LUMOS & ASSOCIATES

MEMORANDUM

DATE:	5/2/2024
TO:	Ed James
FROM:	Chelsea Cluff, P.E.
CC:	Tim Russell, P.E., WRS; Jonathan Lesperance, P.E.
SUBJECT:	Carson City Purveyor Data

1.0 Background Information

Lumos & Associates (Lumos) was contracted by the Carson Water Subconservancy District (CWSD) to assist the United States Geological Survey (USGS) with the data collection and analysis of the projected water use by 13 water purveyors within the Carson River Watershed as part of the Carson River Watershed 30-Year Regional Drought and Water Sustainability Plan. The intended purpose of this document is to identify potential deficiencies in water supply (both quantity and/or quality) over a 30-year planning horizon with a focus on existing and future municipal water production, water quality, and water rights for Carson City. Where deficiencies are noted or anticipated, potential mitigation measures will be provided for future consideration. Existing well pumping rates, future well pumping rates and well locations will be provided to USGS for use in modeling groundwater and surface water impacts across the watershed. Tabulated data including monthly production for each well over the current 5-year (2018-2022) period of record, will be made available to USGS, CWSD, and the water purveyor.

The total area of Carson City is approximately 92,608 acres and has 18,521 service connections. Based on the 2020 US Census, Carson City has a population of approximately 58,639 people. The Carson City system includes 29 existing active municipal supply wells serving 15,701 residential, 430 Quasi-Residential, 1,960 City, and 430 commercial connections. The Carson City water system is located directly north of both the Indian Hills General Improvement District (IHGID) and Douglas County water systems and is approximately 157.1 mi^2 in size. Carson City is connected with the Minden and Douglas County System via a regional intertie.

Carson

308 N Curry, Suite 200

Carson City, NV 89703

775.883.7077

2.0 Existing and Future Demands

2.1 Existing Production

Carson City Public Works (CCPW) obtains its potable water from twenty-nine (29) groundwater wells from both the Eagle Valley and Dayton Valley basin, the Quill Water Treatment Plant (QWTP), induction wells on the Carson River, and the intertie with Minden. As noted by CCPW, the growth in well pumpage will be seen within the Eagle Valley Basin system. The growth will be supplemented by increased demands on well pumpage, but a rehabilitation project is currently in the design stage for the QWTP.

This project will increase production from the current 1.5 MG a day to 4 MG a day by an estimated completion date of 2026. An additional boost in production will occur after a rehab to the Marlette Dam system is completed, which will increase QWTP production to 6 MG by an estimated completion date of 2036. There is also an additional operational flexibility to increase plant capacity to 8 MG, however, this will not be represented in this report. The regional intertie is currently being drawn at max capacity by Carson City and will not be a source of growth, instead it is assumed that the operational use of the intertie may morph as increased growth occurs in the Douglas County region. The contractual amount still obligated to Carson City will not change but may be distributed into spring and fall months rather than a large peak during summer-time demands. It is also important to note that the pipeline capacity may be a limiting factor in the transmission main that distributes water from the Town of Minden to the intertie along Heybourne Dr. which restricts multiple users from pulling peak flow during summer months.

Monthly total well production from each individual wells varies from 0 million gallons per month to 25.8 million gallons per month. From 2018 to 2022, eight (8) wells have had zero production. Well 10b is the highest producing well with a pumping capacity of 2,119 gallons per minute (gpm) and a max daily production of 2,034,411 gallons per day (gpd). The highest producing induction well is Well 41 with a pumping capacity of 1,600 gpm. The Minden intertie provides the largest capacity outside of Carson City's internal wells at 3,500 gpm. For a breakdown of each well with pumping capacity and max daily production capacity see Table 1. The existing locations and associated permit numbers for each well are listed within Table 6 in the Supplemental Information section.

Table 1: Well Pumping Capacity & Max Daily Production Capacity

Well Name	Well Pumping Capacity (gpm)	Max Daily Production Capacity (gpd)
Well 3	1,125	1,079,980
Well 4	500	479,998
Well 5	292	279,845
Well 6	1,226	1,177,289
Well 7	252	242,350
Well 8	268	257,586
Well 9	168	161,348
Well 10b	1,200	1,152,000
Well 11	502	481,962
Well 16b	31	29,282
Well 24b	1,200	1,152,000
Well 25b[3]	1,000	960,000
Well 33	100	96,000
Well 34	749	719,253
Well 38	300	288,000
Well 40	739	709,254
Well 41[3]	1,750	1,680,000
Well 43	181	173,787
Well 44	350	336,000
Well 45	252	242,052
Well 46	1,072	1,029,511
Well 47	379	364,060
Well 48	480	461,012
Well 49	603	579,211
Well 50	165	158,730
Well 51	528	506,721
Well 53	283	271,394
Well 54	200	65,408
Well 55	401	385,248
Minden Intertie	3,500	3,360,000
Quill Water Treatment Plant[4]	1,302	1,250,000
Total	21,100	20,255,873

Notes:
[1] Well pumping capacity was analyzed using the 2019 Carson City Water Use Analysis Report and correspondence with CCPW
[2] Maximum daily production was estimated by using a sixteen (16) hour pumping cycle, the 16-hour pumping cycle is only being used for the purpose of drought and sustainability planning and does not actually reflect well capacity if pumping at 24 hours a day
[3] Wells 25b and 41 are induction wells.
[4] The Quill Water Treatment Plant daily capacity is between 1 – 1.5 MG and is ultimately driven by accessible surface water. However, an upgrade is expected to increase capacity to 4 MG by 2026 and up to 6 MG by 2036

Combined, the twenty-nine wells, QWTP, and the regional intertie have a total pumping capacity of 21,100 gpm and a max daily production of 20,255,873 gpd assuming a sixteen (16) hour a day pumping cycle. Overall, the production capacity of a system as identified in this report is summer-time capacity since water demand increases three (3) to five (5) times in the summer when compared to winter-time demands. Therefore, the capacity analysis is focused on the high production months. The maximum monthly production for all five (5) years analyzed occurred between July and August with the overall highest production month being July of 2021 at 512.5 million gallons (MG).

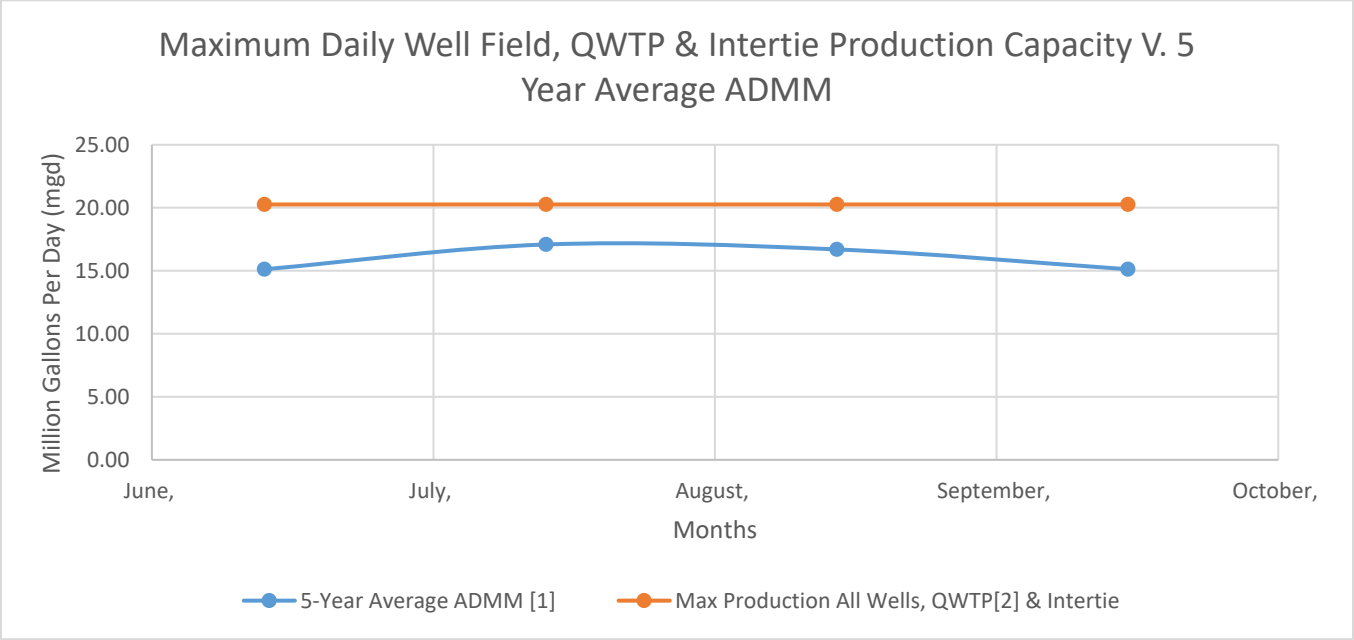
The maximum monthly production was used to calculate the average day max month (ADMM) by dividing the absolute maximum month for each year throughout the five years of data and dividing by the number of days within that month. The ADMM was used along with the maximum pumping capacity (based on a 16 hour a day pumping cycle) to evaluate production deficiencies in the system. Figure 1 illustrates the difference in summer demand versus capacity by illustrating the average five-year ADMM to the available production capacity. In this case, the average five-year ADMM is well below the available production capacity showing sufficient capacity. For a breakdown of the production of all the wells through the summer period see Table 2, and for the yearly production of all wells broken down by month, reference Table 8 in the Supplemental Information section.

Table 2: Historical Monthly Well Production

Month	Monthly Well Production (gallons)					
	2018	2019	2020	2021	2022	2018-2022 Average Day Max Month
Jun	382,037,569	404,918,593	422,379,032	453,642,406	403,279,993	413,251,519
Jul	490,346,716	446,294,813	506,741,609	512,574,345	491,190,784	489,429,653
Aug	479,538,665	446,847,236	500,979,441	482,787,987	481,577,094	478,346,085
Sep	392,874,773	359,549,298	437,408,034	453,601,652	391,697,198	407,026,191

Notes:
[1] The combined monthly well production includes the water provided through the regional intertie with the Town of Minden and the water produced by the Quill Water Treatment Plant.

= Maximum Month



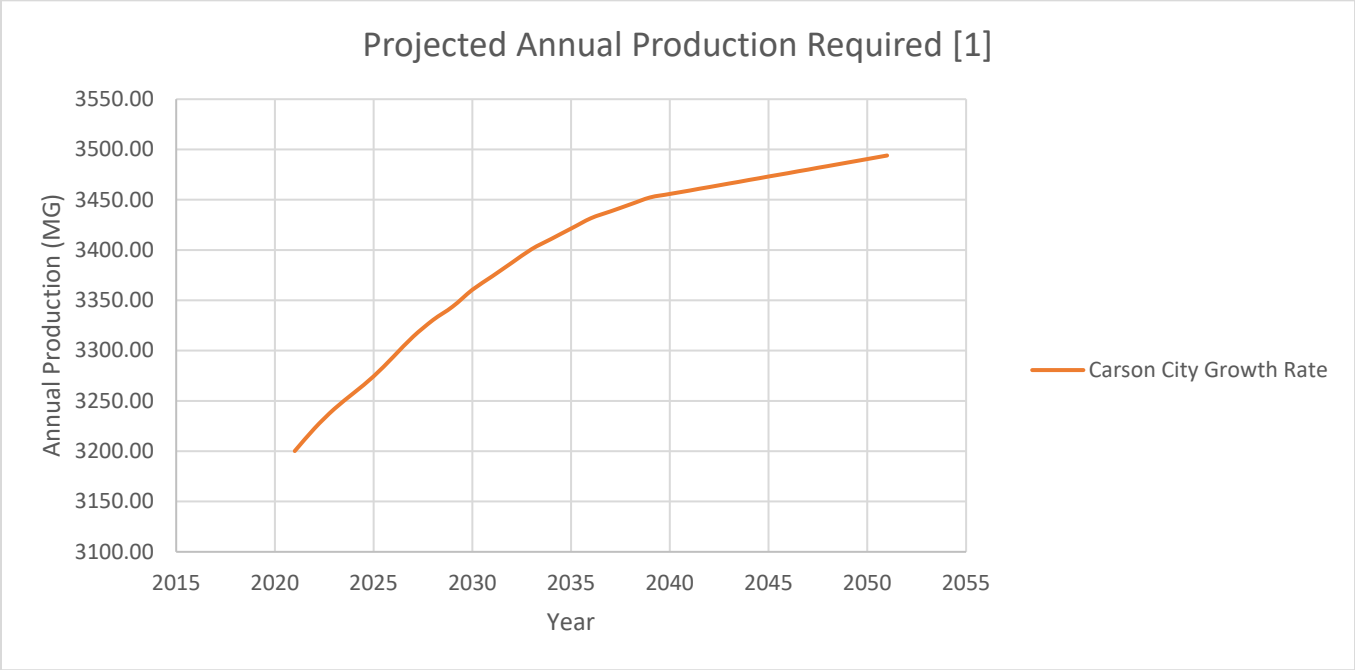
Notes:
[1] The 5-Year Average ADDM includes the 29 Carson City Wells (including 2 induction wells), the regional intertie, and flow from the Quill Water Treatment Plant.
[2] The capacity for Quill Water Treatment Plant is limited by the amount of surface water received by QWTP.

Figure 1: Maximum Well Capacity

2.2 Growth Projections and Future Required Production

To estimate the growth in water production for the Carson City area, a planning period from 2021 through 2051 (30 years) was analyzed. The growth rate analyzed was from the State Demographer for the Carson City area, which varies along the 20-year planning period (0.7% to 0.1%). This growth rate was extended from the last growth rate given in the estimate at 2041 (0.1%) to 2051 to cover the 30-year planning period. The growth rate is applied in a compounding nature, is based on population but applied to water production as a proxy. Detailed growth considerations, such as developable land (receiving area), planned developments, and land use classifications were not taken into consideration in the growth analysis as this is a high-level estimate of production growth and assumes that the projected growth rate can be accommodated within the Carson City service territory.

Figure 2 illustrates the annual well production required using the growth rate from the State Demographer over the 30-year planning horizon. Table 8, in the Supplemental Information section, provides an in-depth breakdown of the growth rate over the 30-year planning horizon.

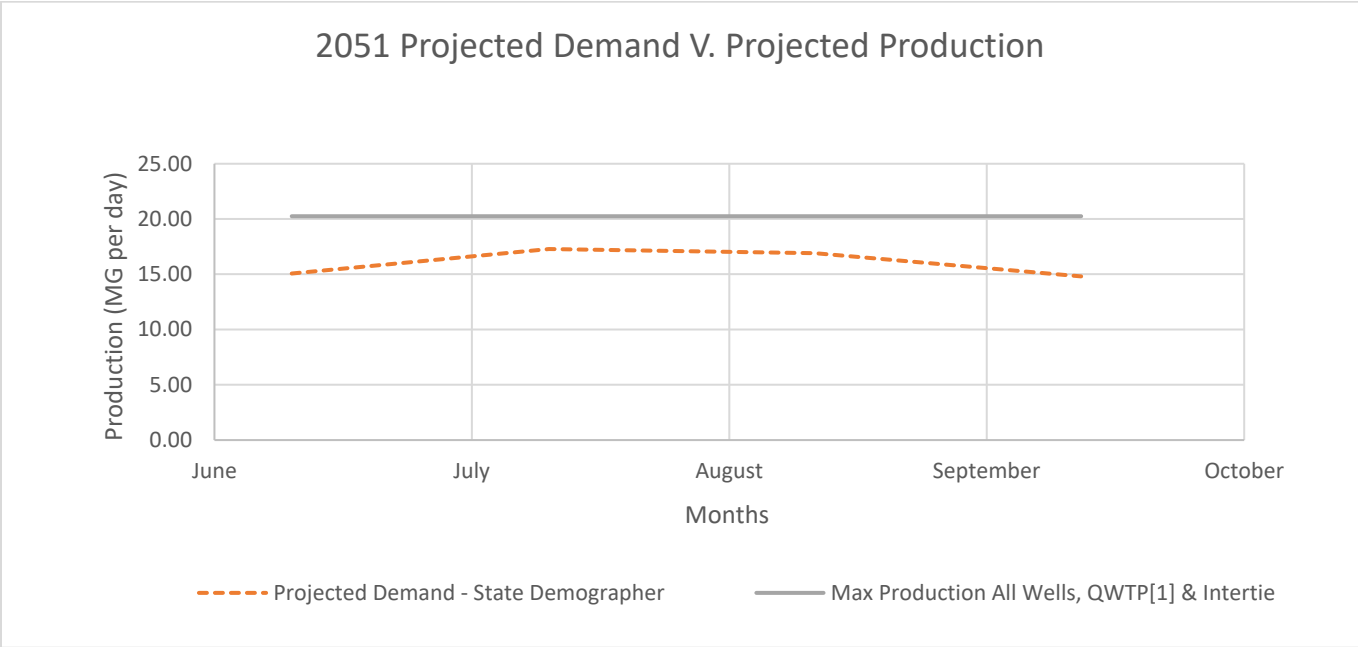


Notes:
[1] The Annual Production includes the 29 Carson City Wells (including 2 induction wells), the regional intertie, and flow from the Quill Water Treatment Plant.

Figure 2: Projected Annual Production

2.3 Estimated Future Demand v. Existing Available Production

To estimate future well production necessary to meet anticipated water demand, the growth projection discussed in Section 2.2 was used to project the maximum daily demand required for Carson City. The calculated yearly demand for Carson City in 2051 was approximately 3,494 MG based off the growth rate described in Section 2.2. To get the monthly future demand in 2051 for each of the high production months (June through September), the estimated annual future demand for 2051 was multiplied by the 5-year average percentage of the high production months. The five-year average percentage was found by taking the monthly total and dividing it by the total annual production for each year between 2018 to 2022 and then averaging across all five years. In Figure 3, the projected demands are compared against the current total well capacities. The max capacity of the wells exceeds the projected required production for the Carson City growth projection. For projected annual total production, see Table 8 in the Supplemental Information section.



Notes:
[1] The capacity for Quill Water Treatment Plant is limited by the amount of surface water received by QWTP.

Figure 3: Projected 2051 Demand versus Projected Production

3.0 Water Quality

Water quality data was analyzed using purveyor provided data from 2018 through 2022. The data provided analyzes existing water quality per well for four (4) constituents: Arsenic, Iron, Manganese, and Nitrogen. It is noted that Carson City wells are also impacted by uranium and fluoride. Wells 11, 24B, 53, and 54 have higher levels of Arsenic ranging from 7 to 12 parts per billion (ppb). The environmental protection agency (EPA) maximum contaminant level (MCL) is 10 ppb. The MCL and secondary maximum contaminant level (SMCL) for each constituent is provided in Table 3. Carson City is mitigating these high concentrations by rehabilitating the affected wells. Other contaminants found in exceedance of their respective MCL or SMCL limits were Uranium in wells 10B and 46, Manganese in wells 24B and 50, and Iron in well 50. The yearly concentrations are shown in Table 3.

Due to water quality issues or strata constraints, there is a multitude of wells that must run together for adequate blending or drawdown concerns. The following wells have system constraints:

- Well 10 must run with Well 6 (Uranium)
- Well 55 must run with Well 51 (Uranium)
- Well 44 must run with Well 40 (High Iron Bacteria & Flouride)
- Well 24 and 25 must run with Well 41 (Manganese & Arsenic)
- Well 50 and 40 must run on a 12 hour on/12 hour off cycle (Strata)

Table 3: Contaminants Concentration

Well	Contaminant	Arsenic	Iron	Manganese	Nitrogen	Uranium	Fluoride
	MCL/SMCL	10 (ppb)	0.3 (ppm)	0.05 (ppm)	10 (ppm)	30 (ppb)	2 (ppm)
Well 3 [1]	2018	0	0	0	2.5	----	----
	2019	----	----	----	2.52	----	----
	2020	0	0	0	2.93	----	0.056
	2021	----	----	----	----	18	----
	2022	----	----	----	----	17	----
Well 5	2018	0	0	0	0	24	----
	2019	----	----	----	----	----	----
	2020	0	0	0	0	14	0.006
	2021	----	----	----	0	----	----
	2022	----	----	----	0	25	----
Well 6	2018	2.2	0	0	1.2	17	----
	2019	----	----	----	1.97	----	----
	2020	3.2	0	0	1.25	16	0.077
	2021	----	----	----	1.43	----	----
	2022	----	----	----	1.47	15	----
Well 8	2018	1.3	0	0	2.8	2.4	----
	2019	----	----	----	0.79	----	----
	2020	2.5	0	0	2.72	----	0.12
	2021	----	----	----	2.76	----	----
	2022	----	----	----	2.58	2.5	----
Well 9	2018	1.3	0	0	0.94	4.2	----
	2019	----	----	----	2.68	----	----
	2020	1.4	0	0	0.91	----	0.18
	2021	----	----	----	0.849	4.2	----
	2022	----	----	----	1.24	5	----
Well 10B	2018	1.5	0	0	2.2	85	----
	2019	----	----	----	1.45	----	----
	2020	1.3	0	0.024	2.85	30	ND
	2021	----	----	----	3.96	----	----
	2022	----	----	----	3.5	30	----
Well 11	2018	12	0	0.001	0	16	----
	2019	----	----	----	0	----	----
	2020	12	0.03	0.015	0	20	0.095
	2021	----	----	----	0	----	----
	2022	----	----	----	0	16	----
Well 24B	2018	12	0.034	0.052	0.5	7.9	----
	2019	----	----	----	0.5	----	----

Carson Office

308 N Curry, Suite 200, Carson City, NV 89703

Tel. 775.883.7077 / Fax. 775.827.6112

www.lumosinc.com

Well	Contaminant	Arsenic	Iron	Manganese	Nitrogen	Uranium	Fluoride
	MCL/SMCL	10 (ppb)	0.3 (ppm)	0.05 (ppm)	10 (ppm)	30 (ppb)	2 (ppm)
	2020	----	0.06	0.056	0.6	----	1.1
	2021	----	----	----	0.88	9.6	----
	2022	----	----	----	0.53		----
Well 25B	2018	3.2	0.14	0.11	0	1.7	----
	2019	----	----	----	0	----	----
	2020	4.2	0.14	0.12	0	----	0.66
	2021	----	----	0.15	0	----	----
	2022	----	----	----	0	1.3	----
Well 33	2018	4.3	0.099	0.0034	----	----	----
	2019	5.1	0	0	1.9	----	0.37
	2020	3.9	0.074	0	2.3	7.1	0.4
	2021	----	----	----	2.04	----	----
	2022	3.8	0	0	1.99	----	0.37
Well 34	2018	5.5	0	0	0.25	----	----
	2019	----	----	----	0	----	----
	2020	10	ND	ND	----	----	0.54
	2021	----	----	----	0	----	----
	2022	----	----	----	0	----	----
Well 40	2018	1.5	0	0.024	0	----	----
	2019	----	----	----	----	----	----
	2020	1.5	0.02	0.027	0	----	1.1
	2021	----	----	----	----	----	----
	2022	----	----	----	----	0	----
Well 41B	2018	3.7	0	0	0.36	----	----
	2019	3.9	0	0.005	0.34	----	1.4
	2020	----	----	----	0	9.3	1.2
	2021	----	----	----	0	----	----
	2022	4.1	0	0.0076	0	----	1.3
Well 43	2018	0	0	0.0056	3.28	5	----
	2019	----	----	----	2.94	----	----
	2020	0	0	0	3.35	----	0.23
	2021	----	----	----	3.38	----	----
	2022	----	----	----	3.91	8	----
Well 45	2018	----	0	0	0.53	----	----
	2019	----	----	----	0.53	----	----
	2020	----	0	0	0.55	----	0.27
	2021	----	----	----	0.52	----	----
	2022	----	----	----	0	2.6	----

Carson Office

308 N Curry, Suite 200, Carson City, NV 89703

Tel. 775.883.7077 / Fax. 775.827.6112

www.lumosinc.com

Well	Contaminant	Arsenic	Iron	Manganese	Nitrogen	Uranium	Fluoride
	MCL/SMCL	10 (ppb)	0.3 (ppm)	0.05 (ppm)	10 (ppm)	30 (ppb)	2 (ppm)
Well 46	2018	0	0	0	6.8	----	0.064
	2019	----	----	----	6.19	57	----
	2020	----	----	----	6.61	90	----
	2021	----	----	----	8.26	120	----
	2022	----	----	----	8.46	92	----
Well 48	2018	1.5	0	0	0.56	4.2	----
	2019	----	----	----	0.70	----	----
	2020	1.4	0	0	0.8	----	0.065
	2021	----	----	----	0.91	----	----
	2022	----	----	----	1.02	4	----
Well 50 [2]	2018	2.8	0.37	0.057	0	3.5	0.53
	2019	----	----	----	0	----	----
	2020	----	----	----	0	----	----
	2021	----	0.3	0.055	0	----	0.65
	2022	----	----	----	0	4.2	----
Well 51	2018	----	----	----	1	----	----
	2019	1.2	----	----	1.05	----	----
	2020	----	0.025	0	1.05	----	----
	2021	2.2	0	0	0.14	----	0.05
	2022	----	----	----	0.96	----	----
Well 53	2018	11	0	0.0042	0.18	11	0.099
	2019	----	----	----	0	----	----
	2020	----	----	----	0	----	----
	2021	----	0.026	0.0081	0	----	0.12
	2022	----	----	----	0	----	----
Well 54	2018	----	----	----	0.92	----	----
	2019	8.2	0.031	0	1	9.5	0.32
	2020	----	0	----	1.05	----	----
	2021	----	0	----	1.16	----	----
	2022	7.2	0	0	1.1	8.7	0.29
Well 55	2018	4.7	0	0	2.4	----	0.06
	2019	----	----	----	2.18	----	----
	2020	----	----	----	3.17	----	----
	2021	4.5	0	0	2.3	----	0.06
	2022	----	----	----	2.89	----	----

Notes:
[1] Well 3 was decommissioned in 2021 and replaced with Well 3B.
[2] The Arsenic Concentration for Well 50 is from 2013.

Carson Office

308 N Curry, Suite 200, Carson City, NV 89703

Tel. 775.883.7077 / Fax. 775.827.6112

www.lumosinc.com

4.0 Water Rights

Carson City has water rights attributed to 29 wells (including two induction wells), flow from QWTP, and flow from the Regional Intertie. The total combined duty of those water rights is 23,926.48 acre-feet (AF) annually, based on purveyor provided data. A total of 1,874.7 AFA is unused due to Wells 4, 7, 16, and 47 not having produced any water since 2018. The current annual production is 10,574 acre-feet per year (AFA). Projected production based on State Demographer is 13,835 AFA. Based on this projected total, the Carson City system has sufficient water rights over the 30-year planning period even for the most conservative growth estimates. The total combined duty of Carson City's water rights is still to be confirmed.

5.0 Summary

For the beginning of the planning period (2021), Carson City currently has adequate well production capacity (20.26 MG/day) to meet the demands of its community (17.09 MG/day). Based on the planning horizon of 30-years (2021 to 2051) and the growth rate used in this analysis, Carson City has sufficient water rights (23,926.48 AFA) to account for future growth in 2051 (13,835 AFA). As development continues and the population grows within their district, the future required demand for well production will be 18.67 MG/day, which is below the current capacity of 20.26 MG/day from the existing 29 active wells, regional intertie, and QWTP. However, it is critical to reanalyze future water supply to ensure demands can be met in case growth is higher than the State Demographer growth rate. For an in-depth look at all considerations and groundwater modeling scenarios, see Section 5.1 and Section 5.2. For a more detailed breakdown of projected well production required capacity and the surplus, see Table 4.

Table 4: Summarized Existing & Future Production

	Mgal/day	gal/min
Existing (2021) Water Supply Capacity[1]	20.26	21,100
Existing (2021) Water Demand	17.09	17,800
Existing (2021) Water Supply Deficit/Surplus[3]	3.17	3,300
Future (2051) Water Demand [2]	17.29	18,000
Future (2051) Water Supply Deficit/Surplus [3]	2.97	3,100

[1] Existing water supply capacity includes production from the wells listed in Table 1.
[2] The water demand in 2051 assumes the Carson City growth rate, as discussed in Section 2.2.
[3] The deficit/surplus calculation assumes no additional well development between 2021 and 2051 to analyze the additional well capacity needed to meet future demands. A negative number represents a water production deficit (and the need for additional water production) and a positive number represents a water production surplus (no additional water production necessary to meet future water demands).

5.1 Water Supply Considerations

The current demand (17.09 MG/day) is below the maximum well capacities and production from the QWTP and intertie (20.26 MG/day). The future demand (17.29 MG/day) is below the maximum well capacities. Based on the current data and methodology used for the analysis, Carson City's current water supply from the existing 29 wells is sufficient for the projected growth in the service area and will not require additional water sources to meet the projected water demand of 18,000 gpm. It is important to note that population growth in an area is dependent on many different factors that are not always able to be anticipated in a future growth analysis. Therefore, the population and expected community growth should be continually monitored in case an unanticipated population boom drives the water demand to be higher than the capacity of the existing water supply. For this reason, it is encouraged that all purveyors look at the benefits of water conservation. Carson City Public Works has an active Water Conservation Plan that was last updated September 2023.

1. Water Conservation
    - Pros: Reduce overall demand and production needs, inexpensive
    - Cons: Consumer buy in, does not fully accommodate long-term growth, loss of revenue

The analysis within this report shows that additional capacity is not necessary. In the Carson City 2018 Water Resources Report prepared by the Carson City Public Works Department, it was estimated that an additional 10 MG/day of production will be needed by 2050 during the summer season. Carson City's Water Resources Report estimate was based on a growth rate of 1.1% and an additional 20% reserve supply. The likelihood of this capacity deficiency was not analyzed within this report but should be continually monitored in case additional wells and/or capacities are increased affecting regional groundwater. It is also noted that the Quill Water Treatment Facility is currently undergoing plans for expansion, this could increase supply to 6 MG.

5.2 Modeling Options

The base condition that would be recommended for modeling purposes has been summarized below. This is not a recommendation to the purveyor and purely an assumed option for modeling purposes. A summary of the projected production and associated growth per year over the 30-year planning horizon can be found in Table 8.

Base Condition: Run existing wells with existing capacities for all twenty-nine (29) active wells. An assumed completion date of the Quill Water Treatment Plant will increase capacity to 4 MG by 2026, and upwards of 6 MG by 2036. This will reduce demands on the wells within the Eagle Valley basin. It is important to note that wet years will have greater use from Quill and dry years will rely on well pumpage.

Table 5: Proposed Modeling Options

Options	Wells											
	3	4	5	6	7	8	9	10b	11	16b	24b	25b
Base Condition (gpm)	1,125	500	292	1,226	252	268	168	1,200	502	31	1,200	1,000

Options	Wells										
	33	34	38	40	41b	43	44	45	46	47	48
Base Condition (gpm)	100	749	300	739	1,750	181	350	252	1,072	379	480

Options	Wells						Regional Intertie	QWTP	Total
	49	50	51	53	54	55			
Base Condition (gpm)	603	165	528	283	200	401	3,500	1,302	20,100

Carson Office

308 N Curry, Suite 200, Carson City, NV 89703

Tel. 775.883.7077 / Fax. 775.827.6112

www.lumosinc.com

6.0 Supplemental Information

Table 6: Existing Well Locations & Depths

Well #	3	4	5	6	7	8	9	10b	11
App. Num.	23672/23673	24986	25667	26582	26581	27314	81107	29906	29002
Capacity (GPM)	1125	500	292	1226	-	268	73	2119	502
Lat	39.18	39.16	39.17	39.18	39.19	39.14	39.13	39.19	39.16
Long	119.79	119.75	119.77	119.79	119.77	119.76	119.77	119.79	119.76
Depth	470	803	515	500	455	570	610	500	840
Casing Perforations	10	155	270	199	185	1	1	105	255
	285	589	458	494	455	560	590	330	795
Elevation (ft)	4814	4650	4736	4870	4739	4729	4759	4858	4664

Well #	16b	24b	25b	33	34	38	40	41b	43
App. Num.	36083/26494	43401	35277	47704	83811	44581	49571	51902	53141
Capacity (GPM)	31	672	1000	73	749	73	739	1600	181
Lat	39.2	39.16	39.16	39.19	39.17	39.12	39.18	39.16	39.12
Long	119.81	119.71	119.71	119.70	119.76	119.75	119.71	119.71	-119.74
Depth	530	400	375	490	700	235	1250	700	510
Casing Perforations	0	100	80	0	250	70	473	0	288
	0	390	190	0	680	235	1250	0	570
Elevation (ft)	5353	4630	4611	4678	4659	4698	4616	4610	4768
Note: All longitudes are negative (-)									

Well #	44	45	46	47	48	49
App. Number	48618	59827	61508	64799	66709	69344
Capacity (GPM)	197	252	1072		480	603
Lat	39.17	39.14	39.18	39.15	39.17	39.16
Long	-119.72	-119.76	-119.78	-119.72	-119.78	-119.76
Depth	480	560	250	650	428	801
Casing Perforations	160	220	55	140	120	0
	360	500	245	320	390	0
Elevation (ft)	4649	4700	4793	4622	4797	4668

Well #	50	51	53	54	55
App. Number	78899	69042/83671	70662	70521	81933
Capacity (GPM)	165	528	283	68	401
Lat	39.1	39.18	39.17	39.12	39.18
Long	-119.75	-119.79	-119.77	-119.77	-119.79
Depth	415	840	505	510	820
Casing Perforations	180	300	165	155	300
	360	795	445	455	780
Elevation (ft)	4671	4836	4729	4778	4859

Carson Office

308 N Curry, Suite 200, Carson City, NV 89703

Tel. 775.883.7077 / Fax. 775.827.6112

www.lumosinc.com

Table 7: Historical Monthly Well Production

Month	Monthly Well Production (gallons)					
	2018	2019	2020	2021	2022	2018-2022 Average Day Max Month
Jan	86,912,733	118,613,624	114,764,853	136,342,978	146,363,390	120,599,516
Feb	86,105,208	118,667,332	117,099,558	128,424,781	114,603,668	112,980,109
Mar	98,938,868	126,715,953	114,416,186	140,541,858	151,579,799	126,438,533
Apr	171,281,066	187,490,348	224,339,254	294,022,433	245,533,759	224,533,372
May	275,873,023	317,406,693	396,880,079	400,548,833	352,394,184	348,620,562
Jun	382,037,569	404,918,593	422,379,032	453,642,406	403,279,993	413,251,519
Jul	490,346,716	446,294,813	506,741,609	512,574,345	491,190,784	489,429,653
Aug	479,538,665	446,847,236	500,979,441	482,787,987	481,577,094	478,346,085
Sep	392,874,773	359,549,298	437,408,034	453,601,652	391,697,198	407,026,191
Oct	236,094,863	207,298,664	330,049,600	199,990,829	264,215,226	247,529,836
Nov	106,066,201	127,567,542	146,928,207	121,991,216	85,450,742	117,600,782
Dec	90,810,373	109,799,090	133,935,286	131,076,650	103,838,738	113,892,027
Total	2,896,880,058	2,971,169,186	3,445,921,139	3,455,545,968	3,231,724,575	3,200,248,185
Average Day (gpd)	7,936,658	8,140,190	9,440,880	9,467,249	8,854,040	8,767,803
Max Month (gallons)	490,346,716	446,847,236	506,741,609	512,574,345	491,190,784	489,429,653
ADMM (gpd)	15,817,636	14,414,427	16,346,504	16,534,656	15,844,864	15,788,053

Notes:
[1] The combined monthly well production includes the water provided through the regional intertie with the Town of Minden and the water produced by the Quill Water Treatment Plant.

= Maximum Month

Carson Office

308 N Curry, Suite 200, Carson City, NV 89703

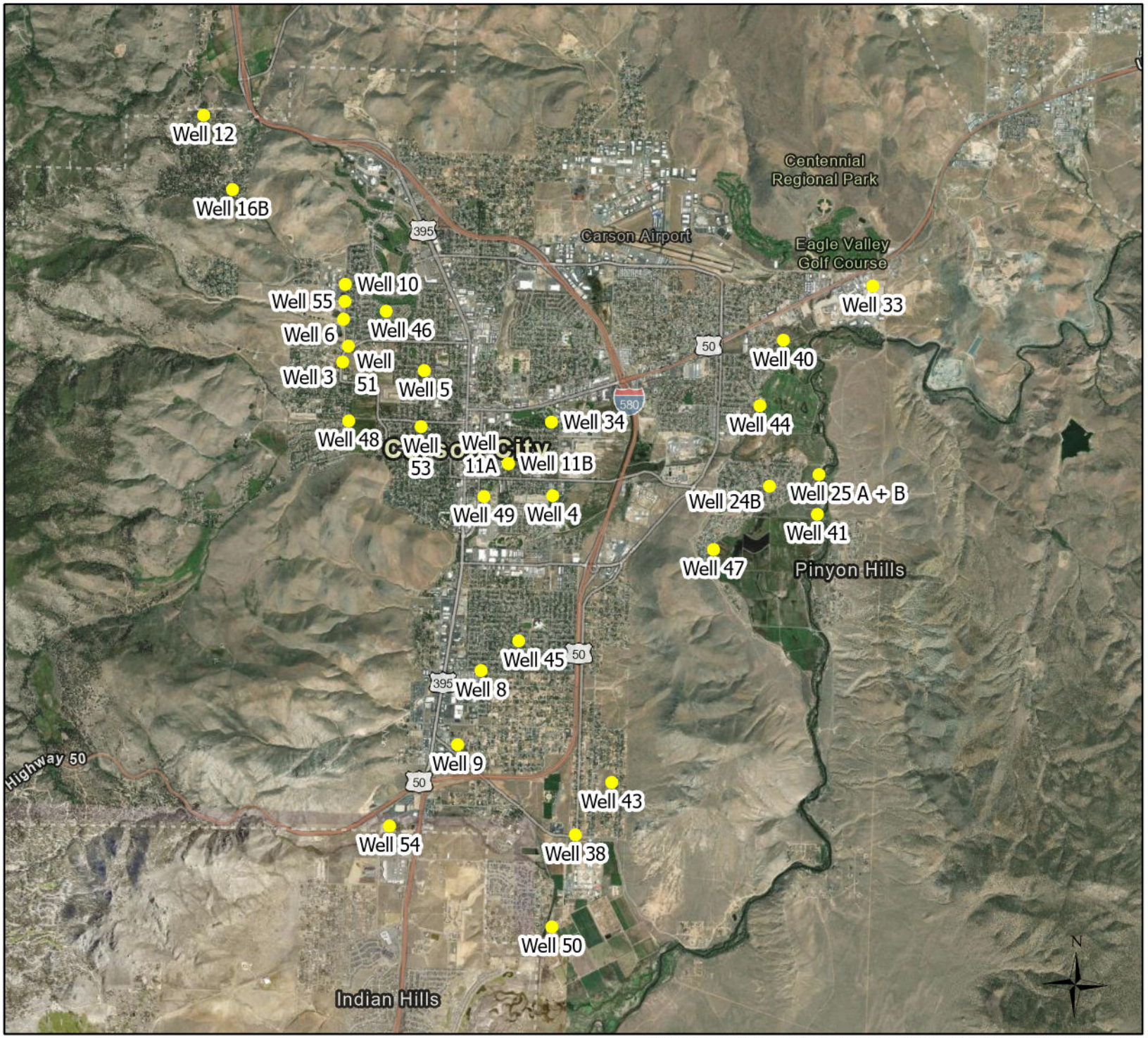
Tel. 775.883.7077 / Fax. 775.827.6112

www.lumosinc.com

Table 8: Future Well Production

Year	State Demographer – Carson City Growth Rate	Future Production [1] (MGAL)
2021 (base)		3,200
2022	0.7%	3,223
2023	0.6%	3,242
2024	0.5%	3,258
2025	0.5%	3,274
2026	0.6%	3,294
2027	0.6%	3,314
2028	0.5%	3,330
2029	0.4%	3,344
2030	0.5%	3,361
2031	0.4%	3,374
2032	0.4%	3,387
2033	0.4%	3,401
2034	0.3%	3,411
2035	0.3%	3,421
2036	0.3%	3,432
2037	0.2%	3,439
2038	0.2%	3,445
2039	0.2%	3,452
2040	0.1%	3,456
2041	0.1%	3,459
2042	0.1%	3,463
2043	0.1%	3,466
2044	0.1%	3,470
2045	0.1%	3,473
2046	0.1%	3,477
2047	0.1%	3,480
2048	0.1%	3,484
2049	0.1%	3,487
2050	0.1%	3,490
2051	0.1%	3,494

Notes:
[1] Total Projected Production is based off State Demographer - Carson City growth rate described in Section 2.2 and is the total of all wells, QWTP, and the Minden intertie in million gallons.



Path: L:\LAProj\10974.000 - CWSD 30 Year Regional Drought Plan\3-Design\CWSD\CWSD\CWSD.aprx

LUMOS & ASSOCIATES
308 N. CURRY ST., STE 200 CARSON CITY, NV 89703
TEL: 775.883.7077
WWW.LUMOSINC.COM

(c)LUMOS & ASSOCIATES, INC.: THIS DRAWING IS THE PROPERTY OF LUMOS & ASSOCIATES, INC... USE OR REPRODUCTION OF THIS DRAWING, IN WHOLE OR IN PART, WITHOUT THE WRITTEN PERMISSION OF LUMOS & ASSOCIATES, INC. IS STRICTLY PROHIBITED. THIS DRAWING IN NOT TO BE USED FOR ANY PROJECT OTHER THAN THE PROJECT FOR WHICH IT WAS PREPARED.

WELL LOCATIONS
CARSON CITY

CWSD
30-YEAR REGIONAL DROUGHT PLAN

1 OF 1

LEGEND

- Carson City Wells

Paper Size: 8.5" x 11"

0 1 2
Miles

Projection: Transverse Mercator
Grid: NAD 1983 UTM Zone 11N
Datum: North American 1983
Created by: dmarinrios

Date:	05/02/2024
Project #:	10974.000
Revision:	2