plans to use water from groundwater, surface water, and industrial reuse water within the next 40 years.
- There are three main sources of existing water assets which could potentially serve GVLD:
 - **Water Assets Available for Lease.** GVLD is currently leasing approximately 3,650 acre-feet of water from CHC to supply water to existing customers. While the volume of this lease may change from time to time, CHC is planning to continue this lease into the foreseeable future.
 - **Water Assets Potentially Available for Transfer.** CHC has approximately 13,863 acre-feet of water available to be transferred for municipal use in GVLD. In most cases, the predicted yield for each of these assets will be the same as the volume available for transfer. However, in the case of the shares at the Riverton Farm Canal Company and Saratoga Springs Farm Canal Company, Surface Water it is expected that the useable yield of shares will be reduced by 20% as part of the transfer process. After taking this into account, there are approximately 12,157 acre-feet of water rights potentially available for transfer.
 - **Industrial Reuse Water.** GVLD expects there to be some industrial facilities with approximately 60% of process water available to be used as reuse water. This is expected to contribute a modest volume of water to GVLD's portfolio.
- In addition to the District's existing assets, there are currently about 31,600 acre-feet of water currently being utilized for agriculture by Elberta Valley Agriculture (EVA) in the GVLD service area. CHC plans to continue to use these assets for agricultural purposes as much as possible. This represents a beneficial use for these assets that can continue until the assets are needed for other purposes. This means that additional EVA agricultural assets may eventually be available for use by GVLD but will likely not be available until all other current sources listed above are being used.

The existing sources that are available to serve GVLD are summarized in Table C. The total available water from these sources in 2065 is 15,464 acre-feet. The specific water assets associated with the CHC Transfer Water are summarized in Table D.

Table C
Summary of Potential Water Assets Available to GVLD via Transfer/Lease/Reuse

Potential Water Assets (2065)	Total Volume (AF)	Expected Useable Yield (AF)
EVA Leased Agricultural Water	3,650	3,650
CHC Transfer Water Asset Total	13,863	12,157
Industrial Reuse Water	125	125
Total	17,639	15,932

Table D
Water Assets Potentially Available for Transfer or Lease to GVLD

Farm Location	Water Right	Change Number	WR Type	Status	Nature of Use	Diversion Type	Available for Transfer (AF)
Lehi - Saratoga	54-66			Certificated	Irr	S	0
Lehi - Saratoga	54-109			Certificated	Irr	S	0
Lehi - Saratoga	54-363			Certificated	Irr	S	489
Lehi - Saratoga	59-5852	a34044 (approved)	WJWUC Shares	Certificated	Irr	S	800
Lehi - Saratoga	59-5957	a44129	ULDC Shares	Certificated	Irr	S	2,892
Lehi - Saratoga	59-5958		WJWUC Shares	Certificated	Irr	S	1,848
Payson Beef 1 and 3	51-1541	a43265	Application	Certificated	Irr & S	G	341
Payson Pastures	51-1078	a43353	Application	Certificated	Irr & S & D	G	6
Payson Pastures	51-1484	a43255	Application	Certificated	Irr	G	776
Payson Pastures	51-1851	a43436	UWC	Unvalidated	Irr & S	G	131
Payson Pastures	51-1852	a43436	UWC	Unvalidated	Irr & S	G	0
Payson Pastures	51-1853	a43436	UWC	Unvalidated	Irr & S	G	0
Payson Pastures	51-4765	a43256	Diligence Claim	Unvalidated	Irr & S	S	504
Payson Pastures	51-4767	a43256	Diligence Claim	Unvalidated	Irr & S	S	746
Payson Pastures	51-5284	a43935	Diligence Claim	Unvalidated	Irr & S	S	787
Payson Pastures	51-5285	a43935	Diligence Claim	Unvalidated	Irr & S	S	6
Payson Pastures	51-8808	a43936	Diligence Claim Seg	Unvalidated	Irr & S	S	348
Pleasant Grove	55-1037	a43381	Application	Certificated	Irr & S	G	44
Pleasant Grove	55-7872	a43304	Diligence Claim	Validated	Irr	S	82
Provo Bay	55-12878	a44122			Irr	S	411
Riverton	59-5875		WJWUC Shares	Certificated	Irr	S	2,438
West Mt Orchard	51-1106	a43305	Application	Certificated	Irr & S & D	G	1
West Mt Orchard	51-1431	a43264	Application	Certificated	Irr	G	232
White/Wangsgard	59-5897	a39966 (approved)	U&SLCC Shares	Certificated	M	G	982

Total Available for Transfer 13,863

SUMMARY OF GOSHEN VALLEY LOCAL DISTRICT 40-YEAR PLAN

Based on the information discussed in the above sections as well as in the appendices, the 40-year water supply plan for GVLD is shown in Figure B. The planned approach to water supply in GVLD will be to use available water from its existing lease first. This is expected to meet about 10 years of growth once the District starts growing in earnest. After this, transferred assets from CHC will be used to satisfy an additional 20 years of growth. Reuse water may contribute a small volume to the total supply along the way.

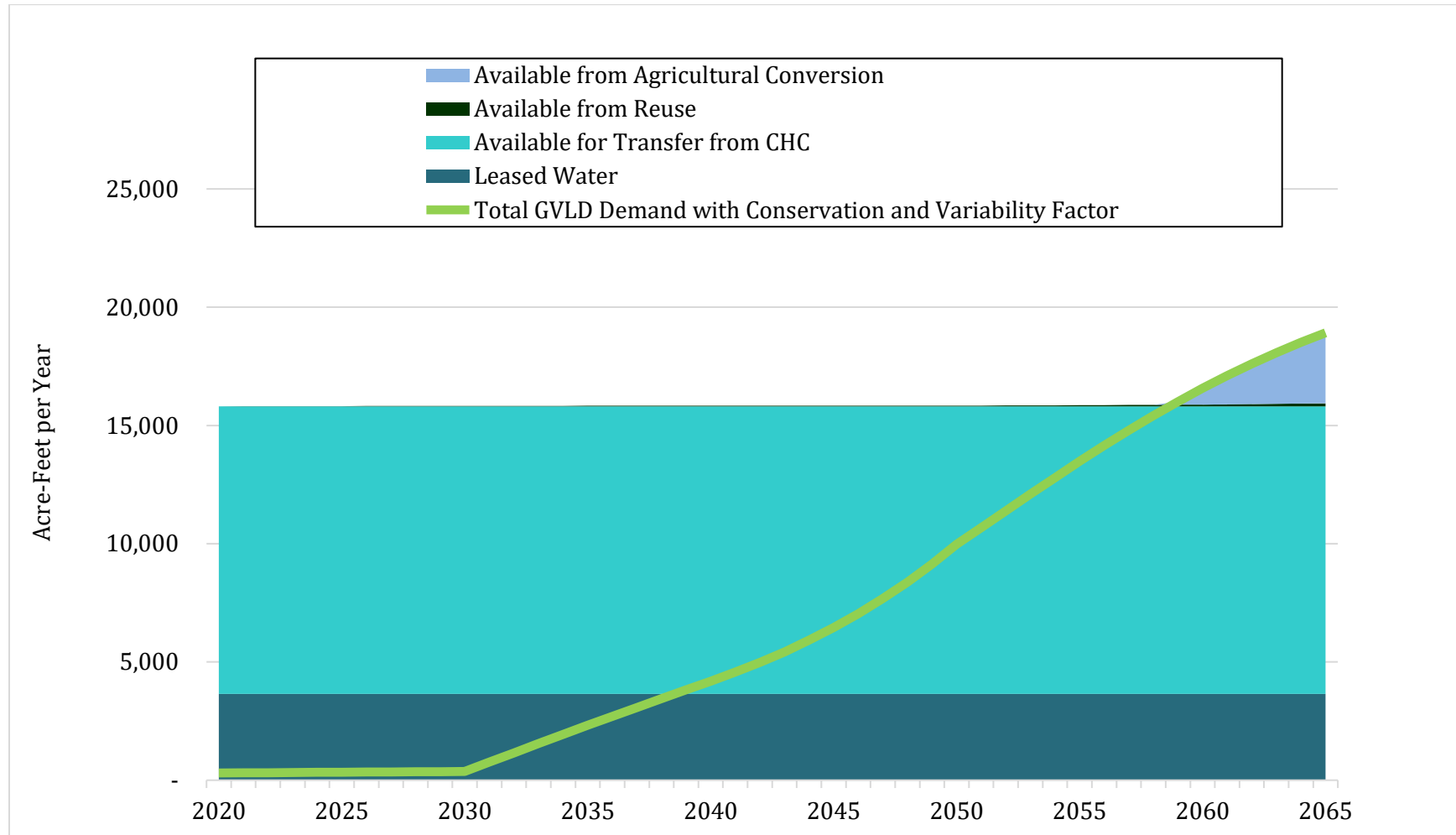
Toward the end of the planning window, it is expected that all of the District's existing assets will be completely used. At this point, the District will need to begin requiring the conversion of agricultural water to municipal use for any additional demand. There appears to be more than adequate agricultural water in the area to meet the additional demand projected in the 40-year planning window.

SUMMARY AND CONCLUSIONS

This report documents the 40-year water demand and supply plan for Goshen Valley Local District. Major conclusions contained within this report as well as the appendices within the report are as follows:

- There is significant growth projected for the GLVD service area. The 2015 Utah School and Institutional Trust Land Administration (SITLA) study was used to project growth in the District.
- Water demand use rates were estimated using historical data from similar Utah communities.
- There are many outside factors that could affect the District's water sources and demands on District supplies. This includes drought, earthquakes, contamination, and long-term climate change. Given the uncertainty associated with District sources, it is important that the District have sufficient flexibility to provide a reliable future water supply. As part of its 40-year water plan, the District must include adequate source to account for potential loss of supply on a temporary or permanent basis.
- The total GVLD planning demand in 2065 after accounting for conservation and supply reliability is 17,639 acre-feet.
- Water assets currently available to GVLD were analyzed in this report and have an expected useable yield of 15,932 acre-ft in 2065.
- Even after accounting for conservation, projected demands in the 40-year planning window exceed the volume of existing District assets. Thus, all District assets listed here are critical to meeting the reasonable future use of the public in the GVLD service area.
- GVLD has access to enough water assets (through transfer or otherwise) to meet projected demands through about 2059. After that, GVLD will need to require the conversion of agricultural water to municipal water to meet projected demands. There appears to be adequate agricultural water in the area to meet the additional demand projected in the 40-year planning window.

Figure B
Supply and Demand Projections in Goshen Valley Local District



APPENDIX 1

TM1 GOSHEN VALLEY LOCAL DISTRICT 40-YEAR WATER RIGHTS PLAN – PROJECTED DEMAND

TECHNICAL MEMORANDUM # 1

TO: Wes Quinton, Farmland Reserve
FROM: Keith Larson, Andrew McKinnon, Emily Fica
Bowen Collins & Associates
DATE: 07/18/2023
SUBJECT: Goshen Valley Local District 40-Year Water Rights Plan – Projected Demands

INTRODUCTION

Goshen Valley Local District (GVLD) has retained Bowen Collins and Associates (BC&A) to complete a 40-year Water Rights Plan accompanied with a Supply and Demand Study. The purpose of this memorandum is to complete the portion of that study regarding water demand. This memorandum specifically addresses 10-year demands (2035), 40-year demands (2065), and buildout demands.

BACKGROUND

The GVLD service area is located on the southwest corner of Utah Lake near the Elberta community. Municipal and industrial water use in the District is expected to grow significantly in the next 40 years. It has been assumed the probable future service area will eventually be bordered on the east by Currant Creek, on the west and south by the Tintic Mountains, and on the north by approximately the Clyde Knoll. Growth east of Currant Creek is anticipated to be served primarily from the Goshen City water system. Figure 1 shows the existing service area and estimated buildout service area for GVLD.

GROWTH PROJECTIONS

The following section identifies the growth projection data and methodologies for estimating growth in the GVLD service area identified in Figure 1.

Growth Projections – Data Source

BC&A evaluated multiple studies to identify growth projections for the area, including studies by the following entities:

- *Mountainland Association of Governments (MAG)*. MAG was formed to assist in growth planning related to regional transportation. MAG relies on established associations, such as cities, counties, or other municipalities to gather data and plan for transportation systems in Utah. MAG projections evaluated in this study are based on a 2017 University of Utah study (*Utah's Long-term Demographic and Economic Projections*, Kem C. Gardner Policy Institute, 2017).

- *Envision Utah*. Envision Utah was formed with the goal of creating a “quality growth strategy” based on input from Utah residents. Correspondingly, projections from Envision Utah often represent a desire of what Utahns hope for rather than a prediction of what will most probably occur. These studies are generally catered towards areas with existing development since those are the areas that the majority of Utah residents have opinions on. The Envision Utah projections evaluated in this study are based on a 2014 study (*Wasatch Front 2050 Market-Driven Growth Scenario, Robert Charles Lesser & Co. Real Estate Advisors, Prepared for Envision Utah, 2014*)
- *Utah School and Institutional Trust Land administration (SITLA) and Farmland Reserve, Inc. (FRI)*. SITLA manages Utah’s trust land in an effort to benefit Utah schools and other trust beneficiaries. FRI and its affiliated entities invest in and operate farmland. SITLA and FRI undertook a joint study to understand how to manage their land and improve association transportation corridors particularly in the northwestern Utah County region, but also requiring study of demographics and growth by subregion for the entire County. Among other consultants, SITLA and FRI hired Robert Charles Lesser & Co. (RCLCO) Real Estate Consulting to prepare growth projections for various areas based on market demands and historic trends. RCLCO data is gathered from many sources, including both public and private entities, with the goal of accurately projecting market-driven development activities (*Northwest Utah County Study – Socio-Economic Growth & Transportation Analysis, Landmark Design / RCLCO / FEHR Peers, Prepared for Utah School and Institutional Trust Land Administration & Farmland Reserve Inc., 2015*). It will be noted that this represents a more recent update of the work originally completed for Envision Utah in 2014.

Each study was reviewed to choose growth projections which best represent a prudent and reasonable projection of growth in the GVLD service area. While all the studies provide useful insight, the Envision Utah and MAG studies appear to underestimate the potential for growth in the Elberta community. This may be because there are no established residences or institutions in the area to provide those organizations with data. Ultimately, the SITLA study prepared in 2015 appears to be a more prudent representation of this area for planning purposes. It is based on market-driven data sources and historic growth patterns in other areas of Utah County that identify potential growth in an area that has minimal existing development.

Based on this conclusion, the 2015 SITLA study was used to project growth in the GVLD service area. This data will be the basis for all subsequent calculations contained in this analysis.

Growth Projections – Land Use Categories

Within the SITLA RCLCO study, land use projections have been split into four main categories: residential, office, retail, and industrial. These areas are all expected to have both indoor and outdoor water demands. Additionally, GVLD is aware of a number of potential industrial facilities which will require additional system process water.

Growth Projections – Methodology

The 2015 RCLCO study began by collecting residential and commercial demand data from various RCLCO sources and the Governor’s Office of Management & Budget. The study then grouped that data into various residential and commercial land use submarkets (residential, office, retail, and industrial as stated in *Land Use Categories* above). Those submarkets were then scored by land use, classified by land value, and distributed to acreage within various communities. Finally, the submarkets were rated and the study estimated the decade at which development would occur within those submarkets.

Growth Projections – GVLD Portion of Growth

One complication within the RCLCO study is that its calculations combined GVLD and Goshen City into a single projection unit labeled “Elberta/West Lake”. However, Goshen City and GVLD are expected to be separate water providers with separate service areas. To get an accurate representation of GVLD projections, it was essential to split up these two different areas. This was done by using an area ratio that compared developable area within the Goshen City service area to developable area within the GVLD service area. These two different areas are shown in Figure 1. Note that it is assumed that Goshen City will contain primarily residential, office and retail developments. Most, if not all, industrial development is anticipated to occur within GVLD’s service area.

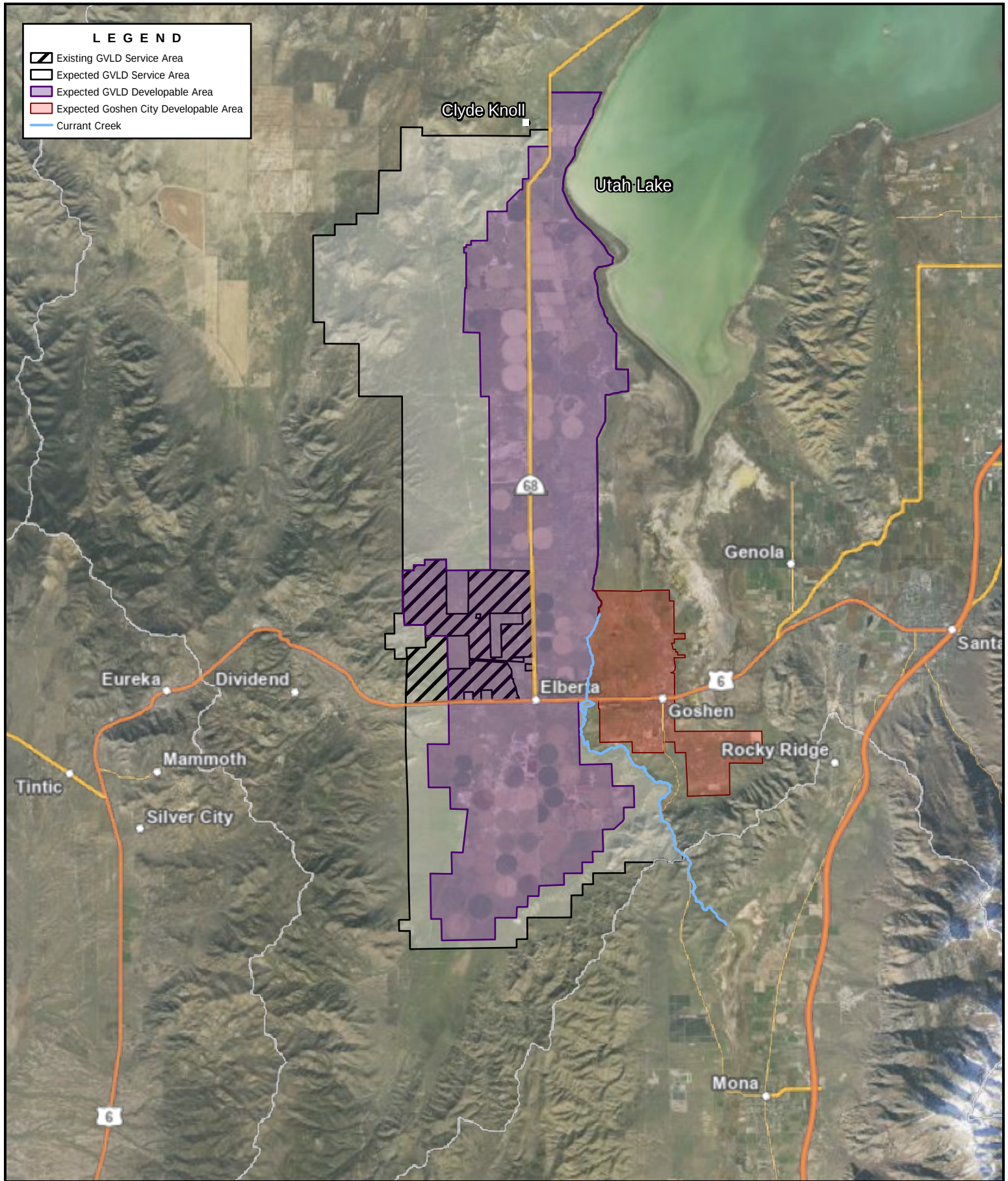
Based on the identified service areas, 86 percent of the developable area is expected to be served by GVLD with the remaining 14 percent served by Goshen City. Growth developed as part of the RCLCO study has therefore been divided based on 86 percent of residential, office, and retail to the GVLD service area and 14 percent to Goshen City. One hundred percent of industrial area is projected to occur in the GVLD service area as noted above.

Growth Projections – Conclusions

Based on the RCLCO study and the discussion above, Table 1 summarizes the projected growth within the District. Growth is expected begin in earnest around the year 2030 and reach buildout around the year 2120. The GVLD service area will be developed as agricultural land use is gradually transitioned to residential, office, retail, and industrial use.

Table 1
Goshen Valley Local District Projected Growth

Year	2020	2025	2035	2065	Buildout
Residential (units)	355	353	3,206	28,002	32,541
Retail (sq ft)	62,388	145,961	323,459	3,904,074	6,452,590
Office (sq ft)	1,000	1,000	36,378	1,558,381	8,763,894
Industrial (sq ft)	84,379	171,448	323,469	1,869,147	14,763,988



LEGEND

- Existing GVLD Service Area
- Expected GVLD Service Area
- Expected GVLD Developable Area
- Expected Goshen City Developable Area
- Currant Creek



BOWEN COLLINS
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Service Area Boundaries

Goshen Valley Local District

40-Year Supply and Demand Study

NORTH:



SCALE:

0 10,000 20,000 Feet

FIGURE NO.

1

WATER DEMANDS

Expected demand in GVLD has been estimated by considering growth in both indoor and outdoor demands. This has been done by considering growth in population (indoor demand) and irrigated acreage (outdoor demand). Considering these two components separately allows for GVLD to accurately evaluate and plan for changes in density.

Water Demand Assumptions

Water demand projections have been based on the growth projection data discussed above multiplied by the expected water use per unit of development as follows:

- *Residential Use*
 - Potable demand is 55.4 gallons per person per day
 - Average household size is 3.47 people
 - Total potable demand is 192 gallons per day (gpd) per unit
 - Secondary demand is 3.33 acre-feet per year per irrigated acre with an estimated 40 percent of residential property being irrigated
 - Park demand is 3.33 acre-feet per year per irrigated acre with an estimated 80 percent of property being irrigated. Parks have been accounted for based on an average 7 acres of park per 1,000 residents.
- *Retail Use*
 - Floor to area ratio (FAR) is 0.27
 - Land efficiency is 80 percent
 - Potable demand is 93.4 gpd per 1,000 square feet
 - Secondary demand is 3.33 acre-feet per year per acre with an estimated 20 percent of retail property being irrigated
- *Office Use*
 - Floor to area ratio (FAR) is 0.34
 - Land efficiency is 90 percent
 - Potable demand is 44.1 gpd per 1,000 square feet
 - Secondary demand is 3.33 acre-feet per year per acre with an estimated 15 percent of office related property being irrigated
- *Industrial Use*
 - Floor to area ratio (FAR) is 0.30
 - Land efficiency is 90 percent
 - Potable demand is 109 gpd per 1,000 square feet
 - Secondary demand is 3.33 acre-feet per year per acre with an estimated 10 percent of industrial property being irrigated
 - Additional process water has been identified to potentially be required by high-water using facilities entering the GVLD service area. This value has been estimated based on background information provided by GVLD staff in consultation with the major landowner within GVLD. This study assumes at least two additional wet industries will need water by buildout.

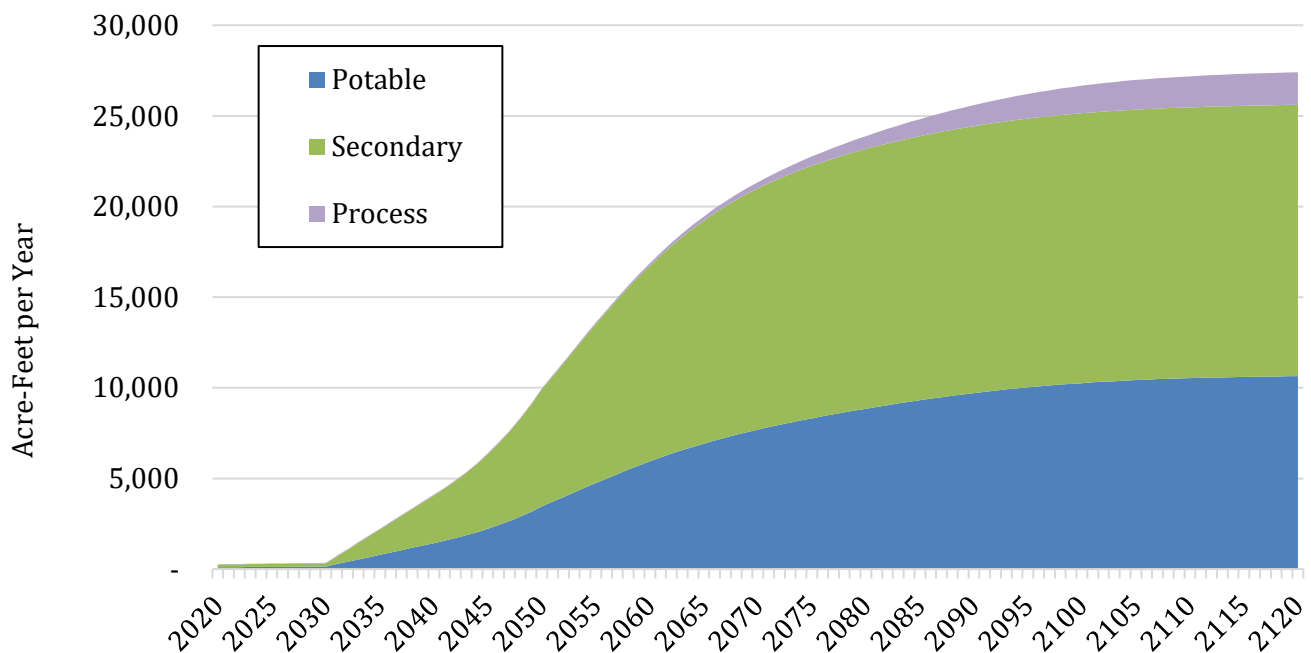
Water Demand Projections

Based on this information, projected water demands for GVLD are summarized in Table 2 and shown in Figure 2.

Table 2
Goshen Valley Local District Water Demands

Year	2020	2025	2035	2065	Buildout
Residential (units)	355	353	3,206	28,002	32,541
Retail (sq ft)	62,388	145,961	323,459	3,904,074	6,452,590
Office (sq ft)	1,000	1,000	36,378	1,558,381	8,763,894
Industrial (sq ft)	84,379	171,448	323,469	1,869,147	14,763,988
Indoor Need (ac-ft)	98	121	784	6,922	10,646
Outdoor Need (ac-ft)	158	164	1,400	12,306	14,964
Process Need (ac-ft)	10	21	39	227	1,796
Total Need (ac-ft)	266	306	2,223	19,455	27,406

Figure 1
Demand Projections in Goshen Valley Local District



CONCLUSIONS

Growth projections for the GVLD service area can be summarized as follows:

1. **Service Area.** The anticipated service area is to be bounded by the Tintic Mountains on the south and west, by Currant Creek on the east, and by approximately the Clyde Knoll on the north.
2. **Growth Rate.** The GVLD service area is expected to see significant growth beginning around 2030 and will grow steadily until the area approaches buildout conditions.
3. **40-Year Demand.** As part of a 40-year water supply plan, GVLD should plan to satisfy approximately 19,455 acre-feet of water demands.
4. **Buildout Demand.** Water demands will grow to over 27,000 acre-feet at buildout.

APPENDIX 2

TM2 GOSHEN VALLEY LOCAL DISTRICT 40-YEAR WATER RIGHTS PLAN – PROJECTED SUPPLY



TECHNICAL MEMORANDUM #2

TO: Wes Quinton, Goshen Valley Local District
FROM: Keith Larson, Andrew McKinnon, Emily Fica
Bowen Collins & Associates
DATE: 07/18/2023
SUBJECT: Goshen Valley Local District 40-Year Water Rights Plan – Projected Supply

INTRODUCTION

Goshen Valley Local District (GVLD) has retained Bowen Collins and Associates (BC&A) to complete a 40-year Water Rights Plan accompanied with a Supply and Demand Study. The purpose of this memorandum is to document available water supply for the District.

AVAILABLE WATER ASSETS

The Church of Jesus Christ of Latter-day Saints (CHC) owns or manages a large amount of water assets in Utah Valley. Most of these water assets are currently being used on farm property that is expected to develop at some point in the future. As the properties develop, some of the water assets are expected to stay with the properties as part of the development requirements of each city. However, the remainder of the water assets are expected to become available for other uses, one of which includes use by the Goshen Valley Local District (GVLD) for future buildout near the Elberta community. CHC has identified water rights that are potentially available for transfer or lease to the Goshen Valley Local District (GVLD) and has provided this information to GVLD. Table 1 summarizes water assets that are potentially available to be transferred or leased to GVLD.

The water rights shown in Table 1 are further summarized in Table 2 based on the farm location of the potential water asset. Additionally, the actual volume available for transfer and the expected useable yield to the GVLD has been estimated based on each farm location. In most cases, the predicted yield for each asset is the same as the volume available for transfer. However, in the case of the shares at the Riverton Farm Canal Company and Saratoga Springs Farm Canal Company it is expected that the useable yield of shares will be reduced by 20% as part of the transfer process. Those yields are reflected in Table 2.

Table 1
Water Assets Potentially Available for Transfer or Lease to GVL

Farm Location	Water Right	Change Number	WR Type	Status	Nature of Use	Diversion Type	Available for Transfer (AF)
Lehi - Saratoga	54-66			Certificated	Irr	S	0
Lehi - Saratoga	54-109			Certificated	Irr	S	0
Lehi - Saratoga	54-363			Certificated	Irr	S	489
Lehi - Saratoga	59-5852	a34044 (approved)	WJWUC Shares	Certificated	Irr	S	800
Lehi - Saratoga	59-5957	a44129	ULDC Shares	Certificated	Irr	S	2,892
Lehi - Saratoga	59-5958		WJWUC Shares	Certificated	Irr	S	1,848
Payson Beef 1 and 3	51-1541	a43265	Application	Certificated	Irr & S	G	341
Payson Pastures	51-1078	a43353	Application	Certificated	Irr & S & D	G	6
Payson Pastures	51-1484	a43255	Application	Certificated	Irr	G	776
Payson Pastures	51-1851	a43436	UWC	Unvalidated	Irr & S	G	131
Payson Pastures	51-1852	a43436	UWC	Unvalidated	Irr & S	G	0
Payson Pastures	51-1853	a43436	UWC	Unvalidated	Irr & S	G	0
Payson Pastures	51-4765	a43256	Diligence Claim	Unvalidated	Irr & S	S	504
Payson Pastures	51-4767	a43256	Diligence Claim	Unvalidated	Irr & S	S	746
Payson Pastures	51-5284	a43935	Diligence Claim	Unvalidated	Irr & S	S	787
Payson Pastures	51-5285	a43935	Diligence Claim	Unvalidated	Irr & S	S	6
Payson Pastures	51-8808	a43936	Diligence Claim Seg	Unvalidated	Irr & S	S	348
Pleasant Grove	55-1037	a43381	Application	Certificated	Irr & S	G	44
Pleasant Grove	55-7872	a43304	Diligence Claim	Validated	Irr	S	82
Provo Bay	55-12878	a44122			Irr	S	411
Riverton	59-5875		WJWUC Shares	Certificated	Irr	S	2,438
West Mt Orchard	51-1106	a43305	Application	Certificated	Irr & S & D	G	1
West Mt Orchard	51-1431	a43264	Application	Certificated	Irr	G	232
White/Wangsgard	59-5897	a39966 (approved)	U&SLCC Shares	Certificated	M	G	982

Total Available for Transfer 13,863

Table 2
Summary of Water Assets Available to GVLD

Water Asset Farm Location	Available for Transfer (AF)	Expected Useable Yield (AF)	Diversion Type
Provo Bay Farm Water Rights	411	411	Surface Water
Pleasant Grove Groundwater Rights	82	69	Groundwater
Pleasant Grove Surface Water Rights	44	44	Surface Water
White/Wangsgard Water Rights	982	982	Groundwater
Riverton Farm Canal Company Shares	2,438	1,950	Surface Water
Payson Area Farms Shares (Groundwater)*	1,487	1,487	Groundwater
Payson Area Farms Shares (Surface Water)	2,391	2,391	Surface Water
Saratoga Springs Farm Canal Company Shares	6,028	4,822	Surface Water
Total	13,864	12,157	

*These include shares located at West Mt Orchard Farm

POTENTIAL CONVERSION OF AGRICULTURAL WATER

Tables 1 and 2 represents the primary assets available to GVLD and those water assets that are expected to be used first to satisfy projected demands. However, projected demands for the GVLD area are expected to significantly exceed the volumes shown here. For demands in excess of the available water described above, GVLD will need to look to the conversion of agricultural water.

The GVLD potential service area consists of many properties that are currently being used for agricultural purposes. As these lands are developed, the water that has historically been used for agriculture may become available for municipal and industrial (M&I) use. This is referred to as agricultural conversion water.

Most of the agricultural property in the potential GVLD service area is owned by CHC or entities associated with CHC. This area is known as Elberta Valley Agriculture (EVA). CHC has completed an analysis of agricultural water assets in this area that may become available for conversion to M&I purposes. Potential sources of agricultural water for conversion include:

- *Various Groundwater Sources.* A number of farms within the GVLD service area currently use shallow groundwater to irrigate. It should be noted that there are actually 24,797 acre-feet of EVA water rights associated with groundwater. However, the volume of ground water sustainably available according to the State of Utah's groundwater management plan is only 18,000 acre-feet for the basin as a whole. The portion of this total that can be used under EVA water rights is unknown as the priority of these rights compared to other water rights in the aquifer is unknown. However, it is believed that EVA rights are generally high priority and would capture much of this total. Therefore, a potential yield of up to the full 18,000 acre-ft is shown in the table. This leaves another 6,797 acre-ft of EVA water rights that are assumed to be physically unavailable. However, physical condition of the underground and surface features of the groundwater may change in the future and result in this additional groundwater becoming available for GVLD use.

- *Mona Reservoir.* These assets include surface water that is currently being utilized at the EVA South Farm. Note that groundwater is also being utilized at the EVA South Farm; however, those assets are counted under “various groundwater sources” above.
- *Utah Lake.* These assets include surface water that is currently being utilized at the EVA North Farm. Note that groundwater is also being utilized at the EVA North Farm; however, those assets are counted under “various groundwater sources” above.

It is important to note that GVLD is currently leasing 3,650 acre-feet per year of EVA agricultural water. This water will be utilized for municipal use before any remaining agricultural water will be converted.

Table 3 summarizes potential assets available through agricultural conversion. As with transferred rights, the expected useable yield for agricultural conversion water has been reduced to reflect likely limitations as part of the ag conversion process.

Table 3
Potential Water Assets Available to GVLD via Agricultural Conversion

EVA Agricultural Water Asset Diversion Location	Total Volume (AF)	Expected Useable Yield (AF)	Diversion Type
Various Groundwater Sources	18,000	18,000	Groundwater
Mona Reservoir	6,036	4,346	Surface Water
Utah Lake	8,513	8,513	Surface Water
Authorized to Divert from Groundwater or Surface Water	2,724	2,179	Surface Water & Groundwater
EVA Leased Agricultural Water	-3,650	-3,650	Surface Water & Groundwater
EVA Water Available for Agricultural Diversion	31,623	29,388	

SUMMARY OF TOTAL GVLD SUPPLY

Table 4 summarizes all potential GVLD assets including the assets potentially available through agricultural conversion and the water currently being leased.

Table 4
Summary of Potential Water Assets Available to GVLD

Potential Total Water Assets	Total Volume (AF)	Expected Useable Yield (AF)
CHC Transfer Water Asset Total	13,864	12,157
EVA Leased Agricultural Water	3,650	3,650
EVA Water Available for Agricultural Diversion	31,623	29,388
Total	49,137	45,195

DIVERSION TYPE

In order to develop a better understanding of water assets available to GVLD, they are grouped according to diversion type. The different diversion types are discussed below, and the total available water assets summarized by diversion type are in Table 5.

Groundwater.

Groundwater diversions produce water from underground aquifers through the pumping of a well. It has a number of benefits which make it a valuable water asset. One of these benefits is groundwater takes minimal treatment to be used for culinary purposes. It should be noted that the majority of wells in the GVLD service area are currently utilizing shallow groundwater. Because this groundwater is relatively close to the surface and potentially under the influence of surface water, it is possible that it would need treatment prior to culinary use. However, when GVLD needs to utilize groundwater assets to meet their demands, they may install wells which collect deeper groundwater which is cleaner and does not generally need to be treated prior to culinary use. As such, it is expected that groundwater currently being used for agricultural purposes within the GVLD will be prioritized for culinary use as the GVLD area develops. The total available groundwater assets are stated in Table 5.

Direct Flow Surface Water.

Direct flow surface water is defined as all water which is produced by an above ground source that must be used as the water is produced. Examples include springs and channels. Since there is no storage associated with direct flow surface water, it must be used as the water is available. Therefore, direct flow surface water is not a reliable source of year-round use for indoor or industrial use. Instead, it is prioritized for use in the irrigation season when it is readily available. The total available surface water assets are stated in Table 5.

Groundwater and/or Surface Water.

CHC has a small number of water assets which utilize both surface and groundwater depending on which is more readily available. Since these assets are variable, careful consideration should be taken when planning for their use. The total available groundwater and/or surface water assets are stated in Table 5.

Industrial Reuse.

GVLD is planning to have a number of industrial facilities built within its service district. These facilities require water for use in processing, but after processing some of that water becomes available for reuse. Since the total amount of processing water is required regardless of reuse, it is accounted for when calculating the water demands for those facilities. Any reuse water that becomes available is accounted for in GVLD's available water supply.

Industrial reuse is extremely variable depending on the type of facility. Since GVLD does not know what types of industrial facilities will develop within their service area, the amount of reuse water available must be estimated. After looking into industrial industries that have shown interest developing in GVLD, and relying on projections presented in the Projected Demand Memo, the predicted total available reuse water at buildout is stated in Table 5.

Table 5
Water Assets Available to GVLD by Asset Type

Asset Type	Total Yearly Yield (AF)	Yield Approved for Transfer or Use
Groundwater	20,552	20,539
Surface Water	25,861	22,477
Groundwater and/or Surface Water	2,724	2,179
Industrial Reuse Water*	125	125
Total	49,262	45,320

*Based on 60% reuse water for projected 2065 industrial demands

ASSET MANAGEMENT

In terms of best managing the available assets, CHC plans to continue to use its existing EVA assets for agricultural purposes as much as possible. This represents a beneficial use for these assets that can continue until the assets are needed for other purposes. This means that additional EVA agricultural assets will not be available until all currently leased water and all other assets from other farms that will be transferred to GVLD (as summarized in Table 1) are used for development in the GVLD service area.

CONCLUSIONS

An inventory of GVLD's available water assets was summarized using data from the CHC. This inventory considered the reliable yield of various sources based on both water rights and physical availability and is referenced in Tables 1, 2, and 3 of this document. This data is then further analyzed based on diversion type in Table 4. Water assets shown in these tables represent the available water supply to be expected for GVLD's 40-year Water Rights Plan.

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