WARREN VALLEY BASIN WATERMASTER
FOR
HI-DESERT WATER DISTRICT
VS.
YUCCA VALLEY COMPANY, LTD, ET AL
CASE NO. 172103 - COUNTY OF SAN BERNARDINO

ANNUAL REPORT
OF THE
WARREN VALLEY BASIN WATERMASTER

FOR THE PERIOD
OCTOBER 1, 2021, THROUGH SEPTEMBER 30, 2022

Hi-Desert Water District
Operations Department
55439 29 Palms Hwy.
Yucca Valley, CA 92284

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FOR
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VS.
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December 2022

TO: Clerk of the San Bernardino Superior Court
Desert District, Department 4
14455 Civic Drive
Victorville, CA 92392

RE: Watermaster Report for Water Year 2021-22

Pursuant to the Judgment in the case of Hi-Desert Water District vs. Yucca Water Company, Ltd., and by Order of Judge Phillip Schaefer, February 10, 1992, submitted herewith is the Annual Report of the Warren Valley Basin Watermaster for Water Year 2021-22.

The boundary of the Warren Valley Groundwater Basin (the "Basin") and the five Hydro geologic Subunits (HGU) described in this Annual Report of the Warren Valley Basin Watermaster, is based upon mapping and research conducted by the United States Geological Survey (USGS). In 2003, the USGS published its Water Resources Investigation Report 03-4009, "EVALUATION OF THE SOURCES AND TRANSPORT OF HIGH NITRATE CONCENTRATIONS IN GROUNDWATER, WARREN SUB-BASIN, CALIFORNIA" (the "Report") prepared in cooperation with Hi-Desert Water District and Mojave Water Agency. The Basin's boundary as shown within the Report, is essentially the same as delineated by Fox in August of 1991, however the Basin has been redefined as having five (5) Hydro geologic Sub-units by the United States Geological Survey instead of three (3). These findings are based upon the knowledge of existing fault lines, which through extensive research, have been found to effectively compartmentalize each HGU within the Basin.

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_____ _____

TONY CULVER
ASSISTANT GENERAL MANAGER/OPERATIONS

GLENN WARE
PRODUCTION FOREMAN

HI-DESERT WATER DISTRICT
Operations Department
55439 29 Palms Hwy.
Yucca Valley, CA 92284

WATER MASTER SUMMARY OF FINDINGS

Watermaster findings for water year 2021-22 are as follows:

- The total amount of water pumped from within the Warren Valley Basin (the "Basin") is reported to be 2,393 acre-feet (AF). This reflects a decrease from the 2020-21 water year production value of 2,557 AF. The total production is the sum of all producers that are considered "major" producers within the Basin for purposes of recording water use. This includes Hi-Desert Water District's (HDWD) water use of 2,016 AF, Joshua Tree Retreat Center [1](JTRC) of 26 AF, Hawks Landing at Blue Skies (HLBS) of 322 AF and Well 2W, leased by San Bernardino County of 29 AF.

- Deliveries of State Water Project (SWP) totaled 2,200 AF and were applied to the Basin via three (3) groundwater recharge basin locations. Adjusted for agreed upon losses of 2%, the amount accruing to the Basin was 2,156 AF. Wastewater also contributed to our recharge totals by recharging 633 AF into the East Sub-Unit.

- HDWD's production for 2021-22 was 2,016 AF. This was a decrease of 158 AF from the previous year.

- HLBS production from within the Basin totaled 322 AF, which was 263 AF below their total annual allotment of 585 AF per year. Last years production was 339 AF.

- JTRC production from within the Basin totaled 26 AF, which was 54 AF below their total annual allotment of 80 AF per year. Last years production was 18 AF.

- Taking into consideration artificial recharge, (SWP deliveries, septic effluent, treated wastewater and large irrigated fields), natural recharge and total pumpage from within the Basin, the Watermaster estimates total available Basin storage within the West, Midwest, and Mideast Sub-basins to be 68,688 AF or 27 years of storage within the upper aquifer using a current production average from within the Warren Valley Basin of 2,613 AF.

[1] Joshua Tree Retreat Center is considered a minimal producer only for purposes of assessment.

- A combination of both the upper and middle aquifers is estimated to yield approximately 104,343 AF or 41 years of storage. The estimated values are based upon United States Geological Survey studies of the Warren Valley Groundwater Basin (Nishikawa and others; 2003) and HDWD records. A spreadsheet outlining cumulative storage is available within Appendix H.

- Wells within the District showed both an increase and decrease in water surface elevation (See Appendix E). Increases ranged between one (1) and ten (10) feet. Decreases ranged between one (1) and twelve (12) feet.

Well ID	AF	Percent of Warren Basin Total	Percent of HDWD Total
20W	503	21.02	24.95
14E	396	16.55	19.64
12E	357	14.92	17.71
HLBS-BS1	322	13.46	N/A
8W	199	8.32	9.87
6W	166	6.94	8.23
9E	130	5.43	6.45
9W	N/A	N/A	N/A
17E	160	6.69	7.94
16E	105	4.39	5.21
2W	29	1.21	N/A
JTRC	26	1.09	N/A

The Warren Valley Basin Watermaster continued its program to monitor water production and water levels pursuant to the Judgment.

Respectfully submitted,

WARREN VALLEY BASIN WATERMASTER

By: _____

Sheldon Hough, President

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1.0 *INTRODUCTON*

Pursuant to the Judgment in the matter of Hi-Desert Water District vs. Yucca Water Company Ltd., Case Number 172103, San Bernardino, California, dated September 16, 1977, (Judgment) Hi-Desert Water District (HDWD) through its Board of Directors was appointed by the Court as Watermaster to administer the provisions of the Judgment. The Watermaster was directed to formulate a proposal for a physical solution to the continuing overdraft of the Warren Valley Basin. The Judgment did not specifically require annual reporting of water levels or water production information, but instead required only that a solution to the overdraft be developed. A solution was formulated and presented by Kennedy/Jenks/Chilton as the Warren Valley Basin Management Plan, dated January 31, 1991 which was adopted by the Watermaster on May 10, 1991. Subsequently, on February 10, 1992, Judge Phillip Schaefer of the West District for the County of San Bernardino Superior Court ordered the Warren Valley Basin Watermaster to report to the Court on an annual basis the water levels in the basin and any matters that might impact the safe yield of the basin.

In December 1997, the Watermaster petitioned the Court to modify its Order of February 10, 1992, which required the annual determination of the safe yield of the Warren Valley Basin, and instead to require that the Watermaster report to the Court annually on conditions affecting water supply, use and disposal and to implement a groundwater monitoring program for basin management. The Watermaster undertook this action because, in general, a safe yield determination is made for allocating water resources among competing claims of right. In this case, HDWD is solely responsible for purchasing supplemental water. Securing supplemental supplies and monitoring water levels to ensure that there is adequate water in storage to meet the demands of the Basin is consistent with good water management practices and is a better use of available funds than preparing safe yield determinations. The Court subsequently approved the requested change.

2.0 COMPILATION AND ANALYSIS OF BASIC DATA

The Annual Report of the Warren Valley Basin Watermaster for the water year 1992-93 established that the hydrologic reporting period for the initial and subsequent reports would be on a water year basis (i.e. October 1 through September 30 of the following year). Presented herein are data pertaining to the analysis of the following items of water supply and utilization for water year 2021-22.

- Precipitation
- Water Demand and Production
- Water Deliveries from Sources Located Outside the Warren Valley Basin
- Existing Water Levels and Trend
- Water Recharge and Storage
- Wastewater Discharge

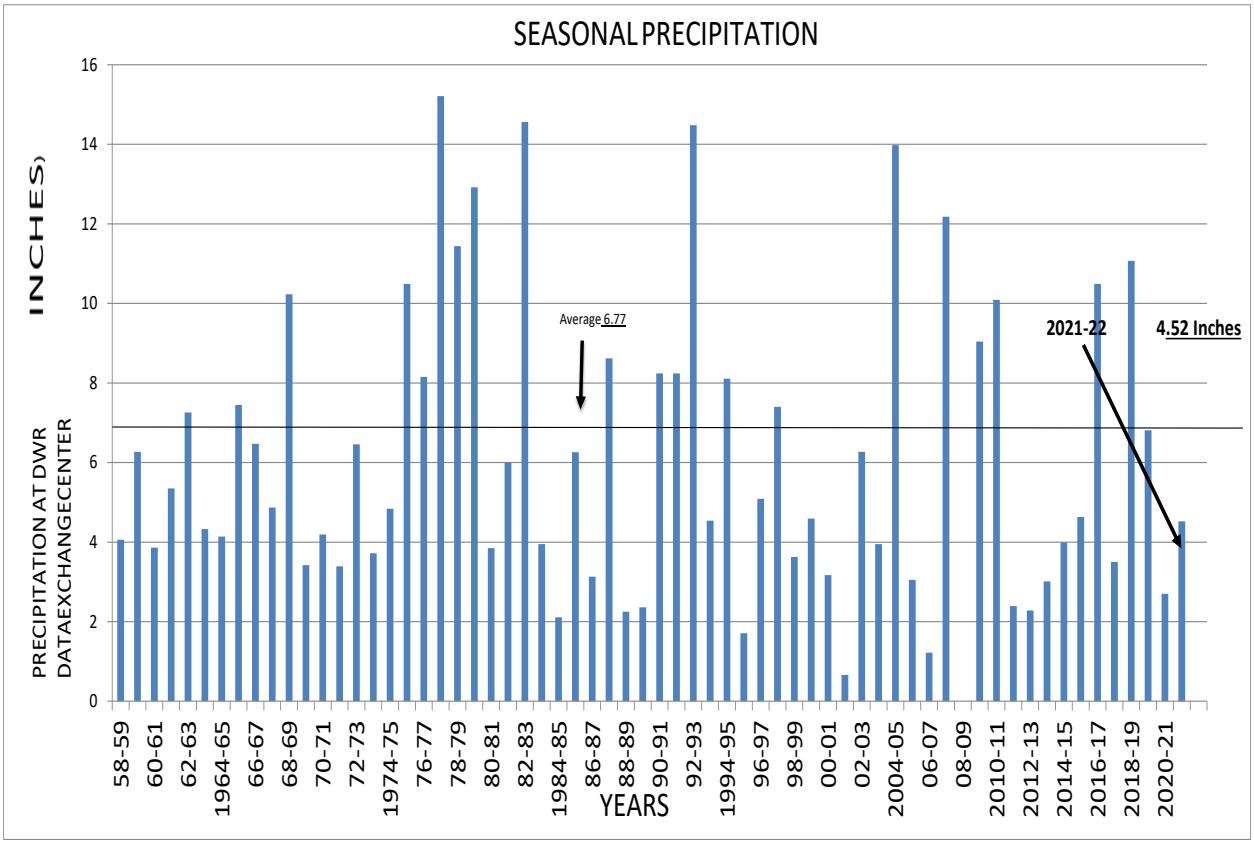
In preparation of this report, the Watermaster has considered information from various sources including the following:

- Records and data on file at the office of the Hi-Desert Water District (HDWD)
- Records and data on file at the office of the Mojave Water Agency (MWA)
- Records and data on file at the State Water Resources Control Board
- Climatological records from the Department of Water Resources, California Data Exchange Center
- United States Geological Survey (USGS)
- Records maintained at the Joshua Tree Retreat Center, Joshua Tree, CA
- Wastewater

Water production and water level data are collected as part of the ongoing groundwater monitoring program administered by HDWD. The hydrographs included within this report are prepared using data collected from wells that are considered representative of the water level trends throughout the Warren Valley Basin.

3.0 PRECIPITATION

The average precipitation recorded at the California Department of Forestry (CAL FIRE) Yucca Valley station for water years 1957-58 through 1992-93 was 6.77 inches. This amount represents the Base Period average against which subsequent seasonal precipitation amounts are compared. Precipitation during 2021-22, shown on Table 1, was 4.52 inches which is 66.77 % of the thirty-six-year Base Period average. The heaviest precipitation (in inches) occurred within the month of December (2.57), followed by August (.90), and September (.61) accounting for 90% of the total for the year.



4.0 WATER DEMAND AND PRODUCTION

Other extractions from within the Basin totaled 377 AF. JTRC water production accounted for 26 AF of this value, the golf course (HLBS), accounted for 322 AF and San Bernardino County Well 2W, counted for the remaining 29 AF. The County has a maximum usage of 50 AF at Well 2W per year, both JTRC and HLBS remained below their water allotments of 80 and 585 AF respectively. HLBS, considered a major producer by the Judgment, paid their applicable assessment fees to the Watermaster for the extracted water. JTRC continues to be a minimal producer for purposes of assessment as it is not required to submit payment to the Watermaster for extracted water so long as such extraction does not exceed 80 AF per year.

4.1 WATER FROM SOURCES LOCATED OUTSIDE THE WARREN VALLEY BASIN

During water year 2021-22, deliveries distributed to the HDWD service area from outside the Warren Basin accounted for 861 AF. These deliveries were from the Mainstream Well 24E, which is located within the Ames/Means Basin. Deliveries of State Water Project (SWP) water to the Basin for groundwater recharge totaled 2,200 AF during the 2021-22 water year. Adjusted for agreed upon losses of 2%, the amount accruing to the Basin was 2156 AF.

Table 2 below outlines water extractions and deliveries of those producers required to report to the Watermaster.

Table 2

Water Year	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Joshua Tree Retreat Center (AF)	51	65	67	39	35	18	26
Hawks Landing at Blue Skies (AF)	227	275	341	274	294	339	322
Hi-Desert Water District (AF)	2,145	2,153	2,214	2,547	2,221	2,174	2,016
Well 2W – Pioneertown Leased County of San Bernardino	------	------	------	12	34	26	29
Subtotal Warren Valley Basin (AF)	2,423	2,493	2,622	2,860	2,550	2,557	2,393
Bighorn Desert View Intertie (AF)	------	------	------	------	------	------	------
Mainstream Well 24E (AF)	768	669	680	240	709	779	861
Subtotal Ames Means Basin (AF)	768	669	680	240	709	779	861
Total All Basins (AF)	3,191	3,162	3,302	3,100	3,259	3,336	3,254

5.0 STATE OF THE WARREN VALLEY BASIN

The Warren Valley Sub-basin (the "Basin") is compartmentalized by fault lines into five (5) hydrogeologic subunits (HGU) that make up the largest water bearing formations of the Basin. These HGU's are referred to as the west, mid-west, mid-east, east, and northeast HGU's. Major producers within the Basin include Hi-Desert Water District (HDWD), which currently extracts water from within the west, mid-west, and mid-east HGU's; Hawks Landing at Blue Skies (HLBS), positioned over the west HGU; and Joshua Tree Retreat Center (JTRC), which primarily extracts groundwater from within the east HGU. The location and approximate boundaries of these HGU's are shown on Plate 1 with groundwater well locations included.

Hydrographs of water surface elevations which include water quality analysis for nitrogen as (NO3-N), total dissolved solids (TDS), and water production data within each of the HGU's are shown within Appendix G. Each of these graph trend changes are associated with groundwater extractions and recharge within the Basin and are explained below. The locations of these wells are shown within Appendix C.

5.1 WEST HYDROGEOLOGIC SUB-UNIT

Compared to last years data, the 2021-22 water year levels within the West HGU decreased on average of seven (7) feet (*2W, 3W, 5W, 6W, 8W, 9W, 10W, 11W and 20W). BS #1, owned by HLBS, was sounded four times (Oct., Jan., June, and Sept.) over the 2020-21 water year. The water level remained the same. The staff at HLBS have been very cooperative and accommodating in providing HDWD staff access to the premises. Table 3 outlines groundwater surface elevations taken from wells within the west HGU during 2021-22.
(* 2W is leased to San Bernardino County)

Table 3

Well ID	Groundwater Surface Elevation (2021-22)	Groundwater Surface Elevation (2020-21)	Increase (ft.) 2020-21 /2021-22	Groundwater Surface Elevation (1992)	Increase (ft.) 1992-93/2021-22
1W	NR	NR	NR	NR	NR
2W	3001	3010	-9	NR	NR
3W	3093	3098	-5	2944	147
5W	3111	3119	-8	2908	203
6W	3116	3118	-2	2942	174
8W	3100	3109	-9	2957	143
9W	3104	3116	-12	2932	172
10W	3102	3109	-7	2944	158
11W	3080	3083	-3	N/A	N/A
20W	3112	3119	-7	N/A	N/A

Water extractions from within the West HGU totaled 897 AF. The extracted water was replenished by State Water Project (SWP) deliveries to HDWD's Site 3 (groundwater recharge facility) totaling 1,112 AF. The West HGU gained 215 AF in 2021/22 when comparing extractions to replenishments.

All active production wells within the Warren Basin were analyzed for nitrate as Nitrogen (NO3-N) and Total Dissolved solids (TDS). HDWD tests all wells for Nitrate and TDS monthly. These wells were sampled once per semester throughout the water year, for the water master. Wells at our two blend facilities are sampled weekly throughout the year. Concentrations of each constituent within these wells remained below the SWRCB's and the Environmental Protection Agency's (EPA) primary and secondary maximum contaminant levels (MCL). In October of 2019 Well 11w NO3-N levels reached the MCL of 10 mg/L.

This year within the West HGU, NO3-N samples at Well 11W were taken each semester as the well was flushing. NO3-N results were still higher than what we would like to see in order to return this well into service. We have continued to monitor Well 11W NO3 with an Analyzer installed in April of 2020. It does appear that NO3 levels are slowly trending down, and we will continue to monitor. The elevated NO3-N levels at Well 11W is attributed to the solute transport of nitrates throughout the saturated zone of the aquifer due to seepage infiltration.

Of the wells sampled both semesters, Well 8W displayed the most change in NO3-N level for the 1st semester with a slight decrease of 1.2 mg/L in the first semester, and .6 mg/L the second semester. Well 6W displayed small changes in NO3-N levels with a slight increase of .34 mg/L in the 1st semester and .47 mg/L in the 2nd semester. Well 9W is currently down due to positive coliform and high Heterotrophic Plate Count (HPC) samples. Well 9W was flushed to obtain those samples.

All other wells remained relatively consistent with the historical levels showing slight variations as seen in Table 4.

Table 4

Well ID	2021-22 Nitrogen NO3-N Results (mg/L) MCL = 10 Semester 1/Semester 2	2020-21 Nitrogen NO3-N Results (mg/L) MCL = 10 Semester 1/Semester 2	2005 Nitrogen NO3-N Results (mg/L) MCL = 10 Semester 1/Semester 2
6W	1.2/1.2	.86/.73	5.1/4.5
8W	3.1/3.6	4.3/4.2	2.4/2.4
9W	2.2/.78	0.9/**	1.7/3.1
11W	8.2/8.0	**/**	5.4/8.3
20W	3/2.7	2.9/3.5	NA

TDS levels within in the West HGU were consistent with that of historical records, compared to last year's numbers. Of the wells sampled both semesters, Well 20W displayed the most change in TDS levels with an increase in the 1st semester and a decrease in the 2nd semester. The difference of TDS levels was +30 mg/L in the 1st semester and -30 mg/L in the 2nd semester. Well 9W had an increase in the 1st semester of +80 mg/L. Table 5 below displays the TDS results for those wells within the west HGU.

Table 5

Well ID	2021-22 TDS Results (mg/L) Secondary MCL = 1000, Semester 1/Semester 2	2020-21 TDS Results (mg/L) Secondary MCL = 1000, Semester 1/Semester 2	2005 TDS Results (mg/L) Secondary MCL = 1000. Semester 1/Semester 2
6W	250/260	240/280	160/170
8W	190/190	170/180	150/180
9W	210/260	290/**	190/180
11W	260/280	**/**	260/260
20W	200/190	170/220	NA

5.2 MID-WEST HYDROGEOLOGIC SUB-UNIT

Three of the sites monitored within the Mid-West HGU during the 2021-22 water year displayed an average increase of six (6) feet in water surface elevation. Well 12E remained the same while Well 7E had a slight decrease of three (3) feet. Table 6 below displays groundwater surface elevation data along with historical information:

Table 6

Well ID	Groundwater Surface Elevation (2021-22)	Groundwater Surface Elevation (2020-21)	Increase (ft.) 2020- 21/ 2021-22	Groundwater Surface Elevation (1992)	Increase (ft.) 1992-93/2021-22
7E	3067	3070	-3	2793	274
9E	3068	3064	+4	2796	272
12E	3066	3066	0	2786	280
16E	3096	3086	+10	2747	349
17E	3066	3061	+5	2799	267

Water extractions from within the Mid-West HGU totaled 752 AF. The extracted water was replenished by State Water Project (SWP) deliveries totaling 430 AF. The Mid-West HGU lost 322 AF in 2021/22 when comparing extractions to replenishments.

Nitrate and TDS samples were taken from wells located within the Mid-West HGU on a semester basis. Nitrate levels within the Mid-West HGU remained relatively consistent throughout the 2021-2022 water year.

Well 16E showed a decrease of -0.8 mg/L in the 2nd semester. Well 17E showed a mild spike in NO3-N this year. Additional samples taken weekly remained relatively consistent to the previous year's readings.

Table 7

Well ID	2021-22 Nitrate as N Results (mg/L) MCL = 10 Semester 1/Semester 2	2020-21 Nitrate as N Results (mg/L) MCL = 10 Semester 1/Semester 2	2005 Nitrate as N Results (mg/L) MCL = 10 Semester 1/Semester 2
9E	2.6/2.9	2.8/3.2	1.1/2.2
12E	**/2.4	2.3/2.6	6.1/6.8
16E	4.0/4.9	4.1/5.7	4.6/4.6
17E	4.1/4.6	3.6/4.0	NR/7.7

TDS sampling shows Well 17E had a slight decrease of -40 mg/L in the 1st semester. Well 9E had a slight increase of +30 mg/L in the 1st semester and +10 mg/L in the 2nd semester. TDS results remained relatively consistent at the other wells within the Mid-West HGU. Results have been provided within Table 8.

Table 8

Well ID	2021-22 TDS Results (mg/L) Secondary MCL = 1000, Semester 1/Semester 2	2020-21 TDS Results (mg/L) Secondary MCL = 1000, Semester 1/Semester 2	2005 TDS Results (mg/L) Secondary MCL = 1000, Semester 1/Semester 2
9E	280/300	250/310	NR/NR
12E	**/310	300/310	290/NR
16E	230/240	260/230	270/250
17E	300/320	340/320	NR/290

5.3 MID-EAST HYDROGEOLOGIC SUB-UNIT

During the 2021-22 water year, groundwater surface elevations increased by one (1) foot at Site 7 and remained the same at Well 14E. Site 7 is being utilized within this report to track changes within the Mid-East HGU due to the low number of active production wells within this HGU. Due to an obstruction in well 18E, we were unable to obtain water sounding levels.

Table 9

Well ID	Groundwater Surface Elevation (2021-22)	Groundwater Surface Elevation (2020-21)	Increase (ft.) 2020-21 /2021-22	Groundwater Surface Elevation (2007/08)	Increase (ft.) 2007/08/2021-22
Site 7	3055	3054	+1	3021.5	33.50
14E	3030	3030	0	3002	28
18E	N/R	N/R	N/R	2982	52 (2017-18)

Water extractions from within the Mid-East HGU totaled 396 AF. The extracted water was replenished by SWP water deliveries to Site 7 (groundwater recharge facility) totaling 659 AF leaving a surplus of 263 AF.

Well 14E is the only active well in the Mid-East HGU. Nitrate sample results for Well 14E shows a slight decrease of 0.2 mg/L in the 2nd semester. In November 2008, the State MCL for Arsenic was lowered from 50 ug/L to 10 ug/L. Due to sporadic high concentrations of Arsenic, the District removed Well 18E from service during the 2009-10 water year.

Table 10

Well ID	2021-22 Nitrate as N Results (mg/L) MCL = 10 Semester 1/Semester 2	2020-21 Nitrate as N Results (mg/L) MCL = 10 Semester 1/Semester 2	2005 Nitrate as N Results (mg/L) MCL = 10 Semester 1/Semester 2
14E	1.6/1.7	1.6/1.9	2.2/3.2
18E[2]	NR	NR	2.1/2.5

TDS samples within the Mid-East HGU taken from Well 14E showed a slight decrease of 10 mg/L for the 2nd semester. Sample results for the 2021-22 water years are seen below in Table 11.

Table 11

Well ID	2021-22 TDS Results (mg/L) Secondary MCL = 1000, Semester 1/Semester 2	2020-21 TDS Results (mg/L) Secondary MCL = 1000, Semester 1/Semester 2	2005 TDS Results (mg/L) Secondary MCL = 1000, Semester 1/Semester 2
14E	240/230	240/240	NR/NR
18E[3]	NR	NR	160/NR

[2] Well down due to arsenic
[3] Well down due to arsenic

5.4 NORTH-EAST HYDROGEOLOGIC SUB-UNIT

There are currently no major producers extracting water from within the North-East HGU. HDWD possesses one well that is monitored for groundwater surface elevations; Well 11E.
Well 11E's groundwater surface elevation was recorded to be 2,945 feet above sea level for the 2021-22 water year. This represents a decrease of one (1) foot in the water surface elevation from the previous year.

Due to the lack of active production wells within the North-East HGU, water quality analyses have not been performed.

5.5 EAST HYDROGEOLOGIC SUB-UNIT

Due to the lack of historical information, HDWD staff continues to utilize groundwater surface elevations from a monitoring well referred to as Well 21E. A reading of 2,895 feet above sea level (obtained in Sept of 2022) represents a one (1) foot increase when compared to the 2,894-measurement recorded in September of 2021.

5.6 RECLAMATION FACILITY

In September 2019 the Reclamation Facility started recharging in the East Hydrogeologic Sub-Unit. During the 2021/2022 water year, there was 633 AF recharged. In the future this water will be extracted and pumped to the west, where it will be recharged into basins with production wells.

PRECIPITATION AT YUCCA VALLEY
(INCHES)

WATER YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP				TOTAL
1957-58	1.19	0.22	0.69	0.54	2.59	2.64	2.61	0.14	0.06	0.20	0.09	0.14	6.77	164.11%	100.00%	11.11
58-59	0.32	0.32	0.00	0.87	2.10	0.00	0.04	0.00	0.00	0.13	0.02	0.26	6.77	59.97%	100.00%	4.06
1959-60	0.37	1.83	1.36	1.26	0.15	0.00	0.59	0.00	0.00	0.05	0.00	0.66	6.77	92.61%	100.00%	6.27
60-61	0.17	0.78	0.45	0.50	0.00	0.01	0.00	0.00	0.00	0.00	1.95	0.00	6.77	57.02%	100.00%	3.86
61-62	0.00	0.58	1.26	0.90	1.97	0.45	0.00	0.19	0.00	0.00	0.00	0.00	6.77	79.03%	100.00%	5.35
62-63	1.02	0.00	0.27	0.66	1.13	0.02	0.02	0.00	0.00	0.00	1.30	2.84	6.77	107.24%	100.00%	7.26
63-64	1.40	1.04	0.04	0.41	0.01	0.97	0.19	0.00	0.00	0.20	0.05	0.02	6.77	63.96%	100.00%	4.33
1964-65	0.00	1.22	0.00	0.03	0.00	0.94	1.54	0.02	0.00	0.22	0.17	0.00	6.77	61.15%	100.00%	4.14
65-66	0.00	4.00	2.56	0.16	0.34	0.29	0.00	0.00	0.00	0.01	0.00	0.09	6.77	110.04%	100.00%	7.45
66-67	0.78	0.52	2.23	0.48	0.00	0.00	1.02	0.00	0.00	0.00	0.38	1.06	6.77	95.57%	100.00%	6.47
67-68	0.00	0.86	1.50	0.10	0.03	1.30	0.34	0.00	0.00	0.74	0.00	0.00	6.77	71.94%	100.00%	4.87
68-69	0.00	0.00	0.00	3.50	3.96	0.00	0.00	1.50	0.00	1.27	0.00	0.00	6.77	151.11%	100.00%	10.23
1969-70	0.00	0.96	0.00	0.00	1.48	0.76	0.00	0.00	0.00	0.22	0.00	0.00	6.77	50.52%	100.00%	3.42
70-71	0.22	1.03	1.24	0.00	0.21	0.05	0.20	0.37	0.00	0.18	0.69	0.00	6.77	61.89%	100.00%	4.19
71-72	0.27	0.08	2.12	0.00	0.00	0.00	0.12	0.00	0.22	0.00	0.57	0.01	6.77	50.07%	100.00%	3.39
72-73	0.43	1.81	0.07	0.32	1.80	1.91	0.00	0.00	0.00	0.00	0.12	0.00	6.77	95.42%	100.00%	6.46
73-74	0.00	0.14	0.00	2.88	0.00	0.64	0.00	0.06	0.00	0.00	0.00	0.00	6.77	54.95%	100.00%	3.72
1974-75	1.00	0.25	0.95	0.00	0.28	0.82	0.78	0.00	0.00	0.00	0.00	0.76	6.77	71.49%	100.00%	4.84
75-76	0.07	0.13	0.00	0.00	3.52	2.13	0.13	0.06	0.00	0.00	0.12	4.33	6.77	154.95%	100.00%	10.49
76-77	0.00	0.21	0.00	1.74	0.00	0.37	0.01	1.22	0.11	0.12	4.33	0.04	6.77	120.38%	100.00%	8.15
77-78	0.00	0.00	1.68	5.55	2.28	4.95	0.44	0.16	0.00	0.00	0.00	0.15	6.77	224.67%	100.00%	15.21
78-79	0.17	1.90	1.06	2.22	1.18	2.49	0.00	0.00	0.00	1.53	0.79	0.10	6.77	168.98%	100.00%	11.44
1979-80	0.10	0.00	0.01	3.91	5.91	1.85	0.18	0.70	0.11	0.15	0.00	0.00	6.77	190.84%	100.00%	12.92
80-81	0.33	0.00	0.00	1.11	0.48	1.51	0.00	0.24	0.00	0.00	0.00	0.18	6.77	56.87%	100.00%	3.85
81-82	0.00	0.47	0.00	0.23	1.47	1.52	0.55	1.21	0.00	0.00	0.35	0.20	6.77	88.63%	100.00%	6.00
82-83	0.00	1.42	2.67	1.60	2.50	1.25	0.16	0.00	0.00	0.00	4.27	0.69	6.77	215.07%	100.00%	14.56
83-84	0.79	0.02	0.59	0.00	0.00	0.00	0.00	0.00	0.00	1.36	0.33	0.86	6.77	58.35%	100.00%	3.95
1984-85	0.00	0.23	0.57	0.33	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.48	6.77	31.17%	100.00%	2.11
85-86	0.00	1.36	0.64	0.28	1.83	1.43	0.07	0.00	0.00	0.14	0.42	0.09	6.77	92.47%	100.00%	6.26
86-87	0.00	0.64	0.06	0.45	0.18	1.09	0.08	0.18	0.00	0.00	0.00	0.45	6.77	46.23%	100.00%	3.13

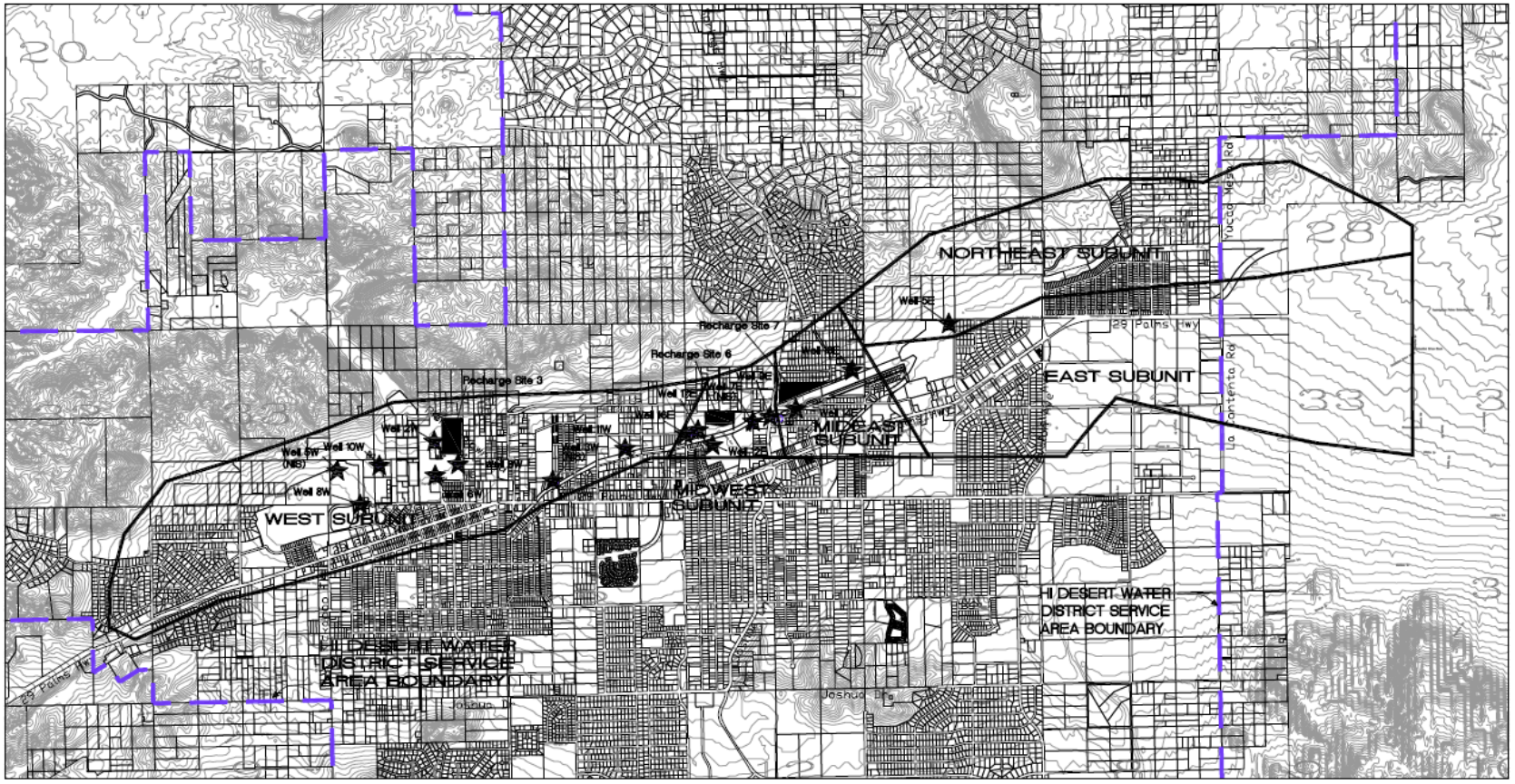
87-88	1.71	0.77	1.37	1.47	0.68	0.32	0.78	0.00	0.00	0.00	1.52	0.00	6.77	127.33%	100.00%	8.62						
88-89	0.00	0.00	0.82	0.94	0.06	0.27	0.00	0.03	0.00	0.00	0.00	0.13	6.77	33.23%	100.00%	2.25						
1989-90	0.02	0.00	0.37	0.44	0.93	0.13	0.20	0.00	0.00	0.00	0.27	0.00	6.77	34.86%	100.00%	2.36						
90-91	0.01	0.00	0.03	0.00	2.75	4.53	0.00	0.00	0.00	0.79	0.00	0.13	6.77	121.71%	100.00%	8.24						
91-92	0.00	0.00	0.90	0.40	3.65	2.34	0.33	0.32	0.00	0.05	0.25	0.00	6.77	121.71%	100.00%	8.24						
92-93	0.46	0.00	2.05	6.27	5.61	0.08	0.00	0.00	0.01	0.00	0.00	0.00	6.77	213.88%	100.00%	14.48						
93-94	0.02	0.31	0.15	0.18	2.41	0.87	0.27	0.02	0.00	0.00	0.31	0.00	6.77	67.06%	100.00%	4.54						
1994-95	0.00	0.00	0.76	4.40	1.25	1.38	0.09	0.10	0.06	0.01	0.01	0.05	6.77	119.79%	100.00%	8.11						
95-96	0.00	0.00	0.22	0.95	0.43	0.11	0.00	0.00	0.00	0.00	0.00	0.00	6.77	25.26%	100.00%	1.71						
96-97	0.23	0.65	0.67	1.30	0.00	0.00	0.11	0.00	0.00	0.41	0.00	1.72	6.77	75.18%	100.00%	5.09						
97-98	0.08	0.31	0.79	0.54	3.55	0.82	0.07	0.40	0.00	0.00	0.38	0.46	6.77	109.31%	100.00%	7.40						
98-99	0.07	0.43	0.12	0.07	0.35	0.01	0.64	0.01	0.00	0.76	0.83	0.34	6.77	53.62%	100.00%	3.63						
1999-00	0.00	0.00	0.00	0.00	2.03	1.93	0.23	0.00	0.00	0.00	0.18	0.22	6.77	67.80%	100.00%	4.59						
00-01	0.06	0.00	0.00	1.01	1.43	0.24	0.43	0.00	0.00	0.00	0.00	0.00	6.77	46.82%	100.00%	3.17						
01-02	0.00	0.20	0.34	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.05	6.77	9.75%	100.00%	0.66						
02-03	0.00	0.35	0.36	0.14	1.50	1.32	0.39	0.01	0.00	0.40	1.74	0.06	6.77	92.61%	100.00%	6.27						
03-04	0.00	1.18	0.70	0.18	1.47	0.33	0.06	0.00	0.00	0.03	0.10	0.00	6.77	58.35%	100.00%	3.95						
2004-05	1.96	0.25	3.00	3.41	2.78	0.24	0.24	0.00	0.00	0.72	1.25	0.13	6.77	206.50%	100.00%	13.98						
05-06	1.57	0.00	0.01	0.40	0.39	0.32	0.17	0.00	0.00	0.19	0.00	0.00	6.77	45.05%	100.00%	3.05						
06-07	0.06	0.00	0.03	0.09	0.03	0.01	0.12	0.00	0.00	0.45	0.03	0.40	6.77	18.02%	100.00%	1.22						
07-08	0.00	1.85	0.53	2.61	0.59	0.00	0.00	6.52	0.00	0.01	0.04	0.03	6.77	179.91%	100.00%	12.18						
08-09	0.00	0.45	1.77	0.01	1.40	0.00	0.00	0.09	0.00	0.00	0.03	0.00	6.77	55.39%	100.00%	3.75						
09-10	0.00	0.20	1.30	5.47	0.84	0.03	0.11	0.00	0.00	0.02	0.97	0.10	6.77	133.53%	100.00%	9.04						
2010-11	0.76	0.02	5.43	0	2.43	0.48	0.04	0	0	0.87	0	0.06	6.77	149.04%	100.00%	10.09						
2011-12	0.00	0.24	0.18	0.00	0.30	0.72	0.42	0.00	0.00	0.29	0.24	0.00	6.77	35.30%	100.00%	2.39						
2012-13	0.01	0.04	0.19	0.64	0.08	0.06	0.00	0.01	0.00	0.57	0.60	0.08	6.77	33.68%	100.00%	2.28						
2013-14	0.12	0.21	0.34	0.00	1.30	0.40	0.13	0.00	0.00	0.05	0.25	0.21	6.77	44.46%	100.00%	3.01						
2014-15	0.00	0.00	0.95	0.70	0.73	0.41	0.00	0.00	0.01	0.78	0.00	0.41	6.77	58.94%	100.00%	3.99						
2015-16	0.58	0.02	0.02	2.07	0.65	0.06	0.61	0.00	0.05	0.00	0.00	0.57	6.77	68.39%	100.00%	4.63						
2016-17	0.25	0.16	2.95	4.78	1.36	0.00	0.00	0.00	0.00	0.01	0.46	0.52	6.77	154.95%	100.00%	10.49						
2017-18	0.00	0.00	0.07	1.60	0.04	0.49	0.00	0.23	0.00	1.07	0.00	0.00	6.77	51.70%	100.00%	3.50						
2018-19	2.03	0.18	0.48	1.86	4.59	0.44	0.03	0.58	0.00	0.03	0.00	0.85	6.77	163.52%	100.00%	11.07						
2019-20	0.00	0.87	1.91	0.00	0.07	1.96	1.90	0.00	0.00	0.00	0.10	0.00	6.77	100.59%	100.00%	6.81						
2020-21	0.00	0.35	0.33	1.06	0.06	0.00	0.00	0.00	0.08	0.41	0.00	0.41	6.77	39.88%	100.00%	2.70						
2021-22	0.18	0.00	2.57	0.00	0.07	0.11	0.06	0.00	0.00	0.02	0.90	0.61	6.77	66.77%	100.00%	4.52						

HI-DESERT WATER DISTRICT

SUMMARY OF WATER PRODUCTION
WATER YEAR 2021- 22
(All Amounts in Acre-Feet)

Hi-Desert Water District Wells	TOTAL	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5E*	0	0	0	0	0	0	0	0	0	0	0	0	0
7E*	0	0	0	0	0	0	0	0	0	0	0	0	0
9E	130	9	7	5	9	6	1	0	0	17	27	29	20
12E	357	37	28	28	1	0	6	48	54	58	46	4	47
14E	396	28	22	14	28	24	31	28	41	45	45	52	38
16E	105	7	5	5	9	8	11	8	9	10	12	14	7
17E	160	10	7	8	15	12	16	12	14	15	18	23	10
18E*	0	0	0	0	0	0	0	0	0	0	0	0	0
3W*	0	0	0	0	0	0	0	0	0	0	0	0	0
5W*	0	0	0	0	0	0	0	0	0	0	0	0	0
6W	166	13	14	13	13	12	14	13	14	13	17	16	12
8W	199	22	25	25	18	16	13	13	13	13	14	13	13
9W	0	0	0	0	0	0	0	0	0	0	0	0	0
10W*	0	0	0	0	0	0	0	0	0	0	0	0	0
11W	0	0	0	0	0	0	0	0	0	0	0	0	0
20W	503	42	38	37	40	38	44	39	42	41	52	52	38
SUBTOTAL	**2,016**												
Well 2W Leased - S.B. County													
2W	29	2	3	2	2	2	2	2	3	2	3	4	2
SUBTOTAL	**29**												
MESA 10E*	0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
MAINSTREAM 24E	861	67	70	61	66	63	74	74	76	74	78	82	76
BIGHORN DESERT VIEW INTERTIE	0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
SUBTOTAL	**861**												
Hawks Landing													
BS #1 & #17	322	23	23	7	8	18	21	23	41	41	46	42	28
SUBTOTAL	**322**												
Joshua Tree Retreat Center													
JTRC #3	26	0	0	0	11	0	0	3	0	0	10	0	3
	0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
SUBTOTAL	**26**												
Grand Total	**3,225**												

NOTES:
*Well is either inactive or a monitoring well.



LEGEND

★ INDICATES WELL LOCATION

▮ INDICATES RECHARGE SITE LOCATION

WARREN VALLEY SUBBASIN
HYDROGEOLOGIC SUBUNITS

HI-DESERT WATER DISTRICT

55439 29 PALMS HIGHWAY
YUCCA VALLEY, CA 92284
(760) 365-8333 phone
(760) 365-0599 fax

HI-DESERT WATER DISTRICT

APPENDIX D

Annual Well Averages

Warren Valley Basin Watermaster

(Feet above Means Sea Level)

2005 - 2022

	WELL	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16-17	17-18	18-19	19/20	20-21	21-22	Total Water level increase in feet Oct 95/Sept 22	Current water level increase in feet Since 2006
West Sub-unit	**1W**	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Recharge Site 3	**2W**	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	3W	3033.08	3035.08	3029.29	3038.00	3040.00	3049.00	3059.66	3066.92	3070.75	3067.50	3069.50	3077.50	3086.50	3095.83	3095.00	3093.83	3094.08	154.92	59.00
	4W	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5W*	2993.84	3022.84	3055.58	3078.00	3080.00	3099.00	3106.16	3107.75	3106.50	3098.50	3097.50	3103.50	3109.50	3105.50	3112.20	3113.33	3113.25	168.87	90.41
	6W*	3001.15	3029.15	3069.09	3079.00	3083.00	3092.00	3098.00	3100.08	3100.90	3092.90	3093.90	3101.90	3107.90	3103.90	3113.49	3112.90	3116.48	180.65	87.33
	7W	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	8W~	3003.04	3010.37	3015.28	3086.00	3074.00	3094.00	3103.83	3090.33	3093.71	3086.71	3086.71	3086.71	3095.71	3096.71	3103.96	3102.71	3102.63	165.02	92.26
	9W~	2984.31	2949.48	2944.66	2998.00	3066.00	3085.00	3093.50	3097.17	3097.65	3090.65	3090.65	3097.65	3104.65	3098.65	3103.74	3150.23	3106.40	158.95	156.92
	10W	2986.92	3021.18	3048.91	3063.00	3064.00	3086.00	3094.58	3098.00	3096.35	3089.35	3089.35	3094.35	3100.35	3095.35	3105.52	3103.68	3104.43	158.95	83.25
	11W	3016.95	2973.45	2944.83	2935.00	2960.00	2977.00	3013.75	3028.83	3022.29	3045.29	3054.29	3058.29	3048.29	3064.29	3086.79	3081.29	3080.46	181.97	107.01
	20W	NR	NR	NR	NR	NR	NR	NR	3106.25	3105.00	3097.00	3097.00	3105.00	3113.00	3107.00	3112.50	3114.17	3113.25	NR	NR
Midwest Sub-unit	**7E***	2949.68	2949.36	2951.72	2960.00	3000.00	3005.00	3006.83	3007.50	3013.78	3013.78	3025.78	3037.78	3044.78	3166.95	3080.78	3074.86	3066.78	210.04	117.42
Recharge Site 6	**12E***	3124.89	3061.89	3023.16	3028.00	3026.00	3028.00	3036.83	3045.83	3051.81	3043.81	3048.81	3061.81	3071.81	3074.06	3075.21	3070.64	3065.81	202.07	3.92
	16E	3063.64	3044.47	3037.00	3048.00	3046.00	3043.00	3050.08	3056.25	3067.39	3062.39	3070.39	3083.39	3091.39	3096.89	3100.31	3097.56	3096.39	261.98	51.92
	17E	3052.16	3029.41	3019.41	3026.00	3026.00	3027.00	3032.75	3042.67	3049.91	3043.91	3048.91	3062.91	3070.91	3075.41	3075.25	3069.33	3065.91	183.51	36.5
	9E	3054.43	3036.93	3024.83	3021.00	3025.00	3030.00	3037.83	3045.33	3051.27	3048.27	3052.27	3063.27	3077.27	3079.02	3076.97	3070.35	3068.27	318.87	31.34
Mideast Sub-unit	**14E~**	2994.06	2997.00	3010.00	3044.00	3031.00	3042.83	3019.66	3036.83	3017.40	3017.40	3021.40	3030.40	3037.40	3045.40	3048.60	3040.15	3030.40	115.27	33.4
Recharge Site 7	**18E***	2983.74	3016.08	3000.41	2973.00	3015.00	3039.00	3024.41	3030.67	3021.08	3023.08	3022.08	3036.08	NR	3209.08	3209.08	NR	3209.08	318.87	193
Northeast Sub-unit	**5E*~**	2971.60	2995.10	2971.91	2954.00	3055.00	3058.00	3072.00	3072.58	3074.10	3074.10	3074.10	3074.10	NR	NR	2971.60	NR	NR	NR	NR
No Recharge Site	**11E**	NR	NR	NR	NR	NR	NR	2941.00	2942.00	2943.00	2942.00	2942.00	2943.00	2944.00	2944.33	NR	2945.83	2945.00	NR	NR
East Sub-unit	**21E**	NR	NR	NR	NR	NR	NR	2885.00	2884.83	2886.00	2885.00	2886.00	2887.00	2887.00	2888.33	NR	2891.25	2895.00	NR	NR
Reclamation Recharge										Total 27 year well level average increase / In feet									198.57	
										Total 16 year well level average increase / In feet										81.69

Well 14E= Inconsistant Readings, Sept-18 only reliable month.

Well 18E= Unable to sound after Oct. 2017 due to obstuctions in well. Well is inactive.

NR = No Reading Available

Historical Groundwater Surface Elevations (Feet Above Sea Level) 2021-22

APPENDIX E
Groundwater Surface Elevations

Hi Desert Water District Wells

2021-22 Well ID	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP[1]	Sep-21
5E*	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
7E*	3068	3069	3069	3072	3073	3072	3072	3072	3067	3068	3068	3067	3070
9E	3066	3066	3066	3066	3066	3066	3232	3064	3064	3064	3064	3068	3064
11E*	2945	2945	2945	2945	2945	2945	2944	2944	2945	2945	2945	2945	2946
12E	3066	3066	3066	3066	3069	3066	3066	3066	3064	3062	3059	3066	3066
14E	3035	3035	3035	3035	3035	3040	3035	3035	3033	3028	3028	3030	3030
16E	3091	3091	3093	3098	3098	3098	3091	3091	3089	3084	3084	3096	3086
17E	3067	3070	3070	3070	3070	3066	3064	3066	3209	3060	3060	3066	3061
18E	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/A
21E*	2893	2893	2893	2893	2893	2894	2894	2894	2894	2896	2894	2895	2894
3W*	3098	3096	3096	3096	3096	3095	3093	3093	3093	3093	3093	3093	3098
5W*	3116	3117	3117	3116	3115	3115	3113	3112	3111	3111	3111	3111	3119
6W	3118	3118	3118	3120	3120	3118	3116	3116	3113	3113	3113	3116	3118
8W	3107	3107	3107	3105	3105	3102	3102	3100	3100	3100	3100	3100	3109
9W	3111	3111	3109	3109	3109	3106	3106	3104	3104	3104	3104	3104	3116
10W	3111	3107	3107	3104	3104	3104	3102	3102	3102	3102	3102	3102	3109
11W	3083	3083	3080	3080	3080	3080	3080	3080	3080	3078	3078	3080	3083
20W	3116	3116	3115	3114	3114	3114	3113	3112	3111	3111	3111	3112	3119
Site 3	3119	3119	3117	3116	3116	3117	3116	3115	3113	3114	3113	3115	3123
Site 6	3056	3056	3072	3071	3072	3072	3069	3066	3065	3066	3065	3069	3060
Site 7	3055	3055	3055	3055	3053	3053	3054	3053	3050	3054	3053	3055	3054
BS #1	3112			3107					3107			3109	3109
BS #17*	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
2W - SBC	3009	3007	3007	3007	N/R	3006	3004	3003	3004	3004	3005	3001	3010
JTRC FARM2*	0	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
JTRC #33	0	0	0	2706	0	0	2708	0	2711	0	0	2710	2705

*Depicts inactive or monitoring well

[1] Shaded data used to calculate water surface elevation increase/decrease

Historical Groundwater Surface Elevations (Feet Above Sea Level) 2020-21

HI-DESERT WATER DISTRICT

APPENDIX E
Groundwater Surface Elevations

Hi Desert Water District Wells

2020-21														
Well ID	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP[1]	9/1/2020
5E*	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
7E*	3076	3076	3076	3075	3075	3075	3075	3075	3075	3076	3076	3070	3077
9E	3073	3073	3073	3071	3071	3071	3071	3071	3068	3071	3064	3064	3073
11E*	2945	2946	2946	2946	2946	2946	2946	2946	2945	2946	2946	2946	2946
12E	3071	3073	3073	3071	3073	3073	3073	3073	3069	3071	3066	3066	3071
14E	3049	3047	3044	3037	3042	3042	3042	3040	3037	3037	3030	3030	3044
16E	3098	3100	3100	3100	3100	3100	3100	3100	3098	3098	3086	3086	3098
17E	3071	3072	3073	3071	3071	3071	3071	3071	3071	3070	3060	3061	3073
18E	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/A	N/R
21E*	2890	2891	2891	2891	2891	2891	2891	2891	2891	2891	2892	2894	2890
3W*	3096	3093	3093	3092	3093	3093	3093	3093	3096	3094	3097	3098	3096
5W*	3110	3110	3111	3111	3112	3113	3114	3114	3117	3116	3119	3119	3110
6W	3109	3109	3109	3111	3111	3113	3113	3113	3116	3116	3118	3118	3109
8W	3100	3100	3100	3100	3100	3100	3100	3105	3105	3105	3112	3109	3102
9W	3101	3101	3101	3103	3103	3103	N/A	3129	N/A	3118	3118	3116	3103
10W	3102	3102	3102	3102	3102	3102	3102	3104	3102	3102	3109	3109	3102
11W	3083	3083	3080	3080	3080	3080	3080	3080	3083	3080	3080	3083	3085
20W	3108	3111	3111	3112	3113	3113	3114	3115	3117	3118	3119	3119	3108
Site 3	3112	3113	3114	3115	3116	3112	3119	3120	3121	3121	3123	3123	3111
Site 6	3074	3075	3076	3074	3074	3074	3074	3075	3056	3067	3066	3060	3065
Site 7	3072	3067	3070	3065	3063	3064	3063	3062	3062	3062	3053	3054	3073
BS #1	3103			3107					3105			3109	3105
BS #17*	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
2W - SBC	3003	3004	3006	3005	3007	3009	3011	3012	3008	3012	3011	3010	3003
JTRC FARM2*	2705	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
JTRC #33	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	N/R	N/R	#VALUE!	N/R

*Depicts inactive or monitoring well

[1] Shaded data used to calculate water surface elevation increase/decrease

Historical Groundwater Surface Elevations (Feet Above Sea Level) 2019-20

APPENDIX E
Groundwater Surface Elevations

Hi Desert Water District Wells

2019-20														
Well ID	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP[1]	9/1/2019[1]
5E*	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
7E*	3079	3079	3078	3081	3081	3080	3086	3084	3083	3082	3082	3077	3074
9E	3075	3075	3063	3080	3078	3080	3080	3080	3080	3078	3078	3073	3075
11E*	2945	2945	2945	2946	2945	2946	2945	2946	2946	2946	2946	2946	2944
12E	3071	3073	3075	3078	3077	3077	3077	3077	3078	3075	3075	3071	3069
14E	3047	3047	3051	3053	3056	3056	3054	3042	3040	3044	3044	3044	3049
16E	3096	3098	3098	3100	3100	3102	3105	3102	3100	3100	3100	3098	3086
17E	3068	3070	3068	3079	3077	3079	3082	3079	3078	3076	3075	3073	3070
18E	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
21E*	2890	2890	2890	2894	2889	2889	2889	2890	2890	2890	2891	2890	2888
3W*	3094	3094	3095	3094	3095	3093	3093	3098	3098	3098	3098	3096	3093
5W*	3113	3115	3115	3115	3115	3113	3113	3112	3111	3110	3110	3110	3116
6W	3118	3116	3116	3116	3116	3116	3116	3111	3111	3109	3109	3109	3113
8W	3105	3105	3105	3105	3105	3105	3105	3102	3105	3105	3102	3102	3105
9W	3106	3108	3106	3106	3106	3103	3103	3103	3101	3101	3103	3103	3110
10W	3107	3107	3107	3107	3107	3107	3104	3104	3104	3104	3102	3102	3107
11W	3078	3083	3083	3085	3087	3087	3090	3090	3090	3090	3090	3085	3080
20W	3115	3115	3115	3115	3115	3115	3114	3111	3111	3108	3108	3108	3115
Site 3	3119	3120	3120	3120	3116	3115	3117	3214	3115	3108	3111	3111	3119
Site 6	3073	3075	3078	3079	3083	3074	3083	3081	3080	3064	3065	3065	3070
Site 7	3073	3081	3079	3081	3085	3084	3079	3080	3079	3077	3071	3073	3079
BS #1	3112	N/R	N/R	3112	N/R	N/R	3110	N/R	N/R	3105	N/R	N/R	N/R
BS #17*	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
2W - SBC	N/R	N/R	N/R	3007	3006	3002	3006	3004	3001	3000	3002	3003	3010
JTRC FARM2*	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
JTRC #33	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R

*Depicts inactive or monitoring well

[1] Shaded data used to calculate water surface elevation increase/decrease

Historical Groundwater Surface Elevations (Feet Above Sea Level) 2018-19

HI–DESERT WATER DISTRICT

APPENDIX E
Groundwater Surface Elevations

Hi Desert Water District Wells

2018-19														
Well ID	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP[1]	9/1/2018[1]
5E*	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
7E*	N/R	N/R	N/R	N/R	N/R	N/R	N/R	3085	3075	3074	3074	3074	N/R
9E	3075	3080	3080	3080	3080	3082	3080	3080	3080	3078	3075	3075	3075
11E*	2944	2944	2944	2944	2945	2945	2944	2944	2945	2945	2945	2944	2944
12E	3073	3073	3071	3078	3078	3078	3078	3078	3073	3071	3071	3069	3071
14E	3043	3043	3044	3055	3051	3060	3045	3045	3033	3028	3044	3049	3037
16E	3084	3102	3102	3100	3102	3098	3100	3100	3100	3093	3091	3086	3084
17E	3069	3080	3077	3209	3209	3078	3076	3078	3079	3075	3072	3070	3069
18E	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
21E*	2887	2887	2887	2888	2888	2888	2888	2888	2890	2889	2890	2890	2888
3W*	3091	3097	3096	3098	3099	3099	3099	3098	3098	3094	3094	3093	3091
5W*	3115	3117	3117	3117	3117	3116	3116	3116	3116	3116	3115	3116	3114
6W	3117	3118	3118	3118	3118	3116	3116	3116	3116	3113	3111	3113	3116
8W	3102	3102	3102	3105	3105	3107	3107	3107	3105	3105	3109	3105	3097
9W	3108	3108	3108	3108	3108	3108	3108	3108	3108	3108	3108	3110	3110
10W	3105	3105	3105	3104	3107	3107	3107	3107	3109	3107	3107	3107	3104
11W	N/R	N/R	N/R	3085	3085	3085	3085	3083	3080	3080	3080	3080	N/R
20W	3118	3119	3118	3219	3219	3117	3117	3117	3117	3117	3115	3115	3118
Site 3	3121	3122	3123	3122	3122	3120	3120	3120	3119	3119	3119	3119	3119
Site 6	3072	3083	3084	3083	3084	3078	3069	3078	3062	3066	3070	3070	3072
Site 7	3079	3088	3086	3085	3084	3084	3084	3085	3076	3075	3080	3079	3079
BS #1	3107			3112				3112		3107			NR
BS #17*	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	NR
													Jul-2011
JTRC FARM2*	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	NR
JTRC #33	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	N/R	N/R	#VALUE!	2684

*Depicts inactive or monitoring well

[1] Shaded data used to calculate water surface elevation increase/decrease

Historical Groundwater Surface Elevations (Feet Above Sea Level) 2017-18

HI-DESERT WATER DISTRICT

APPENDIX E
Groundwater Surface Elevations

Hi Desert Water District Wells

2017-18														
Well ID	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP[1]	9/1/2017[1]
5E*	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
7E*	3044	3044	3041	3044	3044	3046	3046	3048	3046	3046	3046	N/R	3044
9E	3071	3078	3078	3078	3078	3078	3080	3075	3075	3075	3078	3075	3064
11E*	2944	2944	2944	2944	2945	2945	2944	2944	2944	2944	2944	2944	2944
12E	3063	3063	N/R	3076	3076	3076	3076	3075	3071	3069	3071	3071	3063
14E	3056	3063	3061	3059	3058	3054	3053	3080	3072	N/R	3052	3037	3028
16E	3089	3089	3089	3093	3098	3098	3098	3093	3089	3084	3086	3084	3086
17E	3064	3072	3067	3066	3077	3077	3077	3076	3071	3068	3069	3069	3065
18E	3034	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	3018
21E*	2887	2887	2887	2887	2887	2887	2888	2888	2888	2888	2888	2888	2887
3W*	3082	3084	3083	3084	3085	3088	3089	3089	3090	3091	3091	3091	3082
5W*	3106	3106	3106	3108	3108	3110	3110	3112	3113	3112	3114	3114	3105
6W	3104	3104	3104	3106	3106	3106	3106	3109	3111	3113	3113	3116	3104
8W	3097	3095	3095	3095	3095	3095	3095	3095	3095	3097	3099	3097	N/R
9W	3099	3099	3099	3103	3103	3106	3106	3110	3110	3110	3110	3110	3101
10W	3095	3095	3095	3095	3095	3095	3102	3104	3107	3107	3104	3104	3095
11W	3064	3066	3066	3043	3045	3045	3041	3034	3029	N/R	N/R	N/R	3064
20W	3107	3108	3109	3112	3113	3115	N/R	3115	3117	3116	3117	3118	3107
Site 3	3110	3110	3111	3114	3116	3116	3117	3119	3119	3120	3119	3119	3111
Site 6	3065	3075	3075	3077	3078	3078	3077	3068	3075	3072	3073	3072	3062
Site 7	3084	3088	3081	3087	3090	3091	3086	3091	3091	3083	3082	3079	3075
BS #1	3099			3102			3103				3102		NR
BS #17*	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	NR
													Jul-2011
JTRC FARM2*	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	NR
JTRC #33	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	N/R	N/R	#VALUE!	2684

*Depicts inactive or monitoring well

[1] Shaded data used to calculate water surface elevation increase/decrease

Historical Groundwater Surface Elevations (Feet Above Sea Level) 2016-17

HI-DESERT WATER DISTRICT

APPENDIX E
Groundwater Surface Elevations

Hi Desert Water District Wells

2016-17													
Well ID	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUL	AUG	SEP[1]	9/1/2016[1]
5E*	3074	3074	3074	3074	3074	3075	N/R	N/R	N/R	N/R	N/R	3074
7E*	3041	3030	3028	3034	3034	3034	3039	3041	3046	3044	3044	3030
9E	3057	3059	3059	3061	3064	3064	3066	3064	3066	3064	3064	3057
11E*	2943	2943	2943	2943	2943	2943	2944	2944	2944	2944	2944	2943
12E	3055	3057	3061	3061	3062	N/R	3066	3065	3063	3062	3063	3054
14E	3023	3026	3033	3040	3037	3035	3035	3033	3033	3020	3028	3026
16E	3075	3077	3077	3079	3084	3084	3084	3089	3086	3086	3086	3075
17E	3051	3058	3060	3061	3065	3065	3067	3067	3065	3065	3065	3049
18E	3037	3039	3039	3047	3045	3045	3045	3047	3019	3020	3018	3033
21E*	2886	2887	2886	2887	2887	2887	2888	2888	2887	2887	2887	2886
3W*	3071	3072	3073	3075	3077	3078	3080	3081	3081	3082	3082	3070
5W*	3098	3100	3102	3105	3105	3105	3107	3107	3106	3106	3105	3097
6W	3095	3097	3102	3104	3104	3104	3104	3104	3104	3104	3104	3095
8W	3086	3086	3086	3088	3086	3090	3090	3088	N/R	N/R	N/R	3086
9W	3092	3092	3097	3097	3099	3097	3101	3101	3099	3101	3101	3090
10W	3086	3091	3093	3095	3098	3095	3095	3095	3095	3095	3095	3086
11W	3048	3052	3057	3057	3057	3059	3059	3059	3055	3066	3064	3052
20W	3097	3099	3103	3105	3105	3106	3108	3109	3107	3107	3107	3095
Site 3	3101	3105	3108	3109	3110	3110	3111	3110	3110	3110	3111	3099
Site 6	2949	3049	3060	3059	3064	3065	3068	3069	3066	3061	3062	3054
Site 7	3048	3049	3049	3051	3055	3062	3062	3065	3065	3068	3075	3048
BS #1	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	NR
BS #17*	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	NR
												Jul-2011
JTRC FARM2*	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	NR
JTRC #33	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	2684

*Depicts inactive or monitoring well

[1] Shaded data used to calculate water surface elevation increase/decrease

HI-DESERT WATER DISTRICT

APPENDIX G
Table 3 - Semi Annual Nitrate and TDS Analysis of the Warren Valley Basin

Year	Semester	Well ID	Nitrate (as $NO_{3\text{-}N}$)		Date Sampled	T.D.S.		Date Sampled
2022	1	2w	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**
	1	6w	1.2	mg/L	1/5/2022	250	mg/L	1/5/2022
	2		1.2	mg/L	7/7/2022	260	mg/L	7/7/2022
	1	8w	3.1	mg/L	1/5/2022	190	mg/L	1/5/2022
	2		3.6	mg/L	7/7/2022	190	mg/L	7/7/2022
	1	9w	2.2	mg/L	1/5/2022	210	mg/L	1/5/2022
	2		0.78	mg/L	7/7/2022	260	mg/L	7/7/2022
	1	10w	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**
	1	11w	8.2	mg/L	1/5/2022	260	mg/L	1/5/2022
	2		8	mg/L	7/7/2022	280	mg/L	7/7/2022
	1	20w	3	mg/L	1/5/2022	200	mg/L	1/5/2022
	2		2.7	mg/L	7/7/2022	190	mg/L	7/7/2022
	1	9e	2.6	mg/L	1/6/2022	280	mg/L	1/6/2022
	2		2.9	mg/L	7/7/2022	300	mg/L	7/7/2022
	1	12e	Down	mg/L	1/6/2022	Down	mg/L	1/6/2022
	2		2.4	mg/L	7/7/2022	310	mg/L	7/7/2022
	1	14e	1.6	mg/L	1/6/2022	240	mg/L	1/6/2022
	2		1.7	mg/L	7/7/2022	230	mg/L	7/7/2022
	1	16e	4	mg/L	1/6/2022	230	mg/L	1/6/2022
	2		4.9	mg/L	7/7/2022	240	mg/L	7/7/2022
	1	17e	4.1	mg/L	1/6/2022	300	mg/L	1/6/2022
	2		4.6	mg/L	7/7/2022	320	mg/L	7/7/2022
	1	18e	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**

*denotes average reduction for graphing purposes due to a lack of data

HI-DESERT WATER DISTRICT

APPENDIX G

Table 3 - Semi Annual Nitrate and TDS Analysis of the Warren Valley Basin

Year	Semester	Well ID	Nitrate (as NO_{3-N})		Date Sampled	T.D.S.		Date Sampled
2021	1	2w	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**
	1	6w	0.86	mg/L	1/6/2021	240	mg/L	1/7/2021
	2		0.73	mg/L	7/7/2021	280	mg/L	7/8/2021
	1	8w	4.3	mg/L	1/6/2021	170	mg/L	1/7/2021
	2		4.2	mg/L	7/7/2021	180	mg/L	7/8/2021
	1	9w	0.9	mg/L	1/6/2021	290	mg/L	1/7/2021
	2		**	mg/L	**	**	mg/L	**
	1	10w	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**
	1	11w	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**
	1	20w	2.9	mg/L	1/6/2021	170	mg/L	1/7/2021
	2		3.5	mg/L	7/7/2021	220	mg/L	7/8/2021
	1	9e	2.8	mg/L	1/7/2021	250	mg/L	1/7/2021
	2		3.2	mg/L	7/1/2021	310	mg/L	7/1/2021
	1	12e	2.3	mg/L	1/7/2021	300	mg/L	1/7/2021
	2		2.6	mg/L	7/1/2021	310	mg/L	7/1/2021
	1	14e	1.6	mg/L	1/7/2021	240	mg/L	1/7/2021
	2		1.9	mg/L	7/1/2021	240	mg/L	7/1/2021
	1	16e	4.1	mg/L	1/7/2021	260	mg/L	1/7/2021
	2		5.7	mg/L	7/1/2021	230	mg/L	7/1/2021
	1	17e	3.6	mg/L	1/7/2021	340	mg/L	1/7/2021
	2		4	mg/L	7/1/2021	320	mg/L	7/8/2021
	1	18e	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**

*denotes average reduction for graphing purposes due to a lack of data

Year	Semester	Well ID	Nitrate (as NO_{3}-N)		Date Sampled	T.D.S.		Date Sampled
2020	1	2w	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**
	1	6w	0.74	mg/L	1/9/2020	300	mg/L	1/9/2020
	2		1.5	mg/L	7/1/2020	280	mg/L	7/1/2020
	1	8w	4.3	mg/L	1/9/2020	180	mg/L	1/9/2020
	2		4.9	mg/L	7/1/2020	180	mg/L	7/1/2020
	1	9w	2	mg/L	1/9/2020	240	mg/L	1/9/2020
	2		2.6	mg/L	7/1/2020	210	mg/L	7/1/2020
	1	10w	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**
	1	11w	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**
	1	20w	3.5	mg/L	1/9/2020	200	mg/L	1/9/2020
	2		3.5	mg/L	7/1/2020	190	mg/L	7/1/2020
	1	9e	3.1	mg/L	1/2/2020	300	mg/L	1/2/2020
	2		3	mg/L	7/2/2020	310	mg/L	7/2/2020
	1	12e	2.3	mg/L	1/2/2020	310	mg/L	1/2/2020
	2		2.8	mg/L	7/2/2020	300	mg/L	7/2/2020
	1	14e	1.2	mg/L	1/2/2020	260	mg/L	1/2/2020
	2		1.6	mg/L	7/2/2020	220	mg/L	7/2/2020
	1	16e	8	mg/L	1/2/2020	240	mg/L	1/2/2020
	2		5.7	mg/L	7/2/2020	220	mg/L	7/2/2020
	1	17e	3.3	mg/L	1/2/2020	300	mg/L	1/2/2020
	2		3.9	mg/L	7/2/2020	290	mg/L	7/2/2020
	1	18e	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**
	*denotes average reduction for graphing purposes due to a lack of data							

Year	Semester	Well ID	Nitrate (as NO_{3}-N)		Date Sampled	T.D.S.		Date Sampled
2019	1	2w	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**
	1	6w	1	mg/L	1/10/2019	340	mg/L	1/10/2019
	2		0.85	mg/L	7/3/2019	330	mg/L	7/3/2019
	1	8w	5.5	mg/L	1/10/2019	180	mg/L	1/10/2019
	2		**	mg/L	**	**	mg/L	**
	1	9w	2.5	mg/L	1/10/2019	220	mg/L	1/10/2019
	2		2	mg/L	7/3/2019	260	mg/L	7/3/2019
	1	10w	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**
	1	11w	8	mg/L	1/10/2019	290	mg/L	1/10/2019
	2		7.8	mg/L	7/3/2019	270	mg/L	7/3/2019
	1	20w	3.7	mg/L	1/10/2019	210	mg/L	1/10/2019
	2		3.9	mg/L	7/3/2019	220	mg/L	7/3/2019
	1	9e	3	mg/L	1/10/2019	300	mg/L	1/10/2019
	2		2.9	mg/L	7/3/2019	300	mg/L	7/3/2019
	1	12e	2.9	mg/L	1/10/2019	310	mg/L	1/10/2019
	2		2.7	mg/L	7/3/2019	330	mg/L	7/3/2019
	1	14e	1.8	mg/L	1/10/2019	240	mg/L	1/10/2019
	2		1.5	mg/L	7/3/2019	240	mg/L	7/3/2019
	1	16e	4.5	mg/L	1/10/2019	240	mg/L	1/10/2019
	2		6	mg/L	7/3/2019	240	mg/L	7/3/2019
	1	17e	2.4	mg/L	1/10/2019	310	mg/L	1/10/2019
	2		2.8	mg/L	7/3/2019	330	mg/L	7/3/2019
	1	18e	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**
	*denotes average reduction for graphing purposes due to a lack of data							

Year	Semester	Well ID	Nitrate (as $NO_{3\text{-}N}$)		Date Sampled	T.D.S.		Date Sampled
2018	1	2w	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**
	1	6w	1.3	mg/L	1/8/2018	320	mg/L	1/8/2018
	2		0.95	mg/L	7/2/2018	330	mg/L	7/2/2018
	1	8w	4.3	mg/L	1/8/2018	180	mg/L	1/8/2018
	2		5	mg/L	7/2/2018	180	mg/L	7/2/2018
	1	9w	1.6	mg/L	1/8/2018	260	mg/L	1/8/2018
	2		1.6	mg/L	7/2/2018	270	mg/L	7/2/2018
	1	10w	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**
	1	11w	8.7	mg/L	1/8/2018	290	mg/L	1/8/2018
	2		6.8	mg/L	7/2/2018	270	mg/L	7/2/2018
	1	20w	3.2	mg/L	1/8/2018	200	mg/L	1/8/2018
	2		3.4	mg/L	7/2/2018	200	mg/L	7/2/2018
	1	9e	3	mg/L	1/8/2018	290	mg/L	1/11/2018
	2		3.3	mg/L	7/2/2018	320	mg/L	7/5/2018
	1	12e	2.8	mg/L	1/8/2018	280	mg/L	1/11/2018
	2		3.3	mg/L	7/2/2018	300	mg/L	7/5/2018
	1	14e	1.5	mg/L	1/8/2018	250	mg/L	1/11/2018
	2		1.1	mg/L	7/2/2018	280	mg/L	7/5/2018
	1	16e	4	mg/L	1/8/2018	240	mg/L	1/11/2018
	2		4.3	mg/L	7/2/2018	250	mg/L	7/5/2018
	1	17e	2.7	mg/L	1/8/2018	300	mg/L	1/11/2018
	2		2.1	mg/L	7/2/2018	330	mg/L	7/5/2018
	1	18e	**	mg/L	**	**	mg/L	**
	2		**	mg/L	**	**	mg/L	**

Year	Semester	Well ID	Nitrate (as NO_3-N)	Date Sampled	T.D.S.	Date Sampled
2017	1	2w	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	6w	2.0 mg/L	1/4/2017	200 mg/L	1/4/2017
	2		1.8 mg/L	7/6/2017	260 mg/L	7/6/2017
	1	8w	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	9w	2.6 mg/L	1/4/2017	180 mg/L	1/4/2017
	2		2.4 mg/L	7/6/2017	220 mg/L	7/6/2017
	1	10w	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	11w	8 mg/L	1/4/2017	250 mg/L	1/4/2017
	2		7 mg/L	7/6/2017	270 mg/L	7/6/2017
	1	20w	3.4 mg/L	1/4/2017	160 mg/L	1/4/2017
	2		3.5 mg/L	7/19/2017	190 mg/L	7/6/2017
	1	9e	2.9 mg/L	1/5/2017	280 mg/L	1/5/2017
	2		3.1 mg/L	7/19/2017	310 mg/L	1/12/2017
	1	12e	3.2 mg/L	1/12/2017	330 mg/L	1/12/2017
	2		4.1 mg/L	7/6/2017	290 mg/L	7/6/2017
	1	14e	1.9 mg/L	1/5/2017	240 mg/L	1/5/2017
	2		1.5 mg/L	7/6/2017	260 mg/L	7/6/2017
	1	16e	4.2 mg/L	1/12/2017	260 mg/L	1/12/2017
	2		4.4 mg/L	7/6/2017	240 mg/L	7/6/2017
	1	17e	2.6 mg/L	1/12/2017	330 mg/L	1/12/2017
	2		2.9 mg/L	7/6/2017	300 mg/L	7/6/2017
	1	18e	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**

*denotes average reduction for graphing purposes due to a lack of data

Year	Semester	Well ID	Nitrate (N03 as N)	Date Sampled	T.D.S.	Date Sampled
2016	1	2w	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	6w	2.3 mg/L	1/6/2016	270 mg/L	1/6/2016
	2		2.2 mg/L	7/6/2016	240 mg/L	7/6/2016
	1	8w	2.4 mg/L	1/6/2016	120 mg/L	1/6/2016
	2		2.8 mg/L	7/6/2016	220 mg/L	7/6/2016
	1	9w	2.2 mg/L	1/6/2016	220 mg/L	1/6/2016
	2		2.5 mg/L	7/6/2016	240 mg/L	7/6/2016
	1	10w	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	11w	7.5 mg/L	1/6/2016	120 mg/L	1/6/2016
	2		8.1 mg/L	7/6/2016	340 mg/L	7/6/2016
	1	20w	3.4 mg/L	1/6/2016	120 mg/L	1/6/2016
	2		3.6 mg/L	7/6/2016	220 mg/L	7/6/2016
	1	9e	3.6 mg/L	1/7/2016	340 mg/L	1/7/2016
	2		3.5 mg/L	7/7/2016	250 mg/L	7/7/2016
	1	12e	3.4 mg/L	1/7/2016	370 mg/L	1/7/2016
	2		4 mg/L	7/7/2016	340 mg/L	7/7/2016
	1	14e	1.6 mg/L	1/7/2016	330 mg/L	1/7/2016
	2		1.8 mg/L	7/7/2016	230 mg/L	7/7/2016
	1	16e	5.1 mg/L	1/7/2016	340 mg/L	1/7/2016
	2		4.5 mg/L	7/7/2016	230 mg/L	7/7/2016
	1	17e	2.2 mg/L	1/7/2016	390 mg/L	1/7/2016
	2		2.8 mg/L	7/7/2016	310 mg/L	7/7/2016
	1	18e	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**

*denotes average reduction for graphing purposes due to a lack of data

Year	Semester	Well ID	Nitrate (N03 as N)	Date Sampled	T.D.S.	Date Sampled
2015	1	2w	17 mg/L	1/7/2015	180 mg/L	1/7/2015
	2		9.6 mg/L	7/6/2015	120 mg/L	7/6/2015
	1	6w	9.2 mg/L	1/7/2015	320 mg/L	1/7/2015
	2		9 mg/L	7/6/2015	210 mg/L	7/6/2015
	1	8w	13 mg/L	1/7/2015	120 mg/L	1/7/2015
	2		11 mg/L	7/6/2015	160 mg/L	7/6/2015
	1	9w	11 mg/L	1/7/2015	340 mg/L	1/7/2015
	2		9.9 mg/L	7/6/2015	210 mg/L	7/6/2015
	1	10w	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	11w	38 mg/L	1/7/2015	330 mg/L	1/7/2015
	2		32 mg/L	7/6/2015	260 mg/L	7/6/2015
	1	20w	18 mg/L	1/7/2015	240 mg/L	1/7/2015
	2		17 mg/L	7/6/2015	190 mg/L	7/6/2015
	1	9e	14 mg/L	1/8/2015	310 mg/L	1/8/2015
	2		12 mg/L	7/2/2015	280 mg/L	7/2/2015
	1	12e	16 mg/L	1/8/2015	290 mg/L	1/8/2015
	2		17 mg/L	7/2/2015	250 mg/L	7/2/2015
	1	14e	7.2 mg/L	1/8/2015	280 mg/L	1/8/2015
	2		7.6 mg/L	7/2/2015	240 mg/L	7/2/2015
	1	16e	22 mg/L	1/8/2015	130 mg/L	1/8/2015
	2		19 mg/L	7/2/2015	250 mg/L	7/2/2015
	1	17e	9.7 mg/L	1/8/2015	240 mg/L	1/8/2015
	2		7.7 mg/L	7/2/2015	320 mg/L	7/2/2015
	1	18e	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**

*denotes average reduction for graphing purposes due to a lack of data

Year	Semester	Well ID	Nitrate (as NO_3)	Date Sampled	T.D.S.	Date Sampled
2014	1	2w	17 mg/L	1/8/2014	260 mg/L	1/8/2014
	2		18 mg/L	7/3/2014	200 mg/L	7/3/2014
	1	6w	11 mg/L	1/8/2014	210 mg/L	1/8/2014
	2		12 mg/L	7/3/2014	210 mg/L	7/3/2014
	1	8w	9.6 mg/L	1/8/2014	180 mg/L	1/8/2014
	2		11 mg/L	7/3/2014	180 mg/L	7/3/2014
	1	9w	9.8 mg/L	1/8/2014	230 mg/L	1/8/2014
	2		9.8 mg/L	7/3/2014	180 mg/L	7/3/2014
	1	10w	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	11w	22 mg/L	1/8/2014	290 mg/L	1/8/2014
	2		22 mg/L	7/3/2014	240 mg/L	7/3/2014
	1	20w	** mg/L	**	** mg/L	**
	2		14 mg/L	6/9/2014	230 mg/L	6/9/2014
	1	9e	9.4 mg/L	1/9/2014	280 mg/L	1/9/2014
	2		11 mg/L	7/3/2014	260 mg/L	7/3/2014
	1	12e	19 mg/L	1/9/2014	290 mg/L	1/9/2014
	2		** mg/L	**	** mg/L	**
	1	14e	6 mg/L	1/9/2014	250 mg/L	1/9/2014
	2		8 mg/L	7/3/2014	230 mg/L	7/3/2014
	1	16e	20 mg/L	1/9/2014	240 mg/L	1/9/2014
	2		** mg/L	**	** mg/L	**
	1	17e	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	18e	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**

*denotes average reduction for graphing purposes due to a lack of data

Year	Semester	Well ID	Nitrate (as NO_3)	Date Sampled	T.D.S.	Date Sampled
2013	1	2w	24 mg/L			
	2		23 mg/L	7/2/2013	300 mg/L	7/2/2013
	1	6w	6.7 mg/L	1/8/2013	250 mg/L	1/8/2013
	2		11 mg/L	7/2/2013	210 mg/L	7/2/2013
	1	8w	11 mg/L	1/8/2013	170 mg/L	1/8/2013
	2		10 mg/L	7/2/2013	180 mg/L	7/2/2013
	1	9w	7.3 mg/L	1/8/2013	230 mg/L	1/8/2013
	2		11 mg/L	7/2/2013	200 mg/L	7/2/2013
	1	10w	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	11w	24 mg/L	1/8/2013	270 mg/L	1/8/2013
	2		22 mg/L	7/2/2013	290 mg/L	7/2/2013
	1	20w	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	9e	9.7 mg/L	1/8/2013	260 mg/L	1/8/2013
	2		9.7 mg/L	8/15/2013	260 mg/L	8/15/2013
	1	12e	15 mg/L	1/8/2013	300 mg/L	1/8/2013
	2		18 mg/L	7/2/2013	290 mg/L	7/2/2013
	1	14e	7.8 mg/L	1/8/2013	240 mg/L	1/8/2013
	2		8.3 mg/L	7/2/2013	240 mg/L	7/2/2013
	1	16e	20 mg/L	1/8/2013	250 mg/L	1/8/2013
	2		24 mg/L	7/2/2013	240 mg/L	7/2/2013
	1	17e	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	18e	** mg/L	**	** mg/L	**
	2		**	**	**	**

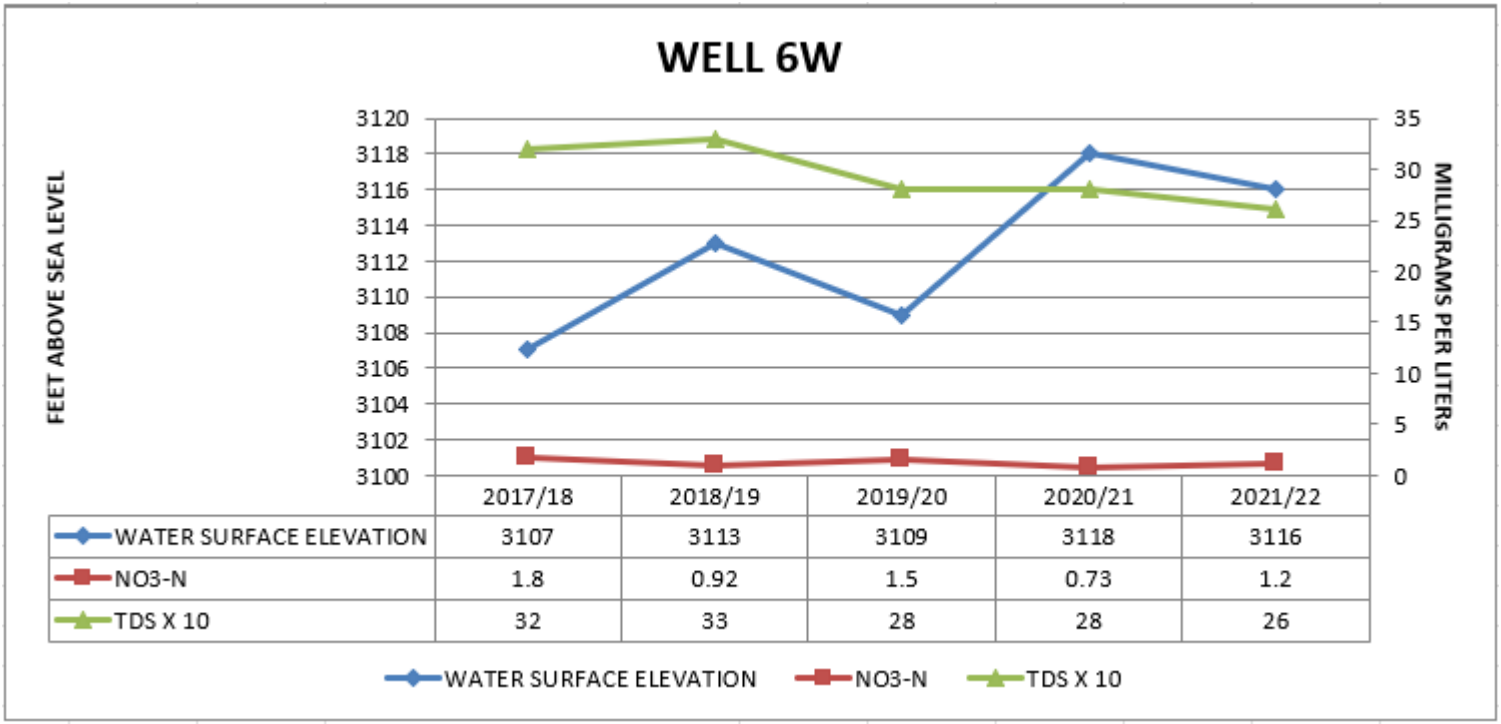
*denotes average reduction for graphing purposes due to a lack of data

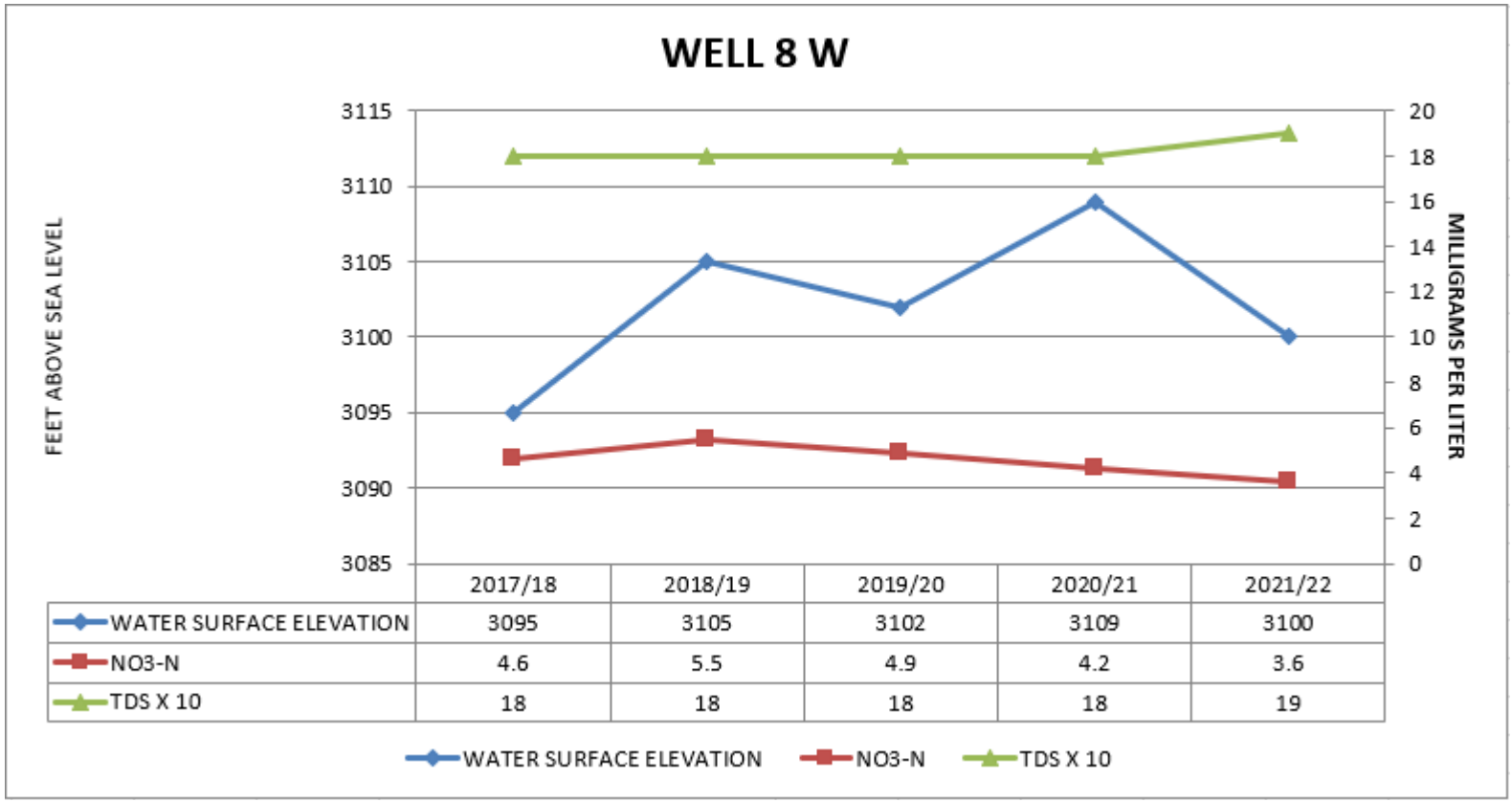
Year	Semester	Well ID	Nitrate (as NO_3)	Date Sampled	T.D.S.	Date Sampled
2012	1	2w	15 mg/L	1/4/2012	210 mg/L	1/4/2012
	2		15 mg/L	7/3/2012	220 mg/L	7/3/2012
	1	6w	6.8 mg/L	1/4/2012	240 mg/L	1/4/2012
	2		7 mg/L	7/3/2012	240 mg/L	7/3/2012
	1	8w	10 mg/L	1/4/2012	180 mg/L	1/4/2012
	2		9 mg/L	7/3/2012	190 mg/L	7/3/2012
	1	9w	12 mg/L	1/4/2012	210 mg/L	1/4/2012
	2		3.7 mg/L	7/3/2012	210 mg/L	7/3/2012
	1	10w	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	11w	22 mg/L	1/4/2012	270 mg/L	1/4/2012
	2		19 mg/L	7/3/2012	280 mg/L	7/3/2012
	1	20w	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	9e	9.4 mg/L	1/19/2012	*265 mg/L	1/19/2012
	2		8.5 mg/L	7/5/2012	250 mg/L	7/5/2012
	1	12e	16 mg/L	1/4/2012	300 mg/L	1/4/2012
	2		16 mg/L	7/26/2012	250 mg/L	7/26/2012
	1	14e	8.3 mg/L	1/19/2012	*255 mg/L	1/19/2012
	2		6 mg/L	7/5/2012	270 mg/L	7/5/2012
	1	16e	22 mg/L	1/4/2012	250 mg/L	1/4/2012
	2		21 mg/L	7/5/2012	250 mg/L	7/5/2012
	1	17e	15 mg/L	1/4/2012	300 mg/L	1/4/2012
	2		14 mg/L	7/5/2012	280 mg/L	7/5/2012
	1	18e	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**

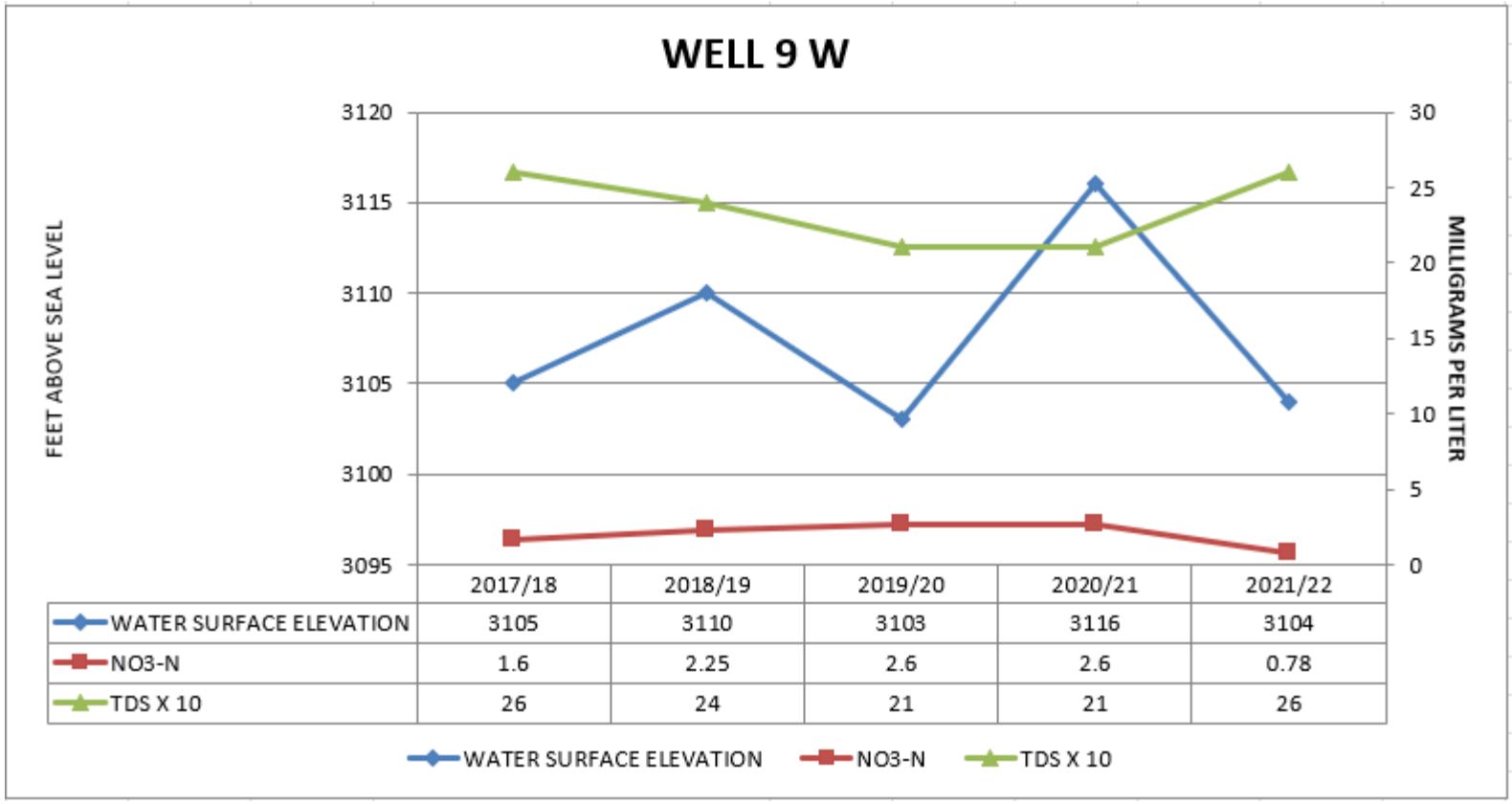
*denotes average reduction for graphing purposes due to a lack of data

Year	Semester	Well ID	Nitrate (as NO_3)	Date Sampled	T.D.S.	Date Sampled
2011	1	2w	9.7 mg/L	1/4/2011	220 mg/L	1/4/2011
	2		15 mg/L	7/7/2011	240 mg/L	7/6/2011
	1	6w	5.9 mg/L	3/14/2011	270 mg/L	3/14/2011
	2		4.5 mg/L	7/7/2011	270 mg/L	7/6/2011
	1	8w	12 mg/L	1/4/2011	150 mg/L	1/4/2011
	2		13 mg/L	7/7/2011	160 mg/L	7/6/2011
	1	9w	10 mg/L	1/4/2011	190 mg/L	1/4/2011
	2		12 mg/L	7/7/2011	180 mg/L	7/6/2011
	1	10w	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	11w	14 mg/L	1/4/2011	260 mg/L	1/4/2011
	2		16 mg/L	7/7/2011	260 mg/L	7/6/2011
	1	20w	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	9e	10 mg/L	1/3/2011	280 mg/L	1/3/2011
	2		11 mg/L	7/7/2011	280 mg/L	7/7/2011
	1	12e	20 mg/L	1/3/2011	300 mg/L	1/3/2011
	2		21 mg/L	7/7/2011	300 mg/L	7/7/2011
	1	14e	9 mg/L	1/3/2011	240 mg/L	1/3/2011
	2		10 mg/L	7/7/2011	240 mg/L	7/7/2011
	1	16e	23 mg/L	1/3/2011	230 mg/L	1/3/2011
	2		23 mg/L	7/7/2011	240 mg/L	7/7/2011
	1	17e	18 mg/L	1/3/2011	260 mg/L	1/3/2011
	2		18 mg/L	7/7/2011	300 mg/L	7/7/2011
	1	18e	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**

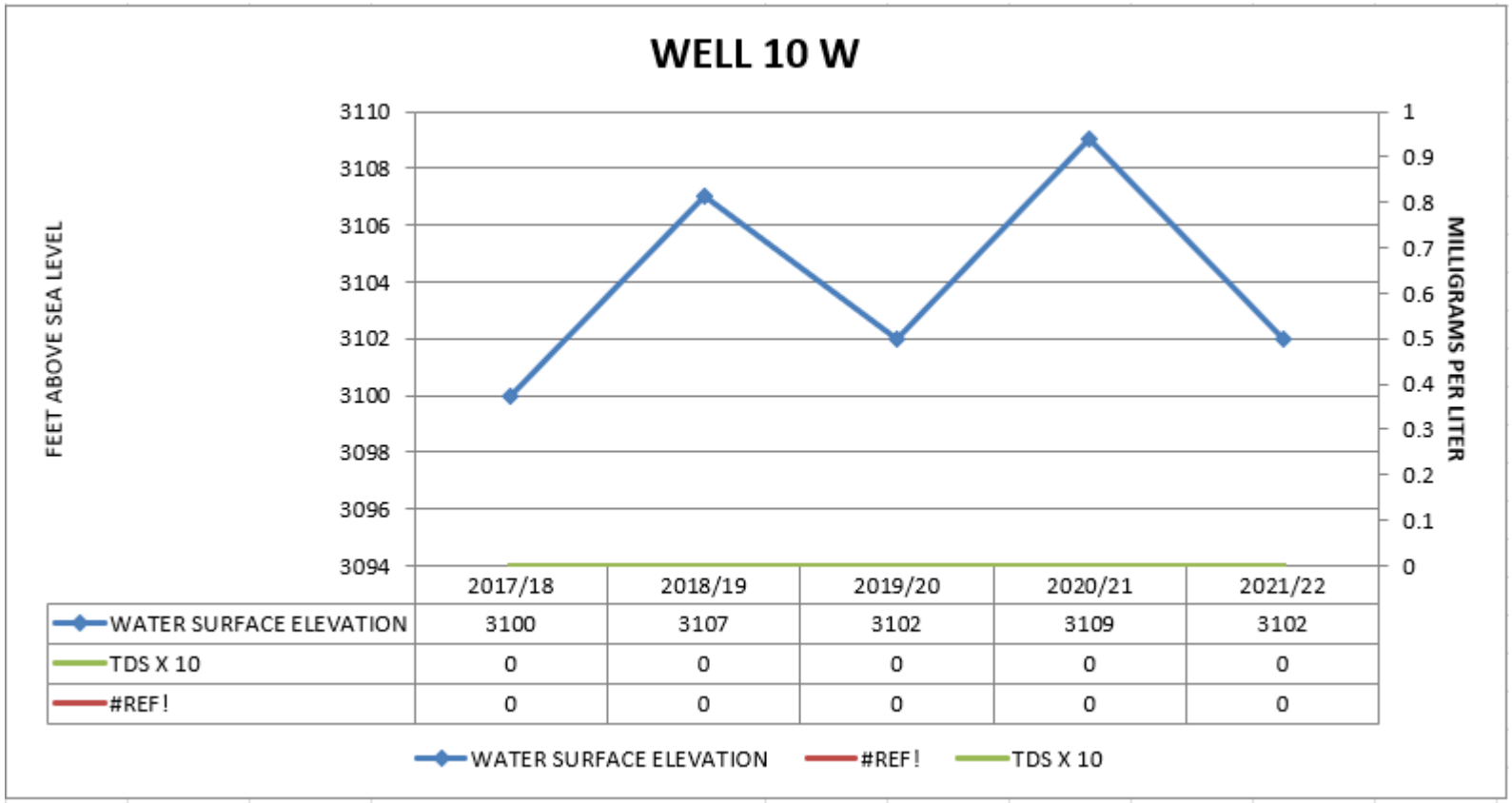
Year	Semester	Well ID	Nitrate (as NO_3)	Date Sampled	T.D.S.	Date Sampled
2010	1	2w	7.8 mg/L	1/20/2010	220 mg/L	1/20/2010
	2		8.1 mg/L	7/7/2010	230 mg/L	7/7/2010
	1	6w	8.7 mg/L	1/20/2010	220 mg/L	1/20/2010
	2		** mg/L	**	** mg/L	**
	1	8w	11 mg/L	7/7/2010	170 mg/L	7/7/2010
	2		12 mg/L	10/10/2010	170 mg/L	10/10/2010
	1	9w	12 mg/L	1/20/2010	200 mg/L	1/20/2010
	2		12 mg/L	7/7/2010	190 mg/L	7/7/2010
	1	10w	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	11w	10 mg/L	4/7/2010	250 mg/L	4/7/2010
	2		13 mg/L	10/10/2010	250 mg/L	10/10/2010
	1	20w	** mg/L	**	** mg/L	**
	2		** mg/L	**	** mg/L	**
	1	9e	9.5 mg/L	4/18/2010	270 mg/L	4/18/2010
	2		9.6 mg/L	10/10/2010	280 mg/L	10/10/2010
	1	12e	14 mg/L	1/14/2010	300 mg/L	1/14/2010
	2		18 mg/L	7/7/2010	300 mg/L	7/7/2010
	1	14e	9.2 mg/L	1/14/2010	280 mg/L	1/14/2010
	2		9.4 mg/L	7/7/2010	220 mg/L	7/7/2010
	1	16e	26 mg/L	1/14/2010	290 mg/L	1/14/2010
	2		22 mg/L	7/7/2010	220 mg/L	7/7/2010
	1	17e	15 mg/L	1/14/2010	320 mg/L	1/14/2010
	2		20 mg/L	7/7/2010	280 mg/L	7/7/2010
	1	18e	12 mg/L	1/14/2010	180 mg/L	1/14/2010
	2		** mg/L	**	** mg/L	**

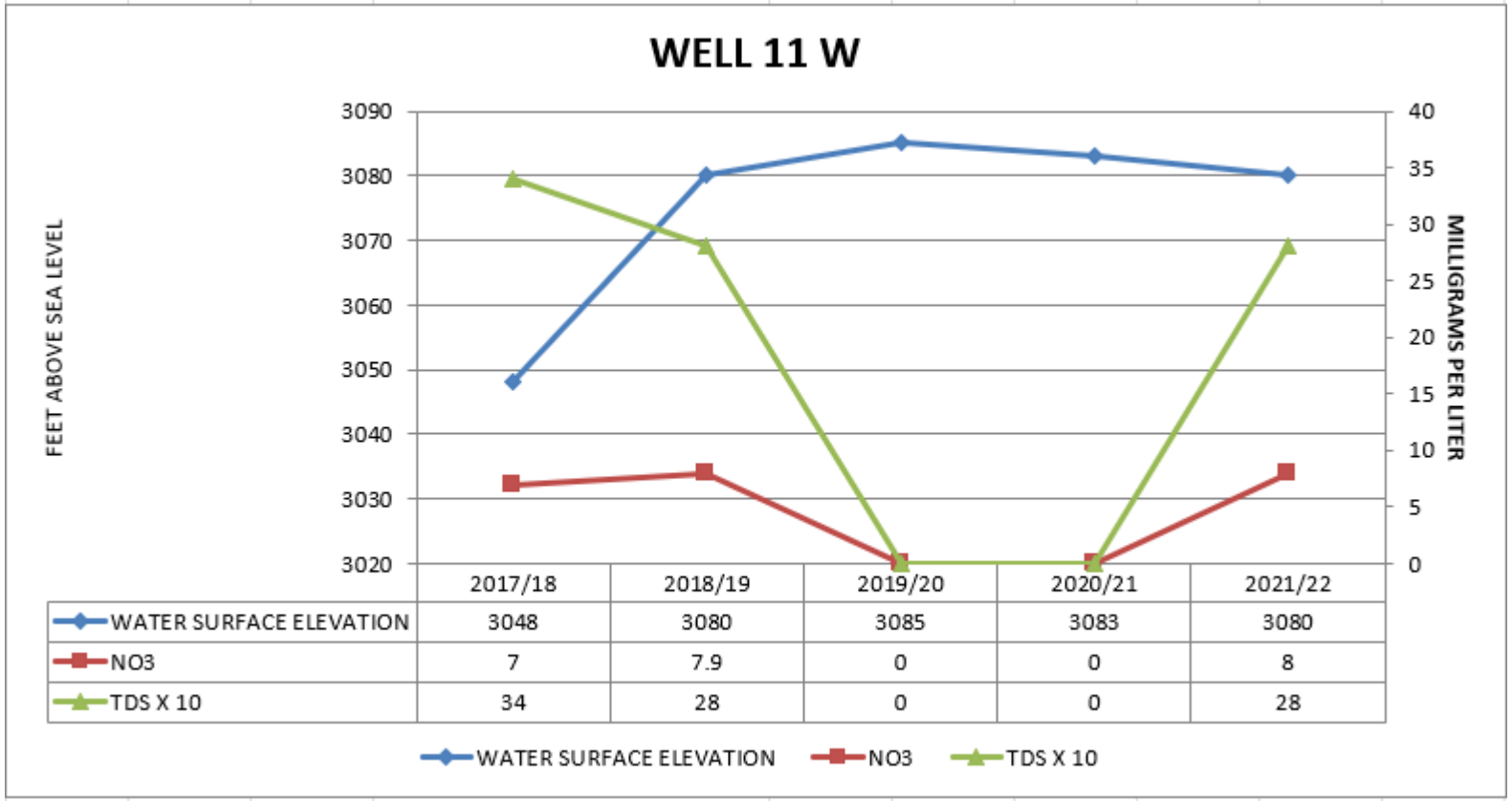

WELL 6W
FEET ABOVE SEA LEVEL
MILLIGRAMS PER LITERs
3120
3118
3116
3114
3112
3110
3108
3106
3104
3102
3100
35
30
25
20
15
10
5
0
2017/18
2018/19
2019/20
2020/21
2021/22
WATER SURFACE ELEVATION 3107 3113 3109 3118 3116
NO3-N 1.8 0.92 1.5 0.73 1.2
TDS X 10 32 33 28 28 26
WATER SURFACE ELEVATION
NO3-N
TDS X 10

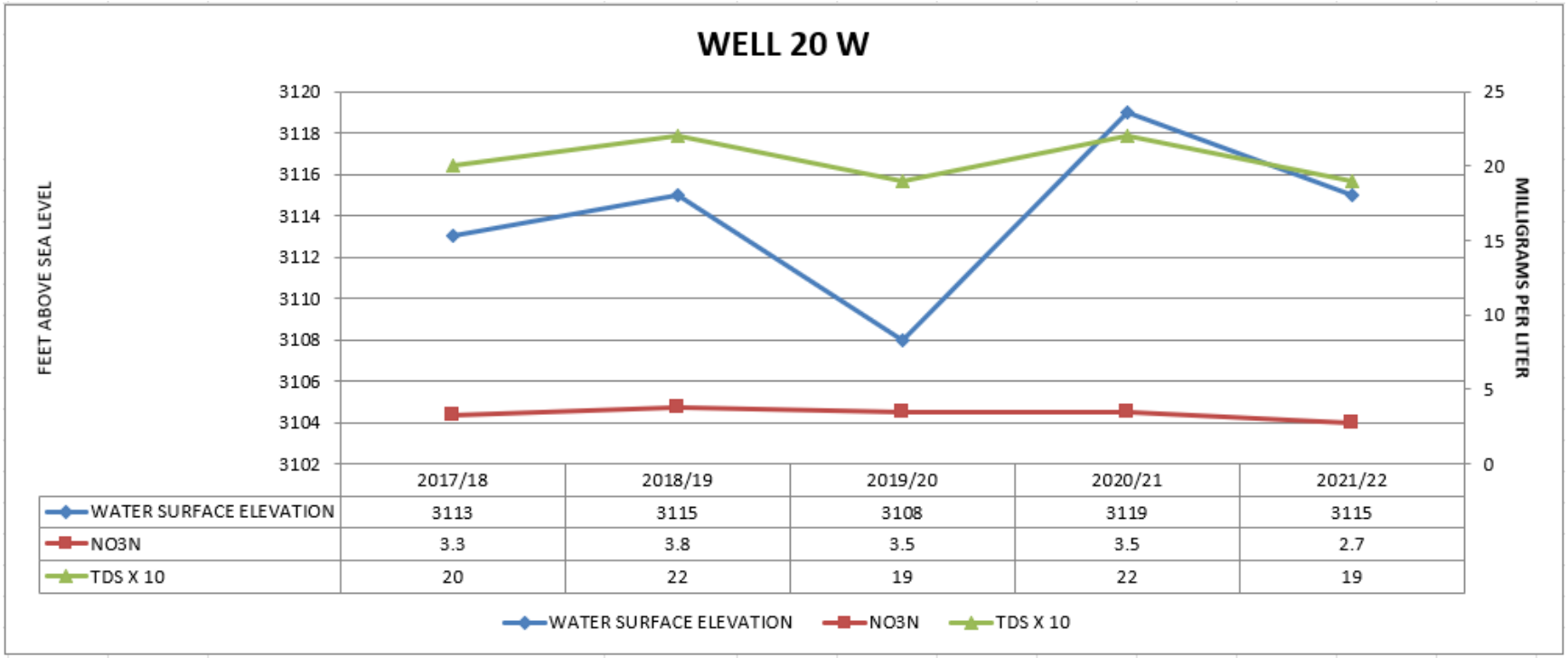

WELL 8 W
FEET ABOVE SEA LEVEL
MILLIGRAMS PER LITER
3115
3110
3105
3100
3095
3090
3085
20
18
16
14
12
10
8
6
4
2
0
2017/18 2018/19 2019/20 2020/21 2021/22
WATER SURFACE ELEVATION 3095 3105 3102 3109 3100
NO3-N 4.6 5.5 4.9 4.2 3.6
TDS X 10 18 18 18 18 19
WATER SURFACE ELEVATION
NO3-N
TDS X 10



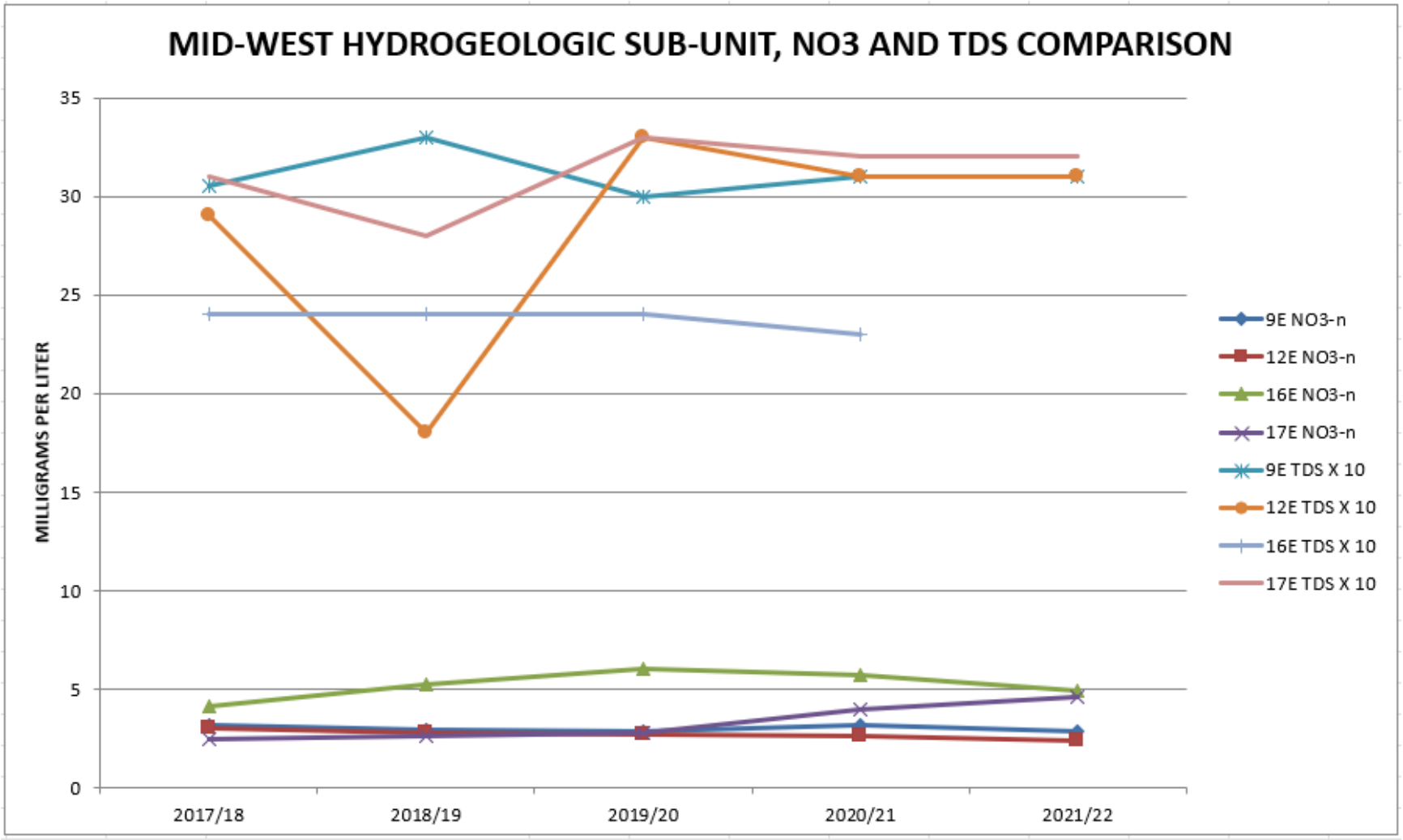
	2017/18	2018/19	2019/20	2020/21	2021/22
WATER SURFACE ELEVATION	3105	3110	3103	3116	3104
NO3-N	1.6	2.25	2.6	2.6	0.78
TDS X 10	26	24	21	21	26

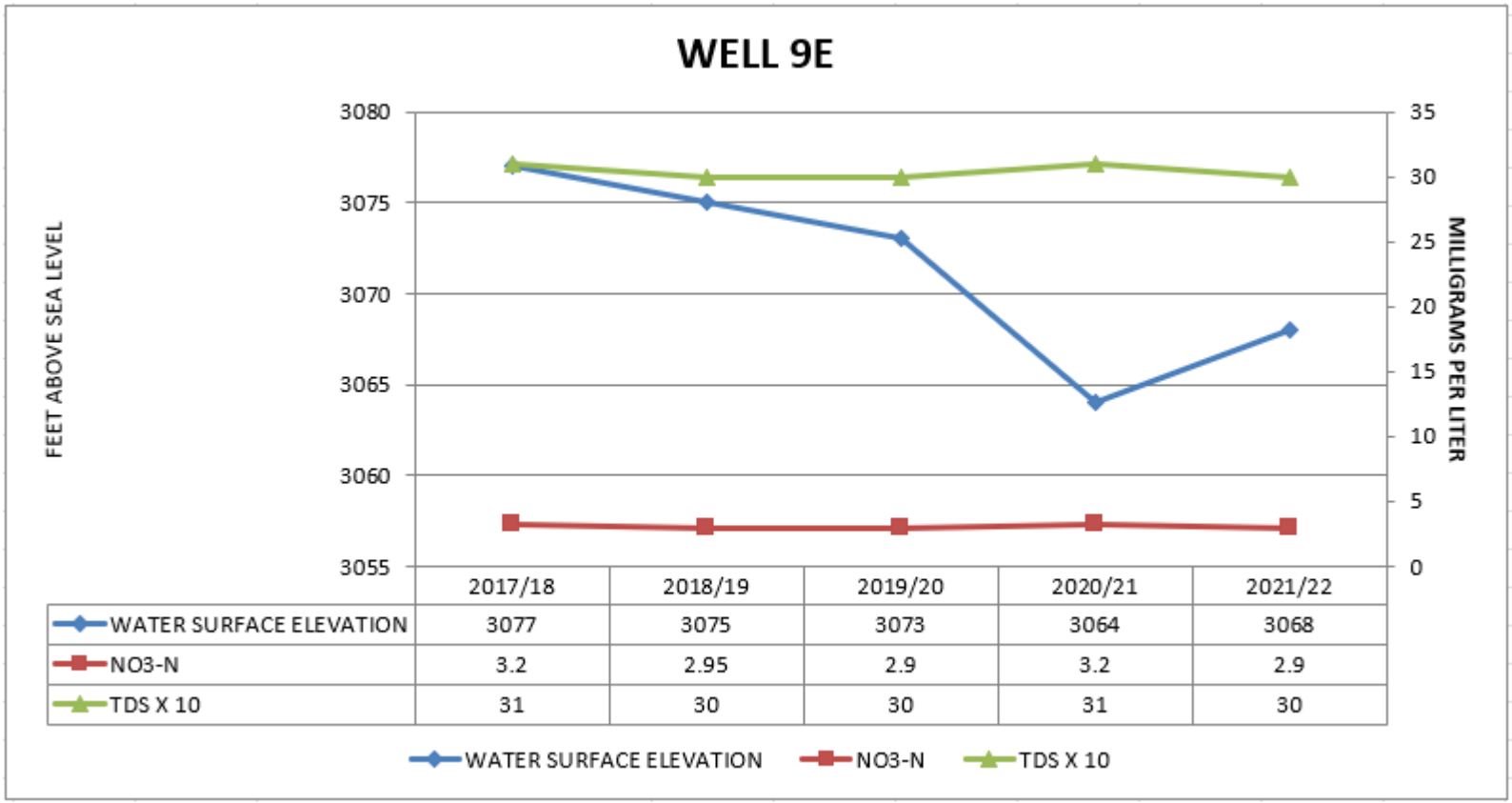

WELL 10 W
FEET ABOVE SEA LEVEL
MILLIGRAMS PER LITER
3110
3108
3106
3104
3102
3100
3098
3096
3094
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2017/18
2018/19
2019/20
2020/21
2021/22
WATER SURFACE ELEVATION 3100 3107 3102 3109 3102
TDS X 10 0 0 0 0 0
#REF! 0 0 0 0 0
WATER SURFACE ELEVATION
#REF!
TDS X 10


WELL 11 W
FEET ABOVE SEA LEVEL
MILLIGRAMS PER LITER
3090
3080
3070
3060
3050
3040
3030
3020
40
35
30
25
20
15
10
5
0
2017/18
2018/19
2019/20
2020/21
2021/22
WATER SURFACE ELEVATION 3048 3080 3085 3083 3080
NO3 7 7.9 0 0 8
TDS X 10 34 28 0 0 28
WATER SURFACE ELEVATION
NO3
TDS X 10

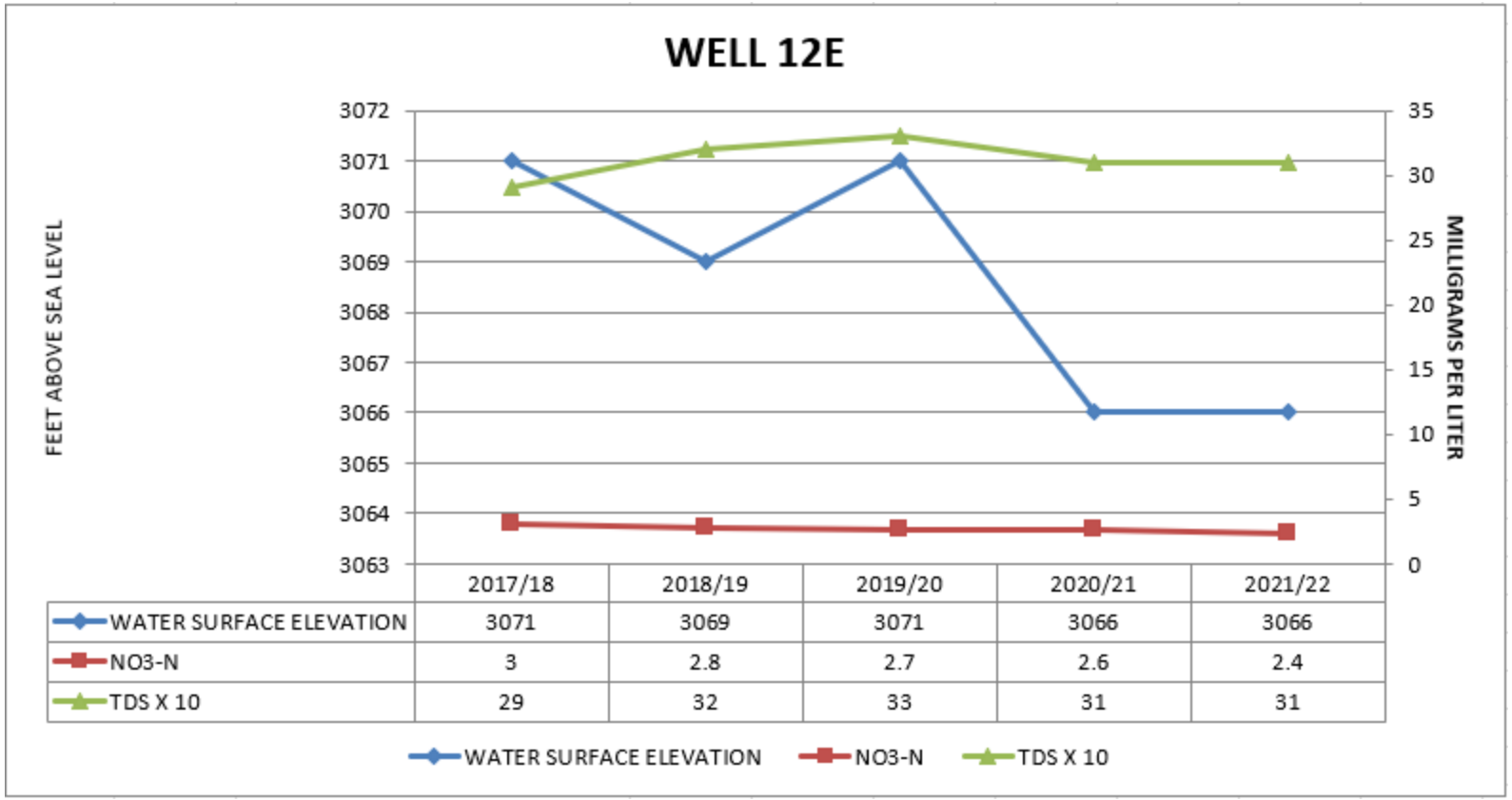


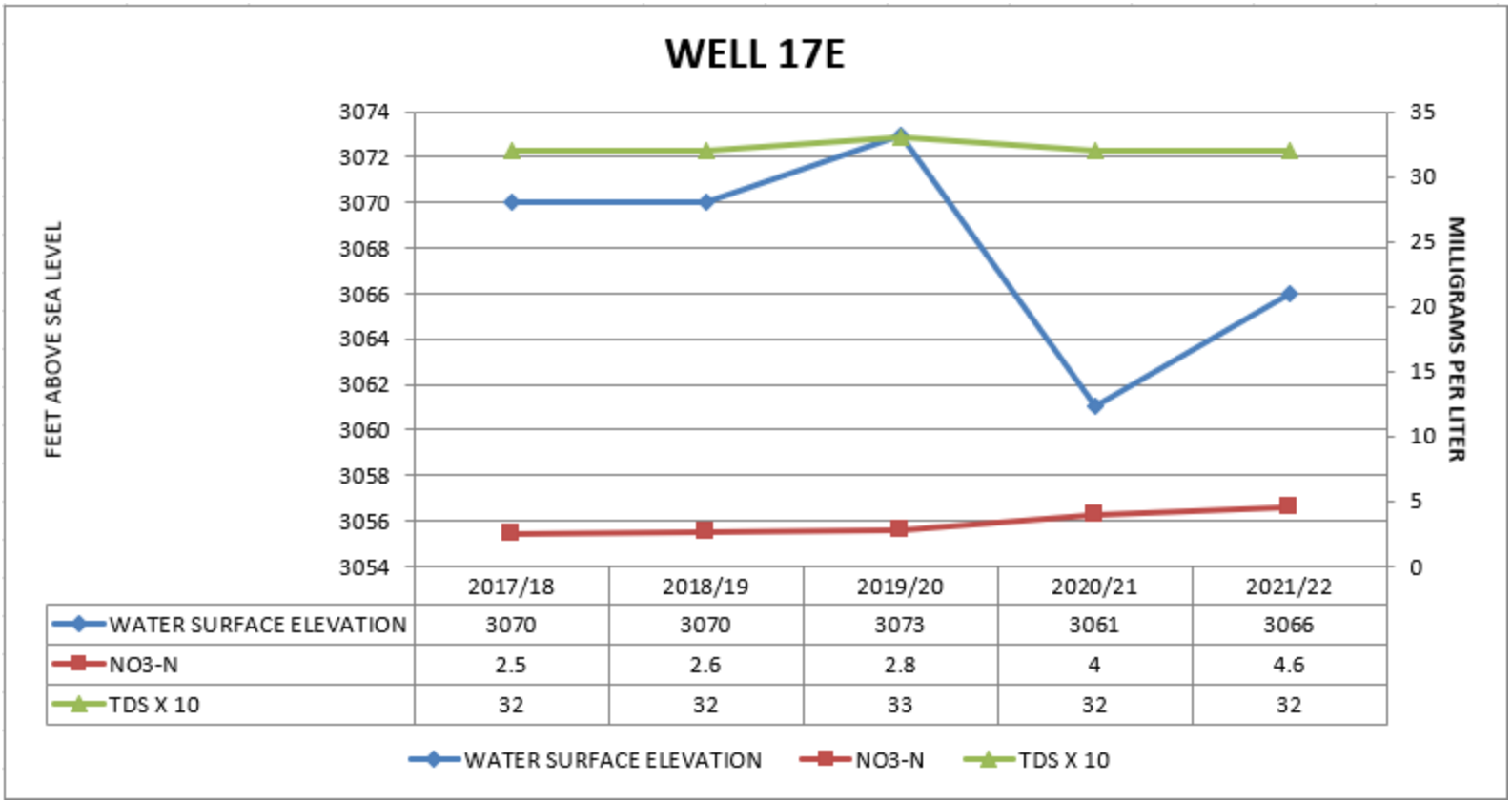
	2017/18	2018/19	2019/20	2020/21	2021/22
WATER SURFACE ELEVATION	3113	3115	3108	3119	3115
NO3N	3.3	3.8	3.5	3.5	2.7
TDS X 10	20	22	19	22	19


MID-WEST HYDROGEOLOGIC SUB-UNIT, NO3 AND TDS COMPARISON
MILLIGRAMS PER LITER
35
30
25
20
15
10
5
0
2017/18
2018/19
2019/20
2020/21
2021/22
9E NO3-n
12E NO3-n
16E NO3-n
17E NO3-n
9E TDS X 10
12E TDS X 10
16E TDS X 10
17E TDS X 10



	2017/18	2018/19	2019/20	2020/21	2021/22
WATER SURFACE ELEVATION	3077	3075	3073	3064	3068
NO3-N	3.2	2.95	2.9	3.2	2.9
TDS X 10	31	30	30	31	30


WELL 12E
FEET ABOVE SEA LEVEL
MILLIGRAMS PER LITER
3072
3071
3070
3069
3068
3067
3066
3065
3064
3063
35
30
25
20
15
10
5
0
2017/18
2018/19
2019/20
2020/21
2021/22
WATER SURFACE ELEVATION 3071 3069 3071 3066 3066
NO3-N 3 2.8 2.7 2.6 2.4
TDS X 10 29 32 33 31 31
WATER SURFACE ELEVATION
NO3-N
TDS X 10



	2017/18	2018/19	2019/20	2020/21	2021/22
WATER SURFACE ELEVATION	3070	3070	3073	3061	3066
NO3-N	2.5	2.6	2.8	4	4.6
TDS X 10	32	32	33	32	32

Appendix H: Water Reserves 2022

APPENDIX H - WARREN BASIN WATER STORAGE AND BALANCE

11/17/2022

Water Year Oct. - Sept.	State Water Recharge	USGS Nat Recharge	Wastewater Recharge	USGS Septic & Golf Course	Warren Basin Total Recharge	HDWD Pumpage Total	HLBS Golf Course Pumpage	USGS Groundwater Underflow	Warren Basin Outflow Total	Warren Basin Inflow - Outflow	Warren Basin Cumulative added storage	Cummulative Storage Upper Aquife	Years of Reserve	Cummulative Storage Upper and	Years of Reserve
BASIN RESERVE BALANCE												23,120	9	59,560	**23**
1994/95	1,909	49		2,131	4,089	1,644	319	41	2,004	2,085	2,870	25,990	10	61,645	**24**
1995/96	2,800	49		2,131	4,980	1,356	300	41	1,697	3,283	6,153	29,273	11	64,928	**25**
1996/97	5,072	49		2,131	7,252	2,140	394	52	2,586	4,666	10,819	33,939	13	69,594	**27**
1997/98	3,153	49		2,131	5,333	1,669	323	59	2,051	3,282	14,101	37,221	14	72,876	**28**
1998/99	1,900	49		944	2,893	1,884	312	29	2,225	668	14,769	37,889	15	73,544	**29**
1999/00	3,916	49		942	4,907	2,323	228	27	2,578	2,329	17,098	40,218	16	75,873	**29**
2000/01	3,459	49		925	4,433	2,179	300	34	2,513	1,920	19,018	42,138	16	77,793	**30**
2001/02	2,491	49		940	3,480	2,336	473	39	2,848	632	19,650	42,770	17	78,425	**30**
2002/03	2,635	49		974	3,658	2,577	226	43	2,846	813	20,462	43,582	17	79,237	**31**
2003/04	3,647	49		925	4,621	2,465	301	45	2,811	1,810	22,273	45,393	18	81,048	**32**
2004/05	2,932	49		901	3,882	2,507	106	48	2,661	1,221	23,494	46,614	18	82,269	**32**
2005/06	4,682	49		901	5,632	3,004	104	47	3,155	2,477	25,970	49,090	19	84,745	**33**
2006/07	4,743	49		901	5,693	2,959	106	49	3,114	2,579	28,549	51,669	20	87,324	**34**
2007/08	4,070	49		901	5,020	2,636	2	51	2,689	2,331	30,879	53,999	21	89,654	**35**
2008/09	2,091	49		880	3,020	2,672	0	50	2,722	297	31,177	54,297	21	89,952	**35**
2009/10	3,446	49		880	4,375	2,598	0	50	2,648	1,739	32,916	56,036	22	91,691	**36**
2010/11	2,816	49		880	3,745	2659	0	50	2,709	1,036	33,952	57,072	22	92,727	**36**
2011/12	2,468	49		880	3,397	2431	0	50	2,481	916	34,868	57,988	23	93,643	**36**
2012/13	2,982	49		880	3,911	2342	0	50	2,392	1,519	36,387	59,507	23	95,162	**37**
2013/14	889	49		880	1,818	2270	311	50	2,631	-813	35,574	58,694	23	94,349	**37**
2014/15	2,673	49		880	3,602	2161	227	50	2,438	1,164	36,738	59,858	23	95,513	**37**
2015/16	2,508	49		880	3,437	2196	274	50	2,520	917	37,655	60,775	24	96,430	**37**
2016/17	4,274	49		880	5,203	2153	341	50	2,544	2,659	40,314	63,434	25	99,089	**39**
2017/18	4,739	49		880	5,668	2214	341	50	2,605	3,063	43,377	66,497	26	102,152	**40**
2018/19	2,125	49		880	3,054	2535	274	50	2,859	195	43,572	66,692	26	102,347	**40**
2019/20	1,479	49		880	2,408	2187	294	50	2,531	-123	43,449	66,569	26	102,224	**40**
2020/21	2,745	49	421	573	3,788	2200	339	50	2,589	1,199	44,648	67,768	26	103,423	**40**
2021/22	2,156	49	633	499	3,337	2045	322	50	2,417	920	45,568	68,688	27	104,343	**41**
Total 1994-2022	**84,800**	**1,371**	**1,054**	**29,411**	**116,636**	**64,342**	**6,217**	**1,306**	**71,865**	**44,783**	**45,568**	**68,688**	**27**	**104,343**	**41**
Storage prior to start	of Recharge														

Notes:

1) All Water volumes are Acre-Feet

2) Recharge water reflects 2% loss

3) JTRC production not included - extractions not part of recharged basins

4) Well 2W is included in column HDWD Pumpage Totals

5) Years of reserves = reserves within upper and middle aquifer divided by a running average of pumpage

Total storage (yrs) recharge - production only **5.54**