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MEMORANDUM

DATE:	5/6/2024
TO:	Ed James
FROM:	Chelsea Cluff, P.E.
CC:	Tim Russell, P.E., WRS; Jonathan Lesperance, P.E.
SUBJECT:	Silver Springs 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 the Silver Springs Mutual Water Company. 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 10-year period of record, will be made available to USGS, CWSD, and the water purveyor.

The water purveyor discussed in this memorandum is Silver Springs Mutual Water Company (SSMWC). SSMWC manages the water supply for the census designated place of Silver Springs, Nevada that has a population of 5,629 people as per the 2020 U.S Census. They serve approximately 1,103 residential, 58 commercial, 6 industrial, and 32 construction connections. The community is approximately 49,370 acres and is in northern Lyon County; 35 miles northeast of Carson City.

2.0 Existing and Future Demands

2.1 Existing Production

Silver Springs obtains its municipal water from four (4) groundwater wells. Three (3) of the wells are currently active. Monthly total well production from each well varies from 4.1 million gallons per month to 5.1 million gallons per month during the summer months. The Lake #2 Well is the highest producing well with a pumping capacity of 1,000 gallons per minute (gpm) and a max daily production of 960,000 gallons per day (gpd). Other groundwater users besides those being served by SSMWC are irrigation, commercial, recreation and domestic wells. The pumping report produced by Division of Water Resources shows the largest water use coming from domestic wells. As of 2021, there were approximately 1,348 domestic wells in and outside the service area that are pulling approximately 0.5 AFA to 1.0 AFA each from the basin. SSMWC is not liable for the pumping of these domestic wells.

For a breakdown of each well with pumping capacity and max daily production capacity refer to Table 1. The existing locations and associated permit numbers for each well are listed within Table 7 in the Supplemental Information section.

Table 1: Well Pumping Capacity & Max Daily Production

Well Name	Well Pumping Capacity Production (gpm)	Max Daily Production Capacity (gpd)[2]
Ft Churchill #1	-	-
Lake #2	1,000	960,000
Idaho #3	800	768,000
Deodar #4	750	720,000
Total	2,550	2,448,000

Notes:
[1] Maximum daily production was estimated by using a sixteen (16) hour pumping cycle. 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.
[2] Well capacities were confirmed by a memo provided by Facque Consulting.

Municipal Production

The three (3) active wells total pumping capacity is 2,550 gpm and a max daily production of 2,448,000 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 within SSMWC increases three (3) times compared to winter-time demands. Therefore, the capacity analysis is focused on the high production months. The maximum monthly production was analyzed for five (5) year period (2018 to 2022) and occurred between May and August with the overall highest production month being May of 2020 at 33.58 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 in Figure 1, the ADMM for peak summer months is less than the current maximum well production of the municipal wells. 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 in the Supplemental Information section.

It is important to note that SSMWC asked for the period of historical data to exceed the 5-year review period that Lumos & Associates prepared for their scope of work. Figure 1, for example, was made using the data set from 2018 to 2022. However, Table 2 has been updated to show the historical well production from 2012-2022.

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Table 2: Historical Total Monthly Well Production

Month	Monthly Well Production (gallons)											
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2012-2022 Average Day Max Month (ADMM)
June	21,869,000	18,301,640	22,838,982	18,988,700	20,377,849	17,425,402	18,069,060	21,259,417	22,435,000	10,774,700	21,675,000	648,530
July	27,102,000	26,230,615	23,146,869	17,480,429	32,031,949	21,336,813	16,218,971	27,890,954	22,050,000	26,013,000	23,220,000	796,126
August	27,219,000	20,930,115	17,434,945	19,649,176	24,909,253	22,640,705	15,238,816	28,404,175	20,906,000	25,091,000	23,555,000	745,388
September	18,817,000	12,366,087	18,966,353	16,950,961	18,208,375	17,391,135	18,724,200	22,518,285	20,875,000	19,874,000	19,721,000	619,432

= Maximum Month

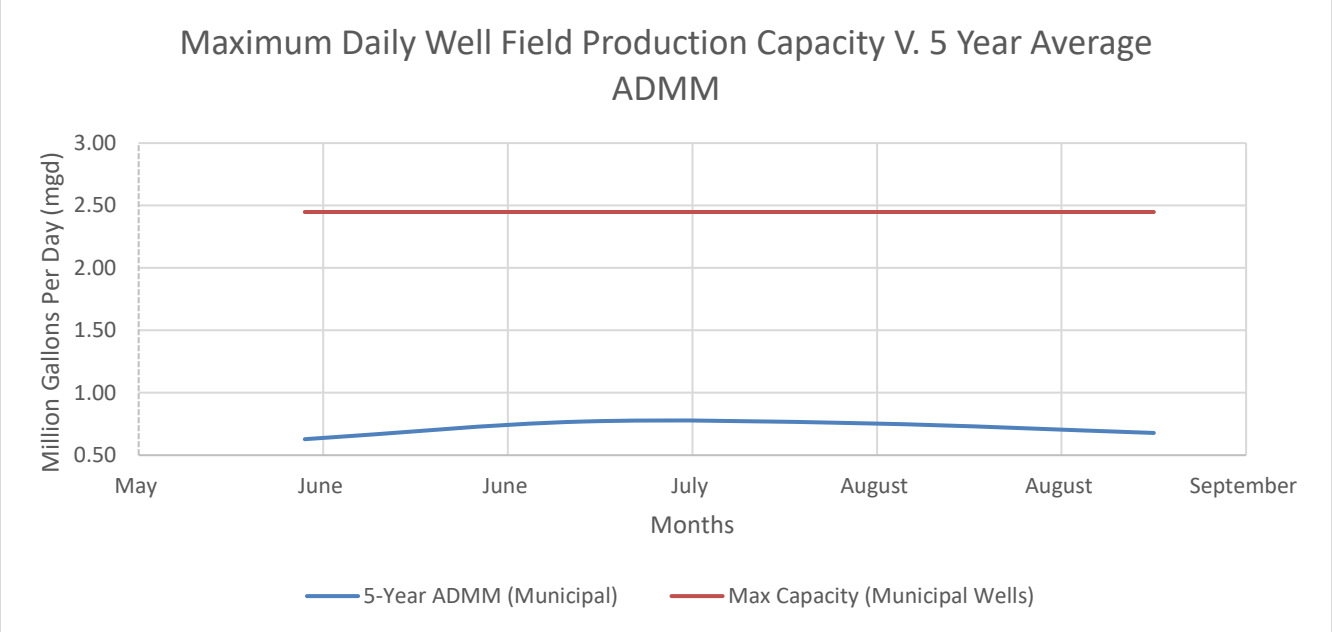


Figure 1: Maximum Well Field Production Capacity

2.2 Growth Projections

To estimate the growth in water production for the Silver Springs area, a planning period from 2021 through 2051 (30 years) was analyzed using historical connection count data. It is proposed by Facque

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Consulting to use known connection counts from 2018-2024 and apply an average growth rate of 0.43% over thirty (30) years. Total connections are estimated to be 154 on a compounding basis.

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

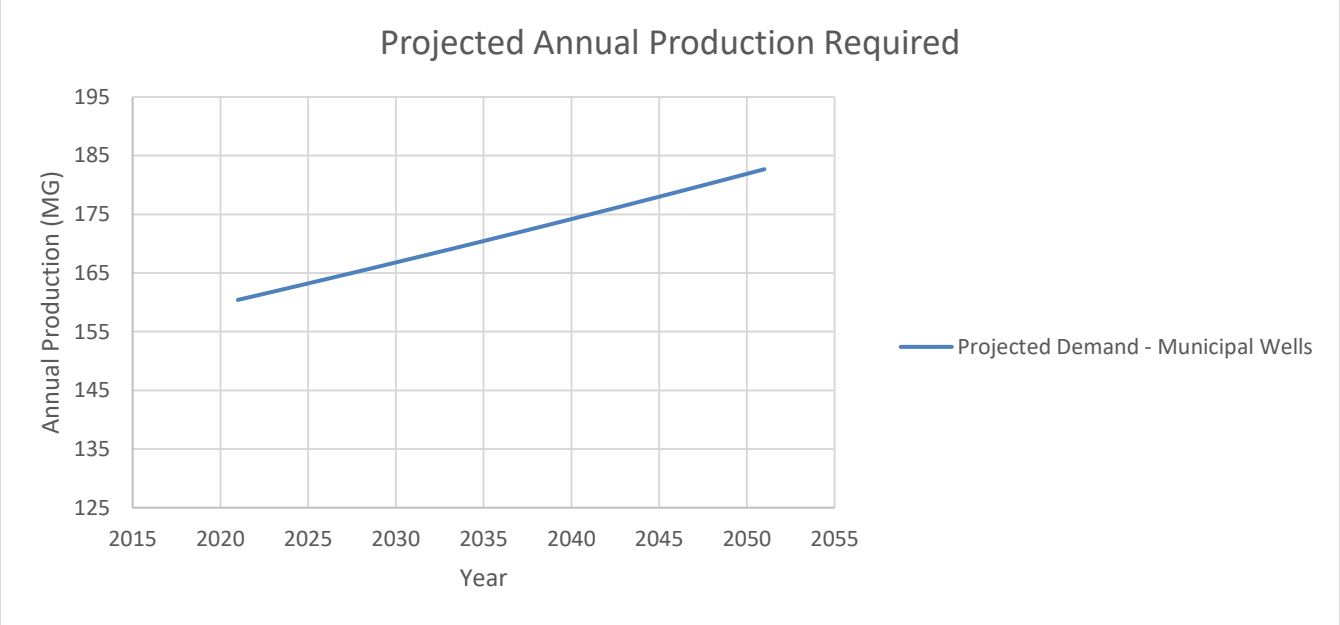


Figure 2: Projected Annual Production

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 SSMWC. The calculated demand for SSMWC in 2051 was approximately 183 MG (562 AF) based off the growth rate for SSMWC connection counts, as described in Section 2.2. On Figure 3, the future estimated ADMM for municipal production is compared against current available production capacity. If all municipal wells are running, there is enough capacity to meet the SSMWC growth rate in 2051.

For projected annual total production for municipal use, see

Month	Monthly Well Production (gallons)											
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2012-2022 Average
Jan	7,614,237	7,589,876	7,728,954	7,259,688	6,493,502	8,555,216	7,675,025	7,915,455	6,286,000	7,047,000	6,375,000	7,321,814
Feb	6,571,970	6,336,857	7,557,622	6,164,542	7,187,253	6,027,061	6,944,293	7,147,072	6,942,000	6,589,000	6,958,000	6,765,970
Mar	8,859,395	9,359,971	9,967,864	10,021,738	8,235,233	5,832,077	6,621,063	9,528,993	9,739,000	7,790,000	9,368,000	8,665,758
Apr	14,983,184	14,231,952	13,566,163	10,911,479	10,893,122	7,834,237	11,160,594	15,616,367	11,269,000	13,289,000	11,737,000	12,317,463
May	19,226,721	17,164,964	15,403,222	12,057,496	12,904,246	17,697,168	13,810,222	19,782,053	33,578,000	14,096,000	14,433,000	17,286,645
Jun	21,869,000	18,301,640	22,838,982	18,988,700	20,377,849	17,425,402	18,069,060	21,259,417	22,435,000	10,774,700	21,675,000	19,455,886

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Jul	27,102,000	26,230,615	23,146,869	17,480,429	32,031,949	21,336,813	16,218,971	27,890,954	22,050,000	26,013,000	23,220,000	23,883,782
Aug	27,219,000	20,930,115	17,434,945	19,649,176	24,909,253	22,640,705	15,238,816	28,404,175	20,906,000	25,091,000	23,555,000	22,361,653
Sep	18,817,000	12,366,087	18,966,353	16,950,961	18,208,375	17,391,135	18,724,200	22,518,285	20,875,000	19,874,000	19,721,000	18,582,945
Oct	14,391,696	9,715,186	11,591,311	10,223,947	12,389,661	11,562,186	14,085,783	16,378,057	14,642,000	12,696,000	13,758,000	12,857,621
Nov	7,273,168	7,110,323	6,081,140	7,155,112	8,165,153	7,152,124	7,952,656	7,760,011	6,762,000	9,457,000	9,012,000	7,625,517
Dec	6,348,795	8,349,360	6,968,527	6,076,933	6,366,595	6,127,292	6,703,837	7,847,291	8,167,000	7,702,000	7,270,000	7,084,330
Total	180,276,166	157,686,946	161,251,952	142,940,201	168,162,191	149,581,416	143,204,520	192,048,130	183,651,000	160,418,700	167,082,000	164,209,384
Average Day (gpd)	509,280	445,466	455,537	403,806.07	475,058.19	422,567.50	404,533	542,509	518,788	453,160	471,983	463,881
Max Month (gallons)	27,219,000	26,230,615	23,146,869	19,649,176	32,031,949	22,640,705	18,724,200	28,404,175	33,578,000	26,013,000	23,555,000	25,562,972
ADMM (gpd)	878,032	846,149	746,673	633,844	1,033,288.68	730,345.32	624,140	916,264	1,083,161	839,129	759,839	826,442

=Maximum Month

in the Supplemental Information section.

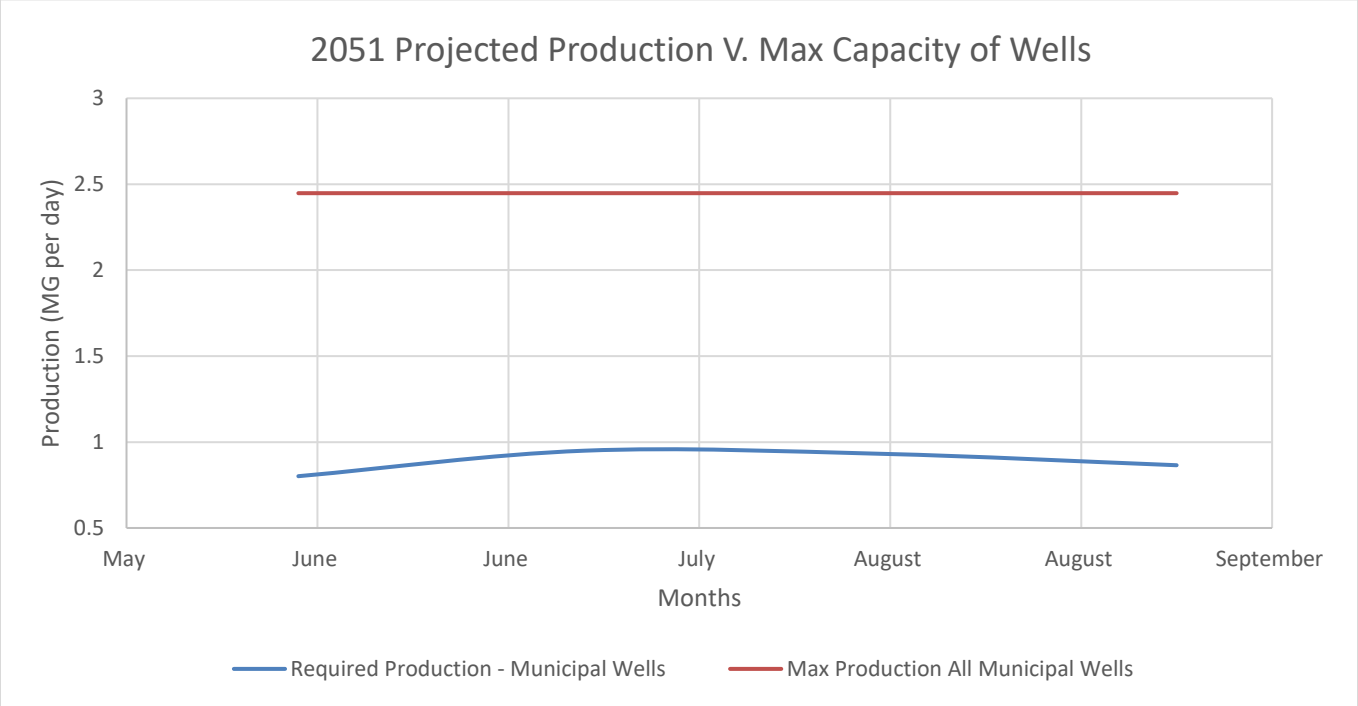


Figure 3: Projected 2051 Production versus Max Capacity of Wells

3.0 Water Quality

SSMWC provided water quality for one well, Deodar #4 for the years 2018-2021. The data analyzed water quality for three (3) constituents: Total Dissolved Solids (TDS), Arsenic, and Nitrogen. The

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maximum contaminant level (MCL) and secondary maximum contaminant level (SMCL) for each constituent is provided in Table 3.

Table 3: Contaminants Concentration

	Sample Year	TDS (ppm) SMCL = 500	Arsenic (ppb) MCL = 10	Nitrogen (ppm) MCL = 10
Deodar #4	2018	420	0.013	2.5
	2019	----	----	1.8
	2020	----	1.8	1.3
	2021	<10	----	<0.050
	2022	----	----	3.3

4.0 Water Rights

SSMWC has 8 certificates and 16 permitted water rights attributed to three (3) active municipal wells. The total combined duty of those water rights is approximately 4,173 acre-feet (AF) annually which exceeds the current annual production in 2021 of 492 AF.

5.0 Summary

Municipal Supply

At the beginning of the planning period (2021), SSMWC currently has adequate well production capacity (2.30 MG/day) to meet the peak demands of its community (0.77 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 154 connections, SSMWC has sufficient water rights to meet this growth. As development continues and the population grows within their district, the future required well production capacity in 2051 will be 0.95 MG/day, which is still well below the current capacity of 2.30 MG/day from the three (3) existing 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

	Mgal/day	gal/min
Existing (2021) Water Supply Capacity [1]	2.45	2,550
Existing (2021) Water Supply Demand[2]	0.77	810
Existing (2021) Water Supply Deficit/Surplus[4]	1.68	1,750
Future (2051) Water Demand [2&3]	0.95	990
Future (2051) Water Supply Deficit/Surplus [4]	1.50	1,570

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Notes:
[1] Existing water supply capacity includes production from the following wells: Lake#2, Idaho #3, and Deodar #4.
[2] The water demand does not include usage from domestic wells.
[3] The water demand in 2051 assumes the SSMWC growth rate, as discussed in Section 2.2
[4] 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 Churchill Valley Basin, where Silver Springs is located, is the perennial yield amount which is estimated to be 1,600 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 septic and irrigation recharge provides the total system yield of the basin. The system yield for Churchill Valley Basin has not been calculated.

According to the 2021 Department of Water Resources (DWR) Churchill Valley Basin pumping inventory report, a total 2,444 AF was produced from the basin. This was based on production from SSMWC, domestic wells, irrigation, and other uses (see Table 5). The total production exceeded the perennial yield of the basin. The largest water use by category is from domestic well users. DWR assumes that each domestic well uses 1.0 AF per year. Chris Facque from Facque Consulting believes the production by domestic wells for this area is closer to 0.5 AF per domestic well.

Table 5. Churchill Valley Basin 2021 historical pumpage (acre-feet).

YEAR	COM	DOM	IND	IRR	MM/IND	QM	COM/REC	STK	TOTAL
2021	11	1,331	0	511	-	560	16	15	2,444

Municipal Supply

The current peak demand (0.77 MG/day) and future peak demands in 2051 (0.95 MG/day) are well below the maximum well capacities (2.30 MG/day), as shown in Figure 1 and Figure 3. Based on the current data and methodology used for the analysis, Silver Spring's current water supply of three (3) active wells is sufficient for the projected growth in the service area and will not require additional wells to meet the projected water demand of 1,570 gpm.

5.1 Modeling Option

Data provided to the USGS will be based on future growth of 0.43% future water use from the wells Lake #2, Idaho #3, and Deodar #4. These numbers are shown in detail in a separate attached spreadsheet.

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The base condition that would be recommended for modeling purposes is shown in Table 6.

Base Condition: Run existing wells with existing capacities for all three (3) active wells.

Table 6: Proposed Required Well Capacities in 2051

Options	Lake #2	Idaho #3	Deodar #4	Total
Base Condition (gpm)	1,000	800	750	2,550
Notes: [1] Max well production was assumed that wells could run 16 hours of the day during the peak months of June through September.				

6.0 Supplemental Information

Table 7: Existing Well Locations & Depths

Parameter	Ft Churchill #1	Lake #2	Idaho #3	Deodar #4
Well Depth (ft)	290	350	400	370
Screened Interval from (ft)	UNKNOWN	165	200	160
Screened Interval to (ft)	UNKNOWN	345	400	335
Latitude	39	39.4	39	39.4
Longitude	-119	-119.21	-119	-119.23
Surface Elevation (ft)	4189	4172	4194	4203
Permit Number	79586	72096	81999	79237
Notes: [1] Exact location of Ft. Churchill and Idaho #3 are unknown				

Table 8: Historical Total Monthly Well Production

Month	Monthly Well Production (gallons)											
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2012-2022 Average
Jan	7,614,237	7,589,876	7,728,954	7,259,688	6,493,502	8,555,216	7,675,025	7,915,455	6,286,000	7,047,000	6,375,000	7,321,814
Feb	6,571,970	6,336,857	7,557,622	6,164,542	7,187,253	6,027,061	6,944,293	7,147,072	6,942,000	6,589,000	6,958,000	6,765,970
Mar	8,859,395	9,359,971	9,967,864	10,021,738	8,235,233	5,832,077	6,621,063	9,528,993	9,739,000	7,790,000	9,368,000	8,665,758
Apr	14,983,184	14,231,952	13,566,163	10,911,479	10,893,122	7,834,237	11,160,594	15,616,367	11,269,000	13,289,000	11,737,000	12,317,463
May	19,226,721	17,164,964	15,403,222	12,057,496	12,904,246	17,697,168	13,810,222	19,782,053	33,578,000	14,096,000	14,433,000	17,286,645
Jun	21,869,000	18,301,640	22,838,982	18,988,700	20,377,849	17,425,402	18,069,060	21,259,417	22,435,000	10,774,700	21,675,000	19,455,886
Jul	27,102,000	26,230,615	23,146,869	17,480,429	32,031,949	21,336,813	16,218,971	27,890,954	22,050,000	26,013,000	23,220,000	23,883,782
Aug	27,219,000	20,930,115	17,434,945	19,649,176	24,909,253	22,640,705	15,238,816	28,404,175	20,906,000	25,091,000	23,555,000	22,361,653
Sep	18,817,000	12,366,087	18,966,353	16,950,961	18,208,375	17,391,135	18,724,200	22,518,285	20,875,000	19,874,000	19,721,000	18,582,945
Oct	14,391,696	9,715,186	11,591,311	10,223,947	12,389,661	11,562,186	14,085,783	16,378,057	14,642,000	12,696,000	13,758,000	12,857,621
Nov	7,273,168	7,110,323	6,081,140	7,155,112	8,165,153	7,152,124	7,952,656	7,760,011	6,762,000	9,457,000	9,012,000	7,625,517

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Dec	6,348,795	8,349,360	6,968,527	6,076,933	6,366,595	6,127,292	6,703,837	7,847,291	8,167,000	7,702,000	7,270,000	7,084,330
Total	180,276,166	157,686,946	161,251,952	142,940,201	168,162,191	149,581,416	143,204,520	192,048,130	183,651,000	160,418,700	167,082,000	164,209,384
Average Day (gpd)	509,280	445,466	455,537	403,806.07	475,058.19	422,567.50	404,533	542,509	518,788	453,160	471,983	463,881
Max Month (gallons)	27,219,000	26,230,615	23,146,869	19,649,176	32,031,949	22,640,705	18,724,200	28,404,175	33,578,000	26,013,000	23,555,000	25,562,972
ADMM (gpd)	878,032	846,149	746,673	633,844	1,033,288.68	730,345.32	624,140	916,264	1,083,161	839,129	759,839	826,442

=Maximum Month

Table 9: Future Municipal Well Production

Year	Silver Springs Growth Rate	Future Production [1] – (MG)
2021	--	160
2022	0.43%	161
2023	0.43%	162
2024	0.43%	163
2025	0.43%	163
2026	0.43%	164
2027	0.43%	165
2028	0.43%	165
2029	0.43%	166
2030	0.43%	167
2031	0.43%	168
2032	0.43%	168
2033	0.43%	169
2034	0.43%	170
2035	0.43%	170
2036	0.43%	171
2037	0.43%	172
2038	0.43%	173
2039	0.43%	173
2040	0.43%	174
2041	0.43%	175
2042	0.43%	176
2043	0.43%	176
2044	0.43%	177
2045	0.43%	178

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2046	0.43%	179
2047	0.43%	180
2048	0.43%	180
2049	0.43%	181
2050	0.43%	182
2051	0.43%	183
Notes: [1] Total Projected Production is based off the State Demographer averaged growth rate described in Section 2.2 and is the total of all wells in million gallons.		

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