LUMOS & ASSOCIATES

MEMORANDUM

DATE:	4/16/2024
TO:	Ed James
FROM:	Chelsea Cluff, P.E.
CC:	Tim Russell, P.E., WRS; Jonathan Lesperance, P.E.
SUBJECT:	Stagecoach 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 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 Stagecoach, Nevada. Where deficiencies are noted or anticipated, potential mitigation measures will be provided for future consideration. Existing and future 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 period of record, will be made available to USGS, CWSD, and the water purveyor.

The water purveyor discussed in this memorandum is Stagecoach General Improvement District (GID). The Stagecoach GID manages the water supply for the census designated place of Stagecoach that has a population of 2,022 people as per the 2020 U.S. Census. Stagecoach is one of nine communities within Lyon County and one of four that are located adjacent to the Carson River Watershed. Stagecoach includes 5,338 acres of land and is 28 miles northeast of Carson City.

2.0 Existing and Future Production

2.1 Existing Production

Stagecoach obtains its municipal water from two (2) groundwater wells. Total monthly well production from each well varies from 3.1 million gallons per month to 4.8 million gallons per month during the summer months. Well 1 is the highest producing well with a pumping capacity of 550 gallons per minute (gpm) and a maximum daily production of 528,000 gallons per day (gpd). Well production is limited by the perennial yield for Stagecoach as opposed to paper water rights. The perennial yield is the amount of water that can be pumped without depleting the corresponding aquifer. There is no formal determination of the perennial yield for Stagecoach, but the estimate is 800 acre-feet annually (AFA). A 2021 report by RCI estimates the range is from 530 to 1,470 AFA. The total permitted water rights for the Stagecoach subbasin is greater than 1,500 AF. There are also approximately 440 domestic wells in the subbasin. The estimated water use per domestic well is 0.5 AFA to 1.0 AFA. Due to limited data on domestic water use, the Department of Water Resources estimate of 1.0 AFA per domestic well and will be used by the USGS to calculate domestic pumping. Stagecoach GID is

not liable for the pumping of these domestic wells and this number is not included in its water demands. For a breakdown of each well with pumping capacity and maximum daily production capacity refer to 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 Production (gpm)	Percent of 5-Year Monthly Average Total Production [1]
Central Well	550	528,000
CD Well	500	480,000
Total	1,050	1,008,000

Notes:
[1] Maximum daily production was estimated by using a sixteen (16) hour pumping cycle in June, July, August, and September. The 16-hour pumping cycle is being used for the purpose of long-term drought and sustainability planning and does not actually reflect well capacity if pumping at 24 hours a day.

Municipal Production

The two wells total pumping capacity is 1,050 gpm and a maximum daily production of 1,008,000 gpd assuming a sixteen (16) hour a day pumping cycle. Overall, the production capacity of a system as identified in this report is the summer-time peak capacity since water demand increases three (3) times 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 June and August with the overall highest production month being August of 2019 at 17.5 million gallons (MG). The average day max month (ADMM) can be calculated 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 to evaluate production deficiencies in the system. On Figure 1 the ADMM for the four (4) summer months is compared to the available production capacity. As seen within Figure 1 the current maximum well production of the municipal wells exceeds the ADMM for peak summer months. 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 7 in the Supplemental Information section.

Table 2: Historical Total Monthly Well Production

Month	Monthly Well Production (gallons)					
	2018	2019	2020	2021	2022	2018-2022 Average Day Max Month (ADMM)
June	11,632,000	11,366,000	12,794,000	13,081,000	11,318,000	401,273
July	12,655,000	14,499,000	15,585,000	13,482,000	11,323,000	450,293
August	13,261,000	17,457,000	12,334,000	12,855,000	11,449,000	449,040
September	8,669,000	7,565,000	11,547,000	10,351,000	10,463,000	323,967

= Maximum Month

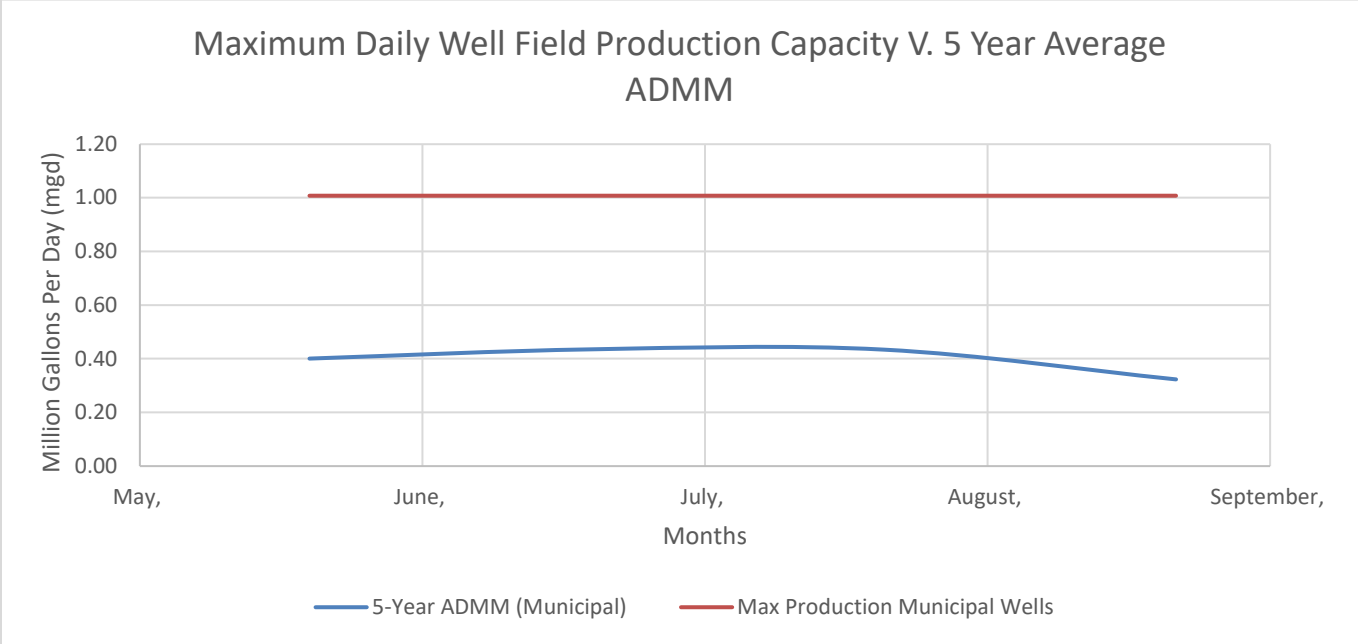


Figure 1: Maximum Well Field Production Capacity

2.2 Growth Projections & Future Required Production

To estimate the growth in water production for Stagecoach, a planning period from 2021 through 2051 (30 years) it is proposed to use the recently approved new development of 186 connections. For planning proposed these 186 connections would be spread out over the 30-year period.

Figure 2 illustrates the annual well production required for the growth rate described above.

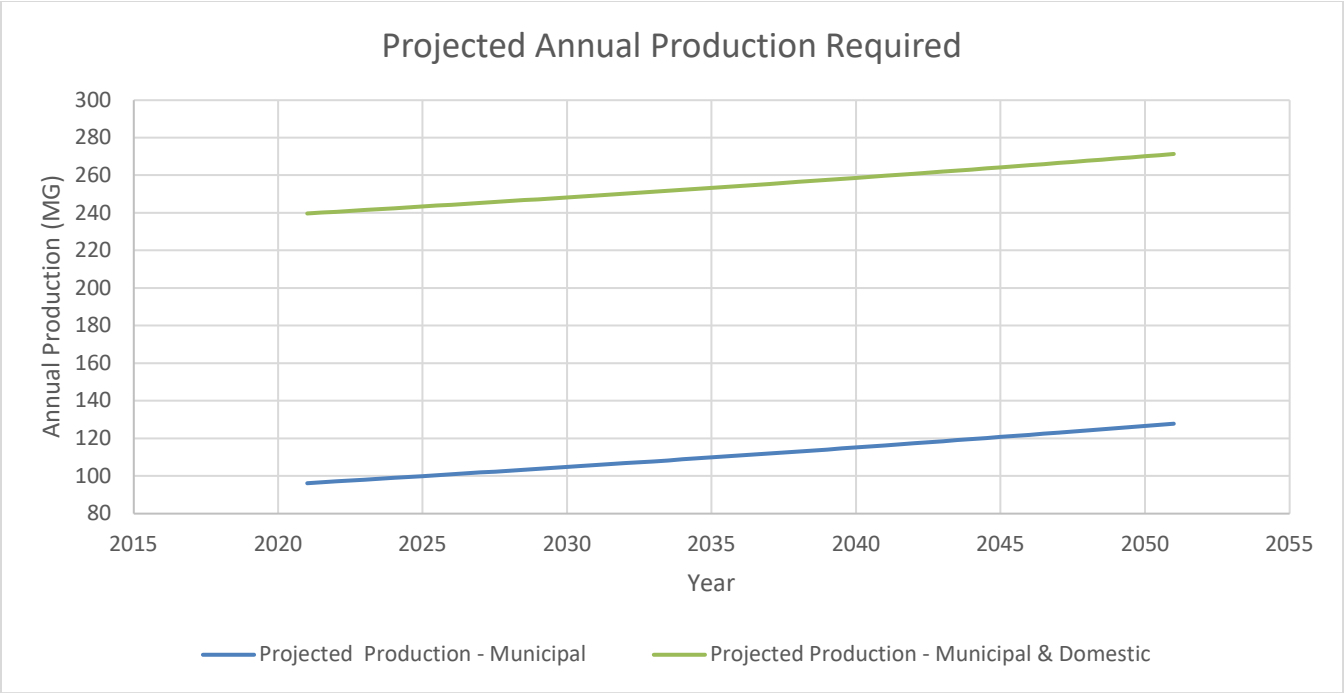


Figure 2: Projected Annual Production

2.3 Estimated Future Demand v. Existing Available Production

To estimate future well production necessary to meet anticipated water demand, the growth projections discussed in Section 2.2 were used to project the maximum daily demand required for Stagecoach GID. The calculated demand for Stagecoach in 2051 for municipal wells was approximately 128 MG based off the calculated Stagecoach growth rate, as described in Section 2.2. On Figure 3, the future estimated ADMM for the Stagecoach growth rate is compared against current available production capacity. If all municipal wells are operating, there is sufficient capacity to meet the Stagecoach growth rate in 2051.

For projected annual total production for municipal use, see Table 8 in the Supplemental Information section.

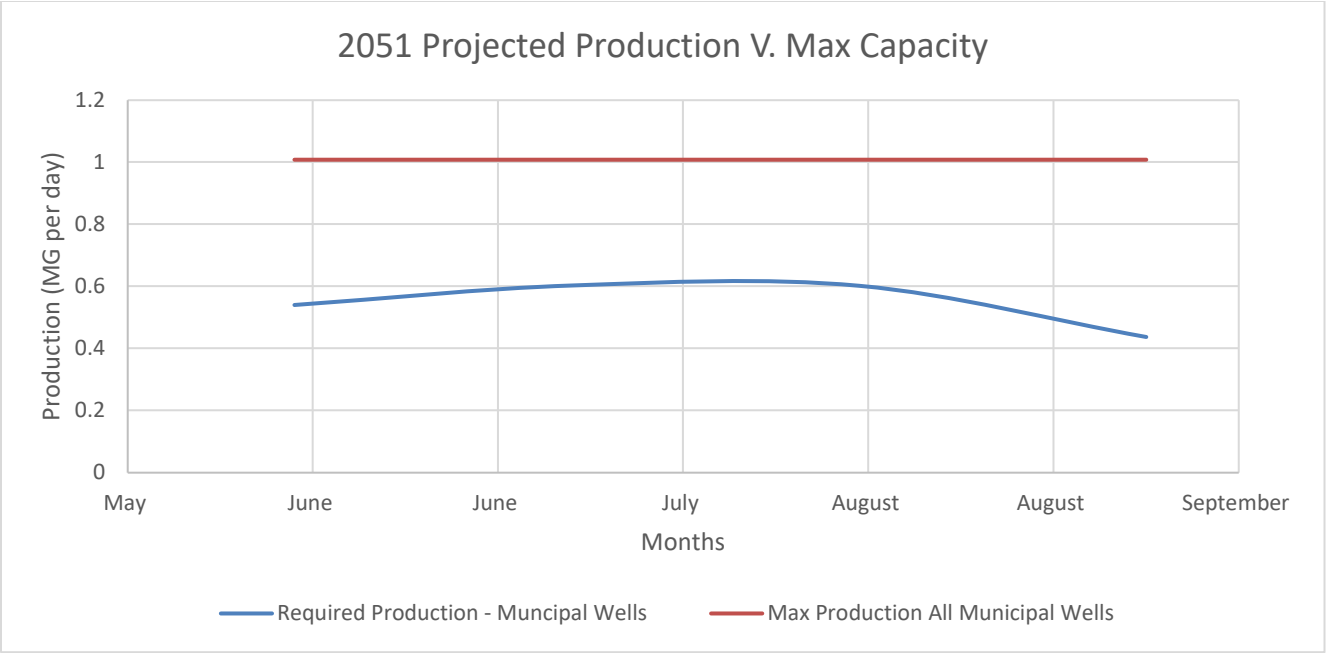


Figure 3: Projected 2051 Production versus Max Capacity of Wells

3.0 Water Quality

Water quality data, provided by Stagecoach GID, from 2018 through 2021 was analyzed. The data analyzed five (5) constituents of existing water quality per well: Total Dissolved Solids (TDS), Arsenic, Iron, Manganese, and Nitrogen. Concentrations for Arsenic are high in both wells, but neither exceed the Environmental Protection Agency (EPA) maximum contaminant limit (MCL). Overall, it is recommended to continue the monitoring of the Central and CD wells. The yearly concentrations, MCL, and secondary maximum contaminant level (SMCL) for each constituent are provided in Table 3.

Table 3: Contaminants Concentration

	Sample Year	TDS (ppm) SMCL = 500	Arsenic (ppb) MCL = 10	Iron (ppm) SMCL = 0.3	Manganese (ppm) SMCL = 0.1	Nitrogen (ppm) MCL = 10
Central Well	2018	300	8	0.07	0	2
	2019	----	----	----	----	4
	2020	----	----	----	----	3
	2021	----	----	----	----	5.2
	2022	----	9.5	----	----	3.9
CD Well	2018	610	----	0.09	0.04	3.6
	2019	----	----	----	----	4.9
	2020	----	9	----	----	5
	2021	----	----	----	----	5.4
	2022	580	----	0	0	5.2

4.0 Water Rights

Stagecoach has 11 certificated and 42 permitted water rights attributed to two (2) municipal wells. The total combined duty of those water rights is 848 acre-feet (AF) annually which exceeds the current annual production of 296 AFA.

5.0 Summary

Municipal Supply

At the beginning of the planning period (2021), Stagecoach GID currently has adequate well production capacity (1.01 MG/day) to meet the demands of its community (0.41 MG/day) and negligible water quality issues impacting their system. Based on the planning horizon of 30-years (2021 to 2051) and the growth rate of 186 new connections, Stagecoach GID has sufficient water rights to meet this growth. As development continues and the population grows within their district, the future required well production capacity will be 0.60 MG/day still well below the current capacity of 1.01 MG/day from the two (2) active wells. 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 – Municipal Supply and Demands

	MG/day	gpm
Existing (2021) Water Supply Capacity[1]	1.01	1050
Existing (2021) Water Demand	0.41	430
Existing (2021) Water Supply Deficit/Surplus[3]	0.60	630
Future (2051) Water Demand[2]	0.60	620
Future (2051) Water Supply Deficit/Surplus[3]	0.40	430

[1] Existing water supply capacity includes production from the following wells: Central Well and CD Well
[2] The water demand in 2051 assumes the Stagecoach growth rate, as discussed in Section 2.2 and does not include domestic wells
[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)

Perennial Yield Constraints

One limiting factor in groundwater production in the Stagecoach subbasin is the perennial yield amount which is estimated to be 800 acre-feet (AF). Perennial yield is the maximum amount of groundwater that can be salvaged each year over the long term without depleting the groundwater reservoir. The recharge from septic systems and irrigation return flows are not included in the perennial yield calculation. Including the septic and irrigation recharge gives the estimated system yield of the subbasin. Stagecoach GID the total combined duty of water rights is 848 AF. In 2021 Stagecoach GID pumped 292 AF. However, according to the State Engineer's 2021 Dayton Valley Basin Pumping report, an additional 676 AF was pumped from other users in the Stagecoach subbasin, which include domestic wells, irrigation, and commercial uses. The total water pumping in 2021 including Stagecoach GID pumping with the other water users was 976 AF. There are approximately 440 domestic wells. Assuming domestic wells use 1 AFA, this category of water users is the largest water use in the subbasin. Although Stagecoach GID significant additional permitted water rights, future growth is limited on the system yield of the subbasin.

5.1 Future Water Supply Considerations

Municipal Supply

The current (0.41 MG/day) and future demands in 2051 (0.60 MG/day) are below the maximum well capacities (1.01 MG/day), as shown in Figure 1 and Figure 3. Based on the current data and methodology used for the analysis, Stagecoach's current water supply of two (2) wells is sufficient for the projected growth in the service area and will not require additional wells to meet the projected water demand of 620 gpm.

5.2 Modeling Option

The base condition that would be recommended for modeling purposes has been summarized below and in Table 5. This is not a recommendation to the purveyor and purely an assumed option for modeling purposes. A summary of the projected population growth per year over the 30-year planning horizon can be found in Table 8.

Base Condition: Run existing wells with existing capacities for both active wells.

Table 5: Proposed Required Well Capacities in 2051

Options	Central Well	CD Well	Total
Base Condition (gpm)	550	500	1,050
Notes: [1] Max well production was assumed that wells could run 16 hours of the day during the peak months of June through September. [2] Proposed well capacity is based on 2020 Stagecoach Water Conservation Plan.			

6.0 Supplemental Information

Table 6: Existing Well Locations & Depths

Parameter	Central Well	CD Well
Well Depth (ft)	738	281
Screened Interval from (ft)	195	160
Screened Interval to (ft)	738	260
Latitude	39.36993056	39.35880556
Longitude	-119.37505	-119.3986583
Surface Elevation (ft)	4328	4305
Application Number	58067	81966/30003

Table 7: Historical Total Monthly Well Production

Month	Monthly Well Production (gallons)					
	2018	2019	2020	2021	2022	2018-2022 Average
Jan	3,683,000	6,147,000	4,167,000	3,842,000	4,229,000	4,413,600
Feb	3,803,000	3,979,000	4,252,000	4,113,000	3,787,000	3,986,800
Mar	4,855,000	6,308,000	4,387,000	5,040,000	5,196,000	5,157,200
Apr	5,916,000	8,732,000	8,386,000	8,872,000	6,868,000	7,754,800
May	9,277,000	9,746,000	9,993,000	9,645,000	8,740,000	9,480,200
Jun	11,632,000	11,366,000	12,794,000	13,081,000	11,318,000	12,038,200
Jul	12,655,000	14,499,000	15,585,000	13,482,000	11,323,000	13,508,800
Aug	13,261,000	17,457,000	12,334,000	12,855,000	11,449,000	13,471,200
Sep	8,669,000	7,565,000	11,547,000	10,351,000	10,463,000	9,719,000
Oct	6,562,000	6,267,000	8,597,000	5,827,000	6,907,000	6,832,000
Nov	4,646,000	4,310,000	4,290,000	4,786,000	3,623,000	4,331,000
Dec	4,963,000	4,102,000	4,659,000	4,411,000	4,464,000	4,519,800
Total	89,922,000	100,478,000	100,991,000	96,305,000	88,367,000	95,212,600
Average Day (gpd)	246,362	275,282	276,688	263,849	242,101	260,856
Max Month (gallons)	13,261,000	17,457,000	15,585,000	13,482,000	11,449,000	13,508,800
ADMM (gpd)	427,774	563,129	502,742	434,903	369,323	435,768

= Maximum Month

Carson Office

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

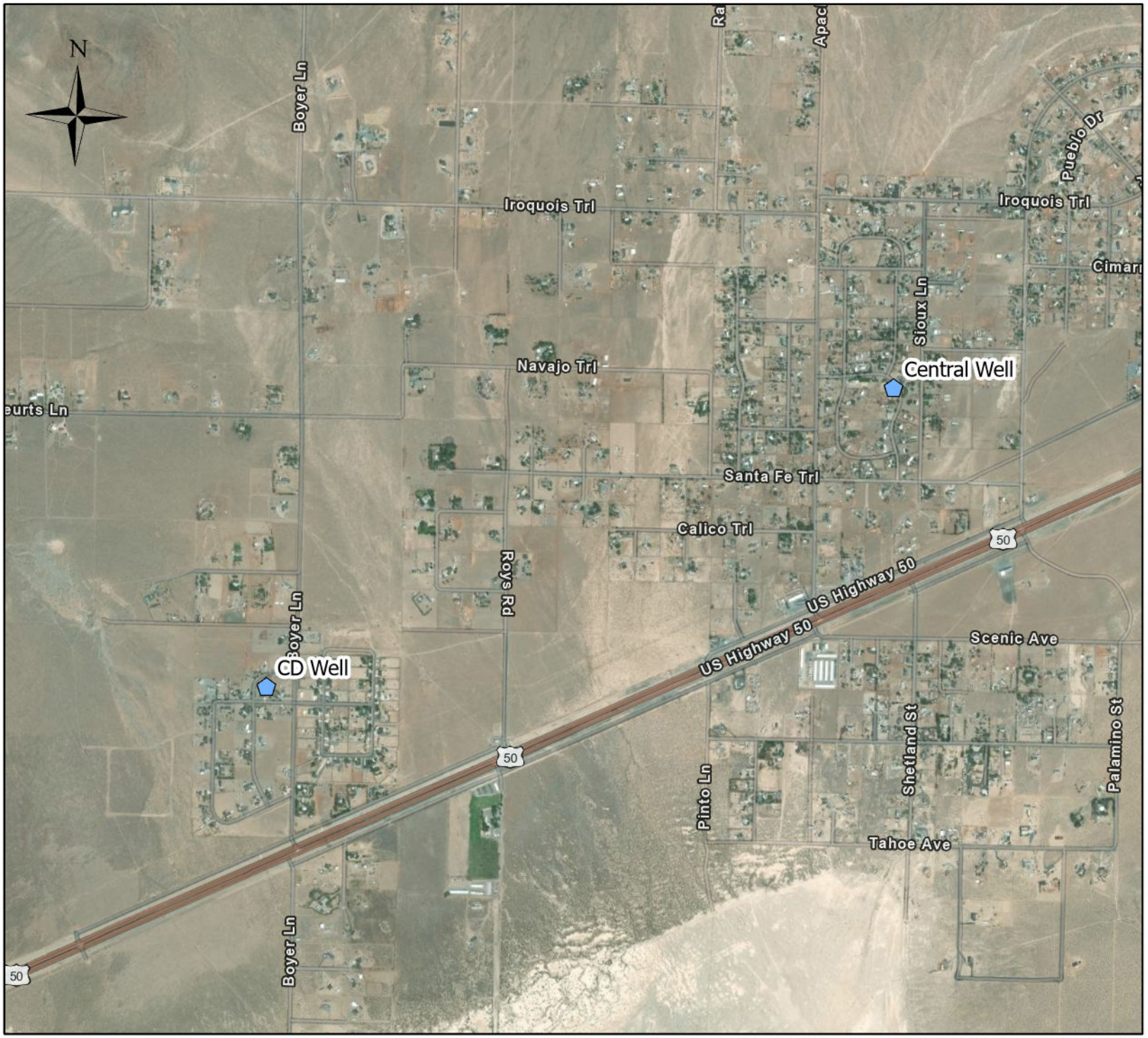
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Table 8: Future Well Production

Year	Growth Rate	Projected Flow - Municipal Use [1]	
		Gallons	MG
2021[2]	0.0%	96,305,000	96
2022	0.95%	97,219,898	97
2023	0.95%	98,143,487	98
2024	0.95%	99,075,850	99
2025	0.95%	100,017,070	100
2026	0.95%	100,967,232	101
2027	0.95%	101,926,421	102
2028	0.95%	102,894,722	103
2029	0.95%	103,872,222	104
2030	0.95%	104,859,008	105
2031	0.95%	105,855,169	106
2032	0.95%	106,860,793	107
2033	0.95%	107,875,970	108
2034	0.95%	108,900,792	109
2035	0.95%	109,935,350	110
2036	0.95%	110,979,735	111
2037	0.95%	112,034,043	112
2038	0.95%	113,098,366	113
2039	0.95%	114,172,801	114
2040	0.95%	115,257,442	115
2041	0.95%	116,352,388	116
2042	0.95%	117,457,736	117
2043	0.95%	118,573,584	119
2044	0.95%	119,700,033	120
2045	0.95%	120,837,184	121
2046	0.95%	121,985,137	122
2047	0.95%	123,143,996	123
2048	0.95%	124,313,864	124
2049	0.95%	125,494,845	125
2050	0.95%	126,687,046	127
2051	0.95%	127,890,573	128

Note:
[1] Total Projected Production for municipal use is based off the Stagecoach calculated growth rate described in section 2.2 and is the total of all wells in gallons and million gallons.
[2] The base year (2021) is the recorded production by the purveyor for the year of 2021.



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WELL LOCATIONS
STAGECOACH

CWSD

30-YEAR REGIONAL DROUGHT PLAN

1 OF 1

LEGEND

Stagecoach Wells

Paper Size: 8.5" x 11"

0 1,000 2,000
Feet

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

Date:	11/30/2023
Project #:	10974.000
Revision:	0