DECISION MANAGEMENT ANALYSIS
(TASK 3: REPORT 2 OF 2)

- **Cost and Rate Structure Uncertainty and Impact Analysis**
- **SGMA/Environmental/Societal/Government Impacts**

Prepared for:
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DECISION MANAGEMENT ANALYSIS (TASK 3: REPORT 2 OF 2)

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1.0 INTRODUCTION

Starting January 1, 2020, State Law requires the implementation of a Groundwater Sustainability Plan[1] (GSP) by the Borrego Springs Community to reduce groundwater use by approximately 75% over the next 20 years. The community water supply is entirely reliant on local pumping- as explained in the Draft GSP there are currently no feasible sources of imported water. It has long been recognized that groundwater depletion is an issue that ultimately impacts the viability and quality of life.[2] Water use has exceeded the natural replenishment rate for decades and the groundwater sub-basin is in a state of critical overdraft as described by the State Department of Water Resources (DWR). This condition has existed for decades, has been the subject of ongoing debate and discussion, and is now subject to State Law under the Sustainable Groundwater Management Act (SGMA) enacted September 2014[3].

Borrego Springs is a small unincorporated community located on the western edge of the Sonoran Desert (**Figure 1**). It is a Severely Disadvantaged Community (SDAC[4]) and located within an Economically Distressed Area (EDA[5]). This Report was developed to examine how water supply uncertainties will affect the Borrego Water District (BWD), the primary source of drinking water to the SDA Community. It also looks at community-wide SGMA impacts based on an economic perspective.

This is the second of two Task 3 Reports by ENSI and combines two deliverables specified in Task 3 of the DWR Proposition 1 Grant Agreement (see **Appendix A**):

- <u>BWD Cost and Rate Structure Uncertainty and Impact Analysis.</u> This analysis focuses on the uncertainties associated with potential impacts of SGMA-mandated water use reductions on the SDAC, BWD rate payers, and BWD infrastructure. The primary emphasis of the analysis is on the incremental costs associated with overdraft impacts to BWD's water supply. (Report **Section 3**)

- <u>SGMA/Environmental/Societal/Government Impacts.</u> This section of the Report uses an economic model (IMPLAN) to examine community-wide socioeconomic impacts and changes that will result from the GSP. An overview analysis of SDAC impacts was included in a separate ENSI document prepared for Task 2 that explains the basis for the scenarios evaluated using the model. (Report **Sections 4 and 5**)

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[1] The Draft GSP is currently being circulated for public review. It was developed by the newly-formed Groundwater Sustainability Agency comprised of the County of San Diego and the Borrego Water District.

[2] Borrego Springs Community Plan, August 3, 2011, Rev. 5-15-2013, 6-18-2014.

[3] https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management

[4] As defined by DWR, Severely Disadvantaged Communities (SDAC) are Census geographies having less than 60% of the Statewide annual median household income ($37,091 [2017]). Map-based DAC information developed by the DWR can be reviewed at https://gis.water.ca.gov/app/dacs/

[5] As defined by DWR, an EDA is a municipality with a population of 20,000 persons or less, a rural county, or a reasonably isolated and divisible segment of a larger municipality with a population of 20,000 persons or less, with a median household income (MHI) that is less than 85% of the Statewide MHI, and with one or more of the following conditions: 1) Financial hardship, 2) Unemployment rate at least 2% of higher than statewide average, and/or 3) Low population density.

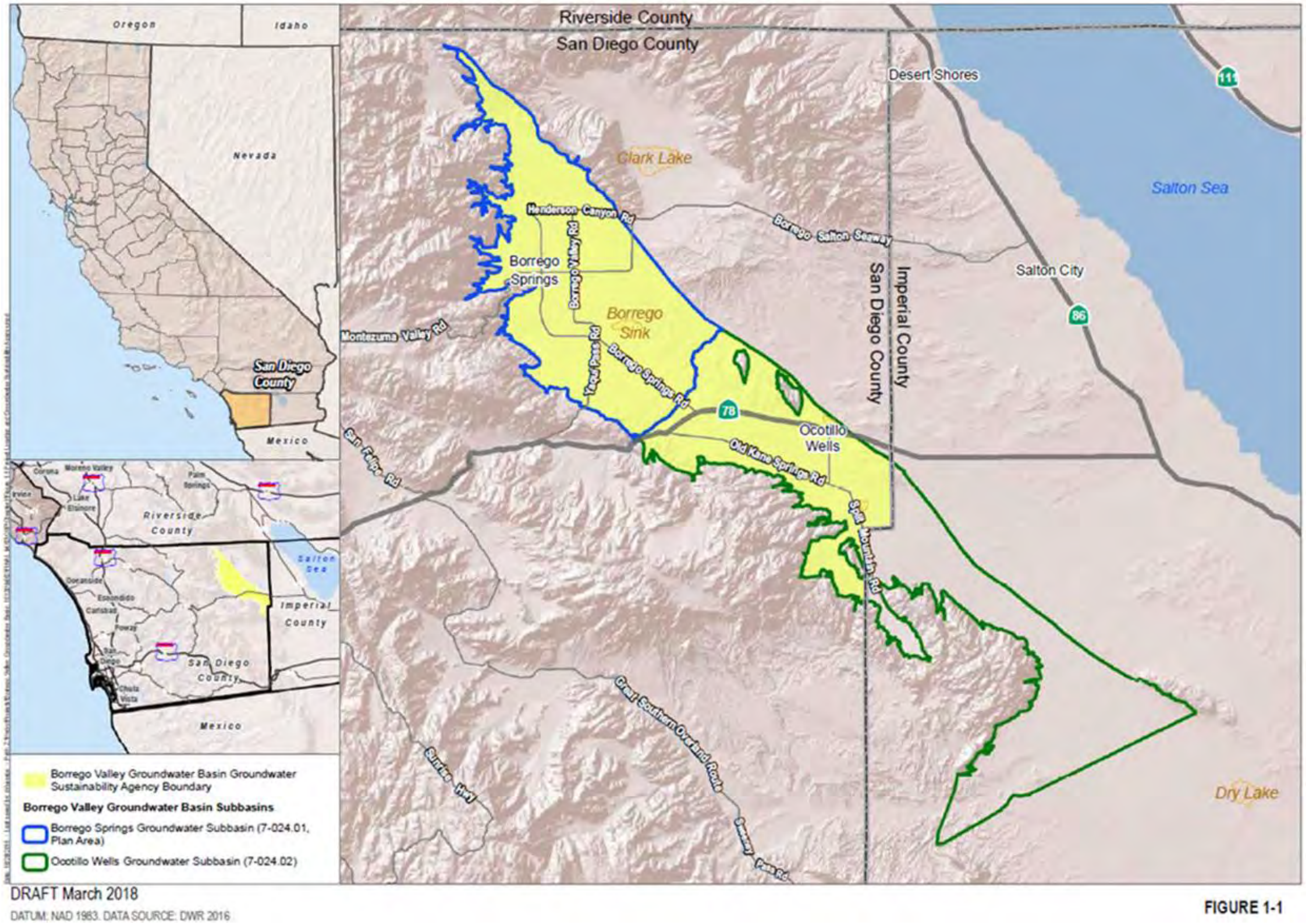


FIGURE 1. Site Location (From Draft GSP, Figure 1-1)

2.0 REPORT OVERVIEW

The work done to develop the GSP has made substantial progress toward understanding of how the ~75% water use reduction can be achieved. This report is the third of three ENSI reports developed under a Proposition 1 Grant obtained by the Groundwater Sustainability Agency[6] (GSA). The two prior ENSI documents provide supporting information for this report and include:

SDAC Impact/Vulnerability Analysis (Task 2 Reports) (ENSI 4/15/2019).

This Report was developed to understand implications that the implementation of SGMA will have on the SDAC including impacts based on potential water reduction scenarios by analyzing baseline data and identifying the primary vulnerabilities of the SDAC population of Borrego Springs. It combines two deliverables specified in Task 2 of the Grant Agreement (see **Appendix A**):

- Baseline Water Use. An overview of how water is used in the GSP area is presented. Three water use sectors are described in the GSP and supporting documents- agricultural, recreational (golf course irrigation), and municipal (water delivered by the Borrego Water District for residential and commercial use). These represent approximately 72%, 18%, and 10% of the Baseline Pumping Allocation (BPA) used as the starting point for water use reductions in the GSP. A comparison of the trade-offs associated with different pumping rate reduction schedules was also included that can be used going forward to assess the progress of water use reductions.

- Water Supply Impact, SDAC Vulnerability, and SGMA Impacts Analysis. The purpose of this section of the Task 2 report is to summarize the SDAC community profile and to identify the primary vulnerabilities of Borrego Springs' SDAC population to the water use reductions mandated under SGMA to occur over a maximum 20-year compliance period. Structural changes in the Borrego Springs community will occur for each of the water use sectors. Extensive community outreach conducted by LeSar Development Consultants in 2018[7] has provided a clear picture of the SDAC concerns and vulnerabilities relative to water.

Decision Management Analysis (Task 3: Report 1 of 2) (ENSI 4/16/2019).

This Report was developed to develop tools to allow the Borrego Water District (BWD) to look at potential water supply situations that may directly impact groundwater users in Borrego Springs, assess the probability of the water supply situations occurring, and make decisions accordingly. Included is assessment of the potential range of outcomes of the groundwater extraction restrictions that will allow the BWD to look at water supply situations, such as the potential need for water treatment, or loss of individual supply wells due to ongoing groundwater overdraft and

[6] The County of San Diego and the Borrego Water District currently comprise the GSA, established in 2016.

[7] Borrego Springs Community Characteristics Report. Drafted as part of the California Proposition 1 Groundwater Sustainability Plan planning process for the Borrego Water District by LeSar Development Consultants (LDC). Final version received 1/31/2019 and included in its entirely in ENSI 4/15/2019. Their work was done as Task 1 to the Proposition 1 Grant.

be able to assess its probability of occurring. The assessment of the potential range of outcomes of the groundwater extraction restrictions is supported by the use of Monte Carlo simulation methods. It combines two deliverables specified in Task 3 of the grant agreement:

- Water Supply Uncertainties. This includes assessment of the overall water balance, changes in water quality over time, and potential impact of overdraft on future BWD well production. Multi-parameter evaluation of water quality trends based on general minerals that shows how water quality has changed due to long-term overdraft, and provides for a systematic overview of groundwater quality variations. Also included was an assessment of water quality indicators that may provide 'early warning' for elevated sulfate and arsenic concentrations (ENSI 12/7/2018, Included as Appendix D2 of the Draft GSP). A local-scale analysis of the expected changes in BWD water well production with ongoing overdraft based on well-specific review of the USGS Groundwater model water level calibration and development of lithology-based hydrogeologic aquifer properties developed from driller's logs. The primary use of this report will be in the ongoing evaluation of the groundwater model performance and predictive capabilities.

- Monte Carlo Simulation (MCS) Model. The target pumping rate of 5700 AFY is based on a long-term average groundwater recharge rate. Successful attainment of sustainable groundwater pumping requires the target pumping rate to be equal to groundwater recharge. Rainfall events that contribute the most to recharge occur on a decadal basis and thus groundwater recharge has a high degree of variability over time. Review of the Borrego Subbasin water balance was done using a probabilistic (Monte Carlo) model that shows how recharge variability over time may affect GSP compliance. The results were used to develop minimum thresholds for chronic lowering of groundwater levels in Section 3.3.1.1 of the Draft GSP.

This report (Task 3, Report 2 of 2) builds on the prior work to address the potential impacts of various water reduction scenarios on the SDAC, rate payers, and BWD infrastructure. It combines a cost structure uncertainty analysis with a larger scale impact assessment to provide for an overview of the potential economic and related community impacts associated with the SGMA-mandated ~75% reduction in water use. The model inputs and evaluation scenarios build upon an extensive community outreach, data review, and survey work done in 2018 by LeSar Development Consultants[8]. Their work, also funded by the Proposition 1 Grant, provided community-specific economic and societal information specific to the potential impacts of water use reductions and increased water costs to the Borrego Springs Community.

[8] Borrego Springs Community Characteristics Report. Drafted as part of the California Proposition 1 Groundwater Sustainability Plan planning process for the Borrego Water District by LeSar Development Consultants. Final version received 1/31/2019.

3.0 BWD COST AND RATE STRUCTURE: UNCERTAINTY AND IMPACT ANALYSIS

3.1 Scope and Purpose

The focus of this cost and rate structure analysis is on the incremental costs associated with overdraft impacts to BWD water supply wells.

Water level decline due to chronic overdraft will continue as the GSP is implemented to reduce groundwater pumping over the next 20 years. Of primary concern are changes in well production rates and declining water quality that have been and are expected to occur until overdraft is abated (ENSI 4/16/2019 includes extensive analysis of both). Here, a well-by-well analysis is conducted to assess the overall uncertainty and range of potential impacts that may occur to BWD's water supply wells specific to changes in production rates and water quality. BWD's active water supply wells are currently operating at 18% to 46% of their initial capacity as a result of overdraft- i.e. aquifer dewatering has led to the wells to lose more than half of their ability to produce water. It is projected that they could lose roughly another 30% of operating capacity during the 20-year SGMA compliance period.

BWD has been and will be continuing to plan for and manage costs associated with chronic overdraft. SGMA adds many additional considerations and directly impacts BWD's cost and rate structure. The next two subsections provide an overview of prior and ongoing analyses related to GSP implementation and BWD's efforts to assess costs and water affordability.

3.1.1 Supporting Analyses: Draft GSP

As stated in the Draft GSP (ES-6) "*The GSA has performed substantial work toward estimating the cost of GSP implementation. Chapter 5, Plan Implementation, contains a breakdown of tasks and associated cost estimates for data collection, management, and evaluation; annual and periodic (i.e., 5-year) reporting; data gap analysis and additional evaluation; PMA [ed: Projects and Management Action] development costs, including Environmental Impact Report; management, administration and other costs; and a 10% contingency. The estimated GSP implementation cost for the anticipated 20-year implementation period is $20,352,000. This estimate does not include the implementation of all PMAs or final costs incurred by BWD for internal management and administration. Additional budget will be required to implement PMAs once they have been developed. In general, the GSA plans to fund GSP implementation using a combination of administrative pumping fees, assessments/parcel taxes, and/or grants.*"

The Draft GSP includes the following that detail the estimated GSP implementation costs:

<u>Section 1.3.3</u> Estimated Cost of Implementing the Groundwater Sustainability Plan and the Groundwater Sustainability Agency's Approach to Meet Costs

<u>Section 4.3.3</u> Expected Benefits of the Water Conservation Program. Includes potential water savings per water use sector and related costs (for example golf course turf removal)

Section 4.5.6 Economic Factors and Funding Sources for Voluntary Fallowing of Agricultural Land Program. Includes costs for land stabilization and restoration, and well destruction.

Section 4.6.1 Water Quality Optimization Program Description. Includes cost for managing and/or treating water quality. It is based on Dudek 12/11/2015, cited below.

Sections 5.1.1 to 5.1.6 Groundwater Sustainability Plan Implementation and Estimated Costs. (with supporting Tables 5-1 to 5-5, Figure 5.2-2, and Exhibit 1). Includes ongoing groundwater monitoring, pump metering, update of supporting information in the GSP, and DWR reporting by the GSA.

3.1.2 Supporting Analyses: BWD Planning and Management

The GSP, in general, focuses on the administrative costs and implementation schedule for the Plan. Specific costs will be determined following adoption and implementation of the GSP, such as the cost of water obtained through the proposed trading program (PMA #1, Section 4.2 of the GSP). The following documents provide additional insights regarding water costs and affordability. The documents are shown twice- first in overview as a list, then with a summary description specific to how they contribute to BWD's planning process. All are included for future reference as appendices.

Mann, 6/2/2014. Economic Costs of Borrego Valley Aquifer Overdraft.
Prepared for: California Department of Water Resources and Borrego Water Coalition
Prepared by: Roger Mann, PhD RMann Economics. **Appendix B**

Dudek 12/11/2015. Water Replacement and Treatment Cost Analysis for the Borrego Valley Groundwater Basin. Draft Technical Memorandum prepared for BWD. **Appendix C**

Raftelis Financial Consultants (RFC) 3/28/2016. Borrego Water District Water and Wastewater Rate Study Report. Prepared for BWD. **Appendix D**

Raftelis Financial Consultants (RFC) 11/17/2016. Borrego Water District County Zoning and SGMA Impact Assessment. Prepared for BWD. **Appendix E**

Raftelis Financial Consultants (RFC) 10/14/2017. Borrego Water District Water Rates Affordability Assessment. Prepared for BWD. **Appendix F**

Dudek 3/29/2018. Policy for Human Right to Water. BWD Board presentation
(in Microsoft PowerPoint, with notes). **Appendix G**

SquarMilnar 1/11/2019. Borrego Water District Financial Statements June 30, 2018 and 2017
Prepared for BWD. **Appendix H**

Report Summaries

A brief summary of each report follows. Many of these reports discuss costs and the discussions include present-day and future costs that may involve varying inflation rate assumptions. The GSP period is 20 years (2020 to 2040) and inflation-adjusted costs over 20 years can appear very different depending on assumed rates. For example, if a 2% annual rate is used, $10 grows to $14.57. $10 grows to $17.54 at a 3% annual inflation rate. Further both income and cost inflation need to be considered the context of SDAC water affordability as has been done by RFC in their Financial Plan and Rate Model.

Mann, 6/2/2014. Economic Costs of Borrego Valley Aquifer Overdraft.
Prepared for: California Department of Water Resources and Borrego Water Coalition
Prepared by: Roger Mann, PhD RMann Economics. **Appendix B.**

This report "*provides an economic benefit associated with the elimination of overdraft in the Borrego Valley on a per acre-foot (AF) basis." "The economic value includes avoided costs associated with a lower groundwater table including: energy, well efficiency and well drilling costs, water quality, habitat loss, and subsidence. Then, the economic value of water saved for future use is included.*"

The analysis not specific to individual wells and looks at BWD's water supply from a large-scale and long-term (100 year) perspective. It does examine key points related to overdraft:

- Increased energy costs from pumping as groundwater levels decline.
- Loss of wells when groundwater tables fall below well intakes. The Draft GSP works to avoid this undesirable impact.
- Water quality and water quality treatment cost estimates. These have been updated by Dudek (12/11/2015, **Appendix C**).
- Subsidence and environmental cost. Subsidence is not judged to currently be of significance based on existing studies as explained in the Draft GSP.
- The opportunity cost for use of the water to support future development. The cost of water for future development has been further addressed by RFC (10/14/2017, and 11/17/2016). This analysis is unique in that it examines the economic value of new homes expressed in terms of the benefit of reducing overdraft.

  The analysis also considers the net benefit to BWD associated with economies of scale if water deliveries are increased. In simple terms BWD has a baseline costs for water delivery and the cost per unit of water will increase when less water is delivered per customer.

Dudek 12/11/2015. Water Replacement and Treatment Cost Analysis for the Borrego Valley Groundwater Basin. Draft Technical Memorandum prepared for BWD. **Appendix C**

This report examines costs associated with water replacement (via import) and water treatment. It provides general costs for water treatment and does not address the potential future need for water treatment on a well-specific basis. As noted in their recommendation section
"*The estimated present cost to the BWD for the importation of an acre-foot of water is show in Table A and ranges from $1,213 to $1,340 per acre-foot. The estimated cost range depends on the Pipeline alignment selected and includes estimates of the pipeline construction, O&M, power, wheeling fee, and initial MWD [ed: Metropolitan Water District, the agency assumed to provide the water] water cost. For budgeting purposes, a value of $1,340 per acre-foot should be used as the current estimated cost to import water to the BVGB.*

The estimated cost to the BWD for the treatment of groundwater due to potential degradation from groundwater overdraft is more difficult to estimate due to unknowns associated with amount of groundwater to be treated, the type and size of treatment facilities, and the amount of O&M cost associated with the selected treatment method. Future groundwater chemistry studies and continued groundwater quality monitoring will help determine the most economical method for groundwater treatment, if needed, as well as the number of systems and Potential infrastructure associated with multiple treatment systems, if required."

"The BVGB currently has some wells that have tested near or above the arsenic MCL, but need for future treatment for these wells cannot be determined. It is likely that with declining groundwater levels, arsenic MCL levels will increase in some wells, but blending with other wells could make treatment unnecessary." …" For budgeting purposes, a conservative value of $548 per acre-foot should be used as the current estimated cost to the BWD to treat arsenic in the BVGB including O&M costs."

Raftelis Financial Consultants (RFC) 3/28/2016. Borrego Water District Water and Wastewater Rate Study Report. Prepared for BWD. **Appendix D.**

This report was conducted "*to develop a financial plan as well as design water and wastewater rates for the District over the next five years*", for fiscal years 2017 to 2021. Tier 1 provides up to 7 units (1 unit = 100 ft^3, or 748 gallons), and Tier 2 is water provided in excess of 7 units. As noted (Section 1.2) "*The current water rate structure of the District consists of two main components: a monthly service charge and a water usage rate or commodity charge. The service charge varies based on meter size whereas the water usage rate is a uniform rate for all customers.*" It also includes cost-of-service analyses for the water and wastewater utility based on recent historical usage and works to develop fair and equitable water and wastewater rates.

Because BWD's water supply does not currently require water treatment to meet drinking water MCLs, water rates do not include any current or future costs for BWD water treatment system operation or maintenance.

Raftelis Financial Consultants (RFC) 11/17/2016. Borrego Water District County Zoning and SGMA Impact Assessment. Prepared for BWD. **Appendix E.**

Included in this report are estimates of the cost of water that BWD will need to obtain in excess of their BPA, in part to accommodate future growth and development of vacant land parcels within BWD's service area. As stated "*The objective of our evaluation is to estimate the financial impact to the District of providing water service to unbuilt parcels while simultaneously achieving the long term sustainability targets of SGMA. To estimate these impacts RFC has incorporated assumptions from our previous work regarding revenues and expenses, total service connections, water demand, account growth, capital planning, and so on*."

RFC evaluated two future use scenarios. The first is based on no population growth and the second assumes build-out by 2050. Both scenarios examined BWD operating costs, capital improvement plan costs, water revenues, operating reserves, and overall costs. Based on their analysis, RFC projected future water rates under two scenarios.

- Residential demand per equivalent dwelling unit (EDU) is estimated to be 0.4 AFY, equivalent to an average of 14.5 units (hcf) per month per EDU.

- "*Total water demanded at buildout due to growth from existing county zoning is estimated at 2,725 AFY. Existing demand is less than 1,700 AFY on average*" (Section 2.1). Baseline demand was refined to be 1741 AFY.

- Under SGMA, BWD's water allocation at the end of the GSP compliance period was calculated to be 522 AFY (a 70% reduction from the 1741 AFY baseline).

- Water trading cost are estimated based on market values observed in 2016 for developer credits and private market rates. Here the present and future value of the credits need to be considered in the context of SGMA-mandated water use reductions where four AF of current water production are required to secure one AF of production at the end of the GSP compliance period. As explained by RFC (page 5) "*The District has identified several valuations for water costs. Most notably are the costs associated with the developer water credit program and valuation by Dudek. The existing water credit cost is $3,600 per AF. Production credits are valued at a 4:1 ratio to developer credits meaning four water credits must be acquired and retired to produce one acre foot of water. This represents a value of $14,400 per AF. Recent private market activity in the basin has put the cost of water at approximately $8,000 per AF. Table 2-5 summarizes the several water valuation options. For the purposes of our analysis we use the current market value to show our impacts in the next section as middle-of-the-road scenarios*."

  Future water costs will be determined as the water trading market develops under the GSP. For this report RFC assumed a cost of $8,000/AF.

- Scenario 1 (no growth) requires the purchase of 1097 AF at a cost of ~$13mm. In this case they estimated "*that the unit rate in 2040 will approach $9.00/hcf from the current*

$3.28/hcf for the uniform non-residential rate". Note that is an inflation-adjusted rate and presented in 2040 dollars.

- Scenario 2 (buildout) requires the purchase of 2221 AF at a cost of ~$30mm. For this scenario they estimated "*that the unit rate in 2040 will exceed $9.00/hcf from the current $3.28/hcf for the uniform non-residential rate. If extended to the year 2050 (buildout) the unit rate is estimated at $11.98/hcf for the uniform non-residential rate*". Note, as before, that is an inflation-adjusted rate.

  An annual ~5.5% rate of increase over 20 years (compounded annually) is required for rates to go from $3.28 to $9.00.

- For reference, the current BWD uniform non-residential rate is $3.77/hcf and includes a $0.29 groundwater management fee not contemplated in the RFC report (from the BWD website www.bvgsp.org rate sheet dated August 2018).

Raftelis Financial Consultants (RFC) 10/14/2017. Borrego Water District Water Rates Affordability Assessment. Prepared for BWD. **Appendix F.**

BWD engaged RFC to examine the affordability of their customer's water rates. As noted in their introduction "*To assess affordability Raftelis relies upon direction from longstanding EPA guidance on affordability, the United States Conference of Mayors, and research by affordability experts. The assessment herein analyzes both existing rates and affordability and projected future rates and affordability under the SGMA Compliance water supply scenario identified in our Memorandum titled "County Zoning and SGMA Impact Assessment" dated November 18, 2016. The affordability assessment relies upon the amended Water Financial and Rate Model created for the SGMA Impact Assessment and corresponding demand projections, basin yield assumptions, financing assumptions, and projected rates to the year 2040.*

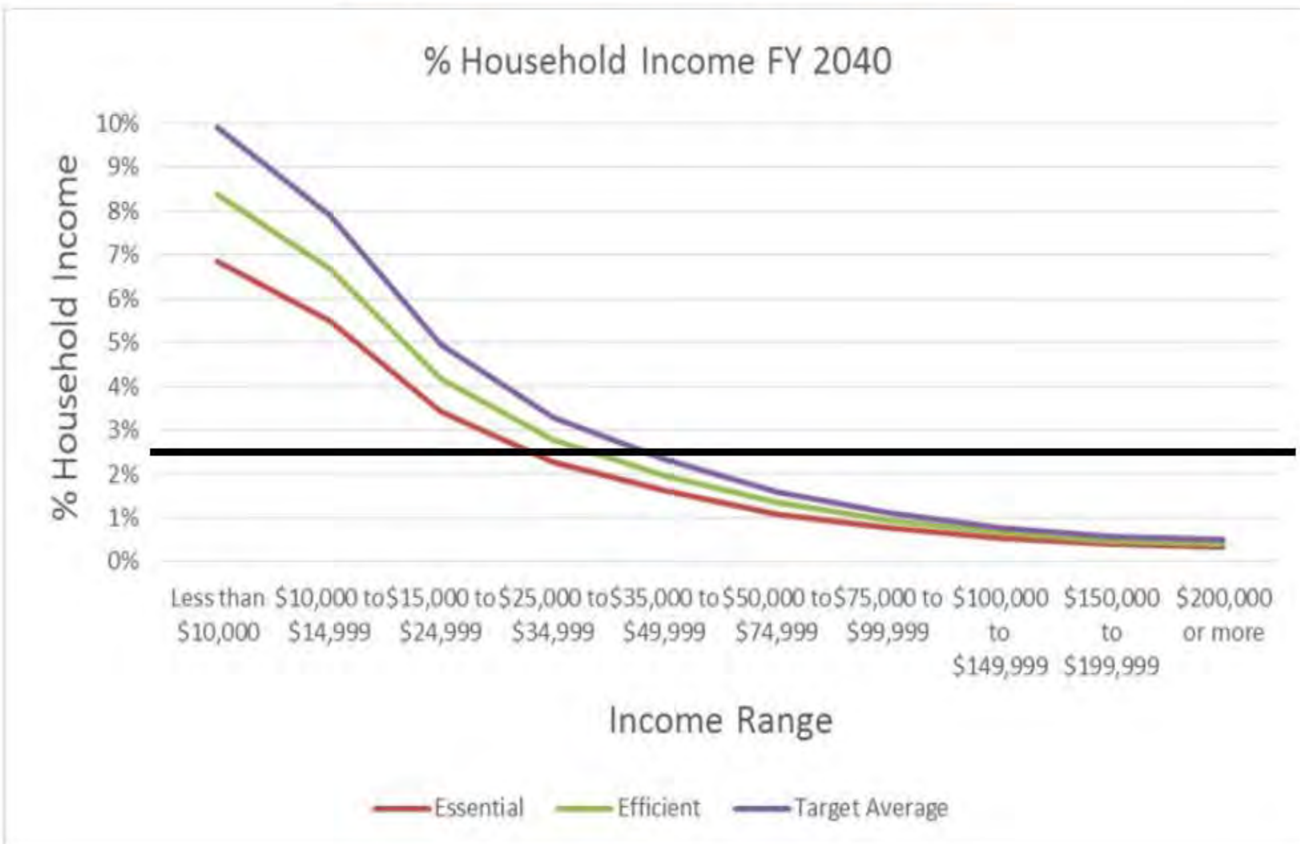
The intention is for the District to be able to understand the affordability of existing rates and water allocation and to estimate the affordability impacts of SGMA compliance in the Borrego Groundwater Basin over the long term."

RFC's report makes numerous assumptions to develop their Financial Plan and Rate Model and affordability analysis for BWD. While they expanded on their prior 11/17/2016 report, the 10/14/2017 analysis is limited to the 'no growth' Scenario 1 and does not allow for the cost impact of additional water demand associated with future build-out of undeveloped parcels.

Water costs are an increasingly significant portion of household income over the 20-year GSP period. RFC's Figure 3-2, copied below as **Figure 2**, compares the cost of water versus household income for three levels of water use- essential (7 hcf/month), efficient (11 hcf/month), and a target average (15 hcf/mo) based on average winter-time residential demand during the 2015-2016 winter time. A 2.5% threshold is indicated based on US EPA guidelines cited in their report.

FIGURE 2 Water Affordability versus Household Income
(from RFC 10/14/2017; **Appendix F**)

Figure 3-2: Percent Household Income, FY 2040



This affordability analysis is used in **Section 3.4** and combined with additional information specific to the Severely Disadvantaged Community of Borrego Springs to assess the impacts of water costs to the SDAC. Of note is that 49% of those who responded to the Borrego Municipal User Survey indicated an annual income of $36,000 or less (LDC, 2019[9]). In other words, nearly half of all of Borrego Springs' households will incur water costs that are well above the threshold indicated by **Figure 2** (RFC Figure 3-2; refer to the left half of the chart).

[9] Page 8, of reference 7.

Dudek 3/29/2018. Policy for Human Right to Water. BWD Board presentation (in Microsoft PowerPoint, with notes). **Appendix G.**

A factor that has become increasingly important to BWD's water management is the establishment of a 'human right to water' by the State of California (Water Code, section 106.3). It reads as follows[10]:

"*DIVISION 1. GENERAL STATE POWERS OVER WATER [100 - 540]*
CHAPTER 1. General State Policy [100 - 113]

106.3.

(a) It is hereby declared to be the established policy of the state that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes.
(b) All relevant state agencies, including the department, the state board, and the State Department of Public Health, shall consider this state policy when revising, adopting, or establishing policies, regulations, and grant criteria when those policies, regulations, and criteria are pertinent to the uses of water described in this section.
(c) This section does not expand any obligation of the state to provide water or to require the expenditure of additional resources to develop water infrastructure beyond the obligations that may exist pursuant to subdivision (b).
(d) This section shall not apply to water supplies for new development.
(e) The implementation of this section shall not infringe on the rights or responsibilities of any public water system."

As noted by Dudek, the BWD needs to consider how state actions (such as SGMA) impact the human right to water. The current consideration and potential action taken by BWD include:

- Exemption of a portion of historical domestic pumping to protect basic water needs from the SGMA-mandated water use reductions. Indoor water use data were used to develop a baseline water use of 57.3 gallons per day per person. 2,730 residential consumers (households or 'dwelling units') were considered eligible with an average of 2.2 residents per dwelling. A total water demand of 385 AFY was determined to be eligible for protection (126 gpd/EDU * 2,730 EDUs [EDU = equivalent dwelling unit]).

- Adopt a multi-tier rate structure for residential customer where the first tier (lowest cost) allows for baseline water use.

- Determine if the baseline rate is applicable to the desert community (See further discussion in **Section 3.3**.)

[10] Source: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=106.3

SquarMilnar 1/11/2019. Borrego Water District Financial Statements June 30, 2018 and 2017 Prepared for BWD by an independent auditor. **Appendix H.**

BWD's financial statement is included for general reference. One of SGMA's greatest future impacts will be on the cost of water that BWD will need to obtain from water trading. Historically BWD has not paid for the right to pump groundwater. In very rough terms, net revenue in 2018 for providing approximately 1600 AFY to their 2,125 residential, commercial, institutional, and irrigation customers was approximately $1.4 mm (revenue – operations cost, neglecting general and administrative expenses), roughly $875/AF. As noted in RFC's 3/28/2016, water rates will need to increase to provide funding to obtain water under the water trading program currently described in the Draft GSP.

OVERVIEW OF THE FINANCIAL STATEMENTS (continued)

Analysis of Revenues and Expenses

The Water District's Revenues, Expenses and Changes in Net Position for the fiscal years ended June 30, 2018 and 2017:

Borrego Water District's Revenues, Expenses and Changes in Net Position

			Variance	
	2018	**2017**	**$**	**%**
OPERATING REVENUES				
Water revenue	$ 3,435,123	$ 3,138,560	$ 296,563	9.45%
Sewer service charges	606,802	556,412	50,390	9.06%
Availability charges	243,957	247,815	(3,858)	-1.56%
Other income	500	1,019	(519)	-50.93%
Total operating revenues	4,286,382	3,943,806	342,576	8.69%
OPERATING EXPENSES				
Water operations	2,067,004	1,995,965	71,039	3.56%
Sewer operations	573,203	468,838	104,365	22.26%
General and administrative	708,764	367,028	341,736	93.11%
Total operating expenses	3,348,971	2,831,831	517,140	18.26%
INCOME FROM OPERATIONS	937,411	1,111,975	(174,564)	-15.70%
NON OPERATING EXPENSES, NET	(116,755)	(87,001)	(29,754)	34.20%
INCOME BEFORE CONTRIBUTIONS AND IMPAIRMENTS	820,656	1,024,974	(204,318)	-19.93%
LOSS ON DISPOSALS	(132,087)	-	(132,087)	0.00%
CHANGE IN NET POSITION	688,569	1,024,974	(336,405)	-32.82%
TOTAL NET POSITION, BEGINNING	14,128,331	13,103,357	1,024,974	7.82%
TOTAL NET POSITION, ENDING	$ 14,816,900	$ 14,128,331	$ 688,569	4.87%

A discussion of the significant variances of the Borrego Water District's Revenues and Expenses are presented below.

- Slight increase in revenue due to rate increases enacted in August 2018.
- Increase in the cost of providing water and sewer service, primarily due to better allocation of overhead and increases in salaries.
- General and Administrative expense increased due primarily to increases in maintenance and repairs, ground water management, and employee benefits expenses.

Page 6

3.2 BWD Potable Water System

As described by BWD in the preface to their 2018 Financial Statement: "*The District has 9 active municipal production wells connected to 90 miles of distribution lines to serve its approximately 2,125 residential, commercial, institutional, and irrigation customers. The District also provides sewer and wastewater treatment services to approximately 830 customers located primarily in the Town Center, Club Circle and Rams Hill development. The estimated replacement cost value of the District's water, sewer and wastewater treatment facility infrastructure is approximately $62,500,000*." The well locations are shown in **Figure 3**. **Table 1** provides a summary of the well characteristics from ENSI 4/16/2019:

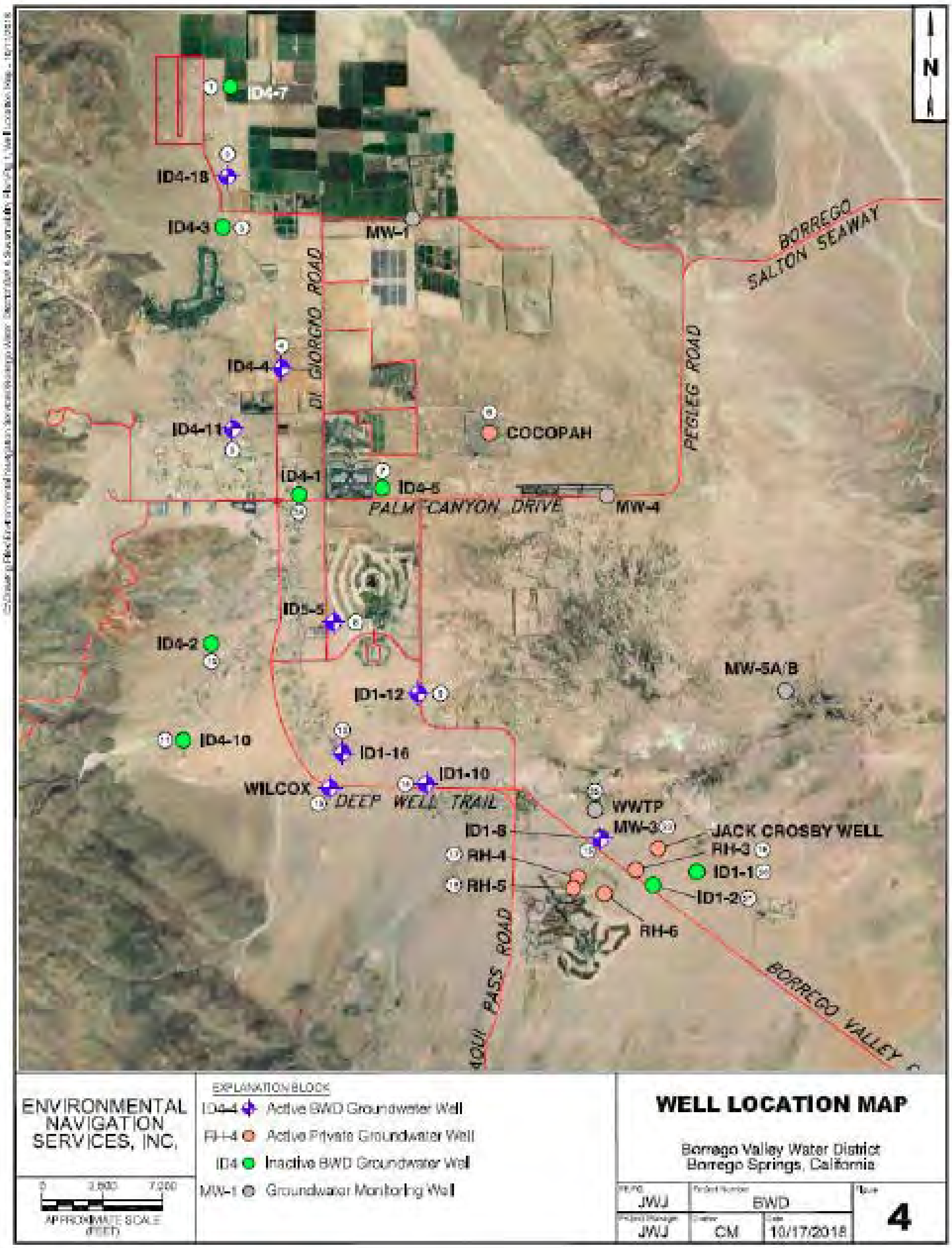
TABLE 1. BWD Water Production Wells

Plot ID	Area	Well Name	GSA GWM Well	Year Inst.	gpm	Static Water Level (ft)	Draw Down (ft)	gpm/ft ***	Plant Eff.****	Well Depth (ft)	Sampling Period	
											start	end
4	North	ID4-4*	Yes	1979**	365	205.4	63.5	6	71	802	1954**	2017
5		ID4-11	Yes	1995	620	223.2	5.8	107	73	770	1995	2017
2		ID4-18*	Yes	1982	130	311.2	7.6	17	50	570	1984	2017
14	Central	ID1-10*	Yes	1972	317	213.9	11.5	28	54	392	1972	2017
9		ID1-12	No	1984	890	145.5	10.4	86	72	580	1988	2018
12		ID1-16	Yes	1989	848	230.9	24.3	35	71	550	1993	2016
8		ID5-5	Yes	2000	542	182.1	16.1	34	62	700	2004	2016
13		Wilcox	Yes	1981	205	305.2	5.8	35	NA	502	2000	2017
15	South	ID1-8	Yes	1972	448	71.2	47.7	9	51	830	1972	2018

Notes: Data from 2018 Pump Check Results (in Dudek New Wellsite Feasibility Report, in process)
*, wells being considered for replacement (3)
**, ID4-4 was redrilled in 1979.
***, gpm/ft calculated from Pump Check data
****, Plant Efficiency from Pump Check, in percent. Values less than 60% are viewed to be of concern.

The sampling period refers to the time period when water quality data are available for the general minerals analysis included in the long-term water quality review and assessment (ENSI 4/16/2019).

FIGURE 3. BWD Well Locations



The well descriptions are also summarized in the Draft GSP (Section 3.3.1.1) in the context of which wells will be used to establish water level-dependent minimum thresholds "*to ensure the several aquifers in the Subbasin are not depleted in a manner to cause significant and unreasonable impacts to other sustainability indicators*".

"*Minimum thresholds are not considered applicable for wells that require replacement, or are not relied upon for a significant source of supply. These wells are as follows:*

(1) Well ID1-10 well is planned for replacement in 2019;

(2) the Wilcox well is an emergency back-up well with no power supply (diesel generator only);

(3) ID1-16 will continue to be used but is planned to be replaced during the GSP implementation period;

(4) ID4-18 is proposed for replacement in the future; and,

(5) ID1-8 is seldom used by the district, and is not anticipated to continue to serve BWD customers over the entire SGMA implementation period.

Although the aforementioned wells are not key municipal wells and thus do not have an accompanying minimum threshold, they are included in Table 3-4 for informational purposes. Table 3-4 also lists the year drilled, well depth, blank casing intervals and a recent static depth to groundwater, GWE, aquifers screened, and management area for the BWD wells."

Table 2, Table 3-4 from the Draft GSP, follows.

Table 2. BWD Well Summary (Table 3-4 of the Draft GSP)

Table 3-4

Borrego Water District Well Screened Intervals and Key Municipal Well Minimum Thresholds

Well	Year Drilled	Well Depth (feet)	Screen Intervals (feet; bgs)	Minimum Threshold / Top of Well Screen (feet; bgs)	Depth to Groundwater (feet; bgs)*	Groundwater Elevation (feet MSL)*	Aquifer	Management Area	Existing Minimum Threshold Exceedance
Improvement District (ID) No. 1									
ID1-8	1972	830	72–240 260–830	72	77.76	448.93	Middle/ Lower	SMA	N/A
ID1-10	1972	392	162–372	N/A	204.2	390.94	Middle	CMA	N/A
ID1-12	1984	580	248–568	248	146.14	387.06	Middle/ Lower	CMA	No
ID1-16	1989	550	160–540	N/A	231.77	388.38	Middle/ Lower	CMA	N/A
Wilcox	1981	502	252–502	N/A	309.78	392.35	Lower	CMA	N/A
Improvement District (ID) No. 4									
ID4-4	1979	802	470–500 532–570 586–786	470	290.88	307.23	Middle/ Lower	NMA	No
ID4-11	1995	770	450–750	450	223.2	390.52	Middle/ Lower	NMA/CMA	No
ID4-18	1982	570	240–300 310–385 395–405 425–440 460–475 490–560	N/A	315.31	375.65	Upper/ Middle	NMA	N/A
Improvement District (ID) No. 5									
ID5-5	2000	700	400–700	400	182.1	394.7	Middle/ Lower	CMA	No

Notes: bgs = below ground surface; MSL = above mean sea level; SMA = South Management Area; N/A = not applicable; CMA = Central Management Area; NMA = North Management Area.
* Fall 2018 measured value, except ID4-11 and Wilcox, which are Spring 2018 measurements (due to active pumping or lack of access at time of Fall 2018 visit).

Note: Well ID4-4 is scheduled to be replaced in 2019.

3.3 BWD Water Rates and Rate Structure

BWD revised their water rates in July 2018, effective August 2018 (tabulated in **Figure 4**). A two tier rate structure is currently in use. Tier 1 follows from the existing State of California efficiency target of 55 gallons per person per day (gpcd) for indoor use (see California Water Code Section 10608.20[11]). In this case it is based on 3 persons per household. 7 hcf (5,236 gallons at 748 gallons/hcf) equates to 172 gpd, approximately 57.4 gpd per person versus the 55 gpd efficiency target.

FIGURE 4. BWD Water and Sewer Rates

Borrego Water District
Rates effective August, 2018 Billing

Building a Home? Ask us about water Credits for sale.

WATER RATES (per unit [1])	Tier 1 Up to 7 units	Tier 2 Above 7 units
Water	$2.48	$2.75
Power	$0.79	$0.86
Groundwater Management	$0.29	$0.31
Total per HCF	**$3.56**	**$3.92**

NON-RESIDENTIAL	
Water	$2.69
Power	$0.79
Groundwater Management	$0.29
Total per HCF	**$3.77**

MONTHLY READY TO SERVE CHARGE	
¾"	$39.21
1"	$50.87
1 ½"	$80.01
2"	$114.97
3"	$208.22
4"	$313.14
6"	$604.54

MONTHLY SEWER FEES	SA 1	SA 5
Monthly Charge	$41.94	$48.78
SA 2 Town Center Sewer: Monthly EDU Holder fee $26.78; Monthly EDU User Fee $22.00		

NEW SEWER CONNECTION	SA 1	SA 5
Hookup	$200	$3,500
Inspection	$50 per EDU	
EDU Price $3,040	Capacity Fee $712.80 per EDU	Inspection Fee $50 per EDU
(Call for a list of EDU's for sale by private sellers)		

NEW METER INSTALLATION			
SA 1		SA 5	
3/4"	$ 795	3/4"	$ 7,651
1"	$ 930	1"	$ 7,745
1 1/2"	$ 1,088	1 1/2"	$ 7,823
(SA 3 & ID4)			
¾" short lat.	$ 5,516	¾" long lat.	$ 6,876
1" short lat.	$ 7,460	1" long lat.	$ 8,820
1 1/2"	$10,071	1 1/2"	$11,290

WATER CREDITS	
County and BWD Approved Credit	$3,600

CONSTRUCTION METER RENTAL	
Deposit	$1,200
Meter Installation or Relocation	$25.00
Monthly Meter Charge	$119.93
Water Rate	$8.73 per 100 cubic feet

BULK WATER	
1 unit (748 gallons)	$11.70
<2000 gal truck	$34.44 per load
2000+ gal truck	$45.39 per load
4000 gal truck	$83 per load

SA 5 CSD Annual Stand-by Fees (Club Circle & Borrego Springs Resort only)	
Individual lot - Water fee	$10/ lot
Individual lot - Sewer fee	$5 / lot
Acreage - Water fee	$10 / acre
Acreage - Sewer Fee	$5 / acre
SA 5 Trash pick-up charge	
Club Circle Homes/Condos/ Other homes (Ace, Back Nine, Foursome Drive)	$17.52

LATE & MISC. FEES	
New Account / Transfer Fee	$10.00
Turn-on / reconnect fee (new and	$340
Late fee	10% or $15, whichever is greater
NSF Fee (Ach or Check)	$25.00
48 Hour Notice/Red Tag	$10.00
Lock/Unlock Meter	$25.00
After Hours Turn On/Off service	$50.00
Backflow Inspections	$50.00
Will Serve/Water Availability	$25.00
Reinstalling a pulled Meter	**Same as New**

[1] **One Unit equals 748 gallons of water**

August 2018

BWD continues to actively work to assess water use and to evaluate how to best structure water costs for the SDA Community (Lyle Brecht, personal communication, April 2019). Under consideration is whether the per capita indoor water use rates are realistic for the desert community.

[11] DIVISION 6. CONSERVATION, DEVELOPMENT, AND UTILIZATION OF STATE WATER RESOURCES [10000 - 12999]
PART 2.55. SUSTAINABLE WATER USE AND DEMAND REDUCTION [10608 - 10609.42]
CHAPTER 3. Urban Retail Water Suppliers [10608.16 - 10608.44]

For example, evaporative cooling systems are commonly used for homes and businesses. These are typically roof-mounted units that rely on the continuous flow of air and water over wet pads to cool indoor air. Water consumption rates are potentially large compared to baseline indoor water use. A 2012 study conducted by Lawrence Berkeley Lab[12] examined world-wide use of evaporative cooling systems and estimated use to be 300 to 500 Liters/day (section 3.2.1 of their study). In terms of water units used for BWD customers, this is equivalent to approximately 3 to 5 hcf/month (see Table, below). BWD's current Tier 1 allows up to 7 hcf/month, indicating that evaporative cooling is a significant portion of household water use in a desert community.

The state law does recognize that evaporative cooling may be eligible for a variance as noted in the legislation[13]. This may be especially important to the lower income portion of the SDAC as they are more likely to rely on evaporative cooling because of lower system installation and operation costs versus conventional air conditioning.

Table 3. Water Consumption Rates for Evaporative Cooling

L/day	gpd	hcf/day	hcf/mo
300	79.25	0.11	3.18
500	132.09	0.18	5.30
	3.78 L/g	748 g/hcf	30 day

BWD's use of tiered water rates is constrained by the State of California's Proposition 218. California constitution Article 13D sec (6) states that:

"1. A property-related charge (such as water rates) imposed by a public agency on a parcel shall not exceed the funds required to provide the property related service.
2. Revenues derived by the charge shall not be used for any other purpose other than that for which the charge was imposed.
3. The amount of the charge imposed upon any parcel shall not exceed the proportional cost of service attributable to the parcel.
4. No charge may be imposed for a service unless that service is actually used or immediately available to the owner of property.
5. A written notice of the proposed charge shall be mailed to the record owner of each parcel at least 45 days prior to the public hearing, when the agency considers all written protests against the charge."

[12] Addressing Water Consumption of Evaporative Coolers with Greywater. By Rashmi Sahai, Nihar Shah, Amol Phadke, Environmental Energy Technologies Division, International Energy Studies Group, Ernest Orlando Lawrence Berkeley National Laboratory. Dated July 1, 2012.
Online at: https://ies.lbl.gov/sites/default/files/lbnl-5532e.pdf

[13] See 10609.14. (a) "The department, in coordination with the board, shall conduct necessary studies and investigations and, no later than October 1, 2021, recommend for adoption by the board in accordance with this chapter appropriate variances for unique uses that can have a material effect on an urban retail water supplier's urban water use objective.
(b) Appropriate variances may include, but are not limited to, allowances for the following:
(1) Significant use of evaporative coolers."
See: http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB1668

In conjunction with Proposition 218, Article X (2) of the State Constitution establishes the need to preserve the State's water supplies and to discourage the wasteful or unreasonable use of water by encouraging conservation. In addition, Section 106 of the Water Code declares that the highest priority use of water is for domestic purposes, with irrigation secondary. In connection with meeting the objectives of Article X, Water Code Sections 370 (AB2882) and 375 authorize a water purveyor to utilize its water rate design to incentivize the efficient use of water. Although incentives to conserve water could be provided by implementing a higher rate as consumption increases, a nexus between the rates and cost incurred to provide the water must be developed in order to achieve compliance with Proposition 218.

Lastly, because BWD serves a SDAC located within an EDA, there is an unrealized potential for SGMA- and SDAC-related grants and other publicly-funded support to subsidize future water costs. For example, in November, 2018, California Proposition 3 was on the ballot. It included provisions for $35,000,000 in grants to Borrego Springs for the purposes related to retiring water usage, improving water end-use efficiency, restoration, conservation and recharge enhancement. The Proposition was unsuccessful but it did frame two key points in the justification. First, Borrego Springs is a key part of the utilization experience for the Anza-Borrego Desert State Park. As such, there is a public good that goes beyond the economic benefits to local residents. The supply and convenience of services and lodging would be difficult to substitute. An investment by the public, in the form of grants, may be partially or completely justifiable in this framework. Second, this is a SDAC community and there should be considerations as to the disproportionate impacts of State-mandated water use reduction to Borrego Springs as compared with other parts of the State.

3.4 Affordability: Recognizing that Borrego Springs is a SDAC within an EDA

Borrego Springs is a census-designated location with a largely rural/ semi-rural population of 2,328 (2016). Because it is surrounded by the Anza-Borrego State Park, the greatest natural resource is the proximity to natural desert environment. The local characteristics of clean air, dark night skies, underground water supply, scenic mountain vistas, natural flora and fauna are considered vital to the future of Borrego Springs. As previously noted, the community is classified by DWR as being severely disadvantaged (SDAC) and located within an economically distressed area (EDA). The basic economic characteristics of Borrego Springs (2018)[14]:

Population: 3,676 Fulltime; Estimated to approximately double during Winter-time
(Seasonal population estimates are subject to uncertainty)
Median Household Income: $46,866
Average Household Income: $65,217
Per capita Income: $29,800

The median income is approximately 65% of San Diego County's median income of $71,886. This puts the majority of the households below the limits for designation as low income or lower under the California Department of Housing and Community Development[15].

Raftelis (RFC) conducted a Water Rates Affordability Assessment for BWD, dated 10/14/2017 (**Appendix D**). Future increases in water rates are of high concern to Borrego springs residents s emphasized by the results of a 2018 Municipal User Survey[16]. The results of both reports are combined here to further illustrate the impact of water rate increases that will be caused increased water costs under SGMA. **Figure 5**, shows the population by income, compared to the affordability assessment that shows the percent of household income necessary to pay their water bill in 2018, and projected to 2040. The 2040 projected incomes are in 2018 dollars and RFC's financial scenario assumes no population growth. The comparison indicates

- 51% of 'water efficient' households currently pay at least two percent of income- a threshold described as significant. When the analysis includes those using water at the target average, 67% of households exceed the two percent criterion percentage.

- Projections of water cost in 2040 are similar, with the percentages of income increasing by 0.1 to 0.4 percent for the low-income households. Future water costs are based on a no growth scenario. In general, water rates under a growth scenario (RFC 11/17/2016) are slightly increased and are managed by how water transfer costs are financed over time.

[14] Census demographic data updated July 1, 2018 by ESRI Demographics.
[15] State Income Limits for 2016, Department of Housing and Community Development, Division of Housing Policy Development, May 24, 2016.
[16] Borrego Springs Community Characteristics Report. Drafted as part of the California Proposition 1 Groundwater Sustainability Plan planning process for the Borrego Water District by LeSar Development Consultants (LDC).

FIGURE 5. Comparison of Borrego Springs Population with Income-based Affordability Assessment

2018

% pop	11 hcf	Income Range	Essential 7 hcf	Efficient 11 hcf	Target Average 15 hcf
36	8.0	Less than $10,000	6.5%	8.0%	9.6%
	6.4	$10,000 to $14,999	5.2%	6.4%	7.7%
	4.0	$15,000 to $24,999	3.2%	4.0%	4.8%
15	2.7	$25,000 to $34,999	2.2%	2.7%	3.2%
16	1.9	$35,000 to $49,999	1.5%	1.9%	2.3%
19	1.6	$50,000 to $74,999	1.0%	1.3%	1.5%
9	0.90	$75,000 to $99,999	0.7%	0.9%	1.1%
3	0.60	$100,000 to $149,999	0.5%	0.6%	0.8%
	0.50	$150,000 to $199,999	0.4%	0.5%	0.5%
	0.40	$200,000 or more	0.3%	0.4%	0.5%
(1,111 households)					
		Median income (dollars)	2.0%	2.5%	3.0%
		20th Percentile	3.8%	4.7%	5.6%
		Poverty Level (3 person household)	3.2%	3.9%	4.7%

2040

% pop	11 hcf	Income Range	Essential 7 hcf	Efficient 11 hcf	Target Average 15 hcf
36	0.4	Less than $10,000	6.9%	8.4%	9.9%
	0.3	$10,000 to $14,999	5.5%	6.7%	7.9%
	0.2	$15,000 to $24,999	3.4%	4.2%	4.9%
15	0.1	$25,000 to $34,999	2.3%	2.8%	3.3%
16	0.1	$35,000 to $49,999	1.6%	2.0%	2.3%
19	-0.3	$50,000 to $74,999	1.1%	1.3%	1.6%
9	0.1	$75,000 to $99,999	0.8%	1.0%	1.1%
3	0.1	$100,000 to $149,999	0.5%	0.7%	0.8%
	0.0	$150,000 to $199,999	0.4%	0.5%	0.6%
	0.0	$200,000 or more	0.3%	0.4%	0.5%
	(vs 2018)				
(1,111 households)					
		Median income (dollars)	2.2%	2.7%	3.1%
		20th Percentile	4.0%	4.9%	5.8%
		Poverty Level (3 person household)	3.4%	4.1%	4.8%

Base Analysis from RFC (10/14/2017) (**Appendix F**)

3.5 Anticipated SGMA Costs

The Draft GSP has been preceded by numerous studies and work done by and for the BWD. A summary presented to the BWD Board by Director Lyle Brecht dated 3/28/2019 follows on the next page. The summary shows the many components involved in the establishment of a sustainable groundwater management program under SGMA. SGMA is currently envisioned to be administered by the Groundwater Sustainability Agency that includes BWD and the County of San Diego.

The Draft GSP provides a detailed summary of administrative costs that are anticipated to be incurred to implement the GSP. As stated in Section 1.3.3 of the draft GSP:
"*Annual implementation costs may vary from year to year as a result of the status of project and management actions (PMAs), significance of new data, and increased milestone reporting requirements every fifth year of implementation. However, the estimated GSP implementation cost for the anticipated 20-year implementation period for operations and monitoring, management, administration and other costs, 5-year annual reviews and 10% contingency is approximately $19,200,000. Estimated total GSP implementation costs assumes the following general components:*

- *Data collection, management and evaluation*
- *Annual reporting*
- *5-Year review assessment and reporting*
- *Data gap analysis and additional evaluation (e.g., Coyote creek boundary condition analysis, etc.)*
- *PMAs development and implementation of components as funding allows*
- *Management, administration and other costs*
- *10% contingency assumed over 20-year plan implementation period*

In addition to the $19,200,000 required for 20-Year GSP implementation costs, an additional $652,000 is estimated to be required for PMA development costs. In addition, $500,000 has been budgeted for preparation of the Environmental Impact Report (EIR) for GSP Plan Implementation. Budget for the EIR has been secured though funding provided by Proposition 1 Severely Disadvantaged Community grant. Thus, the current total estimated GSP implementation cost is $20,352,000 including a contingency of $1,745,000. It is emphasized that this estimate does not include the implementation of all PMAs or final costs incurred by BWD for internal management and administration.

Additional budget will be required to implement PMAs once they have been developed. Implementation of PMAs such as the water conservation program will be highly dependent upon securing funding such as through state or federal grants. Additional information on GSP implementation costs, and how the GSA plans to fund these costs, is provided in Chapter 5. In general, the GSA plans to fund GSP implementation using a combination of groundwater extraction charges, including monthly fixed charges and variable pumping fees, assessments/parcel taxes, and/or grants. Potential funding sources specific to PMAs are presented in Chapter 4."

ECONOMICS OF SGMA

GSP-related Development Costs for the Borrego Springs Subbasin of the BVGB

Item	Cost
Basin Studies - Federal & State grants to District between 1/1/2010 - 1/1/2015	$2,000,000
Basin Studies - paid for by District ratepayers between 1/1/2010 - 1/1/2015	$1,000,000
DWR Grants for Borrego Water Coalition (BWC) work between 1/1/2013 - 1/1/2015	$150,000
District costs for BWC work 1/1/2013 - 1/1/2015	$80,000
BWC Pumper's contributions 1/1/2013 - 1/1/2015	$50,000
DWR Grants to District for CCP GSP development facilitation through 6/30/2018	$120,000
DWR 2017 Grant to County for Borrego Basin GSA formation	$60,000
DWR Prop 1 Grant to County for GSP CEQA work	$500,000
DWR Prop 1 Grant to District for GSP SDAC work	$500,000
District unreimbursed GSP development costs 1/1/2015 - 3/30/2019	$500,000
DWR Prop 1 Grant reimbursing County for GSP development costs from 4/4/2017	$1,475,000
Program & Management Actions (PMAs) estimated development costs	$641,665
TOTAL Actual & Estimated GSP-Related Development Costs	$7,076,665

All of the above costs were necessary for establishing a SGMA-compliant GSP:

- Basin characteristics
- Hydrology and economics of water supply from outside the Basin
- Developing pumper recommendations for meeting SGMA objectives
- Developing a groundwater resource management plan under SGMA that can be implemented

Not included in these GSP-related development costs:

- Estimated $19M GSP regulatory implementation costs through 2040 for *no undesirable results*
- *Cost of water rights/pumping allocation transfers from one sector to another*
- Any legal costs necessary for GSP-related defense

Community *economic risks* of not meeting SGMA-related objectives by 2040:

- Loss of assessed property values (municipal water users' present value ~$300,000,000).
- Loss of annual revenue to region (Anza-Borrego Desert State Park visitors spend ~$40M annually)

Business risks to the District as GSA from improper GSP:

- PV cost of municipal well abandonment and/or advanced water treatment (worst case $10~$40M)

DRAFT March 28, 2019— Developed by Director Lyle Brecht

3.5.1 Water Costs (Water Trading)

A market-based water trading system is being proposed, per the Draft GSP, as the primary mechanism for water transfers among water use sectors and for individual groundwater pumpers seeking to obtain water in exceed of their Baseline Pumping Allocation (BPA). RFC's 11/17/2016 report (**Appendix E**), as summarized in Section 3.1.2 of this Report, used a mid-range estimate of $8,000/AF and described a higher end of $14,400/AF. These costs are estimates of what is required to secure the ability to pump water in perpetuity, so annual costs to BWD will depend on how the costs are financed as further explained in RFC's report.

Similarly, costs to obtain water above their BPAs for the agricultural and recreational sectors will depend on the costs to trade for water within the overall 5,700 AFY cap that is currently being proposed in the GSP. A BPA of 4 AFY will decrease to ~ 1AFY at the end of the 20-year SGMA compliance period so there will be some time for the community to adapt to the water use reductions and for the water trading market to be established.

Overall, RFC's affordability analysis summarized in **Section 3.4** supports that BWD's costs will increase due to water transfers, but that the costs are potentially manageable given sufficient planning. Refer to RFC's analyses for details of how they incorporated water transfer costs into BWD's financial and rate model.

3.6 Potential Future Water Supply Costs and Impacts

A key assumption related to RFC's financial and rate model is that water treatment will not be required. Going forward as noted by BWD's General Manager in the preface to the SquarMilner Financial Statement (**Appendix I**) "… *The primary driver for the long-term financial viability of the District, as well as the economy of the Valley is the overdraft's impact on water quality (see section on Groundwater Supply, Usage & Availability above). In order to accomplish this objective, the District needs to maintain financial stability and a good credit standing with the bond markets in order to accommodate raising new debt. ….*" (ed: emphasis added)

The focus of this Report is on BWD's supply wells and not the supporting infrastructure or financial planning. In basic terms BWD's ability to produce drinking water for the community depends on wells that will continue to produce sufficient quantities of potable water. This section of the Report addresses water quality and well production.

Water Quality
Historical water quality data were analyzed in detail data to address the question of whether historical water quality data and ongoing water testing be used to predict future water quality. The work was included in the Draft GSP as Appendix D2. The ENSI report is entitled *Water Quality Review and Assessment: Borrego Water District (BWD) Water Supply Wells,* dated 12/7/2018. It was subsequently included in its entirely within a second ENSI document entitled Decision Management Analysis (Task 3: Report 1 of 2) dated 4/16/2019. The results are summarized in **Sections 3.6.1** and **3.7**.

Well Production
A detailed analysis of hydrogeologic conditions and groundwater model results was developed to address the question of how will continued overdraft affect BWD water supply well production. The ENSI report is entitled *Assessment of Water Level Decline, Hydrogeologic Conditions, and Potential Overdraft Impacts for Active BWD Water Supply Wells*, dated 1/7/2019. The work is included in its entirety in the above-cited ENSI Report dated 4/16/2019. The results are summarized in **Sections 3.6.2** and **3.7.**

3.6.1 Water Quality

The ENSI water quality assessment report expanded on the water quality trend analyses conducted by Dudek prior to development of the GSP. The spatial variability of water quality within the Subbasin was organized by Dudek in terms of the Northern, Central, and Southern Management Areas (NMA, CMA, and SMA). This report also organizes the wells and data using these three management areas.

Water quality has been affected by overdraft and by historical land use. A well-by-well analysis was performed for each of BWD's active water supply wells. BWD's wells currently produce potable water that meets drinking water standards without the need for treatment.

In summary:

- A multi-parameter analysis of major anion and cation sampling data was conducted for historical and active BWD wells dating back in some instances to the 1970s. The results showed that systematic variations in groundwater quality occur within the Subbasin that generally follow pre-development groundwater conditions.

- Historical data, particularly when plotted on tri-linear (Piper) diagrams, reveal how dewatering of the upper aquifer has led to changes concentrations of naturally-occurring minerals, and show how overdraft has affected the quality of water. In general, the water that has been extracted from the upper aquifer system as a result of overdraft was of higher quality (specifically lower TDS and sulfate) than currently being produced.

- Inorganic water quality for naturally-occurring minerals (sulfate, TDS, sodium, and chloride) generally decreases with depth; however, there is a lack of depth-specific sampling data primarily because the production wells have relatively long screen sections and water samples represent a mixture of water derived from the wells.

- Sulfate in groundwater is increasingly becoming of concern as the upper aquifer system dewaters due to overdraft and waters are being produced from deeper in the aquifer system. Sulfate is shown in Appendix B of the 4/16/2019 report to generally correlate with TDS. Electrical conductivity measurements are commonly used to assess TDS. In this case they can be used as a field-based monitoring tool for TDS, and in turn support tracking of sulfate.

- Arsenic in groundwater is of high concern because treatment to drinking water standards (MCLs) is relatively expensive. Historically, during the period of ~2010 to 2014, arsenic concentrations were at or near the MCL in multiple BWD production wells. Fortunately, the trends have reversed. The potential for MCLS to be exceeded is of high concern to BWD due to the potential cost of water treatment and/or well replacement. The MCL was temporarily exceeded in one well, ID1-10. Arsenic concentrations above MCLs currently occur in groundwater in the South Management Area, primarily in wells installed for the Ram's Hill Golf Course.

  Review of the data shows that there is a relationship between pH and arsenic where elevated arsenic concentrations occur under alkaline conditions with pH levels of approximately 8 and greater. Especially noteworthy is that peak arsenic concentrations can be observed to occur after the peak pH was observed in multiple wells (ID1-10, ID1-16, Wilcox, and ID1-8). The lag time is approximately 2 to 4 years. While additional data and observations are required to further assess the connection between arsenic and pH, this relationship could prove important toward the monitoring and management of BWD's water supply.

- Nitrate in groundwater is a result of historical and current land use. Maximum contaminant level (MCL) exceedances have impacted older BWD wells that have since been abandoned or reconstructed to minimize nitrate levels. Nitrate has not been of recent concern in any of the BWD wells

  The primary sources of nitrate in the Subbasin include fertilizers associated with agriculture and turf grasses (golf courses), and septic systems. Nitrate concentrations are primarily related to land-based activities and do not correlate with inorganic water quality data. Overall determination of historical impacts and ongoing susceptibility of the aquifer to nitrate contamination will require review of prior, current, and future land use placed in a spatial context. Work done by DWR (for example as illustrated in Figure 11 [**Appendix B** of the 4/16/2019 report]) is an example of how land use information can be used. Among the land use parameters that would go into a nitrate source analysis would the location and types of septic and sewer systems, current and historical agricultural activities, and current and historical irrigated turf/golf courses.

A detailed well-by-well summary of the BWD well water quality is included in ENSI 4/16/2019. In summary

- Nitrate, while detectable at low concentrations in all of the wells, is well below MCLs and not of concern.

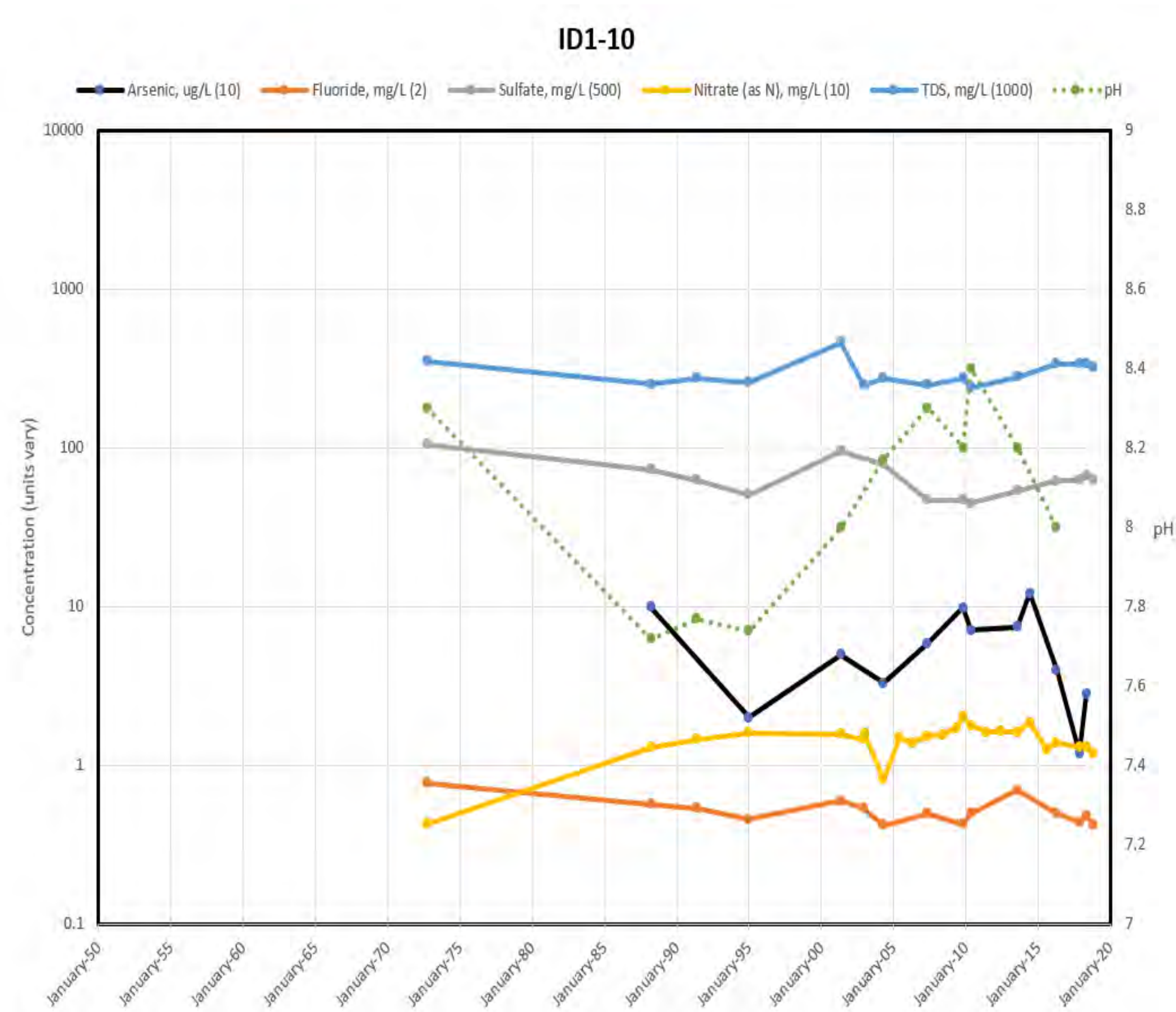
- TDS and Sulfate are increasing in 4 of the nine wells. Of these only one, ID4-18, has TDS above the primary MCL (500 mg/L) primarily as a result of elevated sulfate (above the secondary MCL of 250 mg/L).

- Arsenic is currently below the MCL of 10 ug/L in all wells. The MCL was exceeded in ID1-10 in 2014, and has occurred at concentrations above half the MCL in the Wilcox and ID1-8 wells in 2014 and 2010, respectively.

- pH levels have been observed to increase a number of years before Arsenic levels increased in four wells: ID1-10, ID1-16, Wilcox, and ID1-8. The lead time varied between 2 and 6 years.

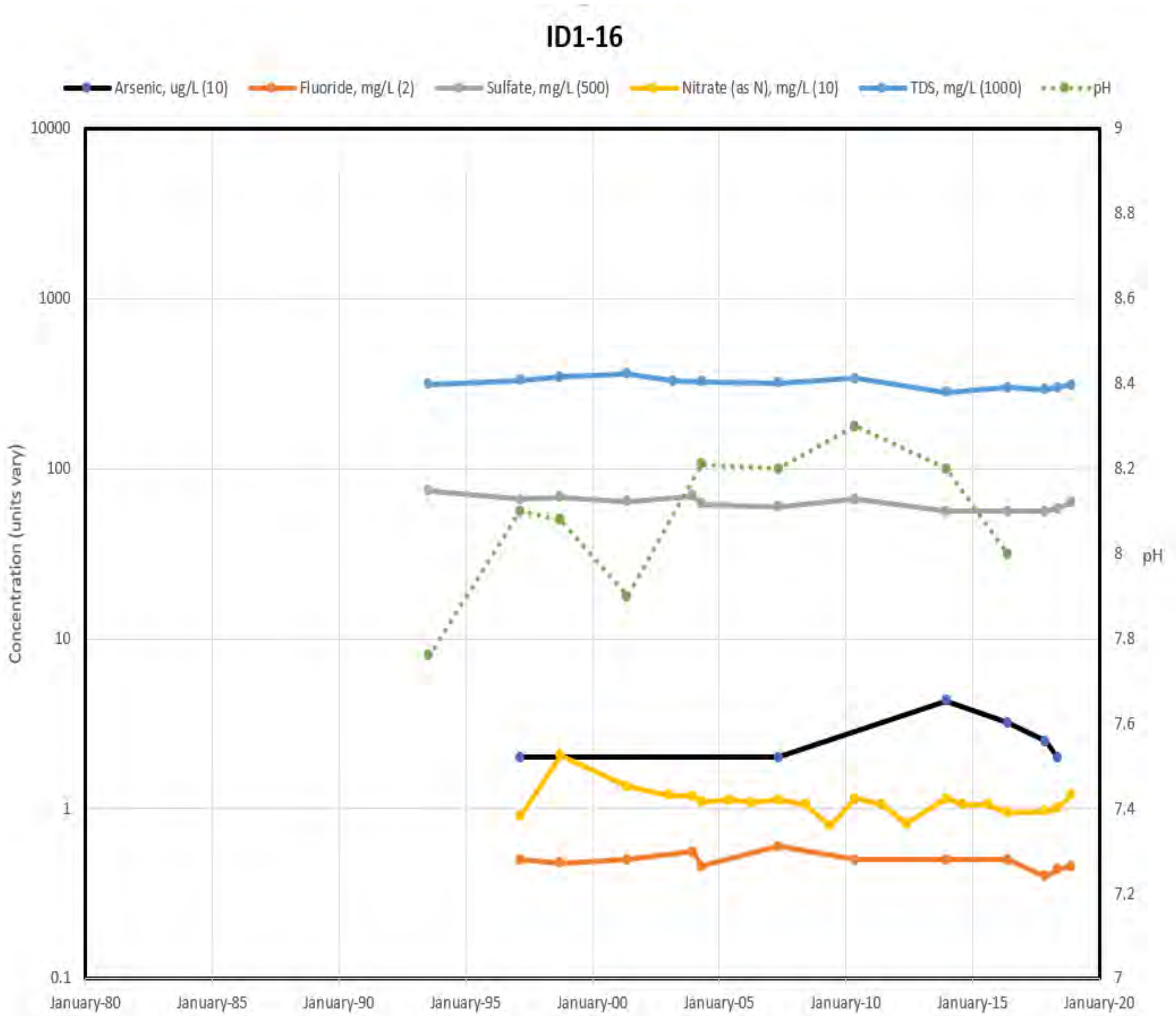
  Figures 6 and 7 depict the historical water quality data from ID1-10 and ID1-16 and illustrate the relationship between pH and arsenic.

FIGURE 6. Water Chemistry Monitoring Results: ID1-10



Note: Similarity in the pH and arsenic charts, and the pH maximum in 2010 versus arsenic maximum in 2015. The MCL for arsenic is 10 ug/L and that value was attained or exceeded multiple times in water samples from ID1-10.

FIGURE 7. Water Chemistry Monitoring Results: ID1-16



Note: Similarity in the pH and arsenic charts, and the pH maximum in 2010 versus arsenic maximum in 2014.

3.6.2 Future Loss of Production due to Overdraft

An analysis of BWD's production wells was done to examine the current rate of overdraft-related water level decline, examine trends, compare the observed and groundwater model-predicted water levels, and review well-specific hydrogeologic conditions for comparison to the regional-scale groundwater model.

The 4/16/2019 ENSI Report is intended for use as the GSP is implemented as a means of evaluating well performance relative to the SGMA threshold criteria (see Section 3 of the Draft GSP). For example, the Draft GSP has established drawdown thresholds for BWD wells based on screen intervals (see Table 3-4 of the GSP, reproduced here as **Table 2**) with the intent to establish a maximum allowable impact in support of the SGMA sustainability criteria. This is explained in the draft GSP (Section 3.3.1) as follows:

"*The GSP regulations provide that the "minimum threshold for chronic lowering of groundwater levels shall be the groundwater level indicating a depletion of supply at a given location that may lead to undesirable results" (Title 23 CCR Section 354.28(c)(2)).*

…

Maintaining groundwater levels above saturated screen intervals for pre-existing municipal wells during an anticipated multi-year drought circumstance was selected as the minimum desired threshold for GWEs that would be protective of beneficial uses in the Subbasin. This minimum threshold in most cases would also be protective of non-potable irrigation beneficial uses."

A key concept going forward is that ongoing overdraft is causing water levels to continue to drop and adversely affect hydraulic conditions and well operation. In many cases sparse well-specific hydraulic test data are available, and the model developed to assess basin-wide hydrologic conditions is being used assess local, well-specific conditions. This gives rise to uncertainty as the groundwater model is being used to predict future water level decline. The BWD production well analysis by ENSI included:

- Hydrographs were constructed that depict measured groundwater levels and model predicted groundwater levels at each well. The hydrographs support the examination of well-specific water level decline trends at each BWD water supply well. The hydrograph data were provided to ENSI by Dudek as the Draft GSP was being developed. These data will be updated as part of the GSP process.

  In the larger perspective the groundwater model generally replicates the overall decrease in water levels and loss of groundwater from storage that has been and continues to occur in the Subbasin due to overdraft. Groundwater elevation decline observed at each of the BWD wells has ranged from 20 to 89 feet for each of the wells. The water level elevation decline rates observed in eight of the nine wells over the past decade range from 0.6 to 4.5 feet/year based on linear trends fitted to the water level data. Well ID1-10 is an exception and has exhibited a rise in groundwater elevation over the past 10 years, in part due to declining use.

Note that ID4-4 is scheduled to be replaced in 2019, ID4-18 has an inner liner being used to stabilize the well and extend its working life, and ID1-10 is being phased out due to concerns regarding future production capacity as it is relatively shallow in depth.

- The differences between the observed and modeled groundwater elevations over time are depicted for eight of the nine BWD water supply wells (Figure 3, included below). Figure 3, further described in the ENSI Report, clearly illustrates how the model calibration process provide a large-scale statistical fit that results in both over- and under-estimates of water level elevation and that the differences can vary over time. Future work done in support of the 20-year GSP process will likely include review and revision of the groundwater model.

- Hydrogeologically-interpreted lithologic logs were developed for each of the BWD wells as derived from driller's logs and available detailed geologic cross-sections and related studies. The interpreted logs were used to compare local well conditions to the larger-scale hydrogeologic parameters used in the USGS Model [USGS Model Report, 2015[17]].

  Here the driller's logs are the only available subsurface data for each of the wells. Driller observation can vary significantly in terms of detail and quality so the logs presented in Appendix C of the 4/16/2019 report are based on professional experience and a high level of interpretation was employed, including the review of underlying hydrogeologic reports.

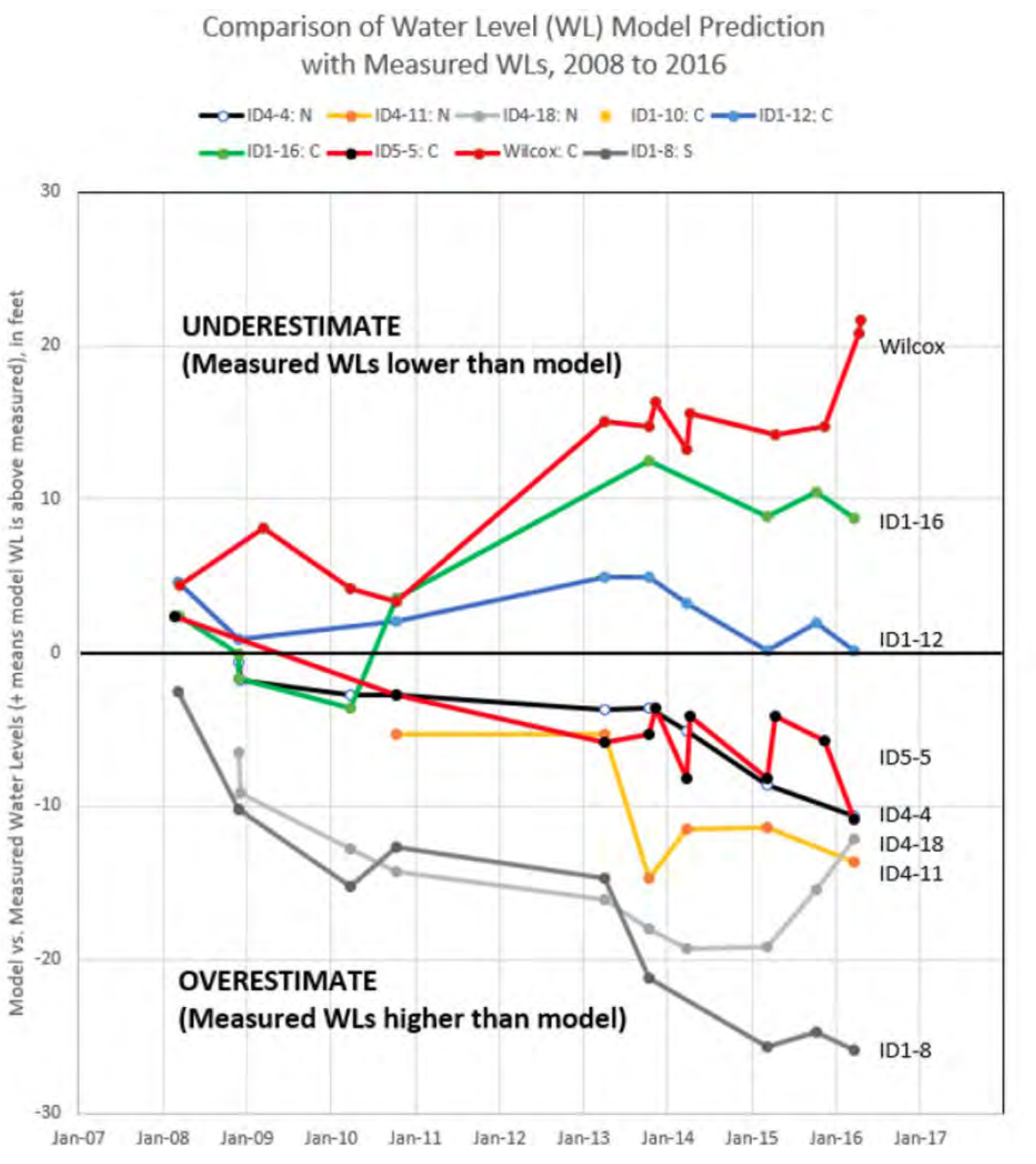
- The hydrographs and model-based water level predictions were compared to the lithologic logs to provide an understanding of well-specific hydrogeologic conditions at BWD's nine water supply wells.

- Comparison of the observed and model-calculated water level elevations can be used to support the use of the groundwater model at BWD well locations. The model works to provide a statistically-based 'fit' of observed and predicted water levels and tends to average conditions across the Subbasin. As a result, while the model provides a Subbasin-wide assessment of hydrologic conditions, local water level elevations calculated by the model can be higher or lower than those observed by water level elevations obtained by measurements at the wells.

  If the water level elevations calculated by the model are lower than observed, the model is said here to overestimate water level declines and thus overestimate overdraft. From a BWD management perspective this means that the use of the model is protectively conservative and allows for a margin of error. Conversely, if the model-calculated water levels are higher than those observed at a well the model is said to underestimate water level decline and overdraft. In both cases the understanding of model behavior can be used to support the localized use of the model.

[17] [USGS Model Report, 2015] Faunt, C.C., Stamos, C.L., Flint, L.E., Wright, M.T., Burgess, M.K., Sneed, Michelle, Brandt, Justin, Martin, Peter, and Coes, A.L., 2015, Hydrogeology, hydrologic effects of development, and simulation of groundwater flow in the Borrego Valley, San Diego County, California: U.S. Geological Survey Scientific Investigations Report 2015–5150, 135 p., http://dx.doi.org/10.3133/sir20155150

FIGURE 8. Comparison of Measured and Modeled Water Levels (from ENSI 4/16/2019)



- The model aquifer geometry and local hydraulic conductivity values were used to calculate aquifer transmissivity, a measure of aquifer productivity, for each BWD well location. Based on the observed water level decline, calculate the change in transmissivity as a function of aquifer saturation was used to assess how overdraft will potentially affect BWD water supply well production.

FIGURE 9. Relative Well Transmissivities with Water Level Decline (Figure 22 from ENSI 4/16/2019)

FIGURE 22

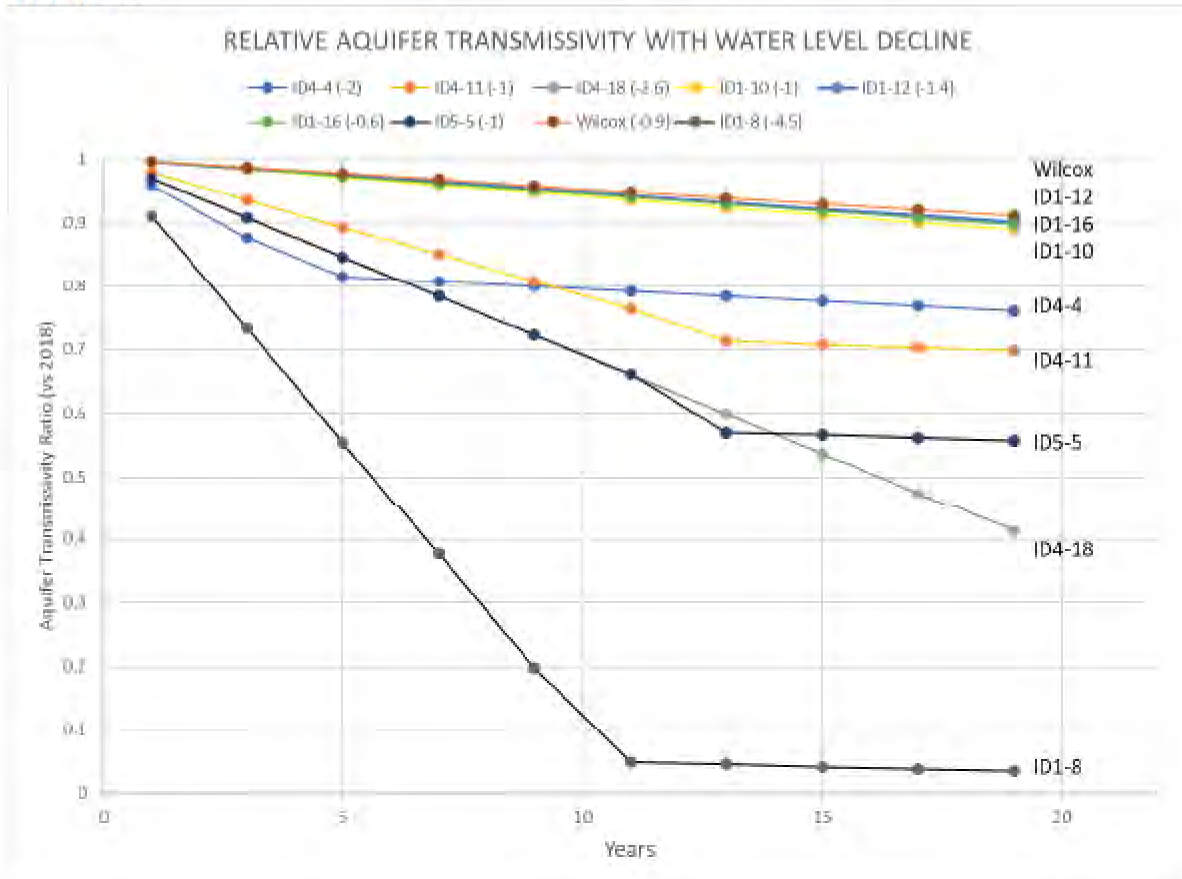


Figure 22, further explained in Appendix C of the 4/16/2019 report, depicts the change in transmissivity over time expressed as a ratio, starting at a value of 1 and decreasing. The annual rate of water level decline is noted for each well in the chart labels, was assumed constant, and ranges from 0.6 to 4.5 ft/year. A future water level decline rate of 1.0 ft/year is provisionally assumed for the ID1-10 replacement well.

Transmissivity is a parameter that is equal to the hydraulic conductivity of the sediment encountered by the well multiplied by the saturated thickness. As water levels decline due to overdraft so does the ability of the well to produce water as flow is proportional to the transmissivity. Wells where large declines in transmissivity occur, such as ID5-5, ID4-18, and ID1-8, will be the most vulnerable to continued overdraft.

Chronic overdraft has been occurring for decades and will continue to affect all of the BWD production wells, with the most significant loss in production occurring in a subset of the wells where the upper aquifer is dewatered. As water production shifts to the middle aquifer the well capacities decrease and production rates are expected to generally decrease to varying degrees as a function of water level. These decreases are incorporated in the groundwater model, but the basin-wide model is based on three aquifer layers (upper/middle/lower) and thus cannot account for local-scale variability. The analysis is summarized in **Table 4**:

TABLE 4. Potential Future Decrease in Well Production due to Chronic Overdraft

	NMA			CMA					SMA
Well:	**ID4-4*+**	**ID4-11**	**ID4-18+**	**ID1-10***	**ID1-12**	**ID1-16**	**ID5-5**	**Wilcox**	**ID1-8**
Water Level Decline, ft/yr	2.0	1.0	2.6	1.0**	1.4	0.6	1.0	0.9	4.5
Rated Flow, gpm	395	920	130	317	890	848	542	205	448
% T at 10 years	80%	80%	70%	95%	95%	95%	70%	95%	*15%*
Adjusted Rate, gpm	316	736	91	301	846	806	379	195	67
% T at 20 years	75%	70%	*40%*	90%	90%	90%	*55%*	90%	*5%*
Adjusted Rate, gpm	296	644	52	285	801	763	298	185	22
	* Poor condition wells. ID4-4 is scheduled for replacement in 2019								
	** Water levels recently rising (less well use). A decline rate of 1 ft/yr used for calculation								
	+ Wells that have inner casing/liner installed and are in poor condition								
Evaluation of Pumping Rate at 1600 AFY Demand (992 gpm continous pumping rate)									
	TOTAL	% loss	**8 hr/day**	versus demand	**12 hr/day**	versus demand			
Flow Rate, gpm	4695		1565		2348				
Adjusted Rate, 10 yrs	3737	20%	1246		1868				
Adjusted Rate, 20 yrs	3347	29%	1116	112%	1673	169%			

Information included in table follows from ENSI (4/16/2019)

- Current rate of water level decline, in feet/year, based on well hydrographs
- Currently-rated flow capacity as tested in 2018
- 20-year projection of decreased well capacity based on the effect of projected water levels on aquifer transmissivity at each well
- Comparison of total well capacity versus well operation at 8 and 12 hours/day. BWD is currently producing approximately 1,600 AFY. Total flow rates vary seasonally and range from approximately 600 gpm in the winter to approximately 1,300 gpm late summer.

3.7 Overall Assessment of Uncertainty and Risk

BWD's ability to provide safe, affordable drinking water begins at the wellhead. Nine wells are currently available for water production. **Table 5** summarizes details regarding the well flow capacity and water quality. All of the wells have been and continue to be adversely affected by chronic overdraft. Going forward there are two key questions

1. Will the wells lose production due to water level decline? As water levels decline the aquifer has been and is expected to continue to yield less water.

2. Will water quality decline to the point where water treatment will be necessary? To date BWD has not needed to treat groundwater, aside from routine filtration and disinfection.

Water Production Risks

- Overdraft (water level decline) rates range from ~1 to ~4.5 ft/yr.

- Current flow rates are substantially less than those observed when the wells were installed. The third column in the table shows that the well production rates are 18% to 46% of their originally tested capacities.

- Additional water level decline is expected while water use reductions take effect under SGMA. Additional reduction in capacity has been estimated based on changes in aquifer transmissivity calculated for each well (ENSI 4/16/2019, as summarized in Section 3.6.1). The effect of continued water level decline varies among wells and well production may decline from 90% to 5% of current flow rates. The low-end estimate of 5% is associated with Well ID1-8 and is due to the currently observed 4.5 ft/yr rate of water level decline. ID4-8 and ID5-5 are also projected to be strongly affected by continued overdraft.

  Future water level decline rates at ID1-10 are uncertain. Water levels have recently been rising due to lack of use. A decline rate of 1 ft/yr is provisionally used. Water level decline will have a proportionally higher impact on this well as it has a relatively short screen interval and depth.

- The installation dates of the wells are also indicated. Older wells have a higher risk of physical failure. Dudek (12/21/2019, **Appendix I**) provides an estimate of 60 years aa being the useful life of a typical production well. That said wells ID4-4 and ID4-18 were installed less than 40 years ago, both have been repaired, and both are recommended for replacement.

- Three of the wells have known construction problems. ID4-4 and ID4-18 have been repaired by constructing inner liners that reduce well efficiency but allow the wells to remain in service. ID1-10 is a relatively shallow well (392 ft) and BWD has not been using the well due to concerns that it will rapidly lose production capacity.

- ‘Model risk’ is also evaluated. The USGS groundwater model is being used to predict water level decline and the ‘risk’ described here is a comparison of the model prediction with the observed water levels. A higher risk is assigned where the model is underpredicting water level decline and lead to a situation where production may need to be reduced due to unanticipated drawdown.

- Review of the projected well performance supports that Wells ID1-8 and ID4-18 will have low production rates and likely no longer be viable.

<u>Water Quality Risks</u>

- TDS and sulfate have been increasing in response to water level decline and chronic overdraft. TDS is now above 500 mg/L in ID4-18 as a result of sulfate.

- Arsenic has previously exceeded the MCL of 10 ug/L in ID1-10, but has since declined. The occurrence of high arsenic is considered a moderate to high risk.

- Arsenic has previously exceeded 5 ug/L in ID1-8 and in the Wilcox well. In all cases where Arsenic concentrations were elevated it was preceded by a rise in pH.

Current and projected future conditions are examined in **Table 6**. BWD’s water well system reflects the combination of a number of independent water systems, now operated together in terms of improvement districts and pressure zones. **Figure 10**, from Dudek (12/21/2018) shows the overall system configuration. Refer to their report (coped in **Appendix I**) for additional details.

BWD operation data from 2015 and 2016 generally reflect current operating conditions and the data were used in Table 6 to calculate current and future well production, per well. Four wells- ID4-4, ID4-11, ID1-12, and ID5-5 support nearly all of BWD’s water supply needs.

- Well ID4-4 is scheduled to be replaced due to well inefficiency related to well construction and the use of an inner liner and casing to maintain the well operation. It is currently being operated at 76% of its maximum capacity. With overdraft the well capacity will decrease and it is projected that it would need to operate 24 hours a day to maintain the current flow rates.

- The total well capacity pumping capacity is projected to decrease by approximately 30% over the next 20 years with continued overdraft. Wells ID4-11, ID1-12, and ID1-16 will provide much of the future production capacity.

The well production has been sorted in terms of the production and water quality risks in **Table 6**. ID1-8 is assumed to no longer be viable. ID4-18 is retained in the list but has a relatively low flow rate.

- 75 percent of the potential well production, by volume, has a low risk of failure. Should the ID4-4 replacement well be successfully installed and have good quality water the percentage will increase.

- ID4-18 and ID1-10 (as noted by <u>underlining</u>) are also being considered for replacement. ID4-18 is a relatively low capacity well and direct replacement may not be worthwhile. ID1-10 has a higher capacity but there are concerns that it is too shallow and thus less resilient to future overdraft.

- Arsenic is also risk driver, especially for ID1-10. Arsenic is of concern at the Wilcox well and at ID1-8. Both are in the southern part of the Subbasin where elevated arsenic is known to occur. ID1-8 is assumed to not be viable, so the combined capacity of ID1-10 and the Wilcox wells represents 14% of BWD's projected well capacity.

<u>Combined Risk and Overall Assessment</u>

BWD's wells will continue to lose production (flow) capacity with continued overdraft. This has the potential to adversely affect BWD's ability to meet future water supply needs.

Review of water quality risks show that 75% of current production has a low risk of water quality problems and need for treatment. Arsenic and sulfate are of the highest potential concern. Should water treatment be necessary, Dudek (12/11/2015; **Appendix C**) provided an estimate of $548/AF for arsenic removal. The current net cost of water production is $875/AF, so water treatment would represent a significant cost to BWD and BWD customers.

Current BWD operations include four wells where arsenic is of potential concern. The MCL has been exceeded in ID1-10 but it is one of BWD's less productive and utilized wells. Elevated concentrations have been observed in the Wilcox and ID1-8 wells. The Wilcox well is an unused 'backup' well and ID1-8 will likely lose viability due to overdraft. Well ID1-16 is an important well to BWD operations and has had low concentrations of arsenic over time.

TDS and sulfate have been increasing in ID4-18. This well has a relatively low production rate and the water could readily be blended, or other supply wells could be used.

Well ID4-4 has low risk for water quality but has a potential to fail due to current well construction. It produces roughly a third of BWD's water supply, and is scheduled for replacement with a nearby well. The new well is expected to be more hydraulically efficient improve BWD's overall pumping capacity.

Long-term management and operation of BWD wells will need to consider how to best optimize well production and water quality in terms of the distribution system and location of customer demands. Among future management options includes improved capacity for intrabasin transfer of water, both potable and irrigation water, to minimize overdraft and water quality impacts. Going forward the well-by-well analysis can be updated based on production records and water quality monitoring data to track BWD's wells and water supply.

Table 5. Summary of Production and Water Quality Risks, per well

	Production Risk						Water Quality Risk		Combined Risk
Well Overdraft	**Flow gpm**	**Pct vs start**	**Next 20yr**	**Install Date**	**Failure Risk**	**Model Risk**	**TDS/ Sulfate**	**Arsenic**	
ID4-4 2.0 ft/yr	395 (1,155)	34%	396 (75%)	1979 (liner repair)	High (temp repair)	Low WLs higher	Low (LT change)	Low	Low <u>in short term</u>: Inefficient poor condition well being replaced in 2019. Replacement well likely to have good water quality, flow, and efficiency
ID4-11 1.0 ft/yr	920 (2,000)	46%	644 (70%)	1995	Low	Low WLs higher	Low	Low	Low
ID4-18 2.6 ft/yr	130 (570)	23%	52 (40%)	1982 (liner repair)	Mod-High (temp repair)	Low WLs higher	Moderate (TDS > 500) (LT change)	Low	Moderate to High Risk: TDS and Sulfate of concern
ID1-10 Rising WL, low use	317 (1,110)	29%	285 (90%*)	1972	Low	Low WLs higher	Low (Increasing)	Moderate to High (Exceeded MCL w/high pH)	Moderate Risk: Past history of Arsenic above MCL Concern of dewatering due to shallow 392' well depth (* production estimate based on hypothetical 1 ft/yr WL decline)
ID1-12 1.4 ft/yr	890 (2,000)	45%	801 (90%)	1984	Low	Low-Moderate	Low	Low	Low
ID1-16 0.6 ft/yr	848 (2,000)	42%	763 (90%)	1989	Low	Moderate WLs lower	Low	Low	Low: Model concern is low given projected overdraft impact
ID5-5 1.0 ft/yr	542 (3,000)	18%	298 (55%)	2000	Moderate	Low WLs higher	Low	Low	Low to Moderate: Losing production due to overdraft
Wilcox 0.9 ft/yr (unused)	205 (900)	23%	185 (90%)	1981	Low	Low WLs higher	Low (Increasing)	Moderate (was above ½ MCL w/high pH)	Moderate: Arsenic has been elevated
ID1-8 4.5 ft/yr	448 (1,110)	40%	22 (5%)	1972	High (dewater)	Moderate WLs lower	Low (LT change)	Moderate (was above ½ MCL w/high pH)	High: Well expected to fail due to excessive overdraft due to local well interference. Arsenic also of concern

Notes: Recent overdraft rates, in ft/year. Flow rates shows current and (historical). ID4-4 scheduled for replacement in 2019.

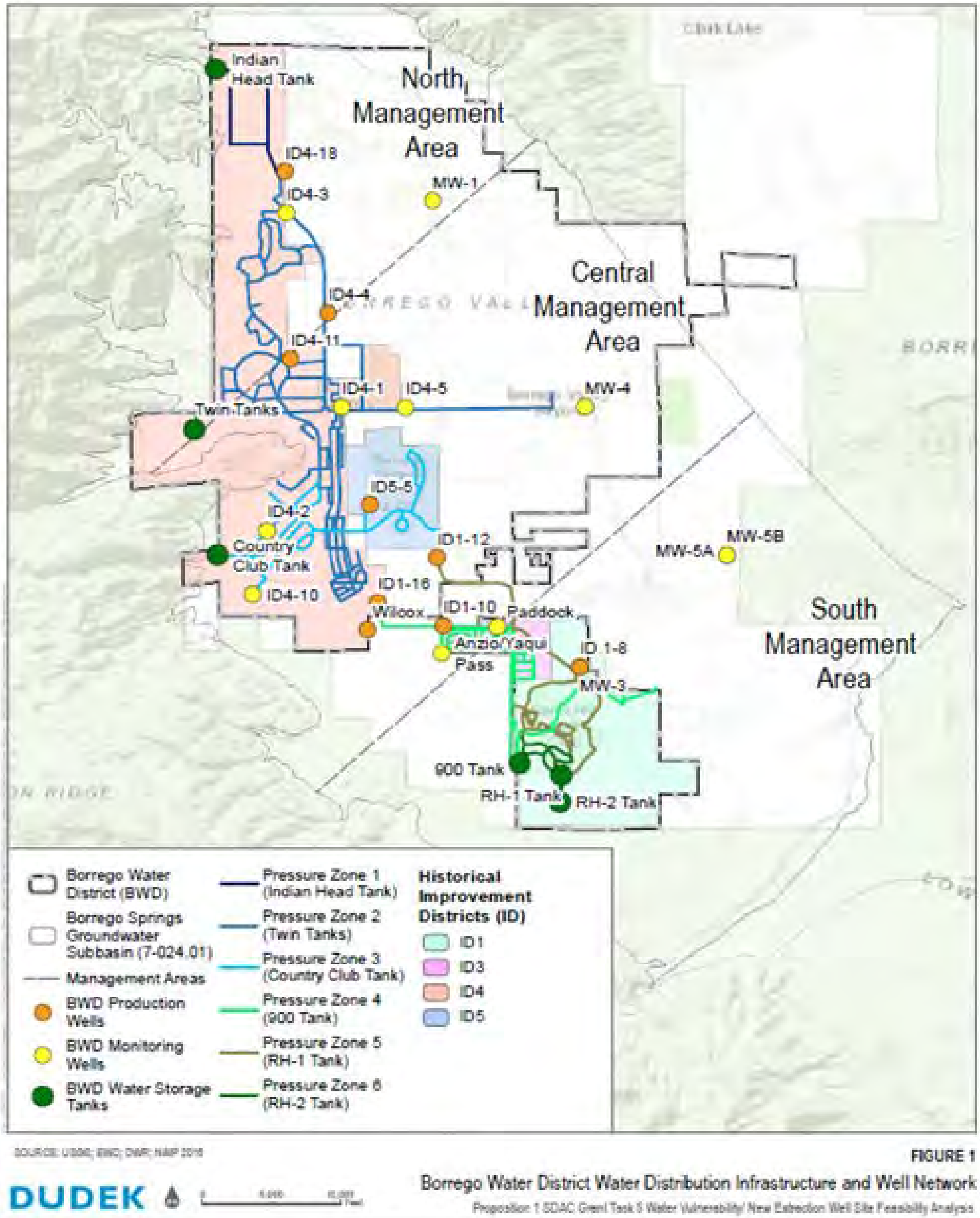
Table 6. Summary of Current and Future Conditions, and Well Risks Sorted by Well Capacity and Use

			Current Conditions						Projected w/Overdraft		
Well	**Improvement District**	**Pressure Zone**	**Rated Flow, gpm (2018)**	**AFY max**	**Use pct (2015/16)**	**AFY prod**	**Pct max**		**Pct of production (20 years)**	**AFY, max**	**versus current use**
ID4-4	4	2	395	637	**29%**	**484**	**76%**		75%	478	**101%**
ID4-11	4	2	920	1,484	**33%**	**540**	**36%**		70%	1,039	**52%**
ID4-18	4	1	130	210	2%	35	17%		40%	84	**42%**
ID1-10	1,3	4,5,6	317	511	1%	24	5%		90%	460	5%
ID1-12	1,3	4,5,6	890	1,436	**16%**	**255**	18%		90%	1,292	20%
ID1-16	1,3	4,5,6	848	1,368	4%	68	5%		90%	1,231	6%
ID5-5	5	3	542	874	**11%**	**188**	21%		55%	481	**39%**
Wilcox	1,3	4,5,6	205	331	0%	0	0%		90%	298	0%
ID1-8	1,3	4,5,6	448	723	3%	48	7%		5%	36	**132%**
		TOTAL	4,695	7,574	100%	1,642	(AFY)			5,399	
										71%	(vs 2018)

	Risks			Production Sorted by Risk (using 20-year projection)						
Well	**Production Risk**	**Water Quality Risk**		**Low**	**Moderate**	**Moderate-High**	**High**		**Arsenic**	**Sulfate**
ID4-4	Mod-High*	Low				478				
ID4-11	Low	Low		1,039						
ID4-18	Mod-High*	Moderate				84				84
ID1-10	Low**	Mod-High				460			460	
ID1-12	Low	Low		1,292						
ID1-16	Low	Low		1,231					detected	
ID5-5	Low	Low		481						
Wilcox	Low	Moderate			298				298	
ID1-8	High	Moderate					36		-	
	* due to well construction									
	** shallow depth, higher risk expected			4,043	298	1,022	36		758	84
			Percent of Production	75%	6%	19%	1%		14%	2%

Notes: Underlined wells are those with the highest priority for replacement. Relative well use based on 2015/2016 average.

FIGURE 10. BWD Water Distribution Infrastructure and Well Network (Dudek, 12/21/2018)



4.0 COMMUNITY-WIDE IMPACTS

A detailed description of the Borrego Springs Community is included in ENSI (4/15/2019) as supported by the Borrego Springs Community Characteristics Report (LDC, 2019[18]). Section 4.2 of the ENSI report provides the following overview:

…..

Impacts and SDAC vulnerabilities can be viewed as either direct or indirect given how water is used. Direct impacts are associated with the cost and affordability of water to BWD customers. Indirect impacts occur as a result of how the community will change as a result of water use reductions. These include impacts to local irrigation-dependent businesses, or those that occur as a result of population and/or demographic response to water use reductions.

Demographics play a large role in the assessment of how SGMA-mandated water use reductions will impact the community. In broad terms there are two highly vulnerable sub-populations within the SDAC:

- Very low-income workers, often with families that include school-aged children, and largely Hispanic/Latinx. This sub-population provides the majority of public school students.

- Retirees. 31% of Borrego Springs' population is at least 65 years of age, and 60% are at least 55 years of age. This subpopulation also includes many with low and/or fixed income (see Section 3.2 of ENSI [4/15/2019])

Community outreach efforts (LDC, 2019; included as Appendix C of ENSI 4/15/2019) successfully obtained detailed information using bilingual surveys and by working within the community to encourage survey responses. Four categories of SGMA impacts have been identified:

- Water affordability (BWD Rate impacts)
  Community outreach has clearly identified water cost as being of high concern. A water affordability study is included in Appendix F[19] that further emphasizes the effect of water rates on the SDA Community of Borrego Springs.

- Jobs/Local Economy
  Water use reduction will have varying effect depending on the water use sector (agricultural, recreational, or municipal). Irrigation-dependent activities will likely realize the greatest impacts. Water availability will likely constrain full development of vacant residential and commercial property (see Appendix D of ENSI [4/15/2019] for details[20]).

[18] Borrego Springs Community Characteristics Report by LeSar Development Consultants (LDC), received 1/31/2019

[19] Raftelis Financial Consultants (RFC) 10/14/2017. Borrego Water District Water Rates Affordability Assessment. Prepared for BWD.

[20] Appendix D: Theoretical Water Demand at Buildout of Present Unbuilt Lots Under County's Current Zoning in Borrego Springs, dated October 4, 2016. Dudek Working Draft Technical Memorandum

- Potential Outmigration
  Residents may choose to leave due to job loss without replacement, water costs, or loss of critical infrastructure such as the school system.

- Infrastructure Impacts/ Quality of Life
  Structural changes to the community infrastructure will occur generally related to shifts in population due to employment and employment opportunity.

  In all cases the community does have a 20-year period to develop adaptation strategies in response to SGMA.
  …..

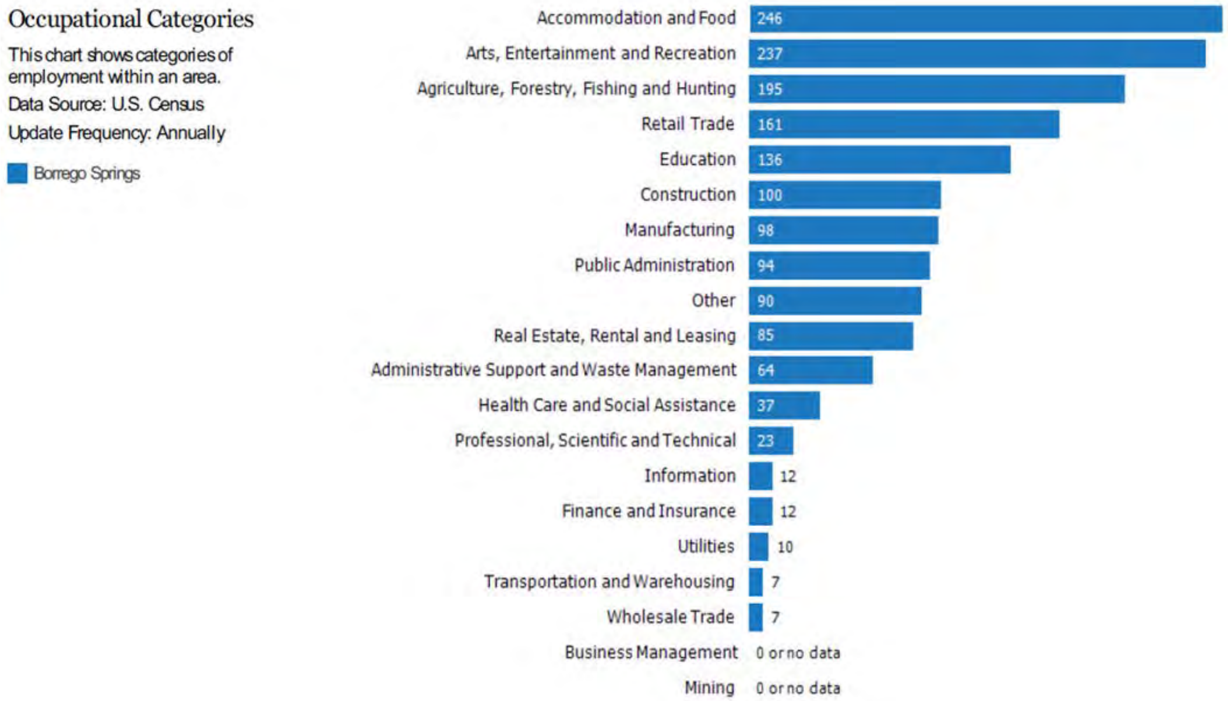
4.1 Impact Scenarios

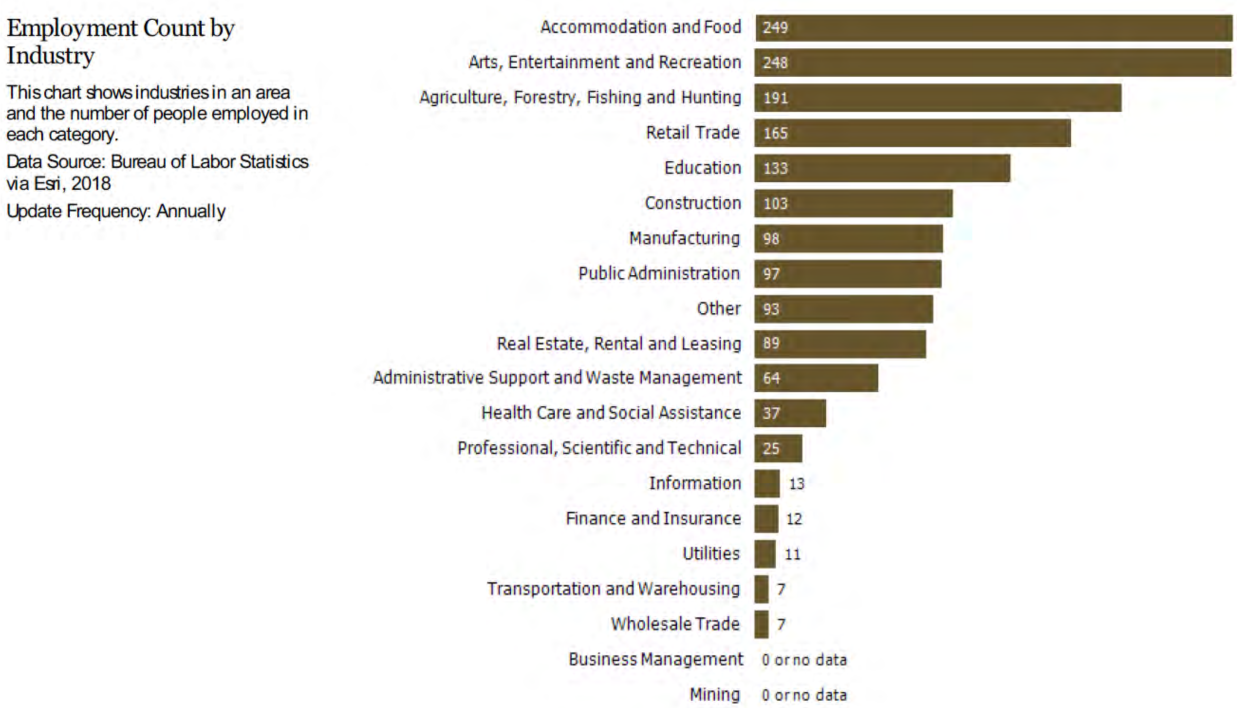
Economic impacts projected to affect the Borrego Springs community are posed in this analysis in terms of the businesses and associated employment that make up each of the water use sectors. These, in turn, have potential impacts to the community structure as the population and community character changes and adapts to water use reductions.

As described in the Draft GSP there are three water use sectors: agricultural, recreational, and municipal. These sectors represent a variety of businesses and related occupations within the local community. **Figure 11** shows a chart depicting the local occupational categories (from Sandicor, 2018 and 2019). These categories are used in **Section 5** to support an economic impact analysis of reductions in agricultural and recreational water availability and use.

The 2017 occupational data (reported in 2018) are used in this and prior reports. The reported data for 2018 (as reported in 2019) indicate a job growth of 1.8%, from 1368 to 1393, with the greatest gain occurring in the arts, entertainment, and recreation category (11 jobs). All other categories had changes of up to +/-4. Whether this will become a sustained trend can only be determined by future data and surveys.

FIGURE 11. Occupational Categories: Borrego Springs (2017 and 2018)





The economic analyses consider two of the four SGMA-related impacts that include jobs/local economy, and outmigration. Water rate affordability was discussed in Section 3 as supported by extensive work done by Raftelis Financial Consultants working on the behalf of BWD. Societal infrastructure was detailed in ENSI (4/15/2019) and summarized in Section 4.2 of this Report.

The following impacts are further assessed in **Section 5** of this Report:

- 50% and 75% reductions in agricultural jobs.
- 50% reduction in agricultural combined with a 10% reduction in education. The reduction in education assumes a net loss of school age children associated with agricultural workers.
- 10% and 20% reductions in accommodations and food, entertainment, and recreation, real estate, and construction (combined, related to recreational/golf course community impacts)
- Working, low income population outmigration due to increased water costs
- Role of Middle income/ small business owners to Borrego Springs
- Loss of school-aged children necessary to support the viability of the public school

4.1.1 Baseline Water Use

An ~75% reduction in groundwater use will require significant changes in how and where water is used. The primary reduction, by volume, will be irrigation used for farming and golf courses. ENSI (4/15/2016, Introduction to Section 2) included a hypothetical water reduction scenario to support understanding of how water uses will change. A portion of that report is repeated here as it provides a quantitative illustration of how water use reductions and changes in water use practices will affect the community:

…..

Water use is described in the Draft GSP in terms of three sectors that include agricultural, recreational, and municipal. Currently both the agricultural and recreational water supplies are supported by privately-owned wells.

- Agricultural use refers to water required to irrigate 2,624 acres of farmland as further described in the Draft GSP (page 2-14) and supporting documents.
- Recreational use is water that supports golf course turf irrigation so changes to this sector will impact residential, recreational, and seasonal population use associated with the golf course communities. There are six golf course communities: Borrego Springs Resort, Club Circle, De Anza Country Club, Rams Hill Country Club, Road Runner Golf and Country Club, and The Springs at Borrego RV Resort and Golf Course. An estimated 461 acres of turf are being irrigated (Draft GSP Table 4-3).

- Municipal use includes water provided by the publicly-owned Borrego Water District (BWD) for residential and commercial users, including golf course community-related residences and businesses. Per the Draft GSP (page 3-24) the BWD water system includes 2,059 metered residential and commercial service connections. Municipal users represent approximately $300,000,000 out of approximately $340,000,000 in County-assessed property values in the Borrego Valley. BWD's service area includes undeveloped residential and commercial properties that represent future water demand.

- Per the GSP (Section 2.1.4) "*Additional groundwater users include two active small water systems and two non-potable irrigators. The two small water systems are the Anza-Borrego Desert State Park (ABDSP) and the Borrego Air Ranch Water Co. The two non-potable irrigators are the Borrego Springs Unified School District (Elementary School) and La Casa Del Zorro Resort and Spa. Industrial service supply includes use for two utility scale solar facilities, a Redi-mix plant, a County service yard and the Republic Services Borrego Landfill.*

  Private groundwater users who extract less than 2 AFY are considered de minimis users under SGMA. There are an estimated 52 active de minimis users within the Subbasin. Domestic well users are generally considered to be de minimis users, provided however, that a few properties that would otherwise qualify as de minimis contain irrigated area in excess of about 0.5 acres, thus taking them out of the definition of de minimis pumper in SGMA. Table 2.1-7 lists beneficial uses and users of groundwater in the Subbasin, including general location and estimated water use."

Total water demand will need to be reduced to approximately 5,700 AFY (the pumping rate target proposed in the Draft GSP based on the sustainable yield rate developed by the US Geological Survey in 2015) by the end of the 20-year SGMA compliance period. The exact distribution of future water use among the three primary water use sectors is not known and will change as the community adapts. For this hypothetical analysis it is anticipated that agricultural land fallowing combined with water market trading will result in the transfer of water demand from agricultural to recreational/golf community and municipal uses. **Table 7** provides a hypothetical example of a potential water transfer outcome. The Baseline Pumping Allocation values used in the table follow from the Draft GSP.

Table 7. Baseline and Hypothetical Future Use after Transfers (Acre-Feet/Year)

	Current Allocation, AFY (GSP Table 2.1-7)					Sustainable Allocation with Transfers, AFY			
Sector	Percent of BPA	Baseline Pumping Allocation	2018 Use	Final Pumping Allocation		50% Ag Transfer (50/50 split)	Final Pumping	Reduction from BPA	Reduction from 2018 Use
Agriculture	72%	15,729	14,767	4,082			2,041	87%	86%
Recreational/golf	18%	4,050	3,245	1,051		1,021	2,072	49%	36%
Municipal (BWD)	10%	2,122	1,600	551		1,021	1,571	26%	2%
Non-Deminumus	0%	62	58	16			16	74%	72%
total (AFY)	100%	21,963	19,670	5,700		2,041	**5,700**		
				74%	pct reduction				
		21,963	total BPA						

Notes:

1. Water can be physically transferred via pipeline or more likely 'on paper' via water trading.
2. Units are in acre-feet per year (AFY)
3. The municipal BPA includes 385 AFY allocated to Human Right to Water demand.

Current municipal demand is ~1,600 AFY. Future demand needs to include future development within the BWD service area.

4. The Anza Borrego State Park is one of the non-deminimus users but uses a relatively low amount of water when compared to land area or number of visitors.

The intent of the **Table 7** is to illustrate how water use reductions and transfers will have a direct effect on the different components of the Borrego Springs community. Here it is assumed for this example that half of the final agricultural pumping allocation is transferred to other sectors- the hypothetical example assumes a 50/50 split between the recreational/golf community use and BWD. Among the likely effects of SGMA include:

- A significant reduction in farm acreage and thus worker employment resulting from loss of irrigation water. If the total acreage of farmland is assumed to be roughly proportional to the irrigation rate then SGMA will lead to the loss of 74% of irrigated land. Multiple factors will determine whether the remaining 26% will be economically viable. The hypothetical example shown in **Table 7** shows a case where half of the remaining farmland BPA is transferred.

- Transfer of water, either physically or via transfer of BPAs, is required to sustain both the recreational/golf and municipal sectors because the final pumping allocations for both are significantly less than their current water demand[21]. As noted in **Table 7** the current use

[21] It should be recognized that the BPAs can exceed current (2018) use because of water conservation, land fallowing, and related water use reduction efforts that have occurred after the point in time when BPAs are established. See the GSP for further details.

rates for the recreational/golf and municipal sectors are 3,245 and 1,600 AFY, respectively. The final pumping allocations correspond to 32% and 34% of current use (i.e. 1,051/3,245 AFY and 551/1,600 AFY, respectively). Given that conservation and irrigation modifications are unlikely to provide for approximately 2/3 reduction in water use, additional water will be required for both sectors.

- The golf communities include vacant parcels and additional residential and commercial development as part of their overall business operation and community structure. The golf courses are a key component to the character structure of these communities.

  The recreational/golf sector community water use is a combination of turf irrigation, residential, and commercial uses. Residential and commercial use will be supported by BWD under their BPA. Turf irrigation demands for all of the golf courses is currently estimated in the GSP to be 3,245 AFY – more than half of the water that will be available under SGMA at the end of the GSP compliance period (i.e. more than half of the current 5,700 AFY sustainable pumping target). SGMA will likely lead to significant changes in turf irrigation as the current demand is roughly 3 times the final pumping allocation (3,245 AFY versus 1,051 AFY per GSP Table 2.1-7). A significant portion of water use reductions can be realized through turf reduction and water conservation measures under the GSP. Refer to the GSP, Section 4.3 (Projects and Management Action No. 2 – Water Conservation) for additional details.

- Transfer of water will be needed for residential and commercial growth in Borrego Springs supported by the Borrego Water District; however, it is not likely that there is sufficient water for full buildout of undeveloped land parcels. Prior review by Dudek in a Working Draft Technical Memo entitled "*Theoretical Water Demand at Buildout of Present Unbuilt Lots Under County's Current Zoning in Borrego Springs*", dated October 4, 2016 (Appendix C [of the 4/15/2019 report]) indicates that full build-out would require an additional 3,746 AFY- more than double the approximately 1,600 AFY currently being served by the District[22]. This future demand cannot be met under SGMA unless all of the agricultural water is transferred (hypothetically all agriculture is eliminated) and the recreational/golf communities limit transfers to ~1,000 AFY. This would leave the recreational/golf sector with a final allocation of ~2,000 AFY compared to a current demand of 3,245 AFY.

  As noted by Dudek in their 2016 report [ed: **Appendix J** of this report] "*Present County Zoning for the BWD's service area may be unsupportable under SGMA constraints. Even with drastic reductions in residential EDU [average water usage], it is uncertain that municipal demand can be met, given current competition with agriculture, recreation, and other water users of the basin, including potential environmental water necessary to maintain the groundwater system.*"

[22] BWD's 2017 Annual Report stated water production in 2017 was 1,611 acre-feet. http://nebula.wsimg.com/c30a61991a5160ddf5e577fe9f7b3c01?AccessKeyId=D2148395D6E5BC38D600&disposition=0&alloworigin=1

In summary, the SGMA-mandated reduction of water use to 5,700 AFY over the next 20 years will require significant changes in water and land use. Review of relative water demand by sector shows that the greatest potential for SGMA compliance comes from reduction of agricultural and turf irrigation. Comparison of current and potential future demands potentially required by the recreational/golf and municipal sectors clearly demonstrates that water transfers will be needed to support these sectors. Water transfers could hypothetically occur from the recreational/golf and municipal sectors to support additional agriculture but is assumed unlikely. Therefore, future water transfers are assumed to occur from the agricultural sector to the other residentially-driven water uses.

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4.1.2 Water Use Reduction Scenarios

Agricultural (72% of BPA)
Land fallowing has been and will continue to be a primary water use reduction strategy as agricultural irrigation is the dominant water use. Two economic scenarios are presented in **Section 5** corresponding to 50% and 75% reduction in agricultural jobs.

Recreational/Golf Course Irrigation (18% of BPA)
There are six golf course communities in Borrego Springs. Residential water is provided by BWD so the sector's water demand is due to turf and landscape irrigation. The Draft GSP describes a variety of ways that golf course irrigation can be reduced by 835 AFY using a combination of water saving measures (Draft GSP) Section 4.3.3. Comparative use in 2018 was reported to be 3,245 AF so the golf courses can achieve additional water use reductions and remain a functional feature of the golf course communities.

The golf course communities are an integral part of the Borrego Springs community, serve to support the seasonal population, and provide recreational opportunities for residents and visitors. These communities involve a range of businesses such as restaurants, and undeveloped residential properties surrounding some of the golf courses represent future building construction and community growth.

Municipal (BWD) (10% of BPA)
Water supplied by BWD support most of the seasonal and year-round residents, as well as the commercial business that comprise the community. **Table 7** represents a 'limited growth' scenario where current water demands continue into the future. Growth depends on recognizing and seizing opportunities for water conservation that will support new water uses within the existing water demand.

As previously noted, properties currently served water by BWD represent approximately \$300,000,000 out of approximately \$340,000,000 in County-assessed property values in the Borrego Valley. Much of Borrego Springs is comprised of vacant land parcels with varying levels of development entitlements. Water availability under SGMA will likely preclude build-out of all undeveloped parcels within BWD's service area (Dudek, 10/4/2016; **Appendix J**).

RFC (11/17/2016, included as **Appendix E**) analyzes a second water demand scenario where future growth occurs through 2050 and BWD water demand increases to approximately 2,725 AFY. Review of **Table 7** supports that water transfers will need to occur from either the agricultural or recreational sectors. Total pumping is limited to 5,700 AFY under SGMA, so if these additional transfers occur to support municipal (BWD) use this will leave ~3000 AFY for both the agricultural and recreational sectors. Currently the recreational sector is using 3245 AFY per **Table 7**. Should the economics of water transfer favor the recreational sector, and recreational pumping is maintained near current levels via water transfers there will be minimal water remaining for agriculture.

4.1.3 Socioeconomic Considerations

Socioeconomics is a social study that examines the interplay between economic activity and social processes. Borrego Springs is a small unincorporated Census-designated community. Here the socioeconomic focus is on how the local population and community character is likely to change as a result of SGMA-mandated water use reductions. Section 3.1 of ENSI (4/15/2019) provides the following overview:

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Although this SDA Community is dependent on the County of San Diego and the State of California for many public services, a range of locally-supported services and institutions have been developed by the community. Per the 2014 Borrego Springs Community Plan[23] "*Our community is supported by the following facilities and infrastructure:*

- *County Road Station*
- *School District (High School is Red Cross Emergency Evacuation Center)*
- *Water District*
- *Fire Department*
- *Sheriff's Sub-station*
- *County Library*
- *Children's Center*
- *Boys' and Girls' Club*
- *Senior Center*
- *Medical Center*
- *Airport*
- *County Rural Bus System*
- *AT&T Central Office*
- *Chamber of Commerce*

The Anza-Borrego Desert State Park headquarters provides visitor facilities that are also used by residents, including a Visitor Center, developed campground, trails and outdoor amphitheater."

The Municipal Use Survey (LDC, 2019; Question 9) highlighted other local community activities supported by local volunteers that included the Little League, Chamber of Commerce, Rotary,

[23] County of San Diego General Plan, Borrego Springs Community. As amended June 18, 2014 (GPA 12-007)

Soroptomists, American Legion, multiple local churches, and the Anza Borrego Desert Natural Heritage Association (ABDNHA).

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These locally-supported services and institutions generally reflect the needs and character of the current population of Borrego Springs. These, in turn, depend on the community demographics, as described in the Borrego Springs Community Characteristics Report (LDC, 2019; included as an Appendix to ENSI (4/15/2015)). Of highest concern include:

- Potential loss of family-aged population and associated potential negative impact on the viability of the public school system.
- Loss of year-round population needed to support seasonal and tourism-related businesses.
- Inability of the community to adapt and maintain stable growth to support the changes in occupations and land uses associated with water use reductions under SGMA.

Lastly there are community issues and concerns that transcend SGMA-related water supply constraints. It is well beyond the scope of this report to provide any detail regarding how future changes within this severely disadvantaged community may be able to effect improvement in the socioeconomic status (SES[24]) of those living in Borrego Springs.

4.2 Environmental

The Draft GSP notes that implementation of many aspects of the GSP will require review under the California Environmental Quality Act (CEQA). Multiple factors may need to be considered as outlined in the initial study checklist
(see, for example, http://resources.ca.gov/ceqa/guidelines/Appendix_G.html).

Detailed CEQA-level analysis of environmental issues is beyond the scope of this report.

[24] SES is defined as "the social standing or class of an individual or group. It is often measured as a combination of education, income and occupation. Examinations of socioeconomic status often reveal inequities in access to resources, plus issues related to privilege, power and control." Psychological definition from https://www.apa.org/topics/socioeconomic-status

5.0 ECONOMIC SCENARIOS AND RESULTS (IMPLAN)

Potential water use reduction-related economic impacts were evaluated for 50% and 75% reductions in agriculture water availability, 10% and 20% reductions in recreational (golf turf irrigation) water availability, outmigration related to water rate affordability, and a review of the role of the middle/entrepreneurial class population and potential impact of their loss to the overall economy. These relative impacts are compared to the overall economy and to the rate of economic growth required over the 20-year SGMA compliance period to offset the various potential economic and job losses.

These scenarios are included to provide insights specific to the potential range of impacts that may occur due to SGMA-mandated water use reductions. They are by no means a prediction of the future.

5.1 IMPLAN

IMPLAN is a basic input-output model that allows estimation of the effects of direct changes to segments of the economy[25]. It quantifies the basic components of an economy using a data base derived from economic data from the U. S. Department of Commerce, the US Bureau of Labor Statistics, and other federal and state government agencies. Data provided for each industry sector include outputs and inputs from other sectors, value added, employment, wages and business taxes paid, imports and exports, final demand by households and government, capital investment, business inventories, marketing margins, and inflation factors (deflators). IMPLAN also allows for the reaggregation of employment categories to customize the output format.

The quantitative analysis methodology used by IMPLAN employs a social accounting matrix model (SAM)[26] where all of the transactions in the economy are included to calculate the flow of income from production to consumption (supply and use). It accounts for a full range of institutions such as households, businesses, and government. As noted in supporting information developed for IMPLAN "*the SAM provides information on non-market financial flows. IMPLAN inter-industry models provide information on market transactions between firms and consumers, and they capture payments of taxes by individuals and businesses, transfers of government funds to people and businesses, and transfer of funds from people to people.*

IMPLAN Group, LLC has developed methodologies for creating local (county) area SAM data that is consistent with Bureau of Economic Analysis' National Income and Produce Accounts (NIPA)." Further description of how they have developed the region-specific data for Borrego Springs can be located at https://implanhelp.zendesk.com/hc/en-us/articles/115009674688-IMPLAN-Data-Components.

[25] For more information on the IMPLAN modeling process, visit IMPLAN.com

[26] https://implanhelp.zendesk.com/hc/en-us/articles/115009674708-Introducing-the-SAM-

5.1.1 Description and Applicability

SGMA compliance is localized to the Borrego Springs Subbasin and, as such, the economic effects of SGMA will be most pronounced within the Subbasin. The analysis included in this report was done for the 92004 postal zip code area. As described in their user's manual, "*IMPLAN is an economic model that allows for analysis at the zip code level which roughly corresponds with the affected area. Using the IMPLAN regional input-output economic modeling system and data files we can estimate direct, indirect and induced effects by sector. The three components of total economic change addressed by IMPLAN within the defined area include:*

- ***Direct effects** represent the initial change in the industry in question.*

- ***Indirect effects** are changes in inter-industry transactions as supplying industries respond to increased demands from the directly affected industries.*

- ***Induced effects** reflect changes in local spending that result from income changes in the directly and indirectly affected industry sectors.*"

Here we used the IMPLAN data set that constructed annually by IMPLAN Group LLC, and set up the model calculations using recently-completed community surveys (LDC, 2019). As noted "*Regional data is derived from many different sources, primarily federal agencies responsible for data collection. The primary sources for data derivation include:*

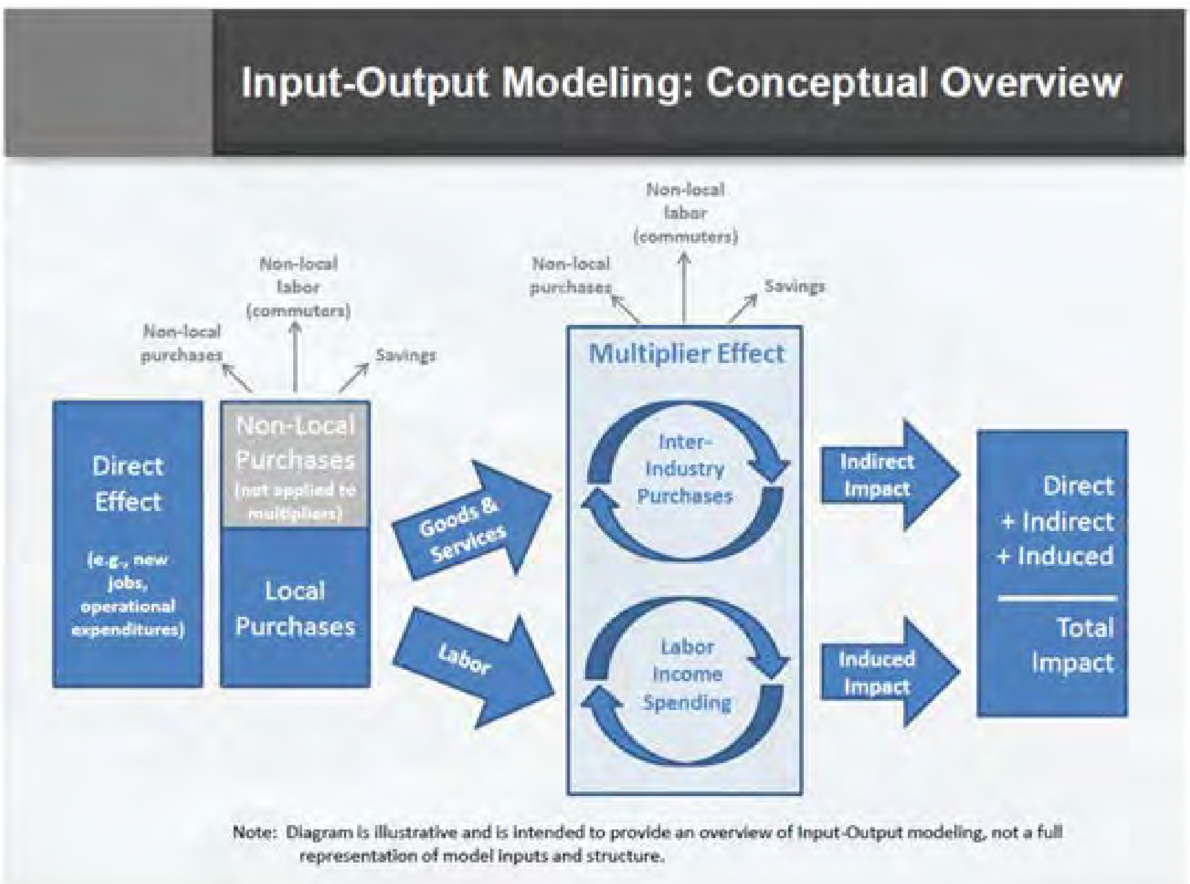
- *the U.S. Bureau of Labor Statistics (BLS) Covered Employment and Wages (CEW) program,*
- *the U.S. Bureau of Economic Analysis (BEA) Regional Economic Information System (REA) program,*
- *the U.S. Bureau of Economic Analysis Benchmark I/O Accounts of the U.S.*
- *the BEA Output estimates,*
- *the BLS Consumer Expenditure Survey,*
- *the U.S. Census Bureau County Business Patterns (CBP) program,*
- *the U.S. Census Bureau Decennial Census and Population Surveys,*
- *the U.S. Census Bureau Economic Censuses and Surveys,*
- *and the U.S. Department of Agriculture Census.*

When combined, these sources provide all the elements needed to assemble a complete U.S. data set." Employment statistics were explicitly used as the basis for defining the economic model analysis. Estimates of selected sectors of the Borrego Springs Economy are based on IMPLAN aggregations from NAICS codes, in this case using the 2016 datasets, aggregated into the U.S. Census American Community Survey categories. A large portion of the Borrego Springs population is retired and not employed; however, they are implicitly included as households that take part in the overall economy.

IMPLAN also allows for a measurement of the economic costs of a percentage reduction in the overall income into the economy. This was used as a tool to estimate the costs of outmigration by income class.

Figure 12 depicts a conceptual overview of the input-output model to illustrate the relationship among, direct, indirect, and induced effects.

FIGURE 12: Conceptual Overview: Economic Input-Output Model



From: http://www.ilw.com/seminars/JohnNeillCitation.pdf

Some initial assumptions are needed to establish the magnitude of the changes in the input to measure the output impact. For this, the data from LDC Community Survey (LDC, 2019) provided useful community-specific parameters.

Appendix K includes summaries of the date input and output files used for this report. The file shows the applicable coded job categories re-aggregated into the census categories and the input figure that was used in the IMPLAN model run.

5.1.3 Limitations

IMPLAN is typically used for regional analyses to assess economic activity among subregions. Within the Borrego Valley this could include assessment of migrant/seasonal workers, short-term construction projects (ex. new library), impact of State Park on San Diego County, etc. Employment reductions by sector are generalized from local data collected by LDC and are not constructed by the model. The analyses provide a series of “what ifs” for different sectors or in combinations of sectors. This provides an understanding of the relative magnitude of various scenarios to the economy but it is not a prediction that the reduction will occur at that level. Because it is zip code specific, the model also does not factor in commuters working in or out of the region. All employment is treated as inclusive to the postal zip code area.

As a straight input-output model IMPLAN cannot evaluate intangibles, aesthetic values, quality-of-life or similar subjective considerations. Further the model is subject to the inputs and parameters defined by the user and, as such, the results are not endorsed by the IMPLAN Group, LLC unless stated by a representative of IMPLAN Group LLC.

5.2 Sector-based Water Use Reduction Impacts

Multiple scenarios were evaluated that examine changes in water use sectors due to water use reductions. Each were analyzed using IMPLAN.

The overall Borrego Springs economy is summarized in the following table.

TABLE 8. Borrego Springs Economy (baseline)

Impact Type	Employment	Labor Income ($)	Value Added ($)	Output ($)
Direct Effect	1,607	78,044,409	124,253,954	202,061,493
Indirect Effect	71.91	2,700,133	6,553,514	10,283,333
Induced Effect	79.10	3,176,994	8,772,094	13,514,387
Total Effect	1,758.01	83,921,536	139,579,562	**225,859,214**

All of the scenarios are based on adjustments to this base case.

5.2.1 50/75% Reduction in Agricultural Sector

50/75% Reduction in Agricultural Sector

The agricultural sector is the largest user of groundwater and will be significantly impacted by land fallowing and water transfers. 50% and 75% reduction of the Agriculture sector employment are shown.[27]

TABLE 9. 50% reduction in Agricultural Sector (farming subset)

Impact Type	Employment	Labor Income ($)	Value Added ($)[28]	Output ($)
Direct Effect	45.83	753,836	1,058,596	1,865,960
Indirect Effect	.51	17,004	37,903	58,192
Induced Effect	.76	30,423	84,002	129,415
Total Effect	47.10	801,263	1,180,501	**2,053,566**

TABLE 10. 75% Reduction in Agricultural Sector (farming subset)

Impact Type	Employment	Labor Income ($)	Value Added ($)	Output ($)
Direct Effect	68.75	1,130,755	1,587,894	2,798,940
Indirect Effect	.76	25,507	56,855	87,287
Induced Effect	1.14	45,634	126,003	194,123
Total Effect	70.65	1,201,895	1,770,752	**3,080,350**

[27] Since we are only looking at a single zip code to model the localized effects of water restrictions, the agricultural worker data is confined to local employment in the sector. Non-area residents who work in the region could skew the results if they are a substantially larger number than the residents who also work outside the modeled zip code. Temporary/seasonal workers who don't line in the area are also not included.

[28] Value Added is based on individual producer or industry sector nationally. Local crop values and profitability could be different than national sector values.

5.2.2 Agricultural Sector Reduction, with Education Impact

If the reductions in agriculture are coupled with outmigration from rising rates the cumulative impacts to secondary education could be assessed at overall cumulative reduction. A reduction of 10% in education employment is assumed in this scenario that is related to a loss in family-aged agricultural employees with school children.

TABLE 11. 50% reduction in Agricultural Sector, with 10% reduction in Educational Sector

Impact Type	Employment	Labor Income ($)	Value Added ($)	Output ($)
Direct Effect	59.43	1,854,950	2,265,421	3,083,878
Indirect Effect	0.52	17,393	39,309	60,116
Induced Effect	1.78	71,696	197,936	304,923
Total Effect	61.73	1,944,040	2,502,666	**3,448,923**

5.2.3 Agricultural Sector Replacement

The total economic effects described in **Sections 5.2.1** and **5.2.2** can be partially or totally offset by increases in other sectors of the economy. These would not necessarily be a one-to-one replacement and may involve displacement of individuals with one skill set for those of another.

The economic output of an industry is based on the total output and the cost of its intermediate inputs. One way to view the replacement value of the average output per industry is shown on the following chart. The average employee compensation per person-year is shown for comparison purposes.

TABLE 12. Average Labor Output, by Industry

Industry[29]	Labor Income (includes benefits, fringe, etc.)	Output (includes profit, value added, taxes, etc.)
Vegetable & Melon farming	$26,295	$88,709
Fruit farming	$16,002	$38,562
Greenhouse, nursery and floriculture	$43,010	$121,248
Hotels and motels	$39,150	$113,722
Restaurants	$27,755	$57,326
New Home Construction	$55,337	$162,188
Retail	$37,324	$91,676

[29] IMPLAN 2016 dataset

Table 12 shows the difference in economic output per labor dollar spent, and illustrates how the local economy is affected by varying types of employment. The term 'multiplier' is commonly used to describe the relative impact. It is notable that new home construction has a relatively high multiplier. Future growth is an important consideration toward offsetting losses to irrigation-dependent business. There are costs, and potential long-term benefits, associated with implementing measures to accommodate future growth. Please refer to Mann (6/2/2014, **Appendix B**) for analyses that support the economic benefits of reducing overdraft to support future growth.

5.3 Recreational/Golf Course Water Use Reduction

The golf course communities include a range of business sectors which can vary for each business so there is no simple way to break out the impacts of closures. Here we model a 10% combined reduction in the Accommodation and Food, Entertainment and Recreation, Real Estate, and Construction business sectors to give an initial picture of the comparative impacts.

TABLE 13. 10% reduction in Accommodations and Food, Entertainment and Recreation, Real Estate, and Construction

Impact Type	Employment	Labor Income ($)	Value Added ($)	Output ($)
Direct Effect	70.29	2,714,336	5,690,459	8,693,929
Indirect Effect	3.53	127,017	303,965	438,469
Induced Effect	2.89	115,941	320,185	493,309
Total Effect	76.71	2,957,295	6,314,609	**9,625,708**

5.4 Subpopulation/Income-based Water Use Reduction Impacts

The economic analysis can also be done based on examining changes in population based on income. Recent surveys[30] of the local population have helped to show public sentiment regarding the ability to tolerate rate increases. Based on the LeSar Development Consultants survey[31], 17% of the people in the $36,000 and under income bracket stated that they could not afford any increase in water rates. RFC's affordability study (RFC, 10/14/2017) as highlighted in Section 3.4, supports that water affordability is of concern to approximately half of Borrego Springs' population. Both studies support that increased water costs have the potential to trigger people to leave Borrego Springs, here termed outmigration.

One element of outmigration is the potential for threshold issues to arise as the cumulative impacts of the shrinking population base becomes too small to support basic infrastructure beginning a

[30] Local surveys carry a selection bias in that responders are not representative of a random sampling. People with the greatest concern are more likely to respond than people who are not. The data can, however, be used for illustrative and guidance purposes and that is the intent here.

[31] Community Profile by LeSar Development Consultants, 2019. Included as an appendix to ENSI 4/15/2019.,

rapid drop in the quality of life for a given population. A shrinking working-age population can ultimately cause business closures, employer decline, housing drops, loss of tax base and public services becoming more costly. While it is difficult to determine where, and at what point, these negative synergies develop, it is prudent to acknowledge the potential.

The potential for outmigration is skewed toward the lower income categories based on the LeSar Community Survey. To measure the effects on the overall potential for outmigration the IMPLAN inputs were correlated in a similar manner with reductions in population based on income range.

5.4.1 Low Income Outmigration

Two estimates were made on the potential for outmigration based on the responses to the LeSar community survey (LDC, 2019). These include the impacts of any rate increase, and the impact of raising water rates by up to $25 per month.

Ten percent of the survey respondents said that they could not afford any rate increase. If this is true, and some choose to leave the area), in response to the rate increase (assuming none move into other local jobs), we can model these impacts using IMPLAN regional input-output economic modeling system[32]. The ten percent of respondents breaks down as an outmigration of 17% in the $40K and under category and an additional 9% from the $40-$50K bracket. This corresponds to approximately 136 of residents in the under $40K income and approximately 16 of residents in the $40 to $50K bracket. Combined these two subpopulations with a combined population of 152 people equal the 10% overall population that stated in the survey that they could not afford any increase.

Next, we can estimate percentages of these groups who would potentially outmigrate and model the impacts. The outmigration would have a direct, negative impact on the economy with an additional induced effect as follows:

TABLE 14A. Outmigration Scenario: $25/month rate increase. 10% Outmigration

$25 rate increase and 10% of those who cannot tolerate increase decide to leave the area.

Direct economic loss: **$3,027,515. Number of jobs ~ 15.**

Impact Type	Employment	Labor Income	Value Added	Output
Induced Effect (loss)	2.82 (induced)	113,335	$312,854	$481,947

The total impact (direct and induced) is $3,509,462.

When the cumulative potential outmigration from a $25 rate increase is calculated assuming that 100% of those who cannot tolerate an increase decide to leave, the following results:

[32] Here we used the IMPLAN's commercial data set (2016).

TABLE 14B. Outmigration Scenario: $25/month rate increase. 100% Outmigration

Direct economic loss is **$26,369,700. Number of jobs ~ 150.**

Impact Type	Employment	Labor Income	Value Added	Output
Induced Effect (loss)	28.21	1,133,352	3,128,544	4,819,467

The total impact (direct and induced) is $30,275,150

Both calculations are based on a reduction in the total employment and do not assess impacts per business sector. Since the mix of specific labor categories being reduced is not specified indirect effects are not included in this particular scenario.

5.4.2 Mid-Income (small business owner) Outmigration

Review of the businesses included in the Borrego Chamber of Commerce[33] clearly shows the role of small businesses and entrepreneurs in the overall economy. Should Borrego Springs prove to not be attractive to those who create and support small business, losses of this subpopulation would have dramatic consequences to the viability of the community.

The economic model is not structured to single out all of the individual businesses within a study area. The Gross Regional Product is a straight value estimate of the economy without the indirect and induced multipliers applied and somewhat different than the previously-presented total. **Table 15** shows the breakdown of the value added to the GRP. The Total Value Added is the GRP derived from the income paid to the owners of the factors of production in the IMPLAN model year (2016) that effectively constitute local businesses.

[33] http://www.borregospringschamber.com/. As noted the Chamber of Commerce has an integral community role "Borrego Springs is an unincorporated community in the county of San Diego and therefore has no city council. Every year the Borrego Springs Chamber of Commerce calls for the nomination of an Honorary Mayor."

TABLE 15. Gross Regional Product

Value Added

Indicator	Value
Employee Compensation	$85,573,664
Proprietor Income	$6,773,095
Other Property Type Income	$69,284,123
Tax on Production and Import	$6,618,661
Total Value Added	**$168,249,543**

Proprietor Income represents self-employed persons. Their value includes salary, benefits and contributions to Social Security/Medicare. Other Property Type Income includes dividends, interest, rent, corporate profits and capital depreciation

Per the 2012 US Census Survey of Business Owners the Borrego Springs, CDP had a total of 89 firms with paid employees and sales receipts of $63,323,000. The impacts of a declining labor force and rising cost of operations may push the more marginal businesses to fold or relocate.

5.5 Anza-Borrego State Park

The importance of the Anza-Borrego State Park to the local economy cannot be overemphasized. The State Park headquarters and visitor center are located in Borrego Springs, the park surrounds the community, and the community serves as the official entrance to the park. It is a large contributor to the local economy. While estimates of visitation and visitor expenditures vary, the portion of this visitor income that is expended locally is implicitly incorporated in the IMPLAN economic model.

In a 2010 study[34] approximately 38 percent of the employment generated by visitation to and operation of the State Park System was in the accommodation and food services industry. This industry is the largest, by employment, in Borrego Springs (see **Figure 11**). 27 percent of employment was in the retail trade industry (the fourth largest local industry as indicated by **Figure 11**). The Southern California region received over $1.5 billion in sales as a result of the visitation and operation of the State Park System.

As noted by the Borrego Valley Stewardship Council[35] "*Borrego Springs, California is the primary gateway for visitors to Anza-Borrego Desert State Park (ABDSP, the Park), which surrounds the community on all sides. ABDSP, a National Natural Landmark and International Biosphere, is the largest desert State Park in the nation (635,000 acres) and one of the largest protected areas in the west. It recently achieved distinction as a part of the University of California Natural Reserve System. Borrego Springs is located about 90 miles from San Diego, California's 2nd largest city and drives national and international visitation exceeding ~ 500,000 tourists each year. Visitors to the ABDSP account for over $40 million in annual revenue to the region.*"

[34] California State Parks, 2015. Anza-Borrego Desert State Park Interpretation Master Plan September 2015. Prepared by The Acorn Group. https://www.parks.ca.gov/pages/638/files/Anza-Borrego_Final_9-25a.pdf

[35] http://www.borregovalleystewardshipcouncil.org/charter.html

5.6 Summary: IMPLAN Results

The economic analysis was done considering two general scenarios. Both pessimistically assume that the community fails to adapt over the 20-year water use reduction period and there is no increase in the overall population or economic growth. The first scenario assesses the local impact of the loss the agriculture and agricultural related businesses. The second scenario assesses potential economic impacts to business activity related the recreation water use sector. In both cases there are no offsetting economic gains.

Table 16 summarizes the results and illustrates that the local impact of agricultural job losses is a relatively small percentage of the overall economy. Recreational (golf course) water use reduction impacts have a higher relative because of the various business related to the golf course communities. The greatest impact is associated with the outmigration of low income workers that may leave based on water affordability.

Table 16. Water Use Sector-based Impacts

	# of jobs	Reduction, Total Input	Percent of total output
Agricultural Water Use Sector			
50% Agriculture Reduction	47	$2,053,566	0.9 %
75% Agricultural Reduction	71	$3,080,350	1.4 %
50% Agriculture Reduction and 10% Education Reduction	62	$3,448,923	1.5 %
Recreational Water Use Sector			
10% Golf Community Reduction	77	$9,625,708	4.3 %
20% Golf Community Reduction	154	$19,251,416	8.6 %
Baseline (Total, from Table 8)	1607	225,859,214	(100 %)

Outmigration Scenarios	# of jobs	
Outmigration: any cost increase	~15	$3,509,462 (1.6 %)
Outmigration: $25/mo	~150	$30,275,150 (13.4 %)

The Draft GSP (Table 2.1-4) examined the population growth rate of Borrego Springs. Over the 20-year GSP planning period the projected growth is approximately 10 percent. The local economy is expected to grow approximately 10% over this time period commensurate with population growth. Occupations associated with this growth are unlikely to develop within agricultural businesses as water use reductions will have the greatest impact on irrigation dependent agriculture.

Successful adaptation of the community will require irrigation-related occupations and businesses to be replaced by those that are less water intensive. Certainty in the long-term water supply also results in stability in the real estate market that will support long-term population growth, and likely avoid economic stagnation.

6.0 SUMMARY

Borrego Springs is a small, unincorporated, census-designated community without a local government. The community is considered to be severely disadvantaged (SDAC) based on income and is located in an economically distressed area (EDA). The groundwater-dependent Borrego Springs community is facing water use reduction of ~75% under SGMA over the next 20 years. There are no viable opportunities for water import. Current water use is distributed as approximately 72% agricultural (farmland irrigation), 18% recreational (golf course irrigation), and 10% supplied by the Borrego Water District for residential and commercial use. The percentages, as explained in the Draft GSP, are based on Baseline Pumping Allocations (BPA) for each water use sector.

Water transfers facilitated by the water trading program described in the Draft GSP will be necessary for the community to adapt to water use reductions under SGMA. There will be new costs associated with the use of groundwater that include fees associated with groundwater management and costs for water obtained via water transfers. BWD will need to obtain water in addition to their BPA to maintain current water service to Borrego Springs residents, and to provide for future growth. The likely result of these transfers will be the retirement of irrigated farmlands and the loss of agricultural jobs. Substantial reductions in golf course irrigation will also be required that will impact the golf course communities.

The Draft GSP does not dictate how the water use reductions will occur. Instead it outlines a range of project management actions intended to work together to meet the sustainability goals described in SGMA. The purpose of this report is to examine impacts to the severely disadvantaged community while recognizing that chronic aquifer overdraft will continue during the 20-year SGMA attainment period. The following subsections summarize the main points of this Report.

6.1 BWD Cost and Rate Structure Uncertainty and Impact Analysis (Section 3).

SGMA-mandated water use reductions will increase the cost of water to BWD. Rate payers who comprise the bulk of the lowest income portion of the severely disadvantaged community have indicated in community surveys that water is already viewed as expensive, that no rate increase is considered acceptable, and that they will consider leaving Borrego Springs should water rates increase on the order of $25/month (LDC, 2019). Approximately half of Borrego Springs' households will incur water costs that are well above the threshold indicated by RFC Figure 3-2 (**Appendix F**, RFC, 10/14/2017).

Raftelis Financial Consultants has provided rate and cost studies to BWD that describe how the cost of water will increase under SGMA and have codeveloped financial strategies to lessen the cost impacts. Affordability under existing conditions is of concern to the lowest income households. BWD's multi-tiered rate structure may be further expanded to provide a reasonably affordable baseline water rate and support the human right to water for those served by the BWD[36].

Future water rates are subject to uncertainty. Some of the cost factors can be readily identified but actual costs are not fully known. Among the costs that are subject to uncertainty include:

- A Groundwater Sustainability Agency was formed in 2016 by the County of San Diego and the BWD to develop the GSP. Estimates for GSP administration are described in the Draft GSP. Some costs may be able to be recovered because the GSA does have the authority to levy fees for groundwater pumping to support their costs. A significant portion of the costs have been supported by a Proposition 1 Grant. Additional grant funding may be available; however, future 'outside' funding is uncertain. The County of San Diego has been an active participant in the GSP process and has contributed significant resources to date via Proposition 1 finding; however, the MOU[37] is limited to GSP development and does not obligate the County to support the 20-year GSP process.

- Cost of water obtained through water trading. RFC (10/14/2017, **Appendix F**) provides an initial estimate of potential costs to develop an estimate of future rates, but significant uncertainty remains until the water market is fully developed. Water will be also needed for future development of undeveloped parcels within BWD's service area.

- Overdraft impacts. Water supply wells throughout the Subbasin have been and will continue to be affected by chronic overdraft that will likely continue to varying degrees until the end of the GSP compliance period. From a BWD rate and cost perspective continued overdraft may trigger the need for well replacement due to loss of production or degraded water quality. Degraded water may also lead to the need for water treatment, and expense that has not been realized to date and has generally not been factored into BWD financial projections.

  A well by well analysis is summarized in **Section 3.7** that illustrates how overdraft costs can affect BWD's rate and cost structure. BWD has 9 wells available for water production. Two are experiencing water level declines that will likely cause the wells to no longer be viable. Water quality can also cause wells MCLs are exceeded and those wells with elevated arsenic cannot be taken out of service, the MCL for arsenic was exceeded in one well, and had been above half the MCL in two others, but has since declined.

- Well Replacement/ Water Supply Expansion. Future municipal growth due to land development or expanded commercial activity will likely require BWD to add water supply wells. Projections by Dudek and RFC support the need to expand from ~1,600 AFY to at least 2,200 AFY. Currently well ID4-4 is scheduled for replacement and the new well is

[36] For example, the municipal BPA includes 385 AFY currently allocated to Human Right to Water demand as further described in Section 3.

[37] "This MOU is entered into by the Parties for the purpose of establishing a cooperative effort to develop and implement a single Plan to sustainably manage the Borrego Basin that complies with the requirements set forth in the Act and its associated implementing regulations." https://www.sandiegocounty.gov/content/dam/sdc/pds/SGMA/101916ag01SignedMOU.pdf

anticipated to have a higher production capacity and increased hydraulic efficiency. New well locations have also been under discussion and a Dudek report dated 12/21/2018 summarize a recent analysis. Included in the analysis are considerations for the how new wells can work with the existing distribution network. Movement of water across BWD's service area is constrained by the system hydraulics and pipeline capacities that reflect the interconnection of previously independent water companies now described as Improvement Districts.

The probability of well failure and the time required for well replacement are reasonably known to the BWD. These costs have been and will continue to be included in BWD's capital improvement plans and represent events that can generally be planned for based on routine well testing and ongoing observations.

- Water Treatment. Water treatment is currently not needed so treatment costs are currently not included in BWD's financial planning. As indicated by the analysis in **Section 3.7**, the potential for MCL exceedances is associated with a portion of BWD's water supply.

- The probability of well failure due to water quality degradation is subject to uncertainty. Establishment of water treatment equipment and processes is a capital improvement that requires time for BWD to fund and implement. The lead time required to set up water treatment or facilitate water replacement depends on the well location within the distribution system and the relative contribution of the well (or wells) to the overall water supply. These costs have been not included in BWD's operation or capital improvement plans to date and represent events that have a high cost impact but currently considered to be of low probability.

- Comparison of the potential costs of physical well failure versus loss of use due to water quality can be posed in terms of expected value where the potential cost is equal to the probability times the cost. This can be done by combining the relative risks of well failure as outlined in **Tables 5** and **6**, together with RFC's BWD financial model that is used to develop water rates (RFC, 3/28/2016; **Appendix F**). The use of RFC's financial model will allow for the development of long-term water treatment costs based on financial strategies available to BWD.

  In closing BWD has been and will continue to work with RFC, Dudek, and others to examine future demand, rates, rate affordability, and financial planning options. This work will evolve as overdraft impacts are managed under the GSP, and as water costs such as those associated with the water trading market become realized.

6.2 SGMA/Environmental/Societal/Government Impacts (Sections 4 and 5)

This section of the Report builds on the community description included in ENSI (4/15/2019). An overview analysis of SDAC impacts was summarized from the ENSI report that explains the basis for the scenarios evaluated using the model.

6.2.1 Economic (~75% water use reduction in water use)

The following scenarios were evaluated using an economic model (IMPLAN) to examine community-wide impacts and changes that will result from SGMA-mandated water use reductions:

- Loss of agricultural jobs. 50% and 75% reductions were assessed that involve ~ 1 to 2% of the local economy.

- Loss of multiple golf course community-related jobs due to loss of associated economic activities. 10% and 20% reductions were assessed for losses in jobs associated with accommodations and food, recreation, and real estate. The potential loss of these multiple economic activities involves ~ 4% to 8% of the local economy.

- Outmigration of a portion of the lowest income population. Substantial outmigration, in this case associated with the loss of ~150 jobs, represents a loss of ~13% of the local economy. Loss of residents will also impact the ability of seasonal businesses to staff and operate.

- Relative assessment of the role of middle class/ small business owners to the Borrego Springs community. Much of the gross regional product is dependent on small business. Outmigration of those integral to small business would have far-reaching community impacts.

All of these scenarios are negative in that they do not assume or account for off-setting economic growth. Tourism and seasonal (winter) residents represent the dominant economic activities and have the greatest potential for future expansion, community stabilization, and community adaptation.

Economic modeling was not conducted relative to appraised real estate values. It is noted that municipal users provided water by BWD represent approximately $300,000,000 out of approximately $340,000,000 in County-assessed property values in the Borrego Valley. BWD's service area includes undeveloped residential and commercial properties that represent future water demand and future economic activity that will be necessary to offset, for example, agricultural job losses. Locally, the economy of Borrego Springs depends on tourism and 'outside money'- retirement pension and welfare support. Predictable and relatively affordable water rates are necessary to maintain a stable population, healthy real estate market, and associated property values.

6.2.2 Societal

Borrego Springs is an unincorporated community. Nearly all of their public services and institutions are supported the County or State, or are self-supported by the local population. Of all the various institutional and organizations, the most vulnerable to population loss is the school district because its funding is directly linked to the number of school aged children that attend the public schools. From an SDAC viewpoint, access to public education is key to educational attainment and socioeconomic status (SES) mobility.

Loss of jobs and/or excessively high water rates have the potential to cause the outmigration of younger families that would reduce the number of students at the elementary and high school levels. Perhaps the most vulnerable service provided to the Borrego Springs community is the high school. For many years students were bused to Julian to attend school. The opening of the high school in Borrego Springs marked a major milestone in the education services to the community. Loss of pupils could force consolidation or eventually closure if the District is no longer able to meet the requirements of State educational standards. By one estimate, the loss of 50-60 agricultural workers with children could equate to a 20% loss of students for the district[38].

6.2.3 Potential Mitigation

A 20-year SGMA compliance period does provide time for the community to adapt. Successful adaptation means that the community is not destabilized and there is job and local economic replacement. While it is recognized that agricultural products exported from the Borrego value provide regional economic benefits, local effects of the loss of agriculture are primarily due to job loss. New local business opportunities are necessary to offset these job losses.

A significant challenge to job replacement is the seasonality of the Borrego Springs economy. For example, staffing at hotels or recreational facilities peaks in the winter and these sorts of jobs are not sufficient to support families or household on a year-round basis. Golfing and agriculture activities are also subject to seasonal variability.

Water rate impacts to the lowest income portion of the severely disadvantage community can, in part, be addressed by BWD through the use of a tiered rate structure as described by RFC (3/28/2016, **Appendix D**). BWD and others also have access to State funding intended to support the severely disadvantage community.

[38] Personal communication from Martha Deichler, School Community Liaison, Borrego Springs Unified School District, October 1, 2018

6.3 Concluding Remarks

Water use will need to be reduced to roughly one quarter of current use over the next 20 years under SGMA. Independent of SGMA, chronic overdraft has cause direct impacts on water quality and quantity. Groundwater overdraft conditions have existed for decades, and the need to sustainably manage groundwater has been the subject of ongoing debate and discussion within this desert community. Successful response and adaptation of the Borrego Springs community to reductions in groundwater use will give rise to fundamental changes in the community character.

Irrigation for farmlands and golf courses is the primary focus of water use reduction, yet farming and golfing have long been part of the community. The transition to less water use will require the community to become less dependent on irrigation-based activities. From an economic and social perspective this will require replacement of the irrigation-dependent jobs and activities with those that can thrive within the community. Borrego Springs has been and will likely continue to be seasonally active as the gateway to the Anza Borrego State Park and supportive of those who choose to enjoy the wintertime climate of the desert.

Uncertainty specific to the water supply is primarily addressed in the Draft GSP by ongoing monitoring and management of pumping reductions and resulting aquifer response to ongoing overdraft. Significant uncertainties remain regarding water trading costs and potential degradation of water quality. Water treatment is not currently required. Specific to water quality a defensive posture will be required to obtain 'early warnings' of what currently constitutes as low probability/high consequence need to implement water treatment. Additional work is also necessary to better understand how water quality changes with depth and to understand sources and causes of water contaminants such as arsenic and sulfate.

Of highest concern are the vulnerable lowest income subpopulations within the severely disadvantaged community (SDAC). Future water rates for BWD customers are not the sole concern given their relatively low income. Looking toward the future, economic growth and improved occupational opportunities are necessary for the community to adapt to the fundamental changes necessary to reduce water use.

7.0 ACKNOWLEDGEMENTS

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This work was done under Task 3 of the Proposition 1 Grant Agreement. It is based on work done by Dudek and Geosyntec to develop the Groundwater Sustainability Plan (GSP). Much of the underlying data used in this Report was provided by Dudek staff during development of the GSP, and community data obtained and developed by LeSar Development Consultants.

In closing we would like to thank the County of San Diego and the Borrego Water District for their facilitation and support of this work conducted under the Proposition 1 Grant. We also fully appreciate the professional support and cooperation of the people working with the multiple companies that are support the GSA including LeSar Development Consultants, Dudek, Geosyntec Consultants, and Raftelis Financial Consultants.

Appendix A:
Grant Agreement Scope

EXHIBIT A
WORK PLAN

Project Title: San Diego County GSP Development (Project)

Project Description: The Grantee's Project shall: 1) identify vulnerabilities and potential impacts from the GSP process on the SDAC in Borrego Valley; 2) assess programmatic level environmental impacts from implementation actions identified in the GSP; and 3) prepare a GSP. Although, the Project will cover the entire Borrego Valley Groundwater Basin (BVGB), the focus will be the Borrego Springs Subbasin (Subbasin) rather than the Ocotillo Wells Subbasin since the latter is not overdrafted and minimally developed.

Component 1: Grant Administration
Category (a): Grant Management, Invoicing, and Reporting
Manage and administer the Project. Prepare and submit invoices to DWR, track progress and schedule, and manage contracts and budgets associated with the Grant Agreement. Administer and track contracts with consultants or other agencies that are necessary to complete tasks in the Work Plan and compile the required invoice back-up information. Conduct administrative responsibilities associated with the Project such as coordinating with partnering agencies and managing consultants/contractors including coordination of conference calls/meetings as needed.

Compile quarterly Progress Reports and invoices for submittal to DWR. Progress Reports will be prepared in accordance with Exhibit F. Invoices will include backup documentation. For each component, backup documentation will be collected and organized by category, along with an Excel compatible summary document detailing the contents of the backup documentation.

Prepare draft Component Completion Reports for Components 2 and 3 and submit to DWR for the Project Manager's comment and review no later than 90 days after work completion. Prepare a draft Grant Completion Report and submit to DWR for the Project Manager's comment and review no later than 90 days after work completion. Prepare the final Component Completion Reports and Grant Completion Report addressing the Project Manager's comments and submit to DWR in accordance with the provisions of Exhibit F.

<u>Deliverables:</u>
- Environmental Information Form (EIF)
- Progress Reports
- Invoices and associated backup documentation
- Final Component 2 and 3 Grant Completion Reports
- Final Grant Completion Report

Component 2: Borrego Valley SDAC Impact Assessment/Environmental Planning
Provide support for the GSP and projects in the Subbasin by identifying vulnerabilities and potential impacts from the GSP process on water supply, accessibility, and usage, as well as assessing environmental, economic, cost, governance, and infrastructure concerns. The deliverables produced support the GSA's work by providing reference materials that will aid GSP planning and implementation outreach and decision-making efforts.

Category (a): Planning/Environmental Documentation
Task 1: SDAC Engagement
Establish community characteristics baseline data on SDAC rate payers and the economic structure of Borrego Valley and provide an overview of GSP planning activities to date and an update on engagement efforts.

Deliverables:

- Summary Report: Community Characteristics
- Summary Report: SDAC Engagement
- Summary of activities included in Progress Report(s)

Task 2: SDAC Impact/Vulnerability Analysis
Understand implications that the implementation of SGMA will have on the SDAC including impacts based on potential water reduction scenarios by analyzing baseline data and identifying the primary vulnerabilities of the SDACs within each subarea.

Deliverables:

- Summary Report: Baseline Water Use
- Summary Report: Water Supply Impact/SDAC Vulnerability/SGMA Impacts Analysis

Task 3: Decision Management Analysis
Develop tools to allow the Borrego Water District (BWD) to look at potential water supply situations that may directly impact groundwater users in Borrego Springs, assess the probability of the water supply situations occurring, and make decisions accordingly. Assess the potential range of outcomes of the groundwater extraction restrictions that will allow the BWD to look at water supply situations, such as the potential need for water treatment, or loss of individual supply wells due to ongoing groundwater overdraft and be able to assess its probability of occurring. Assessment of the potential range of outcomes of the groundwater extraction restrictions using Monte Carlo simulation methods and alike. Analyses will be performed of the potential impacts of various water reduction scenarios on the SDAC, rate payers, and BWD infrastructure. A larger scale impact assessment (SGMA/Environmental/Societal/Government Impacts) will be developed that examines community-wide socioeconomic impacts and changes that will result from the GSP.

Deliverables:

- Summary Report: Water Supply Uncertainties
- Summary Report: Monte Carlo simulation model
- Summary Report: Cost and Rate Structure Uncertainty and Impact Analysis
- Summary Report: SGMA/Environmental/Societal/Government Impacts

Task 4: Well Metering
Refine groundwater extraction data, particularly for agricultural use, that is being pumped within the Subbasin. Well meters will be installed on non-de minimis production wells within the Subbasin of the BVGB.

Deliverables:

- Meter Installation and Calibration Report

Task 5: Water Vulnerability/New Well Site Feasibility Study
Assess water supply vulnerability and determine a new well site to provide potable water to the SDAC in Borrego Springs via the BWD. Once alternative well locations are identified and prioritized, a test well will be drilled to identify geologic and hydrogeologic conditions of the selected location including lithology and borehole geophysics. The test well will be drilled to the depth of optimal supply quantity expected (possibly up to 1,000 feet) and evaluated for production capacity, aquifer properties, and water quality parameters. Upon completion of the evaluation, the test well may be utilized as a production well for BWD, if appropriate. Complete environmental review pursuant to CEQA and procure necessary permits as set forth in Paragraphs 14 and D.7 of this Agreement.

Deliverables:

- Summary Report: Well Ranking System
- Summary Report: Updates on WaterCAD hydraulic modeling files
- Well Installation Report

- Monitoring Plan for the newly installed well
- EIF, all necessary California Environmental Quality Act (CEQA) documents, permits, and access agreements to construct test well as applicable

Category (b): Environmental Planning
Prepare the appropriate CEQA analysis and programmatic documentation, anticipated to be an EIR, for the tasks identified in the GSP that will aid GSP planning. No costs to be reimbursed with grant funds for Component 2, Category (b) may be incurred prior to the adoption of the GSP by the GSA.

Task 6. Project Description, Initial Study, Notice of Preparation, and Scoping
Prepare a project description, which forms the basis of analysis of potential impacts in the EIR. The Notice of Preparation (NOP) will be prepared consistent with CEQA Guidelines and include a completed Initial Study checklist attached to the NOP.

Deliverables:

- Project Description
- Initial Study and NOP

Task 7. Draft EIR, Notice of Availability, and Notice of Completion
Prepare a Draft EIR, Notice of Availability, and Notice of Completion. The EIR will focus on the issues that are identified to have potentially significant impacts in the Initial Study. The EIR will include all contents required by County requirements, the CEQA statute, and State CEQA Guidelines.

Deliverables:

- Draft EIR
- Notice of Availability
- Notice of Completion

Task 8. Final EIR
Review and respond to comments received on the Draft EIR. This task will also include preparation of CEQA Findings of Fact (Finding), Mitigation Monitoring and Reporting Program (MMRP), Notice of Determination (NOD) and, if necessary, a Statement of Overriding Considerations (SOC).

Deliverables:

- Final EIR
- CEQA Findings
- Mitigation Monitoring and Reporting Program
- Notice of Determination
- Statement of Overriding Considerations (if necessary)
- Environmental Information Form for subsequent implementation actions identified in an adopted GSP

Component 3: Borrego Valley GSP Development
Category (a): Planning Activities
Task 1: Advisory Committee Meetings and Public Hearings
Participate in advisory committee meetings throughout GSP development and attend public hearings at key milestones in the process.

Deliverables:

- Summary of activities and meetings included in Progress Report(s)

Task 2: GSA Coordination Meetings
Coordinate GSA activities with consultants and partner agencies to develop GSP components and collaborate on appropriate projects and management actions to achieve sustainability within the Subbasin.

Deliverables:
- Summary of activities and meetings included in Progress Report(s)

Category (b): GSP Development
Task 3: Data Management System, Data Collection and Analysis
Develop a data management system (DMS) that can store information to support development and implementation of the GSP, as well as continued monitoring of the Subbasin and sustainability tracking. Conduct semi-annual water level monitoring and groundwater quality sampling of wells located in areas where pumping and water-level decline are greatest.

Deliverables:
- Summary of the DMS

Task 4: GSP Development
Prepare a GSP for the BVGB that meets SGMA regulations and DWR requirements. Provide summaries of GSP development activities within the Progress Reports. The GSP will include, at a minimum, the sections outlined below:

1. Administrative Information
   Prepare the Introduction section of the GSP. Components of this task includes defining the Purpose of GSP, establishing Sustainability Goal, providing Agency Information, and discussing GSP Organization.

2. Plan Area and Basin Setting
   Identify the geographic area covered by GSP and develop a description of the area. Evaluate the existing monitoring network and providing recommendations on expanding the network and developing an ongoing monitoring program to include water level monitoring and water quality sampling throughout the GSP implementation phase.

3. Water Budget and Hydrogeologic Model
   Develop a water budget and create a hydrogeologic conceptual model to be included in the GSP. Update the United States Geological Survey Numerical Model for the basin.

4. Sustainable Management Criteria
   Prepare the Sustainable Management Criteria section of the GSP. Components of this task include establishing a Sustainability Goal, defining Undesirable Results, determining Minimum Thresholds, establishing Measurable Objectives, and preparing a section on Monitoring Network.

5. Project and Management Actions to Achieve Sustainability Goal
   Prepare the Projects and Management Actions to achieve the identified Sustainability Goal and interim goals. Projects and management actions will be identified and Project Descriptions will be provided.

6. Plan Implementation
   Prepare the Plan Implementation section of the GSP. Components of this task include the Estimate of GSP Implementation Costs, Schedule for Implementation, Annual Reporting, and Periodic Evaluations.

7. Final GSP
   Review public comments, drafting responses to public comments, and finalizing the GSP.

Deliverables:

- Summaries of activities included as attachments in the Progress Reports
- Final GSP
- Proof of final GSP submittal to DWR

Task 5: Well Permitting
Perform adequate revisions to the County's well permitting process for Borrego Valley.

Deliverables:

- Revised Well Permitting Requirements

Appendix B:

<u>Mann, 6/2/2014</u>.

Economic Costs of Borrego Valley Aquifer Overdraft.

Prepared for: California Department of Water Resources and Borrego Water Coalition

Prepared by: Roger Mann, PhD RMann Economics.

Economic Costs of Borrego Valley Aquifer Overdraft

For: California Department of Water Resources and Borrego Water Coalition

Roger Mann, PhD

RMann Economics

June 2 2014

Thanks to Dorian Fougeres (CSUS), Timothy Ross (DWR), Claudia Faunt (USGS), Jerry Rolwing (BWD) and members of the Borrego Water Coalition for their helpful participation and comments.

Economic Costs of Borrego Valley Aquifer Overdraft

This memorandum develops estimates of the economic value of reducing withdrawals from the Borrego Valley Basin by one acre-foot (AF). This economic benefit can be attributed to any AF of reduced overdraft or increased recharge. The economic value includes avoided costs associated with a lower groundwater table including: energy, well efficiency and well drilling costs, water quality, habitat loss, and subsidence. Then, the economic value of water saved for future use is included. Loss of mesquite habitat and other avoided costs such as subsidence are not considered quantitatively in this analysis. That does not mean there are no probable economic impacts from habitat loss or subsidence. Rather, it is beyond the scope of this study to forecast what such costs might be.

Summary

This memo provides an economic benefit associated with the elimination of overdraft in the Borrego Valley on a per acre-foot (AF) basis. Economic concepts are introduced. Then, discounting is used to estimate the present value of future costs that could be eliminated if overdraft ends. Overdraft costs that could be eliminated are

- Increased energy costs from pumping lower groundwater tables.

  The benefit of eliminating this cost is estimated to be worth $36 to $129 per AF of overdraft eliminated, depending on the discount rate and rate of groundwater decline.

- Loss of wells when groundwater tables fall below well intakes

  The benefit of eliminating this cost is estimated to be worth about $9 per AF. About half of the benefit is associated with new BWD pumps and distribution required by 2040.

- Water quality and water quality treatment costs

  The benefit of eliminating this cost is estimated to be worth about $10 per AF of overdraft eliminated. Most benefit involves the avoided cost of advanced treatment required by 2050.

- Subsidence and environmental costs

  The benefit of eliminating this cost could not be quantified.

- The opportunity for use of the water to support development later

This benefit cannot be counted if the aquifer must remain in a steady-state condition indefinitely. If water saved for 50 years can be used to provide water for development, the benefit of future development could be over $1000 per AF in present value terms, depending on discount rate and assumptions regarding the amount of benefit from new regional spending.

Total estimated benefit is $63 to $148 per AF if the saved water can never be used, and $500 to $1500 if the saved water could be used to support residential development in 50 years. All of these estimates are uncertain. Additional forecasting and cost estimating might improve the quality of the estimates.

Introduction

The costs of Basin overdraft, or the benefits of stopping overdraft, are important issues for Borrego Valley residents and water users and the local economy. Currently, the rate of water withdrawal is three to four times the rate of natural recharge, and the groundwater table is declining at an average rate of about 2.7 feet per year for the Basin as a whole. Since the volume of groundwater in storage decreases with depth, it is expected that basin-wide rates of water level decline will increase (USGS 2014). The groundwater decline increases unit-pumping costs, and the decline may be associated with water quality degradation, land subsidence, and loss of natural habitat. As water levels drop below the intake perforations in a well, the well must be abandoned and a new well may be required to meet demands. Wells may also go out of service due to declining water quality.

The Borrego Valley groundwater system consists of three aquifers: the upper, middle, and lower aquifers. The three aquifers, which were identified on the basis of the hydrologic properties, age, and depth of the unconsolidated deposits, consist of gravel, sand, silt, and clay alluvial deposits and clay and silty clay lacustrine deposits (USGS, 2014). Later this century, if overdraft continues, the more permeable parts of the system will be dewatered. The lower parts of the aquifers may be less desirable for water supply because of worse water quality, and because permeability and storage properties likely resulting in a decrease in potential well capacity. The specific yield of the aquifer system decreases rapidly with depth (USGS 2014). If existing wells cannot produce at their current capacity, then additional new wells may have to be drilled to meet demands.

If overdraft is not corrected, these costs are expected, but it is also expensive to reduce overdraft. Costs and benefits of aquifer overdraft can be compared to help decide if actions to reduce overdraft are warranted on an economic basis. This memo provides a summary of quantifiable overdraft costs that can be used to help justify corrective actions.

This assessment is essentially a long run forecast, Therefore, climate change could be important. The economic impacts of climate change on the economics of water supply are beyond the scope of this study. Generally, the analysis presumes that historical climate is a reasonable example for the future.

Background

There is a long history of economic theory in relation to aquifer depletion (NRC, 1997; Strand, 2020; Job, 2009). It is generally recognized that groundwater can have common property characteristics, and pumping can have externalities (costs that are not incurred by the pumper), that together can lead to extraction at higher-than economically optimal extraction rates. Common property means that the resource is used in common by many users. In California, outside of a court-determined adjudication of water rights, no user can presently limit the amount of extraction by another user.

External effects of groundwater pumping include declining groundwater levels, but may also include subsidence, water quality, or environmental costs. If the groundwater supply is finite (may not be replenished) as is the case for a basin in continual overdraft, then groundwater use now subtracts from the finite supply available for all future uses. Opportunity cost is the benefit of future use lost because the water is consumed now.

Each user does not experience the costs they impose on others, so each user has no incentive to reduce their use in consideration of the external costs. These inefficiencies provide economic rationale for regulatory measures to encourage sound management of groundwater basins in California.

Groundwater depletion can be thought of as a property rights problem. In western economics, goods can be allocated efficiently by markets if, among other things, the property right is exclusive. This means that others can be excluded from using it. In California,

> overlying land owners may extract percolating ground water and put it to beneficial use without approval from the State Board or a court. California does not presently have a permit process for regulation of ground water use. In several basins, however, groundwater use is subject to regulation in accordance with court decrees adjudicating the ground water rights within the basins.
>
> The California Supreme Court decided in the 1903 case Katz v. Walkinshaw that the “reasonable use” provision that governs other types of water rights also applies to ground water. Prior to this time, the English system of unregulated ground water pumping had dominated but proved to be inappropriate to California’s semiarid climate. The Supreme Court case established the concept of overlying rights, in which the rights of others with land overlying the aquifer must be taken into account (SWRCB, 2014)

The concept of overlying rights is associated with the concept of correlative rights, meaning that each landowner is entitled to a share of the available supply defined as the “safe yield” or average annual natural recharge rate. Despite this concept, except in areas of the State where groundwater rights are adjudicated, groundwater pumping has generally been unregulated in California.

It is useful to imagine an aquifer owned by just one person, and assume that all effects of groundwater extraction are experienced by that person. Then, this owner would consider all externalities in their decision regarding how much to pump. That is because there is no one else to pay the costs of that person’s extraction. The rate of extraction should be economically optimal, at least from their own perspective. This example shows that aquifer overdraft is not necessarily an economic problem. If all overlying landowners can act in common, as though they are one property owner, then they may decide to extract groundwater at an economically optimal rate.

Analysis Framework and Assumptions

Planning Horizon

This economic analysis estimates increased costs caused by continued overdraft of the aquifer going forward. These costs are estimated for each year of a one hundred year planning horizon, 2014 to 2113. Then, these costs can be discounted and summed to one equivalent cost in 2014 using net present value (NPV). Then, this NPV cost can be annualized, that is, expressed as one annual cost, which has the same NPV over one hundred years as the original one-hundred year time series of depletion costs. The analysis first expresses all costs in current, real (inflation-free) dollars, and then they are discounted and annualized using the same discount rate.

For planning purposes, this analysis assumes an economically useful life for the remaining water in the Basin is 100-years. This assumed 100 years economic life of the Basin is the assumed planning horizon.

The analysis uses the same water use assumptions as used in the detailed actions analysis which are all from BWD (2013). Total 2013 planned use is 19,833 AFY, natural recharge, from USGS (2014) is 5,600 AF per year, so overdraft is 14,233 AFY. Total costs are divided by this overdraft estimate to obtain the cost per AF of overdraft.

Discount Rate

The social discount rate (SDR) is defined as the rate at which people are willing to forgo current consumption for future consumption. The SDR is positive because people invest and lend money, giving up current consumption, receive dividends and interest, and end up with more money to spend later. Real interest rates, being the observed interest rate less the rate of inflation, are often used as a measure of the SDR.

The selection of a discount rate is not a trivial matter; books have been devoted to that subject. There are three major methods that guide the calculation of an SDR: (1) social rate of time preference (SRTP), (2) social opportunity cost of capital (SOC), and (3) shadow price of capital (SPC).The appropriate discount rate may depend on perceived risk. Risky investments demand a risk premium. The best rate may depend on whose benefits or costs are being discounted. In general, discount rates associated with private investors are among the highest; investors expect risk-free real return rates of 5 percent or more. Some have argued that discount rates involving benefits and costs across generations should be very low; perhaps 0 to 2 percent.

A range of 2 to 4 percent is used for this analysis. Results are calculated and displayed at 2, 3 and 4 percent.

Rate of Groundwater Decline

CSDDPLU (2010) states

> Between 1945 and 1980, water levels declined by as much as 100 feet, due to more water being extracted than was being replenished (USGS, 1982).

This works out to be more than 2.8 feet per year.

CSDDPLU (2010) reviews data from eight monitoring wells and finds

> From 1998 to 2006, water level declines have averaged 2.4 feet per year, which is roughly twice the rate of decline measured in the 1980s. This is likely primarily due to the increased extraction rates that are occurring compared to extraction in the 1980s.

The 2014 rate of decline is assumed to be 2.7 feet per year. Under current pumping rates, the rate of decline is expected to increase as the volume of water remaining in storage and the permeability and specific yield of the aquifer declines with depth (CSDDPLU, 2010). To illustrate this more rapid decline, it is assumed that the rate of decline will increase by 1 percent or 2 percent per year. This range is believed to be representative of current trends in the basin. Under the 1 percent assumption, the rate of decline reaches 4 feet per year by 2053, and 6 feet by 2094. A sensitivity analysis is provided with the rate of decline increasing by 2 percent per year. Under the 2 percent assumption, the rate of decline reaches 4 feet per year by 2033, 6 feet by 2054, and 10 feet by 2018.

Electricity Costs and Rates

Most electricity used for pumping is purchased from San Diego Gas and Electric. Most groundwater users pay business rates. Some pumpers pay time of use (TOU) rates, pumping water at night when rates are lowest and storing water in holding tanks for distribution during the day when water demands are highest.

Assumptions were obtained by reviewing SDGE rate sheets for commodity rates during summer (SDGE, 2014). The on-peak, semi-peak and off-peak rate during summer is currently about $0.11, $0.09 and $0.07 per kwh, respectively. It is assumed that pumpers pay an average of $0.08 per kWh under current conditions, and the real price of electricity increases 2 percent per year. This is consistent with long-term trends, and groundwater depletion, by limiting the instant rate of groundwater withdrawal, might force more pumping into the higher-cost time of use brackets.

Water Quality

Overdraft may cause the concentration of a variety of undesirable water quality constituents to increase in the future. Salinity, measured as increasing tds, is declining in the region. This decline is estimated to be 1.67 mg/l per year. It is not clear that this decline is caused by overdraft, or if other factors may be contributing. However, it is assumed that the increasing tds would cease with overdraft.

Table 1.
Production Well Water Quality, 2007 to 2013, in mg/l tds

Year WELL #	2013 tds	2007 tds
ID1-8	500	430
ID1-10	280	250
ID1-12	270	260
ID1-16	280	320
WILCOX	230	210

ID4-4	330	320	
ID4-10	500	490	
ID4-11	340	390	
ID4-18	620	590	
Average	372.22	362.22	
Decline per year			1.67

The Lower Colorado River Basin Water Quality Model, a salinity economics model used for Southern California studies, which includes residential, commercial, industrial and other salinity costs, results in a benefit of $0.15 per milligram per liter (mg/l) of tds per household per year. That estimate is applied here to 2,611 housing units as reported by the 2010 Census of Population and Housing (USDC, 2010).

Number of wells and well replacement

Aquifer depletion will increase well costs as the water level falls below levels that wells are designed to draw water from. An explicit estimate of BWD well costs are included in some scenarios. Brecht (2014) estimated that the BWD south pumps will be replaced with north pumps at a cost of $2 million in 2039, (2014 dollars), and the distribution system will need to be modified at a cost of $3 million in 2040. No new O&M is included for the new wells and distribution system because the O&M for the old system will no longer be required.

In addition, to cope with drinking water standards, advanced wellhead treatment may be required at a cost of $10 million. This wellhead treatment, assumed to be required in 2049, presumes that brine can be disposed of economically under Federal and State permitting laws at that time. Additionally, the incremental operating and maintenance (O&M) costs and amortized repair and replacement (R&R) costs for the wellhead treatment is assumed to be $500,000 annually, starting in 2049.

BWD (2001) found that

> Today, the agricultural area (predominantly north of Henderson Canyon Road) operates approximately 50 wells. Golf courses operate approximately eight wells for irrigation. Domestic water supplies for the Borrego Springs Park Community Service District and the Borrego Water District are pumped from 14 wells. Individual domestic wells total in the neighborhood of 50.

It is assumed that there are a total of 108 affected wells, which does not include the BWD wells. It is assumed that, without groundwater level declines, the average life of these wells is 50 years. With groundwater decline, the average life is decreased to 30 years. The average cost for drilling new irrigation/golf wells and small domestic wells is assumed to be $75,000 and $15,000, respectively.

Subsidence

Pumping more than is recharged can sometimes cause irreversible land subsidence that damages above and below ground infrastructure and diminishes the capacity of aquifers to store water for the future (compaction). Brecht (2013) suggested that $12 million in subsidence costs might be expected in the future due to the low probability of a large amount of subsidence/compaction with continued water level declines (USGS, 2014). Based on data presently available concerning this Basin, there may be some subsidence costs, but it is beyond the scope of this study to establish the probability and potential costs of future subsidence. No subsidence costs are included in the analysis.

Environmental costs

Mesquite bosque is an unusual habitat sustained by relatively shallow groundwater levels. CSDDPLU (2010) states

> With the exception of the southernmost mapped habitat where recent groundwater levels have been relatively static, groundwater levels been declining at a rate of approximately 1 to nearly 3 feet per year. It is likely that as groundwater levels continue to drop, portions of the mesquite bosque will not be able to adequately adapt and habitat will be permanently lost. Potential secondary affects could also negatively impact local residents, plants, and wildlife from dust storms resulting from topsoil that is left exposed when plants die off.

Most of the mesquite bosque habitat may be already lost. A quantitative analysis of the cost of loss of habitat is outside the scope of this analysis.

Value of water left in aquifer

The default analysis presumes that pumping could be reduced so that it equals the amount of recharge on average. In this condition, discharge (groundwater pumpage) would not exceed recharge. As compared to continued overdraft, the water left in the aquifer to eliminate overdraft would never be pumped and the aquifer would remain in balance.

However, an important benefit of not consuming a finite resource now is that it remains available for use later. This potential is especially important if the type of use of the water could be expected to change in the future.

A sensitivity analysis is provided where it is assumed that the water saved by eliminating overdraft would be available for residential development in the future. This saved water is the accumulated volume of water that is not pumped because overdraft is eliminated for 50 years. The future residential development has four benefits; 1) the net income enabled in the home construction industry, 2) the net income enabled by water sales, 3) the net incomes created by the local spending of the new residents, and 4) the willingness-to-pay of the new residents, above what they actually pay, for their new homes. This last benefit is not estimated for this report; the new homes would enable housing for some new residents who are not residents now.

The quantitative analysis associated with this sensitivity analysis is provided to be representative only. At this time, the potential future demand for development in the Borrego Valley cannot be forecast.

Annual overdraft ranges from about 19,000 to less than 5,000 acre-feet (USGS, 2014). The average annual overdraft has been estimated to be 15,000 AF per year (USGS, 2014). Using irrigated land water use assumptions developed for BWD water crediting (BWD 2013) the amount of overdraft is estimated to be significantly less, about 14,233 AF. If this overdraft is eliminated for 50 years, then 711,670 AF more remain in the aquifer. At 0.59 AF per household, this water could support 12,062 homes for 100 years. It is assumed that these homes would be built in 2063, priced at $250,000 on average (in 2013 dollars), and profit margin is 5 percent. The potential profit earned in 2063 is then $150 million.

Residential development would increase water sales. BWD 2014 rates are $2.09 per hundred cubic feet (hcf) in the low tier of water use, and $3.14 per hcf in the high tier. If the new homes take half of their water in each tier, then the average revenue per AF sold is $1,139. These revenues would be partly offset by the costs of providing the water supply. The cost of energy in 2063 is estimated to be $64.60 per AF, and the cost of new wells $61.20 per AF, and there would surely be additional costs to serve the new residents. Fundamentally, it is assumed that water net revenues could benefit from economies of scale; the new residences could be brought on-line at lower than average cost. It is assumed that the residential net benefit would be $800 per AF, less than the revenue minus variable costs (1,139.00 – 64.60 – 61.20) and new annual net income from water sales would then be about $5.7 million. This net revenue is received for the years 2064 through 2163. This represents a net income for BWD that could use to reduce rates for all customers taken together.

The new residents would bring new spending to the region, increasing retail sales, income and employment. There are no useful estimates. If each new residence creates $5,000 in regional net income per year, then the annual benefit would be about $60 million. This value is included in the sensitivity analysis.

Results

Results are summarized in Table 2 below. The analysis provides results in terms of dollars of benefit per AF of overdraft reduction for a large number of scenarios where the scenarios change assumptions about the physical effects of overdraft and the economic discount rate.

Table 2.
Economic Benefit per AF of Overdraft Reduction, $/AF

	Discount Rate		
Assumptions	**2%**	**3%**	**4%**
2.7 feet decline per year	$66.22	$48.69	$35.84
2.7 feet plus 1% decline per year	$89.21	$63.81	$45.69
2.7 feet plus 2% decline per year	$128.72	$89.11	$61.68
2.7 feet plus 1% decline per year			
With WQ cost $0.15/mg/l, 1.5 more/year	$91.31	$65.54	$47.13
Add new BWD pumps, distribution, 2039-40	$96.12	$70.60	$52.18
Add BWD advanced treatment, 2049	$104.12	$78.27	$59.16
Add non-BWD well life up from 30 to 50 yrs	$108.71	$82.63	$63.20
Add ability to sell saved water			
Build 12,062 new homes in 2064	$285.29	$217.19	$161.80
Include $5,000/home in annual net incomes	$1,683.08	$1,115.97	$724.87

First, results are provided assuming that the only effect of overdraft is to increase lift by 2.7 feet per year for 100 years, and associated pumping costs are increased. The benefit of reducing overdraft by one acre-foot (BROBAF) varies from $36 to $66 per AF depending on the discount rate. If the rate of decline will increase one percent a year because of reduced volume remaining and less specific yield in the remaining aquifer, then BROBAF increases, ranging from $46 to $89. If water levels decline even faster at the 2% increasing rate, then BROBAF ranges from $62 to $129.

The remainder of the scenarios assume that the rate of decline increases at the 1 percent rate each year. The additional residential water quality costs appear to make little difference, about $2 per AF, for the bottom line. The assumption that $5 million in new BWD well construction and distribution costs would be required in 2039 to 2040 also makes a small difference in results. The BROBAF increases to a range of $52 to $96 per AF. With the assumption of an additional $10 million in water treatment costs by 2050, with additional operating costs after that, and with the assumption of additional well costs for all private wells, the BROBAF increases to $63 to $109.

In the sensitivity analysis, if all the water saved over 50 years can be sold later to support residential development, then the BROBAF increases to a range of $162 to $285; $217 at the 3% discount rate. If each new home is assigned $5,000 in annual benefit for the regional economy, the BROBAF increases to $725 to $1,683.

The discount rate makes a huge difference for these estimates because of the assumption that the additional residential construction does not happen for 50 years. It is worth noting that, under the assumptions of this analysis, if overdraft is unchanged from current levels but water is provided for residential use, the apparent benefit per AF is $1,436, not including the potential spending benefit of $5,000 per home. The same benefit of building the same homes but 50 years later is only $217 per AF. The $1,436 benefit is large enough to cover costs of any of the detailed actions discussed in a separate measure. That is, if residential growth is at stake now, a large number of land retirement, water-conserving, and water supply measures might be economically justified.

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1. Detailed Actions Analysis

Regional effects discussion

2. Costs of Aquifer Overdraft

Roger Mann, PhD
RMann Economics

Today

- Review draft estimation methods and results for detailed actions analysis
- Take comments regarding methods, assumptions and presentation
- Discuss and take comments on regional effects discussion
- Discuss and take comments regarding costs of aquifer overdraft memo

Detailed Actions Analysis

Many assumptions required

- Assumption means a hydrologic or economic number that should be most-reasonable for representative case
- Essentially a forecast: most reasonable future
- Spreadsheets are structured so assumptions can be easily changed
- Assumptions not very uncertain or don't matter
  - Planning horizon: 100 years
  - Discount rate: 2 to 4 percent
- Most important assumptions:
  - ET: reference ET is 6.3 AF/A, crop coefficients are 0.5 to 0.66. Tamarisk?
  - Fate of AW-ET. Default assumes none to groundwater
  - Irrigation efficiency 0.7 to 0.8
  - Land prices, especially land other than citrus
  - Amount of acreage provided by willing sellers at price
  - Future population growth; assuming little

Detailed actions analysis is still screening level

- Estimate representative costs and supply from most promising actions
- Identify important economic and hydrologic uncertainties
- Given uncertainties, identify potential range of supply, cost and cost/af
- Compare cost-effectiveness across actions
- To move beyond screening level, need field-level measurement, hydrology, cost engineering

Discounting and Annualizing example

	Discount rate		3.00%		
Column>	B	C	D	E	
	Year or Row	Actual Cost	Annualized Cost	AF Supply	
	1	$5,000.00	$696.97	5	
	2	$100.00	$696.97	5	
	3	$100.00	$696.97	5	
	4	$100.00	$696.97	5	
	5	$100.00	$696.97	5	
	6	$500.00	$696.97	5	
	7	$100.00	$696.97	5	
	8	$100.00	$696.97	5	
	9	$100.00	$696.97	5	
	10	$100.00	$696.97	5	Formula
NPV		$5,945.30	$5,945.30		=NPV(0.03,C1:C10)
Annualized		$696.97			-PMT(0.03,10,5945.3)
$ cost per AFY		$1,189.06			+5945.3/5
$ cost per AF		$139.39			+696.97/5

Irrigated Land Retirement Assumptions and Results							
Agricultural acreage	**Share retired**	Cost /acre	Feet ET	Feet AW-ET	Total AFA	Cost/AFY	Cost/AF
Old stock citrus	50.0%	$13,200	4.10	1.16	5.25	$2,514	$98
Middle-aged citrus	25.0%	$17,200	4.10	1.16	5.25	$3,276	$127
Palm	50.0%	$31,200	3.15	1.35	4.50	$6,933	$269
Potato	50.0%	$21,200	0.80	0.34	1.14	$18,550	$721
Other acreage	**Acres**						
Tamasisk	46.1	$12,215			7.68	$1,592	$62
Golf turf	70.0	$8,000	4.16	1.78	5.94	$1,347	$52
Golf non-turf	95.0	$8,000	3.00	1.29	4.29	$1,867	$73
Golf turf not overseeded	300.0	$5,146	0.38	0.16	0.54	$9,530	$370
Municipal outdoor	61.4	$43,560	3.78	1.62	5.40	$8,067	$314
HOA outdoor	12.1	$43,560	3.78	1.62	5.40	$8,067	$314

Irrigation Efficiency Actions, AF Savings, Cost per AFY and cost $/AF			
Action	Savings	$/AFY	$/AF
Irrigation efficiency on remaining palm, potato and nursery acreage	389	$8,357	$325
Golf irrigation system management (physical and operational, 100 acres	113	$11,864	$461
Maximize citrus irrigation efficiency on remaining acres	230	$10,929	$425
Rehabilitate golf irrigation systems (130 acres)	178	$16,723	$650
Improve HOA irrigation efficiency on most of remaining	26	$28,637	$1113
Municipal landscape audits on most of remaining	133	$31,636	$1230

Floodwater and Wastewater Recovery Actions, AF Savings, Cost per AFY and cost $/AF			
Action	Savings	$/AFY	$/AF
Viking Ranch 150 acre stormwater project	300	$34,416	$1338
De Anza Country Club 24 acre stormwater project	154	$14,341	$557
Wastewater percolation ponds and water recovery	80	$7,475	$291

Sensitivity Analyses

	2009 AFY Baseline	Gross AFY Savings	Net AFY Savings	Million $ NPV Cost
Default assumptions	22,117	13,819	13,819	$81.81
Discount rate 2%, not 3%	22,117	13,819	13,819	$85.03
Share of (AW-ET) and stormwater reaching groundwater is 50%, not 0%	22,117	13,819	11,514	$81.81
No reduction in irrigated areas, maximize efficiency	22,117	3,458	3,458	$42.18

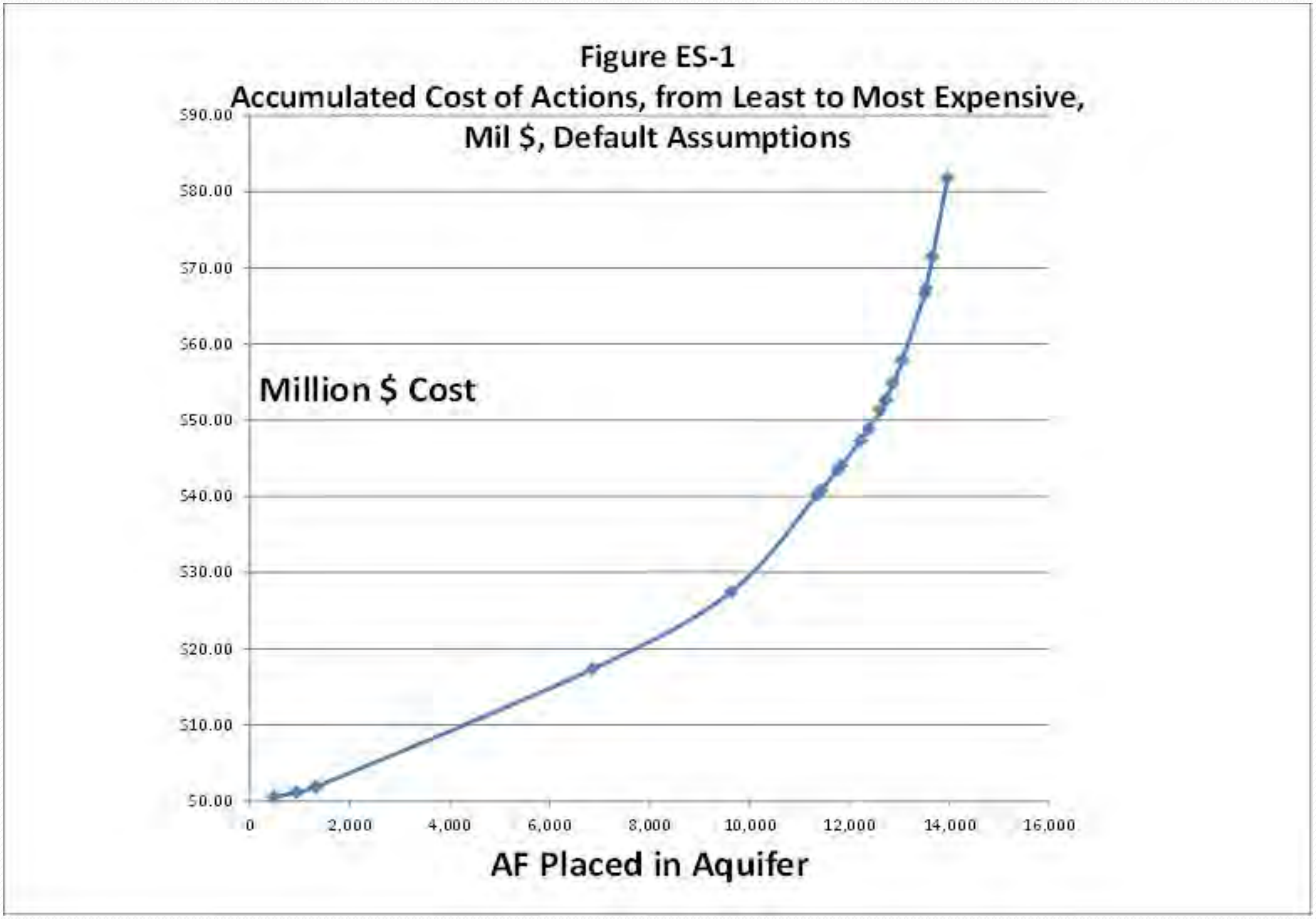
Figure ES-1
Accumulated Cost of Actions, from Least to Most Expensive,
Mil $, Default Assumptions
$90.00
$80.00
$70.00
$60.00
$50.00
$40.00
$30.00
$20.00
$10.00
$0.00
Million $ Cost
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
AF Placed in Aquifer

Findings

- There are no water import projects that appear to be feasible
- Projects to capture more local inflow may be feasible, but such projects appear to have high unit costs compared to most actions, and the potential amount of cost-effective water supply would not reduce overdraft much.
- Without actions to reduce irrigated area there is not enough potential water supply to substantially reduce overdraft.
- Some water use efficiency measures appear to have potential, but most efficiency actions appear to be relatively expensive.

Regional Economics

- Agricultural and golf land retirement or loss of net income could have adverse regional effects
- These effects are related to local spending caused by agriculture and golf
- Golf and citrus have similar gross revenue per acre
- Golf employment per acre appears to be 4 to 5 times more than citrus
- Golf attracts a substantial part-time resident population that spends
- Therefore, adverse regional effects associated with loss of golf acreage are probably much more per acre than for citrus

Costs of aquifer overdraft

- What is the benefit, per AF, of eliminating overdraft?
- Maintain current pump lift. Current decline of 2.7 ft/yr is expected to increase
- Avoid future well replacement costs
- Avoid water quality degradation
- Avoid subsidence and environmental costs
- Save aquifer supply for future use

Assumptions

Discount rate 2% to 4%

Rate of decline 2.7 ft/year, increasing 1% per year: 4 feet per year by 2053, and 6 feet by 2094.

Sensitivity analysis 2% per year

Cost of electricity $0.08 per kwh increases 2% per year

Well cost: golf/irrigation $75K, domestic $15K

Well life: 50 years with no decline, 30 years with decline

TDS increases 1.67 mg/l/year, cost $0.15 per mg/l per household

BWD costs: $50 million in 2039-40, $50 million advanced treatment 2049

Default assumption: no overdraft forever

Sensitivity: what if saved water can be used for new residences in 50 years?

If so, benefits are net income from development

net income from water sales

net income from increased spending

Economic Benefit per AF of Overdraft Reduction, $/AF

	Discount Rate		
Assumptions	**2%**	**3%**	**4%**
2.7 feet decline per year	$54.76	$39.94	$29.37
2.7 feet plus 1% decline per year	$79.04	$55.90	$39.76
2.7 feet plus 2% decline per year	$120.75	$82.62	$56.65
2.7 feet plus 1% decline per year			
With WQ cost $0.15/mg/l, 1.5 mg/l more/year	$81.05	$57.56	$41.14
Add new BWD pumps, distribution, 2039-40	$127.16	$106.09	$89.54
Add BWD advanced treatment, 2049	$165.44	$142.83	$123.00
Add non-BWD well life up from 30 to 50 yrs	$169.85	$147.01	$126.87
Add ability to sell saved water			
Build 12,590 new homes in 2064	$344.36	$280.32	$224.74
Include $5,000/home in annual net incomes	$1,742.15	$1,179.10	$787.81

Summary

The estimated benefit per AF of overdraft avoided from:

- increased energy costs from pumping lower groundwater tables is $30 to $120 per AF, depending on the discount rate and rate of groundwater decline
- loss of wells when groundwater tables fall below well intakes is about $50 per AF. Most of the benefit is associated with new BWD pumps and distribution required by 2040.
- water quality and water quality treatment costs is $35 to $40 per AF. Most benefit involves the avoided cost of advanced treatment required by 2050.

Subsidence and environmental benefits could not be estimated

The benefit of saving water to allow for future growth could be very large from the regional perspective.

Comments?

Please provide any comments by May 8 to rmecon@sbcglobal.net

Appendix C:

Dudek 12/11/2015.

Water Replacement and Treatment Cost Analysis for the Borrego Valley Groundwater Basin.

Draft Technical Memorandum prepared for BWD.

DUDEK

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DRAFT TECHNICAL MEMORANDUM

To: Jerry Rolwing, General Manager, Borrego Water District
From: Trey Driscoll, PG, CHG,
Ron Schnabel, PG, CHG
Subject: Water Replacement and Treatment Cost Analysis for the Borrego Valley Groundwater Basin
Date: December 11, 2015

Water Replacement and Treatment Cost Analysis for the Borrego Valley Groundwater Basin

Purpose of this Study

Dudek has conducted a draft preliminary economic analysis of potential groundwater replacement and treatment costs for the Borrego Valley Groundwater Basin (BVGB). An analysis of economic costs is important in order to enable the Borrego Water District (BWD) to properly price the water services it provides for its customers and to anticipate infrastructure expenditures that will be required to supply potable water to its customers in the future. For an estimate of the economic value of water supply, the replacement cost method is applied by estimating the costs of replacing the groundwater from the overdrafted BVGB with imported water. For estimating the economic value of the quality of groundwater, future treatment costs are calculated for water that is withdrawn which could require advanced treatment to meet water quality standards for potability. These economic costs may also be used to establish the value of water credits, which account for the use of and/or reduction of an acre-feet per year (AFY) in withdrawals from the BVGB.

Background

A study completed by the U.S. Geological Survey (USGS), in cooperation with the BWD indicates that in Borrego Valley, irrigated agricultural, residential, and commercial users, as well as the Anza-Borrego Desert State Park, use approximately four times more water than is replenished through annual average natural recharge of the BVGB underlying the Valley (Faunt 2015). The cooperative study focused on water data from 1945 to 2010. The USGS determined that over the 66-year study period, on average, the natural recharge that reached the saturated groundwater system was approximately 5,700 AFY. During 2000–10, the BWD reported an average groundwater use of about 4,000 AFY for residential and commercial uses; groundwater pumping for agricultural and recreational uses was estimated to be about 16,000 AFY. Today, the present annual groundwater withdrawals from the BVGB are approximately 19,000 AFY or an overdraft of approximately 13,300 AFY compared to the average annual recharge of 5,700 AFY.

The Department of Water Resources (DWR) has measured groundwater-level declines of more than 100 feet in some parts of the groundwater basin in response to anthropogenic activities, resulting in an increase in pumping lifts; reduced well efficiency; dry wells, changes in water quality; and loss of natural groundwater discharge, principally through reduced evapotranspiration from groundwater. Future growth and a lack of access to imported water could continue to increase these effects, producing significant economic impacts to the operation of the BWD and its ability to dependably deliver potable water to its customers.

In 2013, the U.S. Department of the Interior, Bureau of Reclamation (BR), published a Technical Memorandum (TM) entitled *"Proposed Imported Water Pipeline Routes for Borrego Water District Appraisal Analysis."* As part of this TM, the BR included an imported water pipeline cost/benefit analysis as Appendix C entitled *"Concept Level Economic and Financial Analysis Southeast California Regional Basin Study"* (2013 BR Cost Study). Although, the 2013 BR Cost Study concluded that none of the three pipeline alternatives analyzed were economically viable under current conditions, and that further study of the pipeline alternatives was not warranted, this conclusion was reached before enactment of the Sustainable Groundwater Management Act (SGMA) which went into effect on January 1, 2015. The 2013 BR Cost Study, however, provides a reasonable economic cost analysis to estimate the present cost of imported replacement water for the BVGB. Dudek used this 2013 BR Cost Study as the basis of their imported water replacement cost estimate. Additionally, the BR conducted a similar pipeline alignment cost study in 1968, which Dudek compared with the 2013 BR Cost Study estimate after adjustment for inflation.

Additional water supply costs could occur from continued overdraft conditions due to groundwater quality degradation as a function of lower groundwater levels. Groundwater basins within the high-deserts of Southern California consistently show that declining groundwater levels cause an increase in arsenic groundwater values due to the loss of shallower higher-quality and more productive water yielding aquifer zones, and from the oxidation of lower aquifer zones. Arsenic levels commonly increase to above the California drinking water maximum contaminant level (MCL) of 10 micrograms per liter (ug/L) requiring water treatment usually on well-by-well basis. Although detailed groundwater chemistry studies are needed to determine the most economical method for the arsenic treatment, some general cost analysis comparisons have been conducted that provide good general ranges of costs. For this study, Dudek used the Wang, L., and ALSA Tech, LLC (2011), "*Costs of Arsenic Removal Technologies for Small Water Systems*" study conducted for the U.S. Environmental Protection Agency (USEPA).

Water Replacement Costs

Imported Water Cost Analysis

The estimated costs for groundwater replacement for the BVGB come principally from Table 2 (page 6) of the 2013 BR Cost Study. Table 2 summarizes two imported water delivery scenarios from three imported water alignment alternatives. Table 1 of the 2013 BR Cost Study (page 4) defined the two imported water delivery scenarios as an Optimistic and a Pessimistic scenario based on projected forecast water supply and demand needs through December 2062. In the Optimistic Scenario, the forecasted water demand needs was 13,392 AFY, and in the Pessimistic Scenario the forecasted water demand needs was 18,998 AFY. It should be noted that these demand projections shall remain constant over the 50 year forecast as the 2007 San Diego County Department of Planning and Land Use *Policy Regarding California Environmental Quality Act (CEQA) Cumulative Impact Analyses for Borrego Valley Groundwater Use* prohibits new net water demands in BVGB. The difference in demand between the Optimistic and Pessimistic Scenarios is from decreased projected local water supply (precipitation) and higher agricultural demands. As stated above, the current overdraft in the BVGB is estimated at about 13,300 AFY indicating that the Optimistic Scenario would best fit the current groundwater replacement needs of the BVGB, barring decreased precipitation due to climate change. Table 2 of the 2013 BR Cost Study provided the construction and operation and maintenance (O&M) costs for the three alignment alternatives directly. It should be noted that the construction and O&M costs for both the Optimistic Scenario and the Pessimistic Scenario were the same for each of the three imported water alignment alternatives and that only the associated costs (water purchase cost) differed in the two scenarios.

The three imported water alignment alternatives consisted of the Carter Reservoir, Coachella, and West Side Alignments. Table A summarizes the costs of the three imported water alignment alternatives. The cost year for the three water alignment alternatives was 2012 and these costs were not updated to 2015, due to the low inflation rates for 2013 and 2014, which were 1.5 and 1.6 percent, respectively (http://www.usinflationcalculator.com/inflation/current-inflation-rates/). While 2015 prices may be approximated with 2012 prices, this assumption may not be made over the entire 50 year calculation period. The calculations in Table A express the present cost of replacement water and treatment for arsenic, but future costs will most likely increase due to inflation, rising energy costs, and increasing resource scarcity.

Construction Costs

Estimated construction costs for each of the three alternatives were calculated on a yearly cost basis by using a 6 percent cost-of-money figure over a repayment period of 50 years. A 50 year estimate was used as the life of the pipeline before replacement.

Operation and Maintenance Costs

The O&M costs from Table 2 (estimated in 2012 dollars) in the 2013 BR Cost Study were divided by the 50 year operational period of the three alternatives to provide the yearly O&M costs.

Power Costs

The 2013 BR Cost Study did not provide power costs for the imported water and given the estimated O&M cost relative to anticipated power costs for the three alternatives, power cost does not appear to have been included as a separate item. To estimate the power costs for the three alternatives, costs from the 1968 BR pipeline alignment cost study were used and adjusted to 2015 costs (http://www.usinflationcalculator.com/). The Carter Reservoir alternative was not included in the 1968 BR cost study so this cost was assumed to be similar to the West Side Alignment cost for power.

Replenishment Assessment Charge

The Coachella Valley Water District (CVWD) requires a Replenishment Assessment Charge (RAC) for imported water delivered through their system. The 2015 CVWD RAC for the West Whitewater River Subbasin Area of Benefit is $122 per acre-foot. A similar cost was assigned to the other alignments. These are basically water wheeling fee estimates.

Metropolitan Water District Untreated Water Costs

The 2013 BR Cost Study uses a Metropolitan Water District (MWD) untreated water cost of $593 per acre-foot for Tier 1 water purchase. This cost was used for each of the three imported water alignment alternatives.

Tables of Estimated Imported Water Replacement Costs

Table A - Costs Based on Bureau of Reclamation 2013 Concept Study

Imported Source	Year	Total Construction Cost ($)	Yearly Payment at 6% interest over 50 years (1)	O&M (Table 2/50 years)	Power (Table 11) (2)(3)(6)	CVWD RAC (4) ($/AF)	Total CVWD RAC (4) ($)	MWD Tier 1 (2013 per AF) (5)	MWD Tier 1 (2013) (Total $) (5)	Water Delivered (AF) (Table 2)	Total Yearly Cost	Total ($/AF)
Carter Reservoir Alignment	2012 (5)	$73,042,072	$4,613,964	$683,323	$1,504,250	$112	$1,499,904	$593	$7,941,456	13,392	$16,242,897	$1,213
Coachella Alignment	2012 (5)	$93,207,296	$5,887,772	$786,220	$1,825,612	$112	$1,499,904	$593	$7,941,456	13,392	$17,940,964	$1,340
West Side Alignment	2012 (5)	$80,153,844	$5,063,204	$638,607	$1,504,250	$112	$1,499,904	$593	$7,941,456	13,392	$16,647,422	$1,243

Table B- Costs Based on Bureau of Reclamation June 1968 Inland Basins Project Plus Inflation

Imported Source	Year	Total Construction Cost ($) (Table 11)	Yearly Payment at 6% interest over 50 years (1)	O&M ($) (Table 16)	Power ($) (Table 11)	CVWD RAC (4) ($/AF)	Total CVWD RAC (4) ($)	MWD Tier 1 (2013) ($ per AF) (5)	MWD Tier 1 (2013) (Total $) (5)	Water Delivered (AF) (Table 11)	Total Yearly Cost	Total ($/AF)
CVWD Oasis-	2015 (3)	$205,959,175	$13,010,148	$1,094,000	$1,825,612	$112	$1,904,000	$593	$10,081,000	17,000	$27,914,760	$1,642
Borrego Route	1968 (2)	$30,122,000	$1,213,457	$160,000	$267,000	NA	NA	NA	NA	17,000	$1,640,457	$96

NA =Not Available
(1) = year 1968 was 3.225% interest based
(2) Costs are from Bureau of Reclamation June 1968 Inland Basins Project
(3) Inflation costs are from http://www.usinflationcalculator.com/
(4) 2015 CVWD WEST WHITEWATER RIVER SUBBASIN AREA OF BENEFIT Replenishment Assessment Charge (RAC)
(5) Bureau of Reclamation 2013 BR Cost Study
(6) Carter Reservoir Alignment assumed to be same as West Side Alignment
NOTE: TDS of CVWD Imported is 600+ mg/L , The current California State Secodary Maxiumn Contaminate Level (MCL) for TDS is 500 mg/L, no treatment costs are corrently included by the CVWD

Total Cost and Acre-Foot Costs

Using the estimated costs outlined above, the yearly estimated costs and per acre-foot costs of imported water are provided in Table A. These costs are for 2015 with the exception of the estimated construction and O&M costs which are for 2012, but have not likely increased much form the original estimate.

Imported Water Cost Comparison with Previous Cost Estimate

For comparison purposes the estimated costs of imported water in the BR 2013 Cost Study were compared to the BR pipeline alignment cost study in 1968. Table B provides the estimated costs for the CVWD Oasis-Borrego Route from the 1968 RB study. This pipeline route is similar to the Coachella Alignment route of the BR 2013 Cost Study. The 1968 cost estimates for the CVWD Oasis-Borrego Route are shown in Table B in 1968 dollars and in 2015 dollars adjusted using the inflation calculator at http://www.usinflationcalculator.com/. No estimates for CVWD RAC or MWD water purchase costs are available for 1968. The estimated 2015 CVWD Oasis-Borrego Route cost of $1,642 per AF compares reasonably close to the estimated 2015 Coachella Alignment route of the BR 2013 Cost Study of $1,340 per AF even with a much higher construction cost due to the higher volume of water delivered in the 1968 route (17,000 AF vs. 13,392 AF).

Water Treatment Costs

The USGS actively monitors groundwater quality in the BVGB through the Groundwater Ambient Monitoring and Assessment (GAMA) Program (USGS 2014). Although BVGB groundwater is not currently being treated for any constituents, it is highly likely that groundwater quality will degrade with declining groundwater levels. The BVGB currently has some wells that have tested near or above the arsenic MCL on a few occasions. In addition to increased arsenic levels, the BVGB could see increases in other constituents, most notably total dissolved solids (TDS). However, for this study, potential costs were developed specifically for arsenic treatment. Wang, L., and ALSA Tech, LLC (2011) provide the basis for the arsenic treatment and their detailed review of costs associated with arsenic treatment options should be reviewed to provide a good understanding of the complexities associated with estimating potential arsenic treatment costs. Their study was conducted to evaluate the performance, reliability, and cost of arsenic removal technologies and to determine their effects on water quality in distribution systems. Their objective was to collect costs and performance data that could be used by small water systems, engineering firms, and state agencies to make informed decisions on selecting appropriate arsenic treatment technologies to achieve the arsenic MCL of 10 μg/L.

Wang, L., and ALSA Tech, LLC (2011) provide costs based on 28 absorptive media (AM) systems, 18 iron removal (IR) and coagulation/filtration (CF) systems (including four using IR pretreatment followed by AM), two ion exchange (IX) systems, and one each reverse osmosis (RO), point-of-use (POU) RO, POU AM, and system/process modification. Dudek has summarized the results of their study in Table C. A wide range of costs were used to develop an estimate of the potential arsenic treatment costs; this is particularly true with O&M costs, which vary significantly. As much as possible, variations in arsenic treatment O&M costs are footnoted in Table C.

Construction Costs

Table C presents an average well cost in dollars per gallon per minute ($/gpm) for three arsenic treatment system costs. These three systems are absorptive media (AM), combined iron removal (IR), and coagulation/filtration (CF) as IR/CF, and ion exchange (IX). Using the average system sizes (in gpm) for each of the three systems and an assumed well/treatment system use of 80 percent for 350 days provides cost per acre-foot for each system. Multiplying the average well cost ($/gpm) by the average system sizes (gpm) produces the initial capital cost for an average system. These capital costs were calculated on a yearly cost basis by using a 6 percent cost-of-money figure over a repayment period of 30 year. A 30 year estimate was used as the life of the treatment system before replacement.

Operation and Maintenance Costs

O&M costs are much harder to estimate for each of the system types due to wide ranges in actual O&M costs. O&M is the major cost associated with arsenic treatment systems and as shown in footnote 4 Table C, O&M costs can range significantly according to water quality which affects the life of the treatment system. Because of the wide range of O&M costs per system, Table C presents a minimum, average, and maximum O&M cost per system.

Power Costs

Electrical power costs for each of the treatment systems are provided in Table C.

Total Cost and Acre-Foot Costs

Three total costs for each of the three systems is presented in Table C based on the minimum, average, and maximum O&M cost per system.

Table of Estimated Water Treatment Costs

Table C - Arsenic Treatment Costs Based on 2011 EPA Cost Study

Arsenic Treatment Systems (1)	$/gpm (>100 gpm)	Average System Size (gpm)	AFY (Assumes 80% use over 350 days/year)	Capital Cost ($)	Capital Cost per year ($ year @6% for 30 years)	Capital Cost per AF ($/30 year @6%)	Min. O&M (4) ($/AF)	Average O&M (4) ($/AF)	Max. O&M (4) ($/AF)	Electrical ($/AF)	Min. Total Cost per AF ($/AF)	Average Total Cost per AF ($/AF)	Max. Total Cost per AF ($/AF)
AM (adsorptive media) (2)	$806	370	458	$298,220	$21,456	$47	$98	$3,911	$7,186	$10	$154	$3,967	$7,243
IR/CF (iron removal (IR), coagulation/filtration (CF)), (3)	$1,069	455	563	$486,395	$34,994	$62	$23	$486	$945	$23	$108	$548	$968
IX (ion exchange (IX))	$939	395	489	$370,905	$26,685	$55	$114	$156	$202	$16	$185	$227	$273

(1) U.S. EPA ARSENIC REMOVAL TECHNOLOGY DEMONSTRATION PROGRAM (EPA/600/R-11/090) September 2011

(2) AM systems have a higher O&M cost than the IR/CF and IX systems, due mainly to media replacement, which accounted for 79% of the total O&M cost.

(3) The lower O&M cost is a significant advantage of IR/CF over AM as long as the facility can handle IR/CF and IX residuals at a low cost.

(4) Note that O&M costs do not include residuals disposal cost, a key factor in selecting a treatment technology for arsenic removal, direction comparisons among different technologies would be less accurate

AM system electricity costs for the treatment systems (not including pumping from wells to treatment plants or re-pumping to distribution systems) ranged from zero to $0.16 (or $0.03 on average) per 1,000 gal of water treated.

AM systems media replacement costs varied widely from $0.30 to $22.05 per 1,000 gal of water treated due to large variations in media cost and media life and are 79% of the O&M cost.

Average of $12 per 1,000 gal as all of the O&M cost

IR/CF system total O&M costs, range from $0.07 to $2.90 per 1,000 gal of water treated. Average is $1.49 per 1,000 gal

IR/CF system include incremental electricity costs ranged from zero to $0.39 and averaged $0.07 per 1,000 gal of water treated. Electricity accounted for an average of 19% of the total O&M cost.

IX system total O&M costs were generally from $0.35 to $0.62 per 1,000 gal of water treated, average of $0.48 per 1,000 gal.

IX system electricity costs were $0.08 and $0.03/1,000 gal of water treated, assumes $0.055 per 1,000 gal

Conclusion

This economic cost analysis provides replacement imported water and treatment cost estimates to enable the BWD to properly price water services presently provided to their customers in excess of the BVGB's average annual recharge. Future infrastructure expenditures will be required to replace groundwater overdrafted due to groundwater pumping in excess of the average annual recharge to meet groundwater sustainability. The State's enactment of SGMA effective on January 1, 2015 requires that the BVGB achieve groundwater sustainability by 2040. SGMA requires that a Groundwater Sustainability Plan (GSP) to achieve groundwater sustainability be enacted by the Groundwater Sustainability Agency (GSA) by 2020. The BWD, in cooperation with the County of San Diego, is the GSA for the BVGB. The GSP must demonstrate to the State compliance with SGMA by showing measurable achievements in meeting groundwater sustainability.

To supply potable water to its customers in the future over the average annual recharge, the BWD will need to obtain additional imported water from outside the BVGB, and likely treat groundwater degraded due to continued overdraft. For an estimate of the economic value of water supply, the replacement cost method was applied by estimating the costs of replacing the groundwater from the overdrafted BVGB with imported water, and the economic cost for future groundwater treatment. These economic costs can also be used to establish the value of water credits, which accounts for the use of and/or reduction of groundwater withdrawn from the BVGB by the passage of SGMA.

Recommendation

The estimated present cost to the BWD for the importation of an acre-foot of water is show in Table A and ranges from $1,213 to $1,340 per acre-foot. The estimated cost range depends on the pipeline alignment selected and includes estimates of the pipeline construction, O&M, power, wheeling fee, and initial MWD water cost. For budgeting purposes, a value of $1,340 per acre-foot should be used as the current estimated cost to import water to the BVGB.

The estimated cost to the BWD for the treatment of groundwater due to potential degradation from groundwater overdraft is more difficult to estimate due to unknowns associated with amount of groundwater to be treated, the type and size of treatment facilities, and the amount of O&M cost associated with the selected treatment method. Future groundwater chemistry studies and continued groundwater quality monitoring will help determine the most economical method for groundwater treatment, if needed, as well as the number of systems and potential infrastructure associated with multiple treatment systems, if required.

The BVGB currently has some wells that have tested near or above the arsenic MCL, but need for future treatment for these wells cannot be determined. It is likely that with declining groundwater levels, arsenic MCL levels will increase in some wells, but blending with other wells could make treatment unnecessary.

The estimated costs associated with arsenic treatment are provided in Table C. These costs are for a single well head treatment system and include construction and three estimates of O&M costs for each system. O&M costs are highly dependent on groundwater chemistry and very significantly between systems. Higher O&M costs are probably not associated with the most economical method for treatment due to the relative narrow range of capital costs associated with each treatment system type (from $298,220 to $486,395). Therefore, a more average O&M cost range from $227 to $548 per acre-foot for arsenic treatment costs are likely. For budgeting purposes, a conservative value of $548 per acre-foot should be used as the current estimated cost to the BWD to treat arsenic in the BVGB including O&M costs. If O&M costs are deferred until the groundwater is actually pumped and treated, the capital costs associated with treatment should be used. A value of $62 per acre-foot (Table C) would allow for treatment facility capital expenditures.

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Appendix D:

<u>Raftelis Financial Consultants (RFC) 3/28/2016.</u>
Borrego Water District Water and Wastewater Rate Study Report.
Prepared for BWD.

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Suite 207
Murrieta, CA 92562

Phone 951.698.0985

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Borrego Water District

Water and Wastewater Rate Study Report

March 28, 2016

RAFTELIS
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Phone 951.698.0985

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March 28, 2016

Mr. Jerry Rolwing
General Manager
Borrego Water District
PO Box 1870,
806 Palm Canyon Drive,
Borrego Springs, CA 92004

Subject: Water and Wastewater Rate Study Report

Dear Mr. Rolwing,
Raftelis Financial Consultants, Inc. (RFC) is pleased to provide this Water Rate and Wastewater Rate Cost of Service Study Report (Report) for Borrego Water District (District) to address financial needs of the District and to establish updated water and wastewater rates that provide sufficient revenue over a five-year planning period. The rate structure is consistent with direction provided to us from District staff and the District Board.

The major objectives of the study include the following:

1. Develop financial plans for the District to ensure financial sufficiency, meet operation and maintenance (O&M) costs, ensure sufficient funding for capital replacement and refurbishment (R&R) needs, and build up reserves over the five years
2. Perform cost-of-service analyses for the water and wastewater utility based on recent historical usage
3. Develop fair and equitable water and wastewater rates

The Report summarizes the key findings and recommendations related to the development of the financial plan and the development of rates the for water and wastewater enterprise.

It has been a pleasure working with you, and we thank you and the District staff for the support provided during the course of this study.

Sincerely,

RAFTELIS FINANCIAL CONSULTANTS, INC.

Habib Isaac	**Victor Smith**
Manager	Consultant

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1 EXECUTIVE SUMMARY

1.1 BACKGROUND OF THE BORREGO WATER DISTRICT

The Borrego Water District (the District) contracted with RFC to conduct a Water and Wastewater Cost of Service and Rate Study (Study) to develop a financial plan as well as design water and wastewater rates for the District over the next five years.

The District is located approximately 50 miles northeast of the City of San Diego and serves the census designated place of Borrego Springs, as well as other sections of the unincorporated area of San Diego County. The District provides potable water service to a population of approximately 3,500 customers in Borrego Springs through over 2,000 connections. On an annual basis, the District delivers approximately 1,500 acre-feet of potable water, which is obtained from groundwater pumped from the Borrego Valley Groundwater Basin.

The District's Water Utility, like other agencies in San Diego County, is faced with challenges related to the reduction in water usage as a result of conservation, the slow economy, and increasing capital improvement costs as well as the recent Executive Order by Governor Brown (Executive Order B-29-15) related to mandatory conservation. The District is operating in an environment where operational costs continue to increase and the reinvestment of funds to its infrastructure is estimated to be substantial in the near term due to the long-standing critical overdraft of the Borrego Valley Groundwater Basin. This is not a situation that is unique to the District, as many agencies throughout the state are faced with water availability, conservation and the need to update capital infrastructure and treatment that is necessary to continue providing reliable water services, adhere to new regulations and mandates, and meet service demands while water supplies are strained in the face of the current statewide drought and groundwater overdraft.

1.2 WATER UTILITY

The current water rate structure of the District consists of two main components: a monthly service charge and a water usage rate or commodity charge. The service charge varies based on meter size whereas the water usage rate is a uniform rate for all customers. The following tables summarize the current rate structure of the District. **Table 1-1** provides a summary of water accounts by meter size, with the majority of residential customers served by 3/4" meters. **Table 1-2** identifies the monthly service charges. **Table 1-3** identifies the commodity charges by customer class. As shown in **Table 1-3,** the District's uniform commodity rates applies to all customers.

Table 1-1: Water Accounts by Meter Size

Meter Size	Meter Count in FY 2016
3/4 "	1,398
1"	545
1-1/2"	77
2"	25
3"	3
4"	7
6"	2
Total Meters	2,057

Table 1-2: Monthly Service Charge by Meter Size

Meter Size	Monthly Service Charge
3/4"	$42.04
1"	$61.45
1 1/2"	$103.62
2"	$156.85
3"	$284.86
4"	$454.12
6"	$906.10

Table 1-3: FY 2015-16 Uniform Commodity Rate

Customer Class	Structure	Commodity Rate (per unit[1])
All Customers	Uniform	$2.42

1.3 FINANCIAL HEALTH AND PROPOSED RECOMMENDATIONS

1.3.1 Water Utility Recommendations

The beginning balance for the Water Utility in Fiscal Year (FY) 2015-16 reserves is expected to be approximately $2.4M. It is projected that the District would have positive net cash above its operating expenses at Fiscal Year End (FYE) 2015-16; however, without future revenue adjustments, the water utility would only cover operating expenses, but not its necessary capital expenses. The District's annual planned capital improvement expenditures average $2.2M over the next five years, and the District is unable to fund this capital improvement program without an influx of revenue and reserves would be depleted as a result.

After review of the water utilities current revenues, revenue requirements, and reserves, it is recommended that the District adjust revenue by 8% in FY 2016-17 and 6% in each subsequent year through FY 2020-21. Additionally, to mitigate significant rate increases and to adequately fund its capital

[1] Commodity rates are per unit whereby 1 unit equals one hundred cubic feet, or 748 gallons of water.

improvement plan, it is recommended that the District issue debt totaling $9M in FY 2017-18 and potentially $2.7M in FY 2020-21. The District is currently pursuing grant opportunities and exploring the possibility of using State Revolving Fund loans to pay for these projects, which would reduce either the magnitude of the loan or potentially mitigate future rate increases. Given the useful life of these capital improvements, funding these items through debt provides inter-generation equity between existing customers and future customers by spreading the cost over an amortized term that is in-line with the life of improvements. As such, current customers are not funding the entire project in advance of those that will also benefit from these projects.

Overall, the proposed financial plan for the water system aims to strike a balance between maintaining a strong financial position and minimizing rate increases to its customers through a multi-year measured approach. Under the proposed plan, the water utility will maintain a positive net income and will meet the minimum reserve targets over the five-year study period.

In addition to reviewing the water utility's current financial health, RFC also reviewed the current rate structure and consumption data to determine the most appropriate rate structure moving forward. As such, RFC is recommending the following proposed adjustments to the current structure:

- RFC recommends changing the uniform rate to a two customer class rate structure (Residential and Non-Residential) with a 2-tiered rate for Residential customers, reflecting a first tier width of 7 units. 7 units covers the indoor need[2] of the average home in the District's service area. All other usage above this indoor allotment will be in Tier 2. Non-residential usage will be charged a uniform rate based on their proportionate share of the District's revenue requirements.
- RFC also recommends changing the current revenue recovery structure. The utility in FY 2016 is projected to have received 45% of its revenue from fixed charges and 55% of its revenue from commodity charges. This 45% fixed charge recover has increased due to a reduction in usage from conservation and; therefore, a corresponding reduction of total revenue generated by the commodity charges. As such, RFC recommends recalibrating the fixed/variable split to an amount of 33% fixed and 67% commodity for FY 2017-18.

Table 1-4 through **Table 1-6** summarizes the proposed water rates.

Table 1-4: Proposed Monthly Service Charge

Meter Size	FY 2016 (Current)	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
3/4"	$42.04	$34.89	$36.99	$39.21	$41.57	$44.07
1"	$61.45	$45.27	$47.99	$50.87	$53.93	$57.17
1 1/2"	$103.62	$71.20	$75.48	$80.01	$84.82	$89.91
2"	$156.85	$102.32	$108.46	$114.97	$121.87	$129.19
3"	$284.86	$185.31	$196.43	$208.22	$220.72	$233.97
4"	$454.12	$278.68	$295.41	$313.14	$331.93	$351.85
6"	$906.10	$538.03	$570.32	$604.54	$640.82	$679.27

[2] The target average indoor need is set by the State of California at 55 gallons per capita per day. This target is found in California Water Code Section 10608.20.

Table 1-5: Proposed Commodity Charges (FYE 2017)

Customer Class	Tier width	FY 2016-17 Rate (per unit)
Residential		
Tier 1	1 - 7 Units	$3.16
Tier 2	>7 Units	$3.48
Non-Residential	N/A	$3.35

Table 1-6: Proposed Commodity Charges through FYE 2021

Customer Class	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21
Residential					
Tier 1	$3.16	$3.35	$3.56	$3.78	$4.01
Tier 2	$3.48	$3.69	$3.92	$4.16	$4.41
Non-Residential	$3.35	$3.55	$3.77	$4.00	$4.24

2 INTRODUCTION

In 2014, Borrego Water District (the District) contracted with RFC to conduct a Water and Wastewater Cost of Service and Rate Study (Study) to develop a financial plan as well as design water and wastewater rates for the District over the next five years. The major objectives of the study include the following:

1. Develop financial plans for the District to ensure financial sufficiency, meet operation and maintenance (O&M) costs, account for recent conservation reductions in total water use, ensure sufficient funding for capital replacement and refurbishment (R&R) needs, and build up reserves over the five years
2. Perform cost-of-service analyses for the water and wastewater utility based on recent historical usage
3. Develop proportionate water rates in compliance with Proposition 218

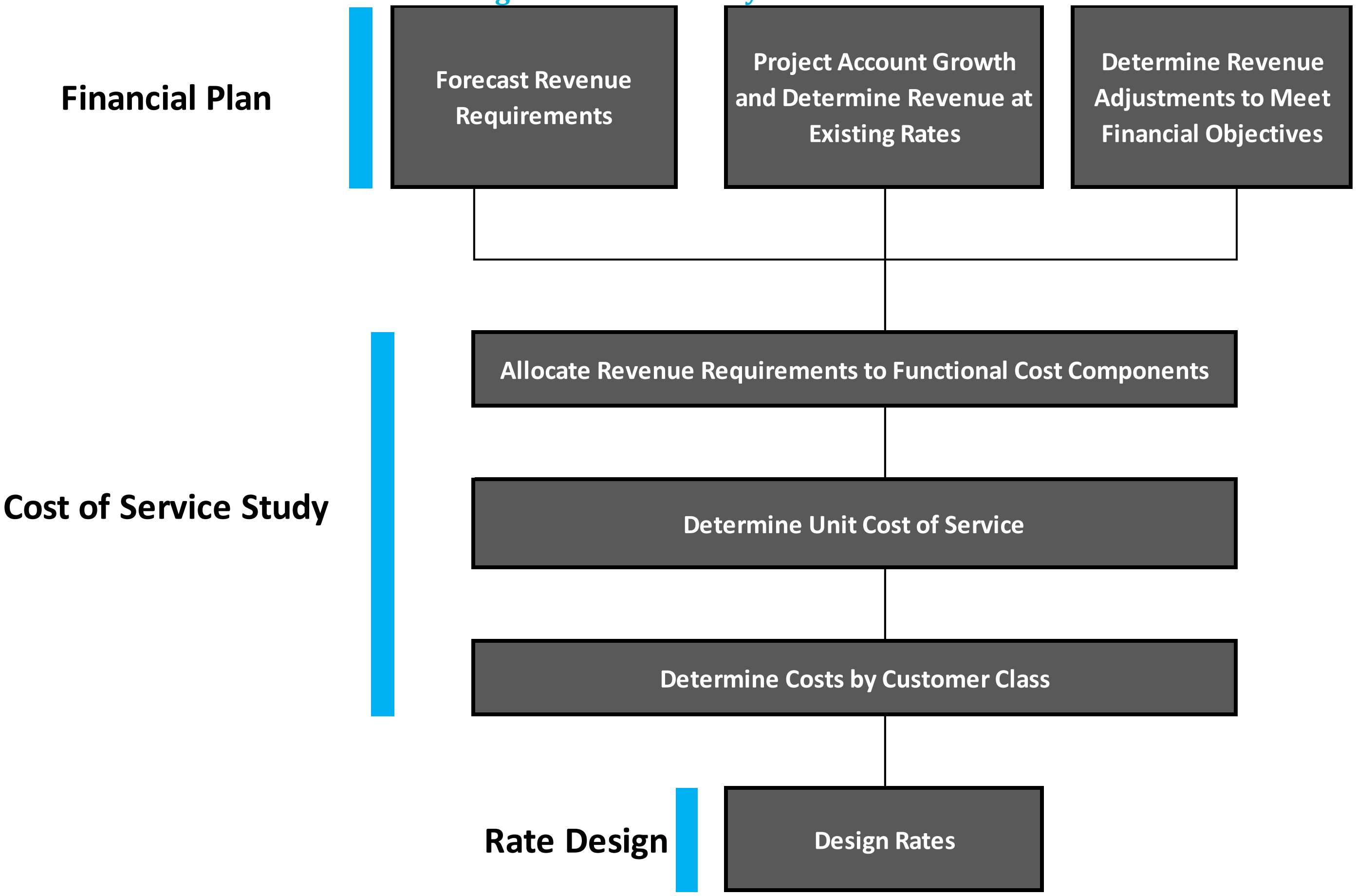
2.1 STUDY APPROACH

The Study approach is summarized as follows:

- **Financial Plan:** District water consumption was compiled and projected to forecast revenue at existing rates. This forecast revenue was compared against a forecast of the District's operation and maintenance (O&M) and capital expenditures to determine any necessary revenue adjustments. The ultimate outcomes are the operating and capital revenue requirements for the year in which cost of service rates will be implemented, FY 2016-17 (the "test year").
- **Cost of Service Analysis:** The Cost of Service Analysis involves allocating the annual revenue requirements determined by the financial plan to the District's customer classes based on their proportionate use of the system, and contribution to the cost of its operation.
- **Rate Design:** Rate Design involves the development of rates for all customer classes, which recover their proportionate share of system costs, determined by the cost of service analysis.

Figure 2-1 provides a graphical representation of the various steps involved in the comprehensive cost of service and rate design process.

Figure 2-1: Rate Study Process



This Study report includes the following sections in addition to the Executive Summary and the Introduction:

- ***Section 3*** summarizes the development of the long-term financial plan for the water utility.
- ***Section 4*** describes the water utility study's findings and results of the cost of service analysis.
- ***Section 5*** describes the methodology and calculation of the District's water rates.
- ***Section 6*** describes development of the long term financial plan and the methodology and calculation of the District's wastewater utility.

However, before discussing the development of the financial plan, the general assumptions used during the course of the study have been discussed below.

2.2 ASSUMPTIONS USED IN THE STUDY

The period for the Water Rate Cost of Service Study uses Fiscal Year 2015-16 as the budget year and the model projects through Fiscal Year 2025-26; however, the proposed rates herein are for the next five (5) years, as the District will continue to periodically review rates and take a measured approach with any potential rate adjustments[3]. Certain cost escalation assumptions and inputs were incorporated into the Study to adequately model expected future costs of the Water Utility. These assumptions were based on industry standards and discussions with District management. Assumptions include growth rates for customer accounts, reduced water demand factors for recent conservation goals of the District, inflation

[3] Tables in this report show a five-year period, starting with FYE 2017 through FYE 2021.

factors, and other miscellaneous assumptions. These assumptions are presented in **Table 2-1** and **Table 2-2**.

Table 2-1: Industry Specific Inflation Factors

Key Factors	FYE 2016	FYE 2017	FYE 2018	FYE 2019	FYE 2020	FYE 2021
Inflation		3.0%	3.0%	3.0%	3.0%	3.0%
Repairs & Maintenance		3.0%	3.0%	3.0%	3.0%	3.0%
Professional Services		3.0%	3.0%	3.0%	3.0%	3.0%
Insurance		3.0%	3.0%	3.0%	3.0%	3.0%
Personnel Expense		5.0%	5.0%	5.0%	5.0%	5.0%
Employee Benefits		5.0%	5.0%	5.0%	5.0%	5.0%
Office expense		3.0%	3.0%	3.0%	3.0%	3.0%
Utilities		5.0%	5.0%	5.0%	5.0%	5.0%
CIP Inflation		5.0%	5.0%	5.0%	5.0%	5.0%

Table 2-2: Growth & Demand Assumptions

Key Factors	FYE 2016	FYE 2017	FYE 2018	FYE 2019	FYE 2020	FYE 2021
Growth Rate						
All Accounts	0%	0%	0%	0%	0%	0%
Other Revenue Projections						
Interest Earnings	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Proposed Debt Terms						
Interest Rates	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Term (years)	30	30	30	30	30	30
Issuance Cost	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Water Demand Factor	98%	95%	95%	95%	95%	95%

3 WATER SYSTEM - FINANCIAL PLAN

This section describes the development of the financial plan, the results of which were used to determine the revenue adjustments needed to meet ongoing expenses and provide fiscal stability to the District.

3.1 REVENUE REQUIREMENTS

A review of a utility's revenue requirements is a key step in the rate design process. The review involves analyses of annual operating revenues under the current rates, operation and maintenance (O&M) expenses, capital expenditures, transfers between funds and reserve requirements. This section of the report provides a discussion on projected revenues, O&M and capital expenditures, the capital improvement financing plan, debt service requirements, and overall revenue requirements over the 5-year period of the Water Utility.

3.1.1 Revenues from Current Rates

The current water rate structure consists of two main components: a monthly service charge and a water usage charge

The monthly service charges by meter size are shown below.

Table 3-1: Monthly Service Charge by Meter Size

Meter Size	FY 2015-16 (Current)
3/4"	$42.04
1"	$61.45
1 1/2"	$103.62
2"	$156.85
3"	$284.86
4"	$454.12
6"	$906.10

The number of meters by meter size are shown in **Table 3-2** below.

Table 3-2: Meters by Meter Size

Meter Size	FY 2015-16 (Current)
3/4"	1,398
1"	545
1 1/2"	77
2"	25
3"	3
4"	7
6"	2

The District's variable rates are shown below. Note that Prior to FY 2015-16 the District had distinct rates for residential customers, which is why the usage information is broken out by tier and class despite being charged a uniform rate. **Table 3-3** shows current commodity charges through FY 2021 with no rate adjustment. **Table 3-4** shows projected water sales through FY 2021, which account for the Water Demand factor shown in **Table 2-2**.

Table 3-3: Current Commodity Charges

Customer Class	FY 2015-16
Residential	
Tier 1	$2.42
Tier 2	$2.42
Non-Residential	$2.42

Table 3-4: Projected Usage through FY 2020-21 (ccf)

Customer Class	FYE 2016	FYE 2017	FYE 2018	FYE 2019	FYE 2020	FYE 2021
Residential						
Tier 1	329,209	312,749	297,112	282,256	268,143	268,143
Tier 2	63,659	60,476	57,452	54,579	51,850	51,850
Non-Residential	274,310	260,595	247,565	235,187	223,428	223,428

The projected water revenues for the Water Utility derived from current rates and calculated from **Table 3-1** through **Table 3-4** are shown in **Table 3-5**.

Table 3-5: Projected Water Rate Revenues at Current FY 2015-16 Rates

	FYE 2016	FYE 2017	FYE 2018	FYE 2019	FYE 2020	FYE 2021
Fixed Revenue	$1,320,093	$1,320,093	$1,320,093	$1,320,093	$1,320,093	$1,320,093
Variable Revenue	$1,614,571	$1,533,844	$1,457,152	$1,384,293	$1,315,079	$1,315,079
Total Water Revenues*	$2,934,664	$2,853,938	$2,777,246	$2,704,387	$2,635,172	$2,635,172

3.1.2 O&M Expenses

The District's Fiscal Year 2015-16 budget values and the assumed inflation factors for the study period were used as the basis for projecting O&M costs. **Table 3-6** shows total budgeted and projected O&M expenses, from Fiscal Year 2015-16 through Fiscal Year 2020-21.

Table 3-6: Projected Water O&M Expenses

	FYE 2016	FYE 2017	FYE 2018	FYE 2019	FYE 2020	FYE 2021
Repairs & Maintenance	$242,000	$249,260	$256,738	$264,440	$272,373	$280,544
Professional Services	$123,819	$127,534	$131,360	$135,301	$139,360	$143,540
Insurance	$64,249	$66,176	$68,162	$70,206	$72,313	$74,482
Personnel Expense	$676,737	$710,574	$746,103	$783,408	$822,578	$863,707
Employee Benefits	$303,426	$318,598	$334,527	$351,254	$368,816	$387,257
Office expense	$69,303	$71,382	$73,523	$75,729	$78,001	$80,341
Utilities	$391,062	$410,615	$431,146	$452,703	$475,338	$499,105
Total	**$1,870,596**	**$1,954,138**	**$2,041,558**	**$2,133,041**	**$2,228,779**	**$2,328,977**

3.1.3 Debt Service

A summary of the District's current debt service payments are shown in **Table 3-7** below.

Table 3-7: Current Debt Service Schedule

	FYE 2016	FYE 2017	FYE 2018	FYE 2019	FYE 2020	FYE 2021
COP 2008						
Principal	$140,000	$145,000	$150,000	$160,000	$165,000	$175,000
Interest	$114,525	$108,113	$101,475	$94,500	$87,188	$79,538
Viking Ranch Refinance						
Water ID1, ID3, ID 5 Portion	$49,107	$49,107	$49,107	$49,107	$49,107	$49,107
Water ID 4 Portion	$73,661	$73,661	$73,661	$73,661	$73,661	$73,661
Total	**$377,294**	**$375,881**	**$374,244**	**$377,269**	**$374,956**	**$377,306**

3.1.4 Capital Improvement Plan

The District has adopted a long-term capital improvement plan (CIP) to address future Water Utility needs. **Table 3-8** shows a summary of the most recent 5-year CIP provided by the District. The Water Utility's future CIP needs will be funded through a combination of rates on a Pay-As-You-Go basis (PAYGO) and proposed debt.

Table 3-8: CIP Summary

	FYE 2016	FYE 2017	FYE 2018	FYE 2019	FYE 2020	FYE 2021
Total CIP – Water	$373,590	$846,701	$5,529,285	$1,323,986	$762,026	$2,129,011
Short Live Assets Replacement Program – Water	$512,600	$397,168	$304,266	$402,655	$292,810	$336,969
Total	**$886,190**	**$1,243,869**	**$5,833,551**	**$1,726,641**	**$1,054,836**	**$2,465,980**

3.1.5 Reserve Requirements

Currently, the District maintains two reserve funds.

Operating Reserve – The purpose of an operating reserve is to have liquid cash on hand for the continued day-to-day operations of the utility. The Operating Reserve may be used for cash flow purposes to fund necessary expenses without the need to wait for billed revenue to come in as well as any unexpected increases in operating expenses. The amount of the Operating Reserve is commonly pegged to a certain percentage of the utility's total operating expenses. The set percentage is usually dictated by the utility's bill frequency; if customers are billed on a monthly basis, then revenue continuously come is and the need to have a significant amount of funds within the Operating Reserve is not necessary. Based on industry standards, The Operating Reserve, in the case of monthly billing, should equal around 90 days of expenses (3 months). As the bill frequency is less frequent, the Operating Minimum Reserve should be increased to account for the time delay of receiving cash on hand. As such, utilities with bi-monthly billing should set the target at 90 to 120 days (3-4 months) of operating expenses. For the Borrego Water District, RFC recommends establishing a minimum reserve of no less than 90 days of O&M, with an ideal operating reserve target of 120-days of O&M expenses.

Capital Improvement Projects Reserve – A Capital Repair and Replacement Reserve is used primarily to meet and ensure the timely construction of necessary capital improvements without any delays due to cash flow concerns. Capital expenses can fluctuate quite a bit from year-to-year and the Capital Reserve may be leveraged to smooth out significant changes in expenses and; thereby, avoiding any unduly rate shock to District customers. It may also serve as collateral and reassurance when awarding a construction contract. A sound target for a utility's Capital Reserve is to have an average years' worth of capital expenses based on the agency's adopted Capital Improvement Plan (CIP). At a minimum, the Capital Reserve should be funded to at least an amount equivalent to the total annual depreciation value of the system and these funds can be used as a reasonable reinvestment amount into the system. RFC recommends a reserve equal to the inflated value of a rolling average of the subsequent 5 years of the District's Capital Improvements.

Collectively, the total minimum reserves of the water utility is approximately $3M in FY 2015-16, and the total reserve target of the water utility is approximately $3.2M in FY 2015-16. The District is roughly $200,000 short of its FY 2016 reserve target.

Reserves for the water enterprise and the sewer and wastewater enterprise will be funded by rates specific to those enterprises so as to meet California Proposition 218 requirements. That is, reserves specific to the needs of the District's water enterprise will be accumulated from water rates. Reserves specific to the needs of the District's sewer and wastewater enterprise will be funded from sewer and wastewater treatment rates.

3.1.6 Financial Outlook at Current Rates

Revenues generated from current rates and other miscellaneous revenues exceed operational expenses through FYE 2021 and the District has adequate reserves to fund its capital costs until FYE 2018; however, from the beginning of the study period, starting in FY 2015-16, reserves will be below the minimum target and used to fund the shortfall of the District's revenue requirements. The District's O&M costs continue to increase through annual inflationary adjustments as previously listed under **Table 2-1** – "Assumptions". As such, current revenues cannot fully fund both O&M and capital without drawing down reserves each year. By FYE 2018, the Total Reserves would be depleted.

In conclusion, the District will not be able to fund its CIP program under the current rates over the next five years. **Figure 3-1** illustrates operating position of the Water Utility, where the expenses, inclusive of reserve funding and debt service, are shown by stacked bars; and total revenues at current rates is shown by the downward sloping red trend line. It shows decreasing revenues due to the assumed 2% reduction in water consumption in FYE 2017 and the ongoing 5% reductions through FYE 2021. **Figure 3-2** summarizes the projected CIP and its funding sources (currently 100% PAYGO) and **Figure 3-3** displays the ending total reserve balance for the water utility.

Figure 3-1: Operating Position at Current Rates

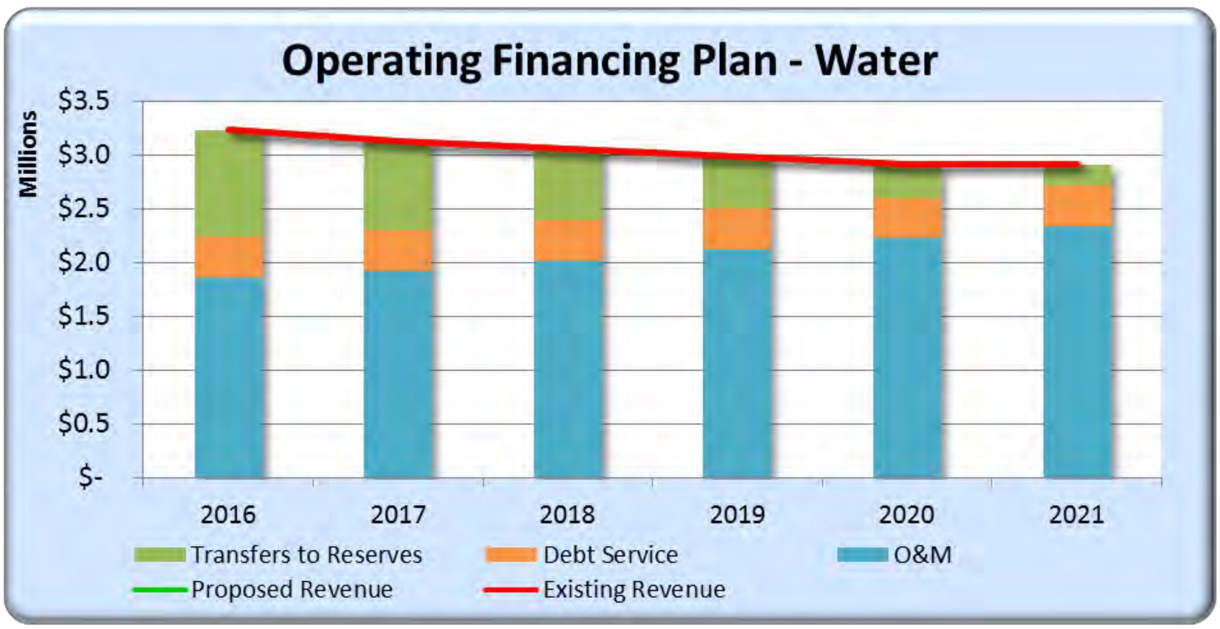


Figure 3-2: Capital Improvement Plan and Funding Source

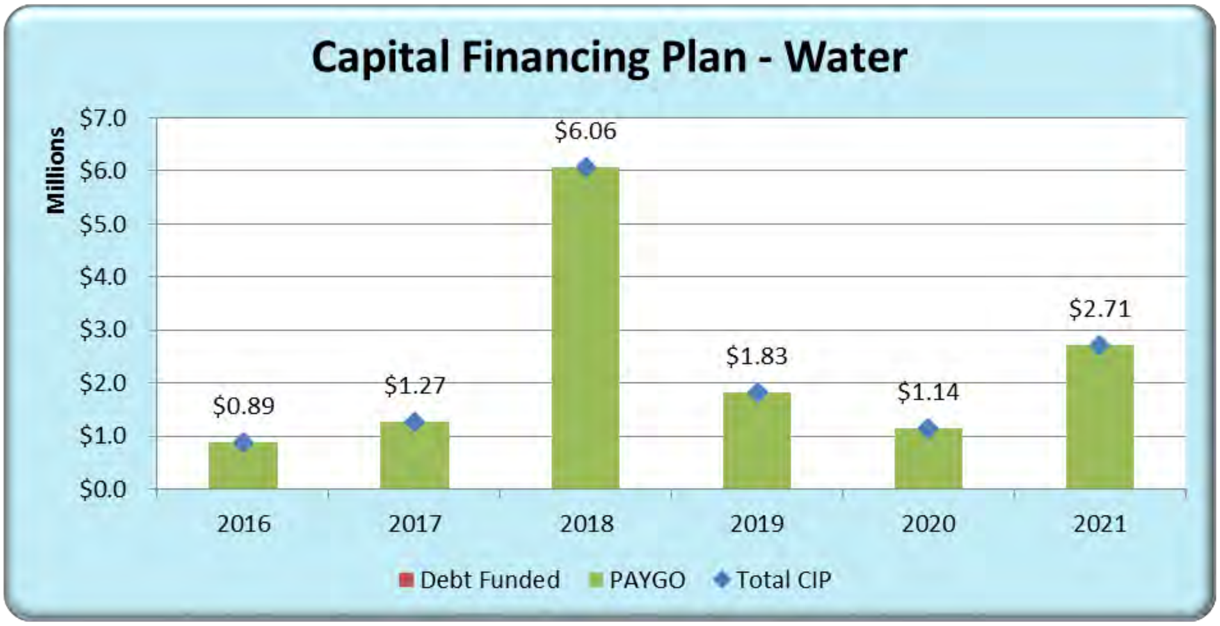
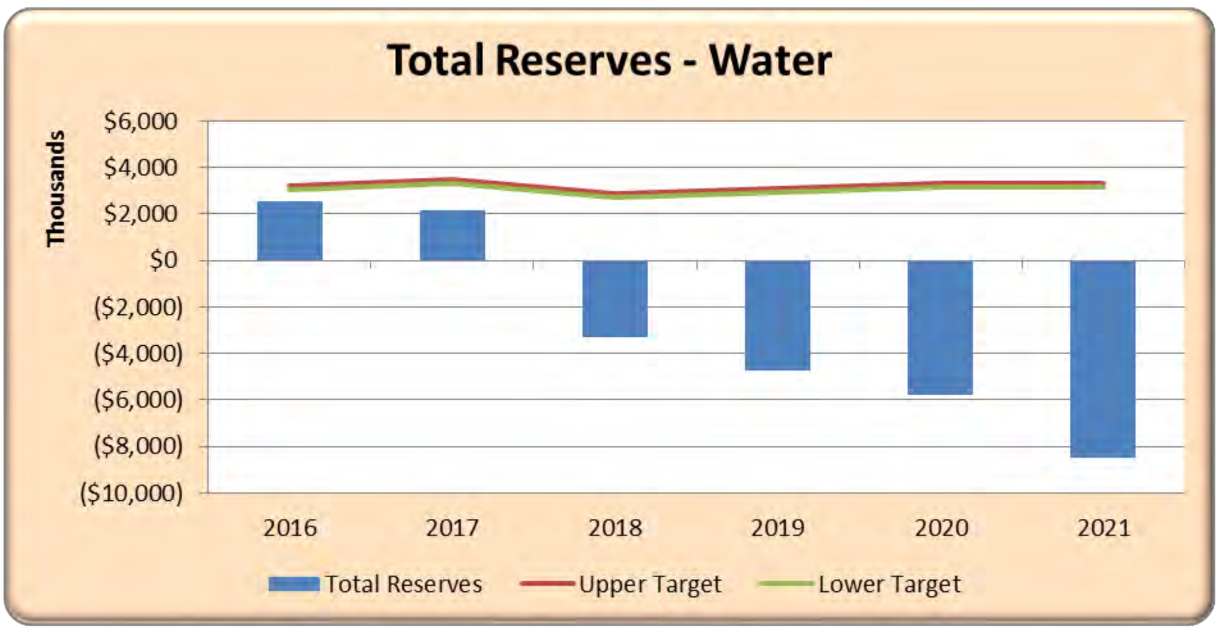


Figure 3-3: Projected Ending Reserves at Current Rates



3.2 PROPOSED FINANCIAL PLAN

To ensure that the water utility will have adequate revenues to fund operating expenses, capital expenditures, and comply with future bond covenants, it is recommended that the District increase rates over the next five years, FY 2016-17 through FY 2020-21. The first revenue adjustment would be an 8% adjustment and would occur on July 1, 2016 with the remaining adjustments being 6% adjustments and occurring on July 1 of each subsequent year.

In addition, RFC recommends issuing $9M in debt in FY 2017-18 to help finance a significant increase of capital related improvements in FY 2017-18. The combination of additional revenue and debt issuance would enable the agency to complete the planned capital projects for the Study period while building up a healthy level of reserves over the next five years.

A pro forma of the proposed revenue requirements is shown in **Table 3-4** below. The proposed revenue requirements account for the District's annual financial needs while building up reserves, maintaining positive net revenues through the study period, and complying with debt covenants.

Table 3-9: Five-Year Water Utility Proposed Financial Plan - Pro-forma

Borrego Water District
Operating Cash Flow

Line No.		FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
1	**Revenue from Meter Charges**	$1,320,093	$1,320,093	$1,320,093	$1,320,093	$1,320,093
2	**Revenue from Commodity Rates**	$1,533,844	$1,457,152	$1,384,293	$1,315,079	$1,249,325
3	**Revenue from Existing Retail Rates**	$2,853,938	$2,777,246	$2,704,387	$2,635,172	$2,569,418
4	Revenue from Rate Adjustments	$228,315	$402,145	$577,354	$754,443	$933,920
5						
6	**Total Rate Revenue**	**$3,082,253**	**$3,179,391**	**$3,281,741**	**$3,389,615**	**$3,503,338**
7	Other Revenue	$259,000	$259,000	$259,000	$259,000	$259,000
8	Interest Revenue	$9,782	$6,833	$7,092	$7,395	$6,727
9	**Total Revenue**	**$3,351,034**	**$3,445,224**	**$3,547,833**	**$3,656,009**	**$3,769,065**
	Revenue Requirements					
10	O&M	$1,954,138	$2,041,558	$2,133,041	$2,228,779	$2,328,977
11	Existing Debt Service	$375,881	$374,244	$377,269	$374,956	$377,306
12	Proposed Debt Service	$0	$639,886	$639,886	$639,886	$831,852
13	Transfer to Contingency					
14	Transfer to Rate Stabilization					
15	**Total Revenue Requirements**	**$2,330,020**	**$3,055,688**	**$3,150,195**	**$3,243,621**	**$3,538,135**
16	**Net Annual Cash Balance**	$1,021,015	$389,536	$397,637	$412,388	$230,929
17	**Coverage Requirements**	115%	115%	115%	115%	115%
18	**Coverage Ratio**	372%	138%	139%	141%	119%

Table 3-10: Five-Year Water Utility Proposed Financial Plan – Reserve Fund Levels

Borrego Water District
Reserve Funds

Line No.			FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
	Operating Reserve						
1	*Source of Funds*						
2	Beginning Balance		$467,649	$488,535	$510,390	$533,260	$557,195
3	Transfer to Capital Reserve		-$1,000,129	-$367,681	-$374,767	-$388,453	-$205,880
4	Net Annual Cash Balance		1,021,015	389,536	397,637	412,388	230,929
5	**Total Funds Available**		488,535	510,390	533,260	557,195	582,244
	Use of Funds						
6	Net Annual Cash Balance		-	-	-	-	-
7							
8	**Total Use of Funds**		-	-	-	-	-
9	**Ending Fund Balance**		**488,535**	**510,390**	**533,260**	**557,195**	**582,244**
10	Upper Target	**33%**	644,866	673,714	703,903	735,497	768,562
11	Lower Target	**25%**	488,535	510,390	533,260	557,195	582,244
	Capital Reserve						
12	*Source of Funds*						
13	Beginning Balance		$2,068,574	$1,820,028	$5,160,139	$3,750,048	$3,033,066
14	Bond Proceeds		$0	$9,000,000	$0	$0	$2,700,000
15	Transfer from Cash Reserve		$1,000,129	$367,681	$374,767	$388,453	$205,880
16	**Total Funds Available**		3,068,703	11,187,708	5,534,906	4,138,501	5,938,946
	Use of Funds						
17	CIP Spending & Short Lived Assets		1,268,022	6,062,296	1,829,188	1,139,182	2,714,875
18							
19	**Total Use of Funds**		1,268,022	6,062,296	1,829,188	1,139,182	2,714,875
20	**Fund Balance Before Interest**		**1,800,681**	**5,125,412**	**3,705,719**	**2,999,319**	**3,224,071**
21	Interest		19,346	34,727	44,329	33,747	31,286
22	**Ending Fund Balance**		**1,820,028**	**5,160,139**	**3,750,048**	**3,033,066**	**3,255,356**
	Target	**100%**	**2,839,775**	**2,232,702**	**2,412,681**	**2,573,465**	**2,573,465**

Figure 3-4 illustrates the operating position of the Water Utility, where the expenses, inclusive of reserve funding and debt service, are shown by stacked bars; and total revenues at current rates and proposed rates are shown by the horizontal trend lines. **Figure 3-5** summarizes the projected CIP and its funding sources, either PAYGO or debt financed. **Figure 3-6** displays the ending total reserve balance for the water utility, inclusive of operating and capital funds, where the horizontal trend line indicates the target reserve balance (as recommended by the reserve requirements discussed in Section 3.1.5) and the bars indicate ending reserve balance.

Figure 3-4: Proposed Operating Financial Plan

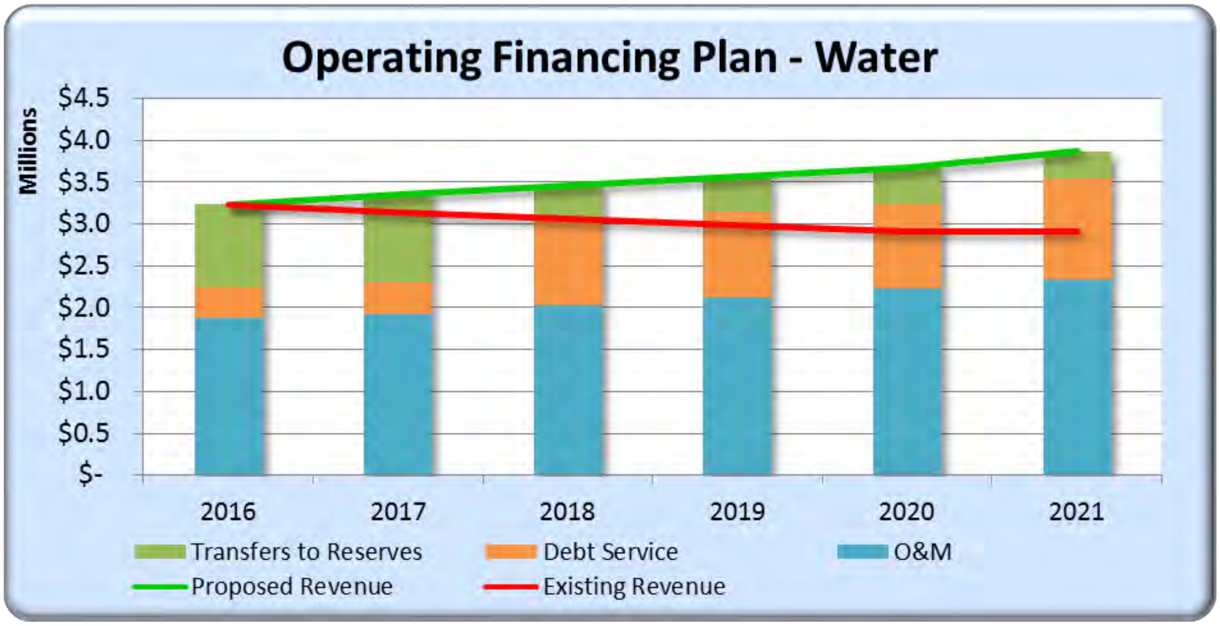


Figure 3-5: Projected CIP and Funding Sources

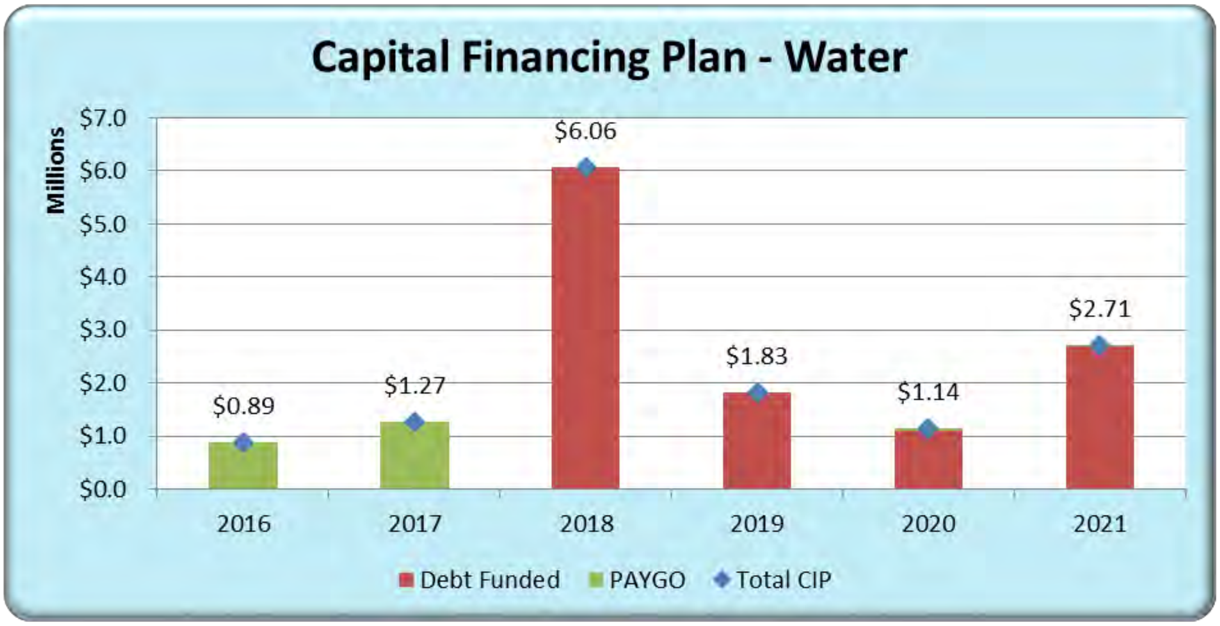
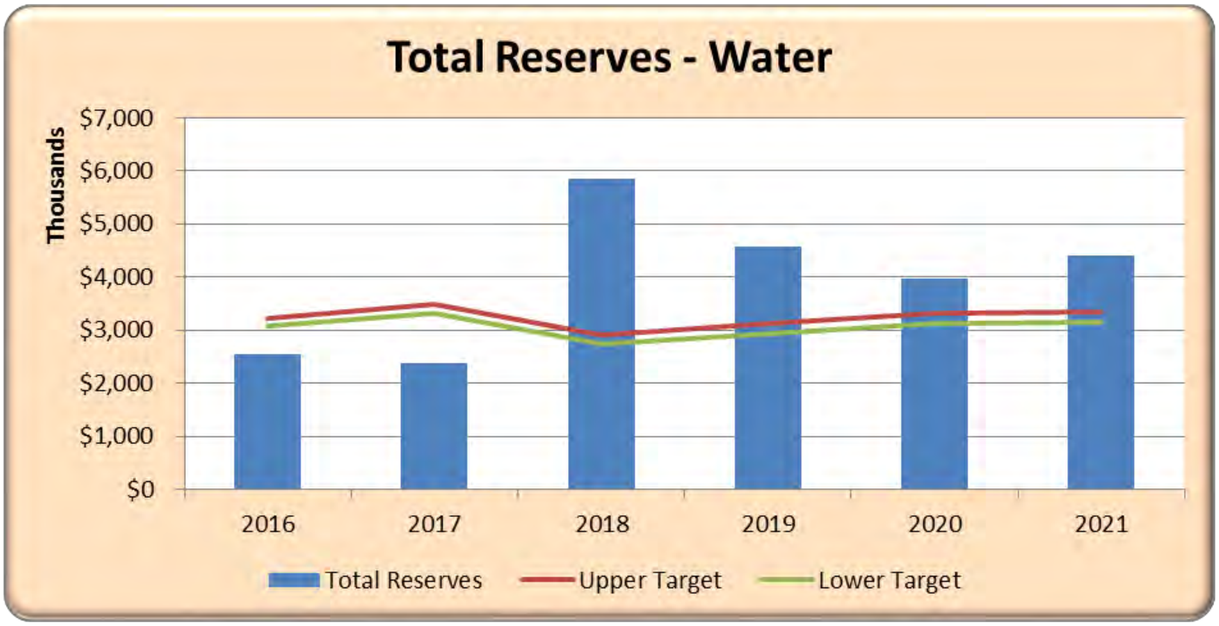


Figure 3-6: Projected Ending Reserve Balances



4 WATER SYSTEM - COST OF SERVICE AND RATE DESIGN

4.1 LEGAL FRAMEWORK AND RATE METHODOLOGY BACKGROUND

Proposition 218 (California Constitution Article 13D sec(6)) states that:

1. A property-related charge (such as water rates) imposed by a public agency on a parcel shall not exceed the funds required to provide the property related service.
2. Revenues derived by the charge shall not be used for any other purpose other than that for which the charge was imposed.
3. The amount of the charge imposed upon any parcel shall not exceed the proportional cost of service attributable to the parcel.
4. No charge may be imposed for a service unless that service is actually used or immediately available to the owner of property.
5. A written notice of the proposed charge shall be mailed to the record owner of each parcel at least 45 days prior to the public hearing, when the agency considers all written protests against the charge.

As stated in the Manual M1, "the costs of water rates and charges should be recovered from classes of customers in proportion to the cost of serving those customers." Prop 218 ensures that water rates cannot be "arbitrary and capricious", meaning that the rate-setting methodology must be sound and that there must be a nexus between costs and the rates charged.

In conjunction with Proposition 218, Article X (2) of the State Constitution establishes the need to preserve the State's water supplies and to discourage the wasteful or unreasonable use of water by encouraging conservation. In addition, Section 106 of the Water Code declares that the highest priority use of water is for domestic purposes, with irrigation secondary. In connection with meeting the objectives of Article X, Water Code Sections 370 (AB2882) and 375 authorize a water purveyor to utilize its water rate design to incentivize the efficient use of water. Although incentives to conserve water could be provided by implementing a higher rate as consumption increases, a nexus between the rates and cost incurred to provide the water must be developed in order to achieve compliance with Proposition 218.

4.2 COST BASED RATE SETTING METHODOLOGY

As stated in the Manual M1, the AWWA Rates and Charges Subcommittee agree with the Proposition 218 that "the costs of water rates and charges should be recovered from classes of customers ***in proportion*** to the cost of serving those customers".

The utilities revenue requirements are, by definition, the cost of providing service. This cost is then used as the basis to develop unit costs for the water components and to allocate costs to the various customer classes in proportion to the water services rendered. The concept of proportionality requires that cost allocations consider both the average quantity of water consumed (base) and the peak rate at which it is consumed (peaking). Use of peaking is consistent with cost of providing service because the water system is designed to handle peak demands, and the additional costs associated with design, construction operating and maintenance of facilities specified to meet these peak demands need to be allocated to those imposing such costs on the utility so that the costs can be recovered appropriately.

4.2.1 Cost Components

The total cost of water service is analyzed by system function in order to equitably distribute costs in relation to how it's incurred, in general, which then allows each cost component to be recovered through the most appropriate revenue recovery (i.e. fixed versus variable). For this analysis, water utility costs of service are assigned under the Base-Extra Capacity method to the following functional cost components: Water Supply, Base, Peaking (Max Day / Max Hour), Customer Service (Billing), and Metering. **Table 4-1** provides a summary of the District's budgeted expenses by cost category.

Table 4-1: Summary of Water Budget Items

Water Budget Item	FYE 2017 Revenue Requirements
Repairs & Maintenance	$249,260
Professional Services	$127,534
Insurance	$66,176
Personnel Expense	$710,574
Employee Benefits	$318,598
Office expense	$71,382
Utilities	$410,615
Debt	$375,881
Total	**$2,330,020**

4.2.2 Functionalizing Cost Components

The next step in the cost of service is to allocate budget items into functional cost components. This is done by categorizing the water budget items by their cost function. For this study, RFC identified seven cost categories. These are: General/Administrative costs, Base costs, Max Day costs, Max Hour costs, Capacity costs, Supply costs, and Billing and Customer Service Costs. These cost categories correspond to functional cost categories. For example, costs that are allocated to General/Admin are allocated 50 percent to Billing and 50 percent to Metering. **Table 4-2** shows the functional cost allocation for each Cost Category. Note that the functional costs that are indicated in gray are fixed cost categories, and those in blue are variable cost categories.

Table 4-2: Cost Category Allocation Percentages

Cost Categories	Billing	Metering	Supply	Base	Max Day	Max Hour
General/Admin	50.0%	50.0%				
Base				100.0%		
Max Day[1]		0.0%		70.6%	29.4%	
Max Hour[2]				47.1%	19.6%	33.3%
Capacity		50.0%		35.3%	14.7%	
Supply			100.0%			
Billing and Customer Service	100.0%					

[1] Max Day was derived based on the water production figures from the District

[2] Max Hour is 1.5x Max Day

4.2.3 Cost of Service

After obtaining the summary of revenue requirements from the budget, the revenue requirements are allocated to functional cost components. **Table 4-3** illustrates how costs were allocated to the functional costs. As mentioned above, costs in light blue are recovered by variable rates, costs in gray are recovered by fixed rate mechanisms.

Table 4-3: Fixed vs. Variable Cost Allocation to Revenue Components

			Fixed Percentage		Variable Percentage			
			33%		67%			
Water Cost Item	Expense	Allocation	Billing	Metering	Supply	Base	Max Day	Max Hour
Repairs & Maintenance	$249,260	Max Hour	$0	$0	$0	$117,288	$48,885	$83,087
Professional Services	$127,534	General/Admin	$63,767	$63,767	$0	$0	$0	$0
Insurance	$66,176	Billing and Customer Service	$66,176	$0	$0	$0	$0	$0
Personnel Expense	$710,574	Max Day	$0	$0	$0	$501,537	$209,037	$0
Employee Benefits	$318,598	General/Admin	$159,299	$159,299	$0	$0	$0	$0
Office expense	$71,382	Billing and Customer Service	$71,382	$0	$0	$0	$0	$0
Utilities	$410,615	Supply	$0	$0	$410,615	$0	$0	$0
Debt	$375,881	Capacity	$0	$187,941	$0	$132,652	$55,288	$0
Viking Ranch Refinance	$0	General/Admin	$0	$0	$0	$0	$0	$0

Monthly fixed charges recover all of the costs associated with Billing and Metering. Commodity rates recover all of costs associated with Supply, Base, Max Day, and Max Hour.

This study calculated water rates based on FY 2016-17 as the base year through FY 2020-21 for the new proposed rates. The annual revenue requirements or costs of service to be recovered from rates include O&M expenses, and the amount of the proposed revenue adjustment, as well as have the revenue offsets subtracted. The revenue offsets include the utility's non-operating revenues and the negative of the projected revenues to fund. These additional offsets and adjustments are allocated by the percentages shown in **Table 4-3**. The results are summarized below in **Table 4-4**.

Table 4-4: Revenue Requirements by Function – Fiscal Year 2015-16

		Fixed Percentage		Variable Percentage			
		33%		67%			
Water Cost Item	**Expense**	**Billing**	**Metering**	**Supply**	**Base**	**Max Day**	**Max Hour**
Subtotal O&M	$2,330,020	$360,624	$411,006	$410,615	$751,477	$313,211	$83,087
Percentage of Total		15%	18%	18%	32%	13%	4%
Revenue Adjustment	$228,315						
Less Revenue Offset							
Non-Operating Revenues	$268,782						
Fund Balance	-$792,700						
Mid-year adjustment	$0						
Total Cost of Service to be Recovered from Rates	$3,082,253	$477,049	$543,697	$543,179	$994,088	$414,329	$109,911

5 PROPOSED RATES

5.1 PROPOSED RATE STRUCTURE

The proposed commodity rate structures vary by customer class and are discussed below.

5.1.1 Residential 2-Tiered Inclining Rate Structure

RFC recommends adjusting the District's current uniform rate structure and replacing it with a 2-tiered rate structure that provides a straight-forward connection between water needs and tiered allotments. The goal of the first tier is to provide for basic indoor water demand with the second tier for all other usage above tier 1. Tier 1 is based on the District's density of approximately 3 persons[4] per household at 55 gallons per capita per day[5] over the 30-day billing period (rounded to the next whole unit of water). **Figure 5-1** shows the calculation used to derive the single-family residential Tier 1 allocation of 7 units of water.

Figure 5-1: Tier 1 Residential Allotment Calculation

$$\frac{3.00 \text{ density x } 55 \text{ gpcd x } 30 \text{ days}}{748.05 \text{ gallons}} = 6.70 = \text{Rounded to 7 Units}$$

The single-family residential Tier 2 covers the rest of the SFR customer class's usage.

Table 5-1: Residential Tier Allotments

Customer Class	Tier width / Allotments[1]
Residential	
Tier 1	1 - 7 Units
Tier 2	> 7 Units

5.1.2 Non-Residential Uniform Rate Structure

For non-residential customers, RFC recommends maintaining a uniform rate. However, despite not being tiered, the uniform rate structure is based on the same cost components and non-residential customers are allocated their proportionate share of costs based on the cost to provide service.

[4] Actually density is approximately 2.2 persons, which is rounded up to the next integer (3).
[5] The state's per capita target for indoor use

5.2 PROPOSED RATES

5.2.1 Fixed Charges

The monthly fixed service charge has the following main components: Billing (Customer Service) related costs and Metering (capacity) related costs. Customer costs are uniform for all customers and include such costs as meter reading, billing, collecting and accounting. **Table 5-2** shows the customer costs allocated evenly over the number of units. There are 2,057 accounts in the District's service area, which equates to 24,684 bills annually.

Table 5-2: Billing Cost Component of the Fixed Charge

Billing Costs per Unit	FYE 2016
Total Customer Accounts Costs	$477,049
Annual Bills	÷ 24,684
Monthly Charge per Unit	**$19.33**

Metering costs include a portion of the capacity related costs and a portion of general/admin related costs. RFC utilized the American Water Works Association meter capacity ratios in calculating the meter component of the fixed charge. These costs are assigned based on meter size. Based on these ratios, the total equivalent meters equals 2,912, therefore the number of equivalent meters per year is 2,912 multiplied by 12, which equals 34,940. **Table 5-4** shows Metering costs allocated over the number of equivalent meters.

Table 5-3: Metering Cost Component of the Fixed Charge

Metering Costs	FYE 2016
Total Metering Costs	$543,697
Number of Equivalent Meters	÷ 34,940
Monthly Charge per ⅝" Meter	**$15.56**

Table 5-5 summarizes the proposed monthly fixed meter for FY 2017. The monthly fixed meter charge includes both the Billing cost component and the Metering cost component.

Table 5-4: Monthly Fixed Charge Calculation

Meter Size	Number of Meters	Billing Charge	Capacity Ratio	Metering Charge	FY 2017 Proposed Charge
3/4"	1,398	$19.33	1.00	$15.56	$34.89
1"	545	$19.33	1.67	$25.93	$45.27
1 1/2"	77	$19.33	3.33	$51.87	$71.20
2"	25	$19.33	5.33	$82.99	$102.32
3"	3	$19.33	10.67	$165.98	$185.31
4"	7	$19.33	16.67	$259.35	$278.68
6"	2	$19.33	33.33	$518.70	$538.03

Table 5-5 shows the proposed rates through FY 2021.

Table 5-5: Proposed Monthly Service Charge (FYE 2016 – FYE 2021)

Meter Size	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
3/4"	$34.89	$36.99	$39.21	$41.57	$44.07
1"	$45.27	$47.99	$50.87	$53.93	$57.17
1 1/2"	$71.20	$75.48	$80.01	$84.82	$89.91
2"	$102.32	$108.46	$114.97	$121.87	$129.19
3"	$185.31	$196.43	$208.22	$220.72	$233.97
4"	$278.68	$295.41	$313.14	$331.93	$351.85
6"	$538.03	$570.32	$604.54	$640.82	$679.27

5.2.2 Variable Charges

Approximately 67% of the District's revenue requirements are proposed to be recovered from the commodity charges (based on the amount of water used). Variable cost components include Supply costs, Base costs, and Peaking costs (max day / max hour), as well as an economic cost component.

For this analysis, consumption and peaking characteristics of customers were analyzed to appropriately allocate costs between each tier. Variable costs were separated into four discrete components- Supply, Base, Peaking, and the Economic Cost. The sum of each of the variable cost components, equals the rate per unit of water per tier. This approach synchronizes the objectives of Article X (2) and Proposition 218 in developing a cost of service tiered rate structure.

5.2.2.1 Water Supply Costs

The District relies entirely on pumped groundwater from the Borrego Valley Basin for their water supply. Thus the price of water is highly dependent on the cost of operating the pumps that provide water to the District. **Table 5-6** shows the calculation that gives the Supply cost per unit of water.

Table 5-6: FY 2016-17 Water Supply Costs

Source of Supply	Production Quantity (ccf)	Supply Cost Recovery	Cost per ccf
Groundwater	633,820	$543,179	$0.86

5.2.2.2 Base Costs

Base costs, also commonly referred to as Delivery costs, are those operating and capital costs of the water system associated with delivering water to all customers at a constant average rate of use. Therefore, Base costs are spread over all units of water, irrespective of customer classes or tiers, to calculate a uniform rate. **Table 5-7** shows the allocation of Base costs to each customer class.

Table 5-7: Base Costs per Unit of Water

Source of Supply	Production Quantity (ccf)	Base Cost Recovery	Cost per ccf
Groundwater	633,820	$994,088	$1.57

5.2.2.3 Peak Costs (Max Day / Max Hour) and Conservation Costs

Extra capacity or peaking costs represent those costs incurred to meet customer peak demands for water in excess of a baseline usage. Total extra capacity costs are apportioned between maximum day and maximum hour demands based on the type of expense. The maximum day demand is the maximum amount of water used in a single day in a year. The maximum hour demand is the maximum usage in an hour on the maximum usage day. Different facilities are designed to meet different peaking characteristics. Therefore, extra capacity costs include repair & maintenance, personnel, capital improvements and a portion of debt, and have been apportioned between base, maximum day, and maximum hour. Costs allocated to base are allocated above.

Costs associated with peaking and conservation are apportioned to each defined customer class based on their total demand (total water used weighted by peak factor). Peaking factors are calculated for each customer class based on the customer class's maximum monthly consumption divided by their average monthly consumption. A weighted peaking factor is calculated by multiplying the peaking factor by the customer class's annual usage. The customer class's weighted peak over the total of the weighted peaking factor yields that class's percentage of total peak. Total peaking costs are multiplied by percentage of peak in order to determine the total to be recovered from peaking charges from each customer class. This ensures that accounts within each customer class will only recover the costs allocated to their respective customer class in proportion to the cost of providing service. **Table 5-8** show the peak costs allocated between each customer class.

Table 5-8: Peak Cost Allocation to Customer Class

	A	B	C	D=C/B	A*D		
Customer Class	Annual Usage	Average Month	Max Month	Peaking Factor	Weighted Peak	Percentage of Peak	Allocated Peak Costs
Residential	373,225	33,407	44,278	1.33	494,674	60%	$314,150
Non-Residential	260,595	23,326	29,611	1.27	330,815	40%	$210,089
Total	**633,820**					**100%**	**$524,239**

Once peak and conservation costs are allocated to each customer class, the next step is to design the most equitable and appropriate rate structure to recover such costs from the corresponding customer class to ensure proportionality between accounts. The proposed variable rate structure for residential customers is a 2-tiered structure, and a uniform rate structure for non-residential customers.

5.2.2.3.1 Peaking Cost Allocation by Tiers and Customer Class

Using the defined tiers and allotments from Section 5.1, the functional variable costs are then applied to each tier. Similar to how costs may be apportioned to different groups of customers based on usage characteristics to show proportionality, maximum day and maximum hour costs were apportioned between tiers based on the unique usage characteristics of customers within each tier

As part of allocating costs between each tier, usage as well as the peaking characteristics of each Tiered Customer Class was analyzed, where Tier 1 is the baseline with a Peak Factor of 1.0. The peaking factor for Tier2 was calculated by taking the maximum average usage of the tier and dividing by the average usage within the tier for the full year. **Table 5-12** shows the residential peaking factors by tier.

Table 5-9: Peaking Factors for Residential Tiers

Tier	Average number of monthly accounts	Average Usage (per Month)	Maximum Usage (per Month)	Peak Factor
Tier 1	516	7.00	7.00	1.00
Tier 2	1042	29.76	37.89	1.27

Table 5-10 illustrates FY 2016 peak costs allocated between tiers by weighting the peak factors by the total usage in each Tier. Note the respective unit costs derived from this analysis become the tier demand values in the variable rate component.

Table 5-10: FY 2016-17 Residential Allocation of Peak Costs by Tier

Residential	FY 2017 Usage	Peaking Factors	Weighted Peak Factor	Percent of Weighted Peak Factor	Allocated Peak Cost	Unit Rate
Residential						
Tier 1	104,028	1.00	104,028	23%	$73,158	$0.71
Tier 2	269,197	1.27	342,685	77%	$240,993	$0.90
Total	**373,225**			**100.00%**	**$314,150**	

5.2.2.3.2 Non-Residential Peaking Allocation

For non-residential customers, all variable charges including peak costs are summed to derive a uniform rate per hcf rather than a tiered rate structure. **Table 5-11** presents the non-residential allocation of peak costs.

Table 5-11: FY 2016-17 Non-Residential Allocation of Peak Costs

Customer Class	Annual Usage	Peaking Factor	Weighted Peak Factor	Percentage of Peak	Allocated Peak Costs	Unit Rate
Non-Residential	260,595	1.27	330,815	40%	$210,089	$0.81

5.2.2.4 Economic Costs

The District instructed RFC to design a portion of the rates to recover the economic cost of water in the Borrego Valley. The costs discussed in this section were taken from a Technical Memorandum from Dudek entitled “Water Replacement and Treatment Cost Analysis for the Borrego Valley Groundwater Basin” (Groundwater Report).

The report stated that roughly 30% of the District’s annual water use can be naturally recharged in the basin. However, after a certain point the groundwater will have to be treated to remain in compliance with California State water quality standards. Therefore, RFC constructed an economic charge based on the Groundwater Report to account for the capital cost associated with treating groundwater to the state mandated standards.

This charge is assessed on all water deemed unsustainable, or unable to be recharged by natural recharge processes. In light of the current prolonged drought, RFC used a lower figure of 25% of total demand as being able to naturally recharge. Therefore, 25% of the water used by each customer class was classified as sustainable, and the remaining 75% of usage is assessed for the capital costs of treatment ($62 per acre foot.[6]) to ensure the continued delivery of safe and healthy potable water. This $62 per acre foot (AF) cost is charged on 75% of the water sold in FY 2017. The total cost is shown in **Figure 5-2** below.

The Dudek Technical Memo lists other economic costs beyond the $62 per AF that RFC used as an economic cost. However, the $62 per AF represents the Capital Cost of treatment, whereas other costs represent the O&M costs associated with operating these plants or the costs associated with importing water. These costs were omitted because the District isn't currently importing water and the additional operational cost related to the treatment facilities will be incurred after the facilities are constructed.

Figure 5-2: Economic Cost of Water Recovery

$$\$62 * 1455AF * .75 = \$67,660$$

Table 5-12A shows the Residential Economic Cost allocated to each tier and **Table 5-13B** shows the non-residential Economic Cost calculation. These tables explain the allocation of the economic cost of water. Column A shows total projected water usage in FY 2017. Column B shows the amount considered sustainable, which is 25% of the total for each class. Sustainable use was allocated first to Tier 1 for residential customers. Column C is the difference between Columns A and B. The total economic cost of water from **Figure 5-2** is then allocated to each according to the percentage of unsustainable water use, and divided by total usage in FY 2017 to determine the unit rate. Note that, with the exception of columns A and D, the Total line shows the total for the entire utility, columns A and D show the total only for the class.

Table 5-12A: FY 2016-17 Residential Economic Cost Allocation

	A	B=.25*A	C=A-B	D	E= D*Figure 5-2	F=E/A
Residential	Usage in FY 2017	Sustainable Use	Unsustainable Use	Percent of Unsustainable Use	Allocated Economic Cost	Cost Per hcf
Residential						
Tier 1	104,028	93,306	10,722	2.3%	$1,526	$0.02
Tier 2	269,197	0	269,197	56.6%	$38,315	$0.15
Total	**373,225**	**158,455**	**475,365**	**58.9%**	**$67,660**	

[6] See Dudek, "Water Replacement and Treatment Cost Analysis for the Borrego Valley Groundwater Basin" (December 18, 2015) available at http://www.borregowd.org/uploads/2016.02.16_BWD_Board_Package.pdf, pp. 37-50

Table 5-13B: Non-Residential Economic Cost Allocation

	A	B=.25*A	C=A-B	D	E= D*Figure 5-2	F=E/A
Non-Residential	Usage in FY 2017	Sustainable Use	Unsustainable Use	Percent of Unsustainable Use	Allocated Economic Cost	Cost Per hcf
Non-Residential	**260,595**	65,149	195,446	41.1%	$27,818	$0.11
Total	**260,595**	**158,455**	**475,365**	**41.1%**	**$67,660**	

5.2.2.5 Proposed Variable Rates

The above costs are totaled in **Table 5-14** below which shows the proposed Commodity Rates for FY 2016-17 and **Table 5-14** shows proposed rates through FY 2020-21. These rates are multiplied by the rate adjustments in Section 3.2 to determine the rates for the next year.

Table 5-14: Proposed Residential Variable (Commodity) Rates by Tier

	Supply Cost	Base Cost	Peaking Cost	Economic Cost	Total
Residential					
Tier 1	$0.86	$1.57	$0.71	$0.02	$3.16
Tier 2	$0.86	$1.57	$0.90	$0.15	$3.48
Non-Residential	$0.86	$1.57	$0.81	$0.11	$3.35

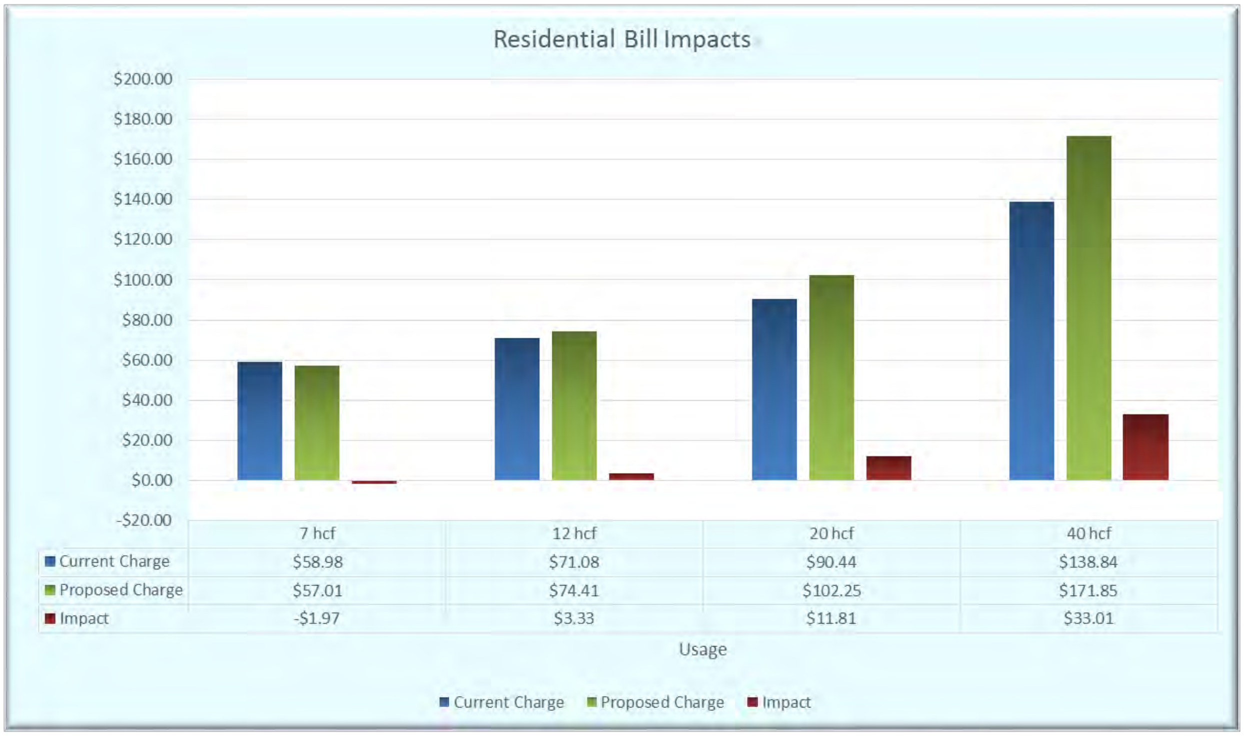
Table 5-14: Proposed Five-Year Commodity Base Rates

Customer Class	FYE 2017 Rates	FYE 2018 Rates	FYE 2019 Rates	FYE 2020 Rates	FYE 2021 Rates
Residential					
Tier 1	$3.16	$3.35	$3.56	$3.78	$4.01
Tier 2	$3.48	$3.69	$3.92	$4.16	$4.41
Non-Residential	$3.35	$3.55	$3.77	$4.00	$4.24

5.3 CUSTOMER IMPACTS

Figure 5-3 shows the relative residential bill impact of the new rates and adjusted rate structure. The below figure shows the comparative impacts of bills at different usages for accounts with a ¾" meter.

Figure 5-3: Residential Bill Impacts



6 WASTEWATER FUND - FINANCIAL PLAN AND RATES

6.1 WASTEWATER REVENUE REQUIREMENTS

Similar to water, a review of wastewater's revenue requirements is a key first step in the rate study process. The review involves an analysis of annual operating revenues under the status quo, operation and maintenance (O&M) expenses, transfers between funds and reserve requirements. This section of the report provides a discussion of the projected revenues, O&M expenses, other reserve funding and revenue adjustments estimated as required to ensure the fiscal sustainability and solvency of the Wastewater Fund.

6.1.1 Revenues from Current Sewer Rates

The District provides sewer collection services within its service area for both residential and commercial use. The District provides Wastewater service to three separate Improvement Districts (IDs). These Districts are: ID 1, ID 2, and ID 5. With the exception of the Borrego Springs Resort in ID 5, all sewer users pay a flat monthly charge that changes depending on ID. Borrego Springs Resort pays an additional usage charge per unit of water used.

Table 6-1: Current Wastewater Charges

ID/ Customer	FY 2016 Monthly Charge
ID-1	$33.56
ID-2 Holders	$19.42
ID-2 Users	$10.00
ID-5	$62.62
Borrego Springs Resort (Account)	$62.62
Borrego Springs Resort (Usage)	$1.30

The District also assesses a charge on ID-2 permit Holders. These are customers that have yet to connect to the Sewer system. ID-2 Users, those actually connected to and using the sewer system, pay the sum of both the Holder and User charge.

District staff provided RFC with the estimated number of accounts for FYE 2015. **Table 6-2** provides a summary of the projected number of sewer accounts by customer type.

Table 6-2: Account and Usage Summary

Customer Type	FY 2016 (Current)	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
ID-1	266	266	266	266	266	266
ID-2 Holders	735	735	735	735	735	735
ID-2 Users	333	333	333	333	333	333
ID-5	275	275	275	275	275	275
Borrego Springs Resort (Account)	5	5	5	5	5	5
Borrego Springs Resort (Usage)	11,643	11,643	11,643	11,643	11,643	11,643

By multiplying the charges outlined above by the relevant number of accounts or amount of usage, RFC projected revenues for the utility for the Study Period. Projected operating revenues are shown in **Table 6-3** below.

Table 6-3 shows the projected revenue based on rates and total accounts identified in **Table 6-1** and **Table 6-2**, respectively.

Table 6-3: Projected Operating Revenues at Current Rates

Customer Type	FYE 2016 (Current)	FYE 2017	FYE 2018	FYE 2019	FYE 2020	FYE 2021
ID-1	$107,124	$107,124	$107,124	$107,124	$107,124	$107,124
ID-2 Holders	$171,284	$171,284	$171,284	$171,284	$171,284	$171,284
ID-2 Users	$39,960	$39,960	$39,960	$39,960	$39,960	$39,960
ID-5	$206,646	$206,646	$206,646	$206,646	$206,646	$206,646
Borrego Springs Resort (Account)	$3,757	$3,757	$3,757	$3,757	$3,757	$3,757
Borrego Springs Resort (Usage)	$15,136	$15,136	$15,136	$15,136	$15,136	$15,136
Total	$543,907	$543,907	$543,907	$543,907	$543,907	$543,907

6.1.2 Wastewater Operations and Maintenance Expenses

The District's FYE 2016 budget values and the assumed inflation factors for the Study Period (as detailed in Section 2.1) were used as the basis for projecting O&M costs. **Table 6-4** summarizes budgeted and projected O&M expenses for the Wastewater Fund.

Table 6-4: Wastewater O&M Summary

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Repairs & Maintenance	$132,000	$135,960	$140,039	$144,240	$148,567	$153,024
Professional Services	$20,719	$21,341	$21,981	$22,641	$23,320	$24,019
Insurance	$10,751	$11,074	$11,406	$11,748	$12,100	$12,464
Personnel Expense	$113,242	$118,904	$124,850	$131,092	$137,647	$144,529
Employee Benefits	$50,774	$53,313	$55,978	$58,777	$61,716	$64,802
Office expense	$11,597	$11,945	$12,303	$12,672	$13,052	$13,444
Utilities	$65,439	$68,710	$72,146	$75,753	$79,541	$83,518
Total	$404,522	$421,247	$438,703	$456,923	$475,944	$495,800

6.1.3 Projected Capital Improvement Plan (CIP)

While the wastewater utility has a less capital intensive CIP than the water utility, it still has a significant slate of projects upcoming. The District is anticipating spending roughly $1.85 million in Wastewater CIP through FY 2021. A summary of the inflated cost of the Wastewater CIP is shown in **Table 6-5**.

Table 6-5: Wastewater CIP Summary

	FYE 2016	FYE 2017	FYE 2018	FYE 2019	FYE 2020	FYE 2021
Total CIP – Wastewater	$477,588	$400,260	$46,786	$282,124	$54,723	$59,182
Short Live Assets Replacement Program – Wastewater	$142,000	$59,850	$89,104	$68,937	$81,735	$85,398
Total	**$619,588**	**$460,110**	**$135,890**	**$351,061**	**$136,458**	**$144,580**

6.1.4 Current Debt

Currently the wastewater utility only has one debt obligation outstanding. This is the 2009 Private Placement. The annual debt service for this loan totals $20,544 annually. This obligation can be seen in **Table 6-6** below.

Table 6-6: Wastewater Existing Debt

	FYE 2016	FYE 2017	FYE 2018	FYE 2019	FYE 2020	FYE 2021
Viking Ranch Refinance						
Wastewater Portion	$20,544	$20,544	$20,544	$20,544	$20,544	$20,544
Total	**$20,544**	**$20,544**	**$20,544**	**$20,544**	**$20,544**	**$20,544**

6.2 WASTEWATER STATUS QUO FINANCIAL PLAN

6.2.1 Wastewater Proforma

Table 6-7 displays the proforma of the District's Wastewater Fund under current rates over the Study Period. All projections shown in the Table are based upon the current rate structure and do not include any rate adjustments. The pro-forma incorporates the data shown in Section **6.1**.

Under the "status-quo" scenario, revenues generated from rates are inadequate to sufficiently recover both operating and capital expenses of the utility beginning in FYE 2016. Though current operating revenues do exceed operating costs, they are insufficient to also fund the utility's capital program and would require the use of reserves. While the ending reserve balance is already below target levels, it dives further below target levels under the status quo scenario and is negative by FYE 2017.

Table 6-7: Status Quo Wastewater Operating Cash Flow

Borrego Water District
Operating Cash Flow

Line No.		FY 2016 $	FY 2017 $	FY 2018 $	FY 2019 $	FY 2020 $	FY 2021 $
4	**Total Rate Revenue**	$543,907	$543,907	$543,907	$543,907	$543,907	$543,907
5	Other Revenue	$0	$0	$0	$0	$0	$0
6							
7	Interest Revenue	$6,473	$1,633	$1,587	$1,539	$1,490	$1,438
8	**Total Revenue**	**$550,380**	**$545,540**	**$545,494**	**$545,446**	**$545,397**	**$545,345**
	Revenue Requirements						
9	O&M	$404,522	$421,247	$438,703	$456,923	$475,944	$495,800
10							
11	Existing Debt Service	$20,544	$20,544	$20,544	$20,544	$20,544	$20,544
12	Proposed Debt Service	$0	$0	$0	$0	$0	$0
15	**Total Revenue Requirements**	**$425,066**	**$441,791**	**$459,246**	**$477,467**	**$496,487**	**$516,344**
16	**Net Annual Cash Balance**	$125,314	$103,749	$86,248	$67,979	$48,909	$29,001
17	**Coverage Requirements**	115%	115%	115%	115%	115%	115%
18	**Coverage Ratio**	710%	605%	520%	431%	338%	241%

Table 6-8: Status Quo Wastewater Reserve Balances

Borrego Water District
Reserve Funds

Line No.			FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
	Cash Reserve							
1	*Source of Funds*							
2	Beginning Balance		574,347	$101,131	$105,312	$109,676	$114,231	$118,986
	Transfer to CIP Spending		-$598,530	-$99,568	-$81,884	-$63,424	-$44,154	-$24,037
3	Net Annual Cash Balance		$125,314	$103,749	$86,248	$67,979	$48,909	$29,001
4	**Total Funds Available**		$101,131	$105,312	$109,676	$114,231	$118,986	$123,950
9	Reserve Target	33%	$133,492	$139,011	$144,772	$150,785	$157,061	$163,614
10	Minimum Reserve Balance	25%	$101,131	$105,312	$109,676	$114,231	$118,986	$123,950
	Capital Reserve							
11	*Source of Funds*							
12	Beginning Balance			-$21,058	-$381,600	-$435,606	-$723,243	-$815,546
13	Bond Proceeds		$0	$0	$0	$0	$0	$0
14	Transfer from Cash Reserve		$598,530	$99,568	$81,884	$63,424	$44,154	$24,037
15	**Total Funds Available**		$598,530	$78,510	-$299,716	-$372,182	-$679,088	-$791,509
	Use of Funds							
16	CIP Spending & Short Lived Assets		$619,588	$460,110	$135,890	$351,061	$136,458	$144,580
17								
18	**Total Use of Funds**		$619,588	$460,110	$135,890	$351,061	$136,458	$144,580
19	**Fund Balance Before Interest**		**-$21,058**	**-$381,600**	**-$435,606**	**-$723,243**	**-$815,546**	**-$936,089**
20	Interest		$0	$0	$0	$0	$0	$0
21	**Ending Fund Balance**		**-$21,058**	**-$381,600**	**-$435,606**	**-$723,243**	**-$815,546**	**-$936,089**
	Target		**$340,621**	**$245,620**	**$253,216**	**$262,235**	**$206,995**	**$530,888**

6.3 PROPOSED FINANCIAL PLAN

6.3.1 Proposed Revenue Adjustments

As shown in the proforma above, the District's current capital improvement plan cannot be completed under current rates without significant reserve drawdown, which would result in a negative reserve balance by FYE 2017. RFC proposes the following revenue adjustments through FY 2020-21 which will allow the sewer enterprise to meet its obligations: 9 percent (9%) revenue adjustment for FY 2016-17 and 4 percent (4%) revenue adjustments in subsequent years. These revenue adjustments are scheduled to go into effect on July 1 of each Fiscal Year.

6.3.2 Proposed Debt Issuances

RFC proposes that the utility issue debt, once in FY 2017 and again in FY 2019 with a value of $0.46 million and $0.5 million, respectively.

6.3.3 Proposed Wastewater Proforma

Table 6-9 shows the proforma for the Wastewater enterprise under proposed revenue adjustments and with the additional proposed debt issuance. These revenue adjustments and the addition of the debt issuances allows the utility to maintain financial viability through the Study Period and begin to build its reserves so that funding its capital program does not result in significant reserve drawdown.

Table 6-9: Proposed Wastewater Operating Cash Flow

Borrego Water District
Operating Cash Flow

Line No.		FY 2016 $	FY 2017 $	FY 2018 $	FY 2019 $	FY 2020 $	FY 2021 $
1	**Revenue from Existing Retail Rates**	$543,907	$543,907	$543,907	$543,907	$543,907	$543,907
2	Revenue from Rate Adjustments	$0	$48,952	$72,666	$97,329	$122,978	$149,654
3							
4	**Total Rate Revenue**	$543,907	$592,859	$616,573	$641,236	$666,885	$693,561
6							
7	Interest Revenue	$6,473	$1,879	$1,952	$2,028	$2,108	$2,190
8	**Total Revenue**	**$550,380**	**$594,737**	**$618,525**	**$643,264**	**$668,993**	**$695,750**
	Revenue Requirements						
9	O&M	$404,522	$421,247	$438,703	$456,923	$475,944	$495,800
10							
11	Existing Debt Service	$20,544	$20,544	$20,544	$20,544	$20,544	$20,544
12	Proposed Debt Service	$0	$33,067	$33,067	$69,009	$69,009	$69,009
13	Transfer to Contingency						
14	Transfer to Rate Stabilization						
15	**Total Revenue Requirements**	**$425,066**	**$474,857**	**$492,313**	**$546,476**	**$565,496**	**$585,352**
16	**Net Annual Cash Balance**	$125,314	$119,880	$126,212	$96,789	$103,497	$110,398
17	**Coverage Requirements**	115%	115%	115%	115%	115%	115%
18	**Coverage Ratio**	710%	324%	335%	208%	216%	223%

Table 6-10: Proposed Wastewater Reserve Levels

Borrego Water District
Reserve Funds

Line No.			FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
	Cash Reserve							
1	*Source of Funds*							
2	Beginning Balance		574,347	$101,131	$105,312	$109,676	$114,231	$118,986
	Transfer to CIP Spending		-$598,530	-$115,699	-$121,848	-$92,233	-$98,742	-$105,434
3	Net Annual Cash Balance		$125,314	$119,880	$126,212	$96,789	$103,497	$110,398
4	**Total Funds Available**		$101,131	$105,312	$109,676	$114,231	$118,986	$123,950
9	Reserve Target	33%	$133,492	$139,011	$144,772	$150,785	$157,061	$163,614
10	Minimum Reserve Balance	25%	$101,131	$105,312	$109,676	$114,231	$118,986	$123,950
	Capital Reserve							
11	*Source of Funds*							
12	Beginning Balance			-$21,058	$94,899	$81,736	$324,931	$290,276
13	Bond Proceeds		$0	$460,000	$0	$500,000	$0	$0
14	Transfer from Cash Reserve		$598,530	$115,699	$121,848	$92,233	$98,742	$105,434
15	**Total Funds Available**		$598,530	$554,641	$216,747	$673,969	$423,673	$395,710
	Use of Funds							
16	CIP Spending & Short Lived Assets		$619,588	$460,110	$135,890	$351,061	$136,458	$144,580
17								
18	**Total Use of Funds**		$619,588	$460,110	$135,890	$351,061	$136,458	$144,580
19	**Fund Balance Before Interest**		**-$21,058**	**$94,531**	**$80,857**	**$322,908**	**$287,215**	**$251,130**
20	Interest		$0	$367	$879	$2,023	$3,061	$2,707
21	**Ending Fund Balance**		**-$21,058**	**$94,899**	**$81,736**	**$324,931**	**$290,276**	**$253,837**
	Target		**$340,621**	**$245,620**	**$253,216**	**$262,235**	**$206,995**	**$224,630**

Figure 6-1 through **Figure 6-4** show a snapshot of the financial plan in graphical form.

Figure 6-1 shows the proposed rate adjustments as blue bars, the resulting debt coverage ratio as a green line, and the required debt coverage of 125% of debt service as a red line.

Figure 6-2 shows the proposed wastewater operating financial plan. The stacked bars are the utility's projected revenue requirements, the red line indicates the projected revenues without the revenue adjustments, and the green line is the projected revenue with proposed revenue adjustments.

Figure 6-3 shows the wastewater utility fund's projected annual CIP spending and the source of the funding. Green bars indicate pay-as-you go (PAYGO) funding, and red bars indicate debt funded projects.

Figure 6-4 shows the wastewater utility fund's yearly ending balance. The blue lines indicate the ending balance, the red line indicates the utility's upper target balance and the green line indicates the lower target balance. The red dots indicate when the utility's ending balance is below the target balance.

Figure 6-1: Wastewater Revenue Adjustments and Debt Coverage

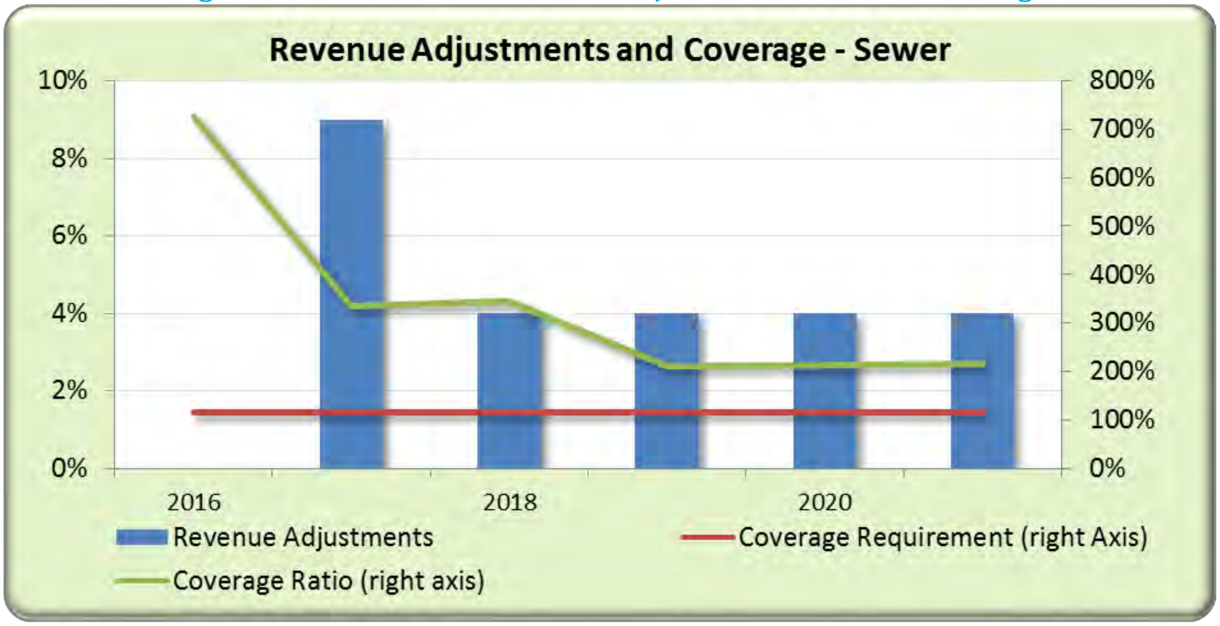


Figure 6-2: Wastewater Operating Financial Plan

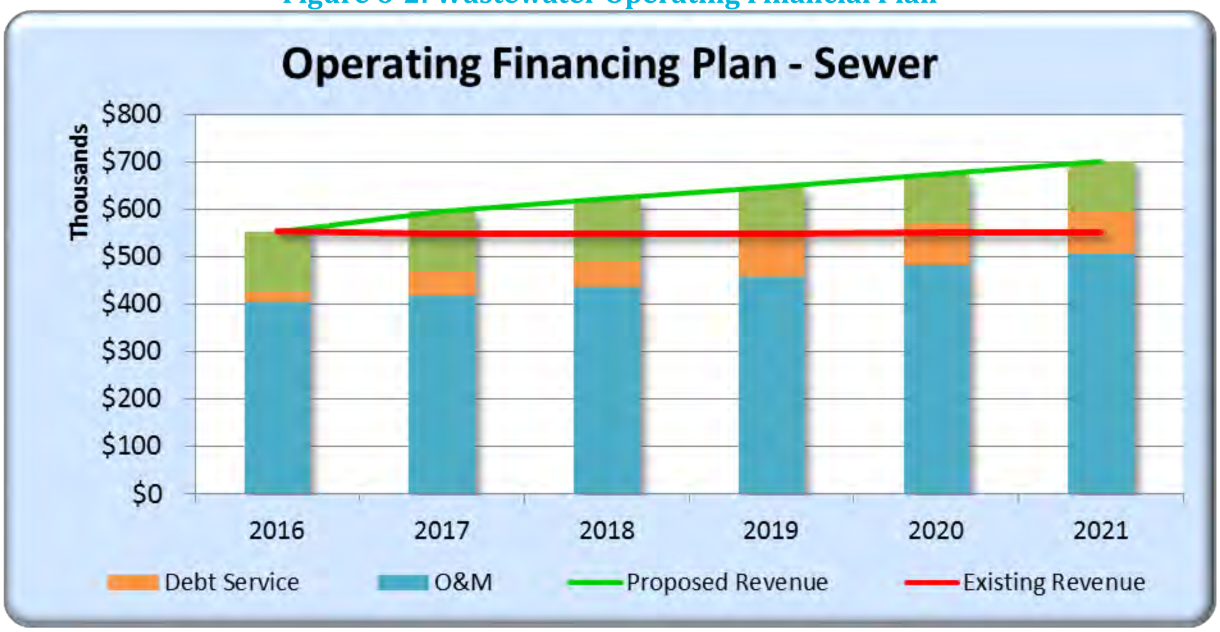


Figure 6-3: Wastewater Utility CIP Funding

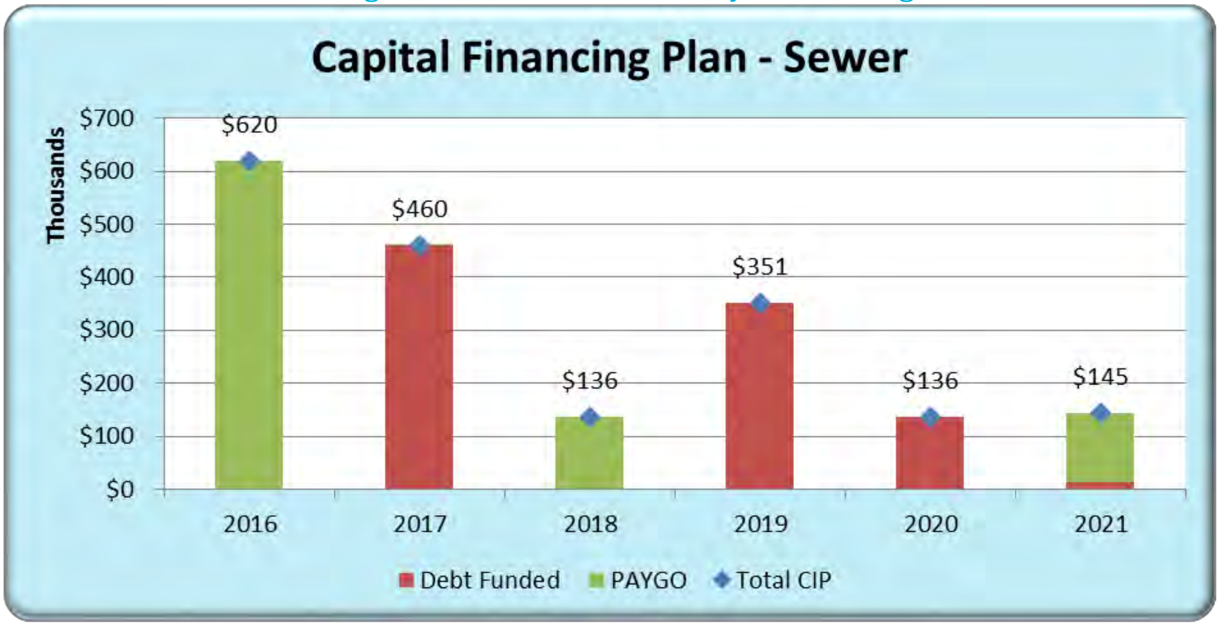
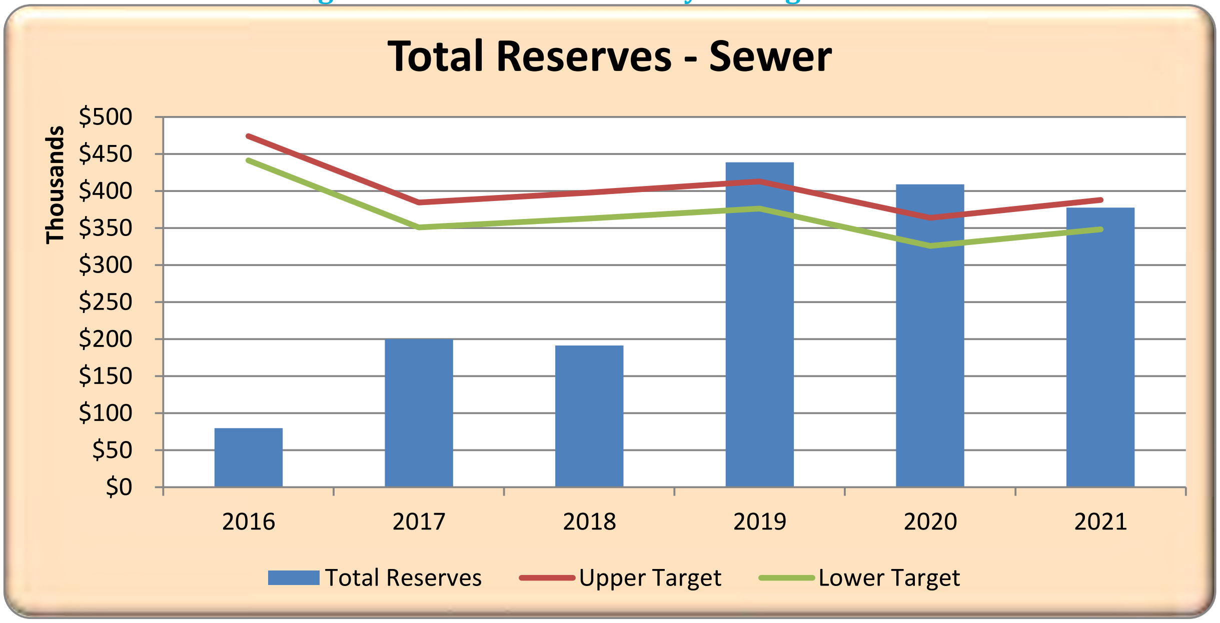


Figure 6-4: Wastewater Utility Ending Balances



6.4 WASTEWATER COST OF SERVICE AND RATE DEVELOPMENT

For the analysis, a "test" year was established in which revenue requirements for that year were evaluated and the resulting rates for that year were calculated. The following analysis uses FY 2016-17 as the test year.

6.4.1 Wastewater Cost of Service Allocation

Proposition 218 requires a nexus between the rates charged and the costs of providing service. Based on the proposed financial plan, the cost of service analysis translates this financial requirement into actual rates.

The first step in the cost of service analysis is to determine how much revenue is required to be collected from rates. The methodology used is based upon the premise that the utility must generate annual revenues adequate to meet its estimated annual expenses. As part of the cost of service analysis, several adjustments are made to the appropriate cost elements to ensure adequate collection of revenue by determining the annual revenues needed from rates: revenues from sources other than rates and charges (e.g. revenues from miscellaneous services) are deducted. **Table 6-11** shows the initial allocation process. The cost of service analysis is dependent on each ID's flow. The cost of service for each class also depends on the revenue requirement for the utility. The following section describes the methodology used to allocate the utility's operating and capital costs to three cost causation components – 1) wastewater flow, 2) bio-oxygen demand (BOD), 3) total suspended solids (TSS), 4) lift expenses and 5) fixed costs.

RFC received input from with District Staff to functionalize O&M costs. The results are shown below in **Table 6-11**.

Table 6-11: Initial Wastewater Cost Allocation

Description	Total Wastewater Expenses	Variable (Flow) %	BOD %	TSS %	Lift (%)	Fixed %
Repairs & Maintenance	$135,960	14.17%	14.17%	14.17%	15.00%	42.50%
Professional Services	$21,341				15.00%	85.00%
Insurance	$11,074				15.00%	85.00%
Personnel Expense	$118,904					100.00%
Employee Benefits	$53,313					100.00%
Office expense	$11,945					100.00%
Utilities	$68,710	85.00%			15.00%	

Table 6-12 shows the calculated results of the cost allocation process.

Table 6-12: Initial Wastewater Cost Allocation Amounts

Description	Total Wastewater Expenses	Flow	BOD	TSS	Lift	Fixed
Repairs & Maintenance	$135,960	$19,261	$19,261	$19,261	$20,394	$57,783
Professional Services	$21,341	$0	$0	$0	$3,201	$18,140
Insurance	$11,074	$0	$0	$0	$1,661	$9,413
Personnel Expense	$118,904	$0	$0	$0	$0	$118,904
Employee Benefits	$53,313	$0	$0	$0	$0	$53,313
Office expense	$11,945	$0	$0	$0	$0	$11,945
Utilities	$68,710	$58,404	$0	$0	$10,307	$0
Total	$421,247	$77,665	$19,261	$19,261	$35,563	$269,497
Existing Debt Service	$20,544					
Proposed Debt Service	$33,067					
Fund Balance	$119,880					
Total	**$594,737**	**$109,651**	**$27,194**	**$27,194**	**$50,209**	**$380,490**
Percent		18.44%	4.57%	4.57%	8.44%	63.98%

The next step was to allocate FY 2017's projected revenues to the correct cost center. This was done by taking the utility's FY 2017 expected revenue and multiplying by its total allocation percentage to calculate the final Revenue Allocation for the utility. The resulting Revenue Requirement is just under $0.6 million, and was allocated amongst the cost centers in the percentages shown in **Table 6-12**.

6.4.2 Wastewater Rate Development

Table 6-13 shows the utility's FY 2017 projected accounts and flows alongside the relevant revenue requirement for each cost center, as well as the costs per unit. The unit rates in the column at the right are obtained by dividing the FY 2017 projected cost by the FY 2017 projected totals.

Table 6-13: Total Revenue Requirement and FY 2016-17 Projected Totals

Totals	FYE 2017 Projected Totals	Projected FYE 2017 Cost
Accounts/Units	1,281	$380,490
Flow (hcf)	33,442	$109,651
BOD	72,481	$27,194
TSS	76,569	$27,194
Lifted Flow (hcf)	23,866	$50,209
Total		$594,737

The unit costs shown in **Table 6-13** are then applied to the wastewater flow and estimated loadings from each customer class, shown in **Table 6-15**, **Table 6-16**, **Table 6-17**, and **Table 6-18** to determine the cost to serve (or cost of service) for each Improvement District.

The assumed flow for all accounts that are not the Borrego Springs Resort is 3 hcf/month. This figure is in part based on the Water Tier 1 allocation of 6 hcf per month but also takes into account the snowbird nature of the District's community, and therefore the return factor is 50%. The total flow in hcf is based on the flow in FY 2015 as provided to RFC by the District. It was assumed that the Borrego Springs Resort would account for the remainder of flow.

The loading figures in **Table 6-15** through **Table 6-18** are taken from the 2014 Update of the Los Angeles County Sewer District Revenue Program Report. This report lists average TSS and BOD strength of flow by customer type. RFC assumed that all customers in IDs 1, 2 and most in ID 5, would have Residential strength characteristics (denoted by the values of 338 mg/L for BOD and 272 mg/L for TSS). The exceptions in ID 5 are the Borrego Springs Resort accounts which have the assumed strength of 500 mg/L of BOD and 600 mg/L of TSS.

The Flow Calculation is shown in **Table 6-14**. The total flow per account per day in ID-1, ID-2, and ID-5, works out to nearly 75 gallons.

Table 6-14: Annual Flow Calculation

ID/Customer Class	Residential Accounts	Gallons Per day	Gallons per Month	Gallons Per Year	Units per Year
Total Flow	874	69,489	2,084,684	25,016,209	33,442
ID 1	266	19,897	596,904	7,162,848	9,576
ID 2	333	24,908	747,252	8,967,024	11,988
ID 5	275	20,570	617,100	7,405,200	9,900
Borrego Springs Resort	5	4,114	123,428	1,481,137	1,978

Table 6-15: FYE 2017 ID-1 Allocation

ID 1	Residential	FY 2017 Projected	Percentage of Total	Projected FY 2017 Cost
	Accounts/Units	266	21%	$79,009
3.00	Flow (hcf/account/month)	9,576	29%	$31,398
338	BOD	20,181	28%	$7,571
272	TSS	16,266	21%	$5,777
	Total Variable Cost			$44,747

Table 6-16: FYE 2017 ID-2 Allocation

ID 2	Users	FY 2017 Projected	Percentage of Total	Projected FY 2017 Cost
	Accounts/Units	333	26%	$98,909
3.00	Flow (hcf/account/month)	11,988	36%	$39,307
338	BOD	25,264	35%	$9,478
272	TSS	20,363	27%	$7,232
	Total Variable Cost			$56,017

ID 2	Holders	FY 2017 Projected	Percentage of Total	Projected FY 2017 Cost
	Accounts/Units	402	31%	$119,404

Table 6-17: FYE 2017 ID-5 and Borrego Springs Resort Allocation

ID 5	Residential	FY 2017 Projected	Percentage of Total	Projected FY 2017 Cost
	Accounts/Units	275	21%	$81,682
3.0	Flow (hcf/account/month)	9,900	30%	$32,461
338	BOD	20,863	29%	$7,828
272	TSS	16,816	22%	$5,972
	Total Variable Cost			$46,261

ID 5	Borrego Springs Resort	FY 2017 Projected	Percentage of Total	Projected FY 2017 Cost
	Accounts/Units	5	0%	$1,485
	Flow (hcf)	1,978	6%	$6,485
500	BOD	6,174	9%	$2,316
600	TSS	23,124	30%	$8,213
	Total Variable Cost			$17,014

Table 6-18: FY 2017 Lift Allocation

Lift Accounts	FY 2017 Projected	Percentage of Total	Projected FY 2017 Cost
Total Lifted Flow	23,866		$50,209
ID 2	11,988	50%	$25,221
ID 5	9,900	41%	$20,828
Borrego Springs	1,978	8%	$4,161

For FY 2017 rates, the final rates for each improvement district were calculated by dividing the costs associated with each Improvement District by the total number of accounts in that district multiplied by the number of bills per year. For example: the FY 2017 monthly rate for ID 1 is calculated by dividing the account cost by the total number of accounts in ID 1 multiplied by 12. By doing the same process for the Variable Cost, and adding it to the monthly account charge the totally rate for FY 2017 is calculated. These are shown in **Table 6-19**.

Table 6-19: FY 2017 Rate Calculation

Customer Class	Total Accounts	Account Cost	Account Charge	Variable Cost	Variable Charge	Lift Cost	Lift Charge	FY 2017 Monthly Rate
ID 1	266	$79,009	**$24.76**	$44,747	**$14.02**			***$38.78***
ID 2 User	333	$98,909	**$24.76**	$56,017	**$14.02**	$25,221	**$6.32**	***$45.10***
ID 2 Holder	402	$119,404	**$24.76**					***$24.76***
ID 5	275	$81,682	**$24.76**	$46,261	**$14.02**	$20,828	**$6.32**	***$45.10***
Borrego Springs Resort	5	$1,485	**$24.76**					***$24.76***

Table 6-20 shows the cost per unit of Borrego Springs Resort. It is the sum of both the Lift Cost and Variable Cost divided by the total water usage that the Resort is projected to be billed for in FY 2017. Note that the Resort's total water usage is expected to be more than its projected flow.

Table 6-20: FY 2017 Borrego Springs Usage Rate Calculation

Usage	Total Usage	Lift Cost	Variable Cost	Cost per Unit
Borrego Springs Usage	11,643	$4,161	$17,014	$1.82

These rates were escalated by the revenue adjustment percentages in the financial plan to find the rates for the remainder of the study period. These are shown in **Table 6-21**.

Table 6-21: Wastewater Rates through FY 2021

Customer Class	Current Rate	Proposed FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
ID 1	$33.56	$38.78	$40.33	$41.94	$43.62	$45.37
ID 2 User	$29.42	$45.10	$46.90	$48.78	$50.73	$52.76
ID 2 Holder	$19.42	$24.76	$25.75	$26.78	$27.85	$28.97
ID 5	$62.62	$45.10	$46.90	$48.78	$50.73	$52.76
Borrego Springs Resort	$62.62	$24.76	$25.75	$26.78	$27.85	$28.97
Borrego Springs Usage	$1.30	$1.82	$1.89	$1.97	$2.05	$2.13

Appendix E:

<u>Raftelis Financial Consultants (RFC) 11/17/2016.</u>
Borrego Water District County Zoning and SGMA Impact Assessment.
Prepared for BWD.

November 17, 2016

Borrego Water District

County Zoning and SGMA Impact Assessment

Prepared by

RAFTELIS FINANCIAL CONSULTANTS

Table of Contents

1 Introduction

1.1 Scope of Work

The Borrego Water District (District) engaged Raftelis Financial Consultants (RFC) to review and analyze the impacts of growth and water availability within the District's service area. To evaluate these impacts RFC reviewed the District's internal work, and that of other District consultants, namely Dudek. Several technical memos were provided to RFC which were included in our methodology and assumptions in an effort to be consistent across several District projects.

As part of the review, RFC has confirmed and/or amended population growth and water demand assumptions, examined the validity of data provided by the District and its consultants related to water availability, reviewed current water market costs, estimated water demand on an equivalent dwelling unit (EDU) basis, and estimated total water demand at buildout in the year 2050.

The District will use this analysis in discussions with the County of San Diego (County) for planning and development purposes.

1.2 Background

The sole water supply source for the District is the Borrego Groundwater Basin. The basin is in critical overdraft. The State of California enacted the Sustainable Groundwater Management Act (SGMA) in 2014 to bring groundwater basins in to sustainability by 2040. As a first step the Act instructs each basin to setup a Groundwater Sustainability Agency (GSA). While the GSA is yet to be formed, a broad group named the Borrego Water Coalition has agreed to set baseline allocations for each entity in the basin, and targeted reductions in five year intervals, to reach the basin's sustainable yield in 2040. While not formally recognized by the state as a GSA, at this juncture the Borrego Water Coalition is the de facto GSA.

Independent of the requirements of SGMA, the District's service area contains a great degree of undeveloped parcels, zoned for a variety of land uses by the County. If built upon, the District is obligated to provide water service to a parcel. Even in the absence of SGMA the District does not currently have water available to serve these parcels. Providing water to these lots may pump the basin dry. With the requirements of SGMA, the District must reduce its current pumping, exacerbating the shortfall in serving new parcels. The county is either unaware or reluctant to discuss the physical and financial constraints of the District in providing water to new users. This analysis aims to provide information to the District which will be conveyed to the County in future meetings.

2 RFC Evaluation

The objective of our evaluation is to estimate the financial impact to the District of providing water service to unbuilt parcels while simultaneously achieving the long term sustainability targets of SGMA. To estimate these impacts RFC has incorporated assumptions from our previous work regarding revenues and expenses, total service connections, water demand, account growth, capital planning, and so on. The following subsections outline our assumptions and methodology.

2.1 Assumptions

Water demand per equivalent dwelling unit (EDU) is estimated at 0.4 acre feet per year (AFY). An equivalent dwelling unit is defined as the amount of water demanded by a typical Single Family Residential (SFR) customer. 0.4 AFY translates to approximately 175 units of water per year or 14.5 units of water per month. The District's billing unit is one hundred cubic feet (hcf) which is 748 gallons of water. Relative to historical water demand, 0.4 AFY/EDU is a conservative estimate and reflects significant long term conservation by the District's customers and assumes reduced water use by new users.

EDUs at buildout were provided by the District and revised appropriately to account for water demand of 0.4 AFY/EDU. The total EDUs at buildout are used to approximate the total number of metered connections at buildout. Because the District receives a significant portion of rate revenue through its fixed meter charges it is imperative to estimate the number of metered connections in a given year and at buildout. For consistency with other planning documents buildout is assumed in the year 2050. Table 2-1 shows the estimated EDUs, metered connections, and water demand, by class at buildout. Total water demanded at buildout due to growth from existing county zoning is estimated at 2,725 AFY. Existing demand is less than 1,700 AFY on average.

Table 2-1: EDUs, Meters, and Water Demand at Buildout

User Type	Number of EDUs (Buildout)	Meters (Buildout)	Rev Tab (2050)	Water Demand (Buildout) hcf	Water Demand (Buildout) AFY
Residential	4,823	4,823	4,814	906,118	1,929
Commercial	439	122	128	80,420	241
Public Agency	220	40	42	88,630	121
Irrigation	422	63	64	47,660	232
Multiple Units	365	40	40	76,641	201
Golf Course	0	0	0	0	0
TOTAL	6,269	5,088	5,087	1,199,469	2,725

SGMA requires groundwater basins to reach sustainability by the year 2040. The sustainable yield was determined by a recent United States Geological Survey (USGS) analysis of the Borrego Basin at 5,600 AFY. A framework drafted by the Borrego Water Coalition determined the reductions required by basin users to achieve sustainable yield in 2040. Step reductions are to be achieved every five years beginning in 2020. Reductions are based upon a user or entity's historical baseline production. Current pumping in the basin exceeds 18,000 AFY. It is estimated that the District's long term average annual production in the basin is 1,741 AFY. Figure 2-1 shows historical production in graphical format and Table 2-2 shows the District's historical production in tabular format.

Figure 2-1: Borrego Water District Historical Groundwater Production

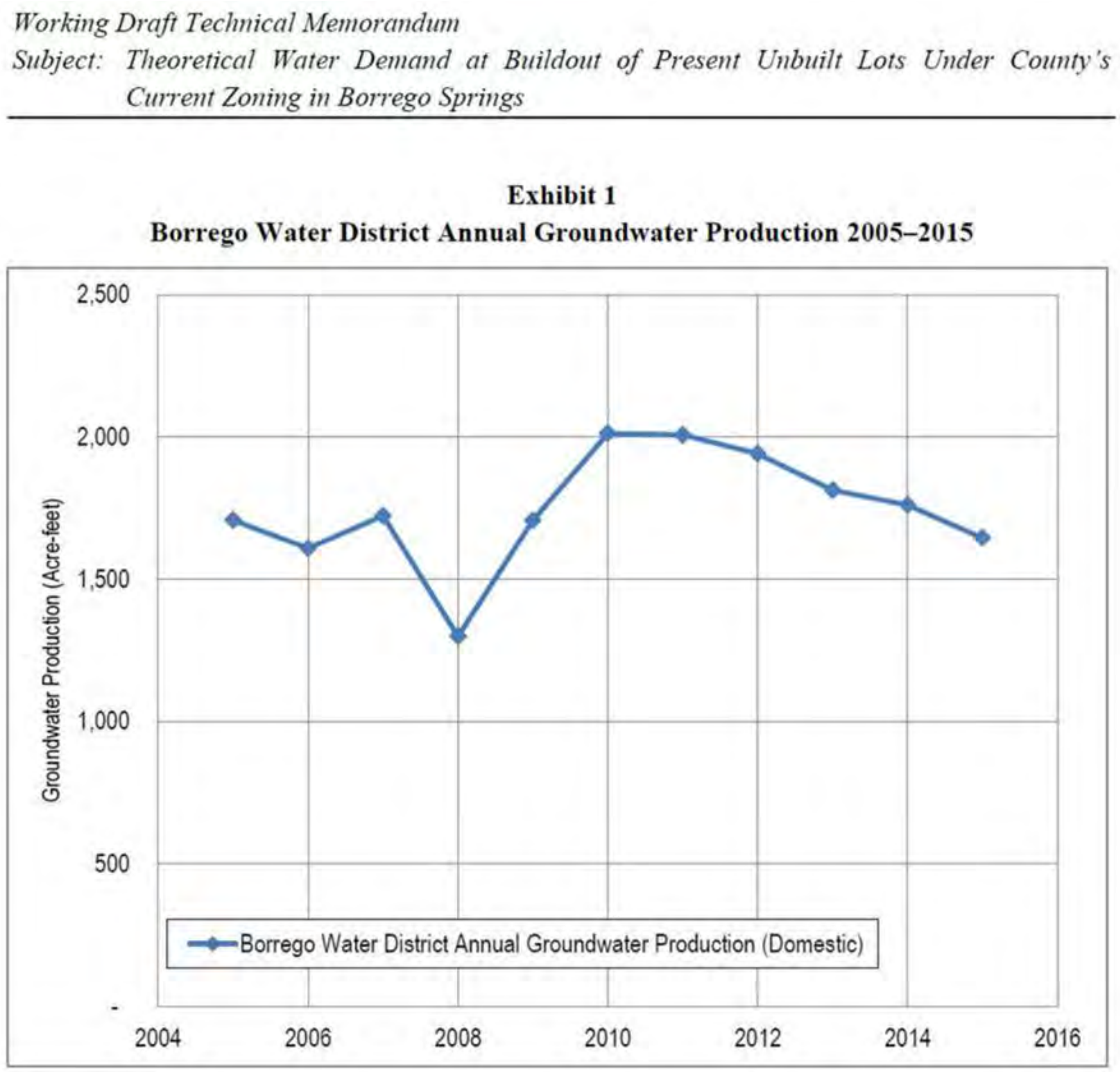


Table 2-2: Borrego Water District Historical Groundwater Production

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Approx. Production (AFY)	1,690	1,600	1,700	1,300	1,700	2,000	2,000	1,950	1,800	1,760	1,650
Baseline Average (AFY)	**1,741**										

Year 2020 is the start date for reducing use within the basin based upon the SGMA allocations. Reduction targets are assumed to be achieved at each five year interval. Year over year reductions are estimated at a linear rate of decline to achieve the target at the end of the five year window. Target percentages and the allocation from baseline is shown in Table 2-3. Target reductions were provided to RFC by the District.

Table 2-3: Borrego Water District SGMA Groundwater Allocation

Year	Reduction (% of Baseline)	Historical Demand- (Baseline)	Allocation to Achieve SGMA	Allocation (% of Baseline)
2020	N/A	1741	1741	100%
2025	20%	1741	1393	80%
2030	40%	1741	1045	60%
2035	60%	1741	696	40%
2040	70%	1741	522	30%

General operating expenses are estimated to increase at a rate of 3 percent per year. Personnel, benefits, and utilities (pumping) expenses are estimated at 5 percent per year. Water purchase costs are estimated to increase at 3 percent per year. Capital cost inflation is estimated at 5 percent per year. For formatting and brevity, a five year horizon of inflationary factors is shown in Table 2-4. All years to 2050 assume the same rates of inflation.

Table 2-4: Inflationary Factors

	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
General Inflation	3.0%	3.0%	3.0%	3.0%	3.0%
Repairs & Maintenance	3.0%	3.0%	3.0%	3.0%	3.0%
Professional Services	3.0%	3.0%	3.0%	3.0%	3.0%
Insurance	3.0%	3.0%	3.0%	3.0%	3.0%
Personnel Expense	5.0%	5.0%	5.0%	5.0%	5.0%
Employee Benefits	5.0%	5.0%	5.0%	5.0%	5.0%
Office expense	3.0%	3.0%	3.0%	3.0%	3.0%
Utilities	5.0%	5.0%	5.0%	5.0%	5.0%
Water Cost	3.0%	3.0%	3.0%	3.0%	3.0%
CIP Inflation	5.0%	5.0%	5.0%	5.0%	5.0%

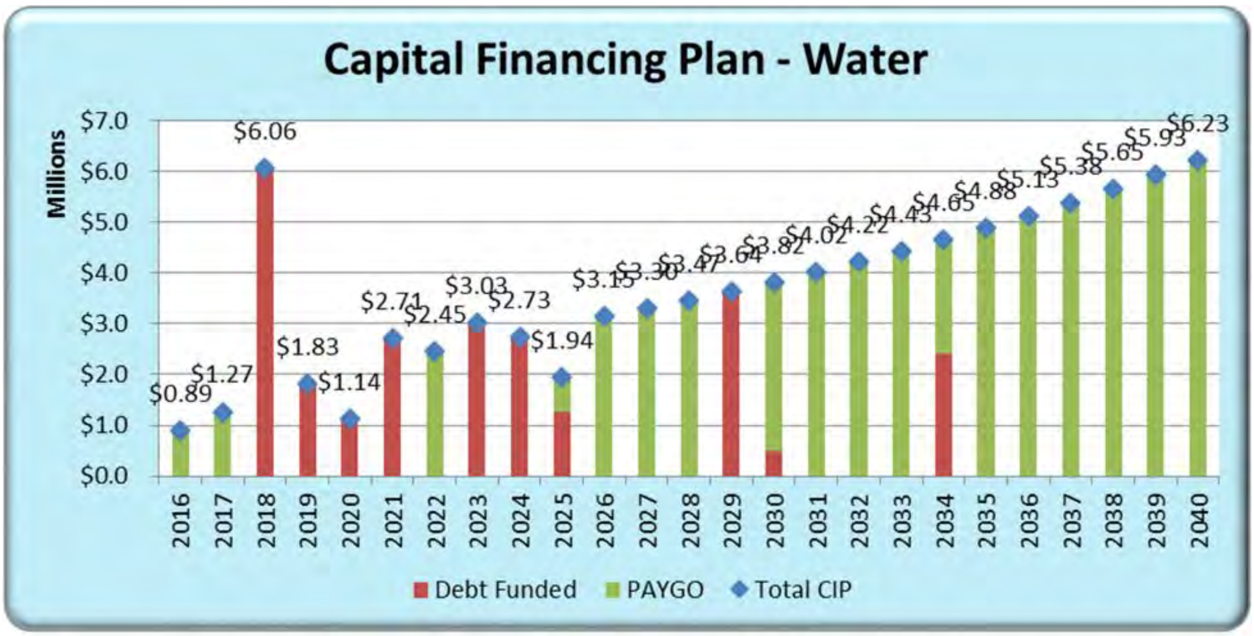
The District has identified several valuations for water costs. Most notably are the costs associated with the developer water credit program and valuation by Dudek. The existing water credit cost is $3,600 per AF. Production credits are valued at a 4:1 ratio to developer credits meaning four water credits must be acquired and retired to produce one acre foot of water. This represents a value of $14,400 per AF. Recent private market activity in the basin has put the cost of water at approximately $8,000 per AF. Table 2-5 summarizes the several water valuation options. For the purposes of our analysis we use the current market value to show our impacts in the next section as *middle-of-the-road* scenarios.

Table 2-5: Water Valuation

Valuation Method	Value
Developer Credit	$3,600
Current Market	$8,000
Production Credit	$14,400

The District's Capital Improvement Plan (CIP) is shown graphically in Figure 2-2. The plan uses budgeted values from the most recent CIP provided by the District and estimates a long term annual average expenditure based upon the previous ten years. Capital costs are estimated to increase by 5 percent per year.

Figure 2-2: 25-year Capital Improvement Plan



2.2 Methodology

To determine the financial impacts of growth and SGMA RFC modified the existing District Financial Plan and Rate Model. The Model was extended through the buildout year of 2050. Annual account growth and water demand on a per account basis was amended to reflect the estimated EDUs and total water demand in 2050. The District currently does not have any purchased water costs, only costs associated with pumping and treating groundwater produced from its own wells. The amended financial plan model incorporates estimated future water purchase costs for two scenarios: *SGMA Compliance* and *County Zoning plus SGMA*.

First, the model calculates the amount of water required to be purchased to meet both increased demand and reduction in groundwater allocation. Increased demand is due to existing county zoning and the reduction in allocation due to SGMA compliance. Second the model estimates the total purchase cost for the given scenario by multiplying the amount of water required for purchase by the cost of water ($8,000 per AF). Lastly the model sums the required purchases in a five year interval (e.g., 2021-2025) to determine the total amount and value required for purchase *prior to* the five year period.

All purchases are estimated to be funded through debt offerings in the year prior to the five year period. For instance, water required to serve new customers and offset the declining allocation in years 2026-2030 would be required to be in place in 2025, with a presumed debt offering in 2024. This logic holds throughout the horizon to 2050.

The following section details the financial impacts, required revenue adjustments and debt issuances, and corresponding rate impacts of the two scenarios.

3 Results

As briefly described in the preceding section, RFC evaluated two scenarios: **SGMA Compliance** and **County Zoning plus SGMA**. SGMA Compliance assumes no growth in District water demand from development (zero account growth and water demand growth). The scenario also assumes that pumping reduction targets described in Table 2-3 are achieved so that the basin achieves SGMA compliance in 2040 and the District's pumping allocation is reduced from 1,741 AFY to 522 AFY.

The second scenario, County Zoning plus SGMA, incorporates the new water demand from future development on top of the District's prescriptive SGMA reduction measures. Note that in this second scenario, costs of procuring additional water supplies are incurred for a period of 10 years beyond Scenario 1 (SGMA compliance must be achieved by 2040 where buildout of the District's service area is anticipated in 2050). For consistency and comparison sake the illustrations in the following subsections show impacts out to the year 2040.

3.1 Scenario 1 – SGMA

The following tables and figures illustrate the financial impacts of SGMA Compliance.

Figure 3-1 show the revenue adjustments required, and corresponding District debt coverage ratio, over the next 25 years. These revenue adjustments allow the District to fund water purchases and capital improvements, maintain adequate coverage ratios, minimize rate spikes, and achieve reserve targets over the 25 year horizon.

Figure 3-1: Revenue Adjustments and Debt Coverage

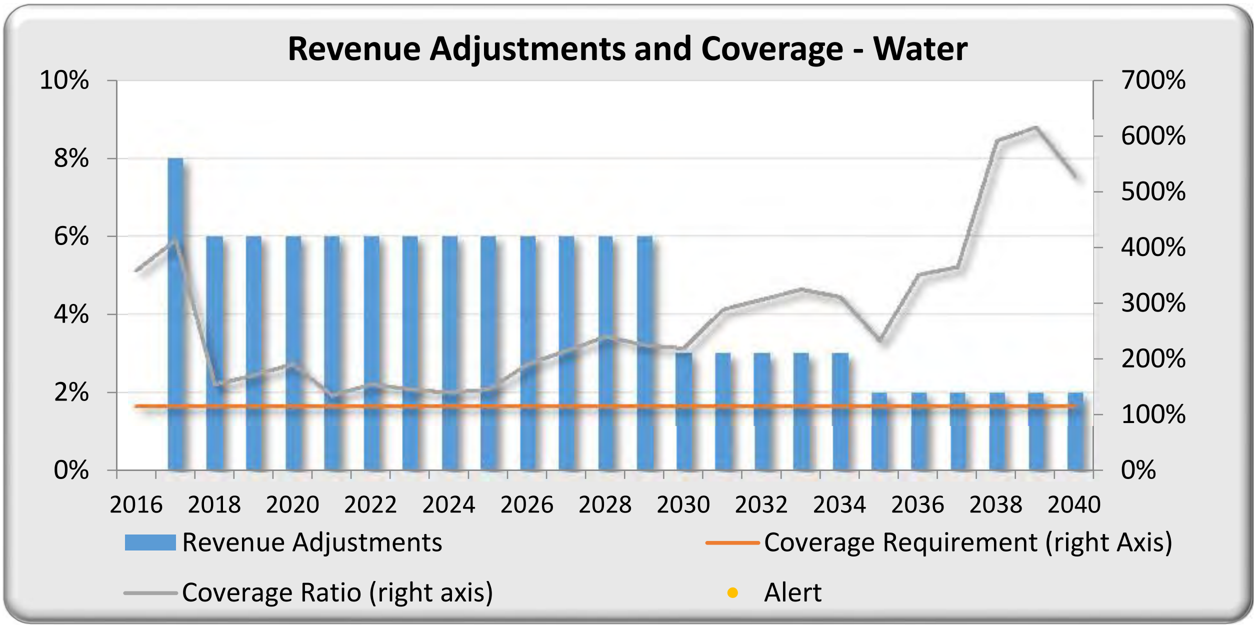


Figure 3-2 shows the operating financial plan of the District to 2040. The red line signifies current rate revenue and the green line signifies proposed rate revenue. The bars represent various expenses including operating and maintenance expenses (O&M), purchased water costs, debt service payments, and reserve funding.

Figure 3-2: Operating Financial Plan

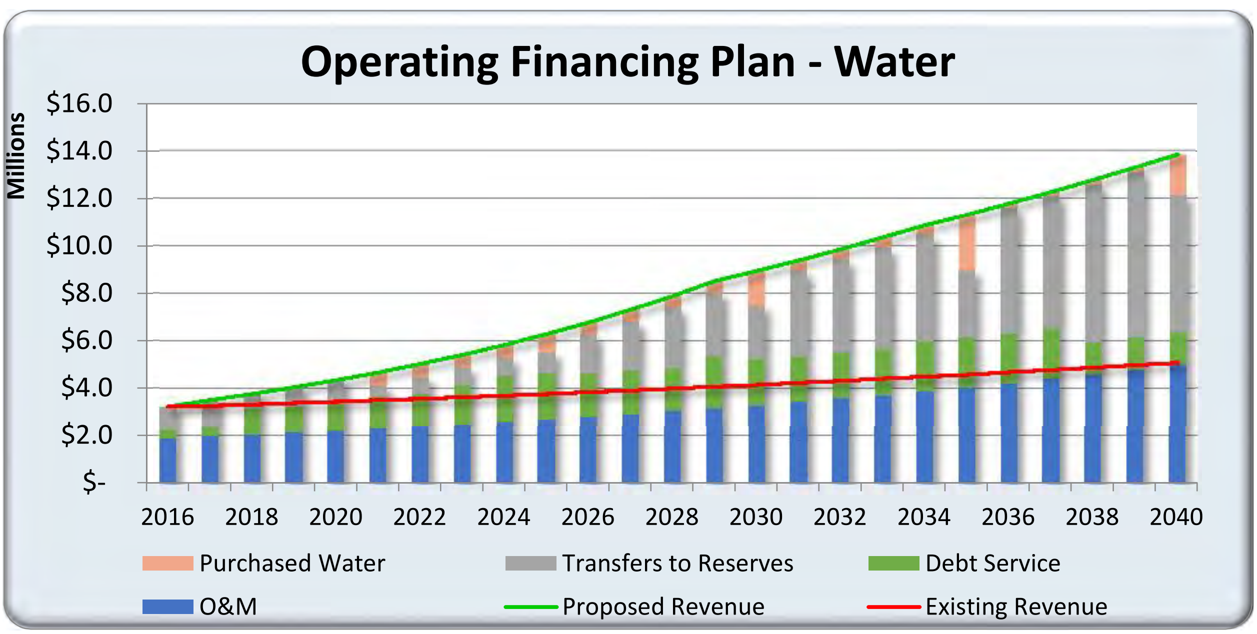


Figure 3-3 shows the ending fund balance in each year through 2040. The red and green lines represent the upper and lower bounds of the reserve target, while the blue bars represent the ending fund balance in a given year.

Figure 3-3: Ending Reserve Balances

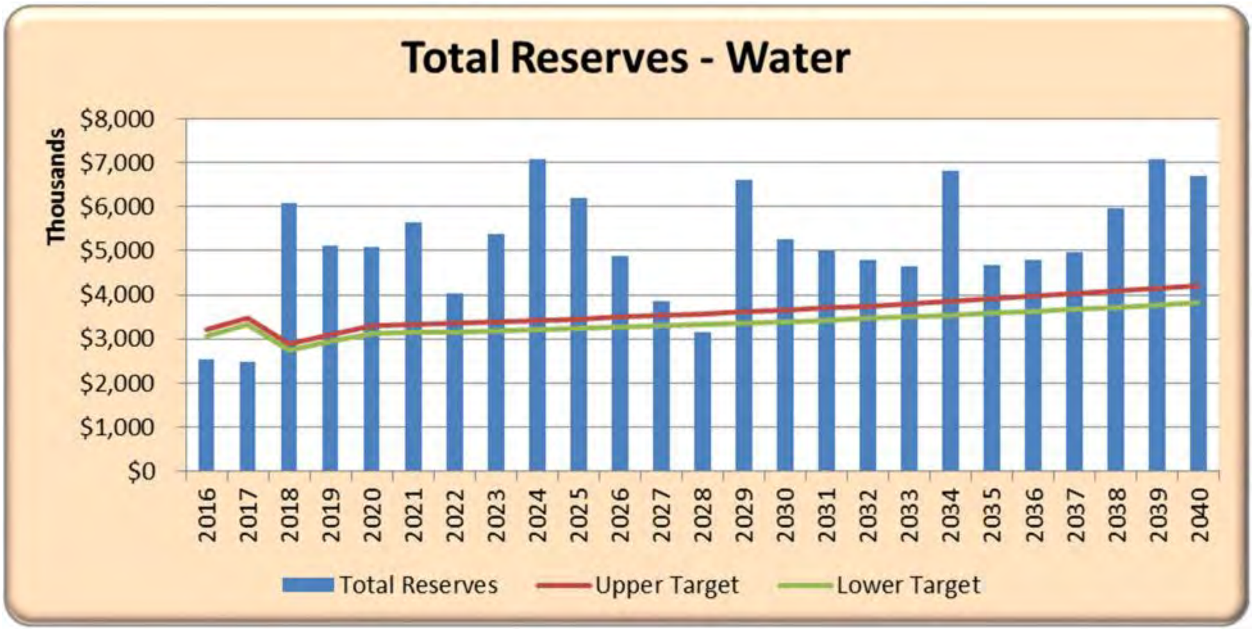


Table 3-1 summarizes the timing, quantity, and cost of water purchases required to offset the District's reduced production allocation and continue to meet existing customer demand. RFC estimates that the District must purchase 1,097 AF in total at an estimated cost of $13.08 million.

Table 3-1: Total Water Purchases and Financial Impact

Fiscal Year	Purchase (AF)	Purchase ($)
FY 2020	0,313 AF	$3,003,143
FY 2025	0,313 AF	$3,521,469
FY 2030	0,313 AF	$4,128,722
FY 2035	0,157 AF	$2,418,938
FY 2040	0,000 AF	$0
FY 2045	0,000 AF	$0
Total	**1,097 AF**	**$13,072,272**

Table 3-2 provides a schedule of commodity water rates to 2040. The rates are increased each year by the revenue adjustments in

Figure 3-1. We estimate that the unit rate in 2040 will approach $9.00/hcf from the current $3.28/hcf for the uniform non-residential rate.

Table 3-2: Rate Impacts to 2040 (SGMA)

Commodity Charges	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028
Tier 1	$3.10	$3.29	$3.49	$3.70	$3.93	$4.17	$4.43	$4.70	$4.99	$5.29	$5.61	$5.95
Tier 2	$3.42	$3.63	$3.85	$4.09	$4.34	$4.61	$4.89	$5.19	$5.51	$5.85	$6.21	$6.59
Non-Residential	$3.28	$3.48	$3.69	$3.92	$4.16	$4.41	$4.68	$4.97	$5.27	$5.59	$5.93	$6.29

Commodity Charges	FY 2029	FY 2030	FY 2031	FY 2032	FY 2033	FY 2034	FY 2035	FY 2036	FY 2037	FY 2038	FY 2039	FY 2040
Tier 1	$6.31	$6.50	$6.70	$6.91	$7.12	$7.34	$7.49	$7.64	$7.80	$7.96	$8.12	$8.29
Tier 2	$6.99	$7.20	$7.42	$7.65	$7.88	$8.12	$8.29	$8.46	$8.63	$8.81	$8.99	$9.17
Non-Residential	$6.67	$6.88	$7.09	$7.31	$7.53	$7.76	$7.92	$8.08	$8.25	$8.42	$8.59	$8.77

3.2 Scenario 1 – SGMA and Existing County Zoning

The following tables and figures illustrate the financial impacts of SGMA Compliance and growth from existing county zoning. Figure 3-4 show the revenue adjustments required, and corresponding District debt coverage ratio, over the next 25 years. These revenue adjustments allow the District to fund water purchases and capital improvements, maintain adequate coverage ratios, minimize rate spikes, and achieve reserve targets over the 25 year horizon.

Figure 3-4: Revenue Adjustments and Debt Coverage

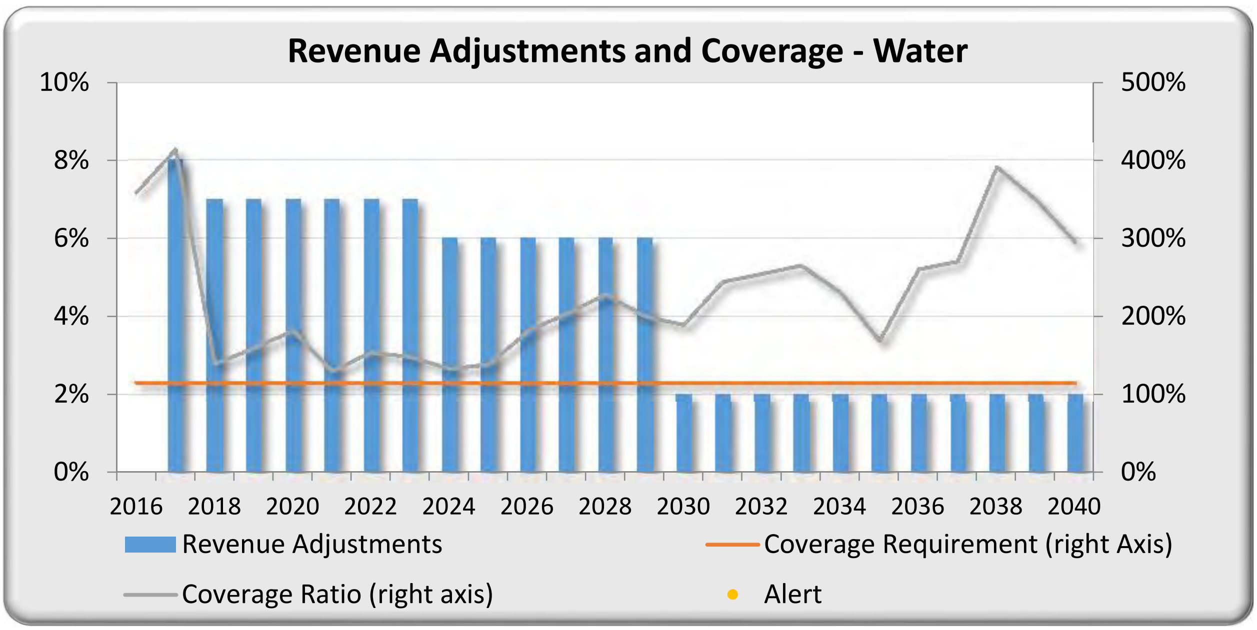


Figure 3-5 shows the operating financial plan of the District to 2040. The red line signifies current rate revenue and the green line signifies proposed rate revenue. The bars represent various expenses including operating and maintenance expenses (O&M), purchased water costs, debt service payments, and reserve funding.

Figure 3-5: Operating Financial Plan

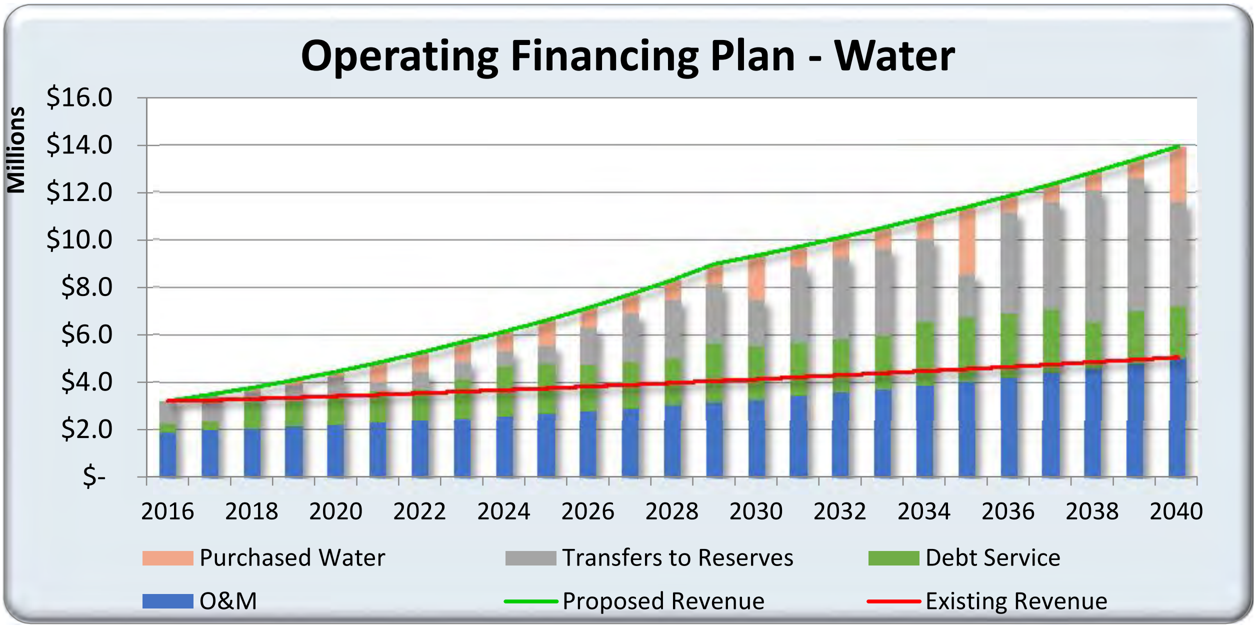


Figure 3-6 shows the ending fund balance in each year through 2040. The red and green lines represent the upper and lower bounds of the reserve target, while the blue bars represent the ending fund balance in a given year.

Figure 3-6: Ending Reserve Balances

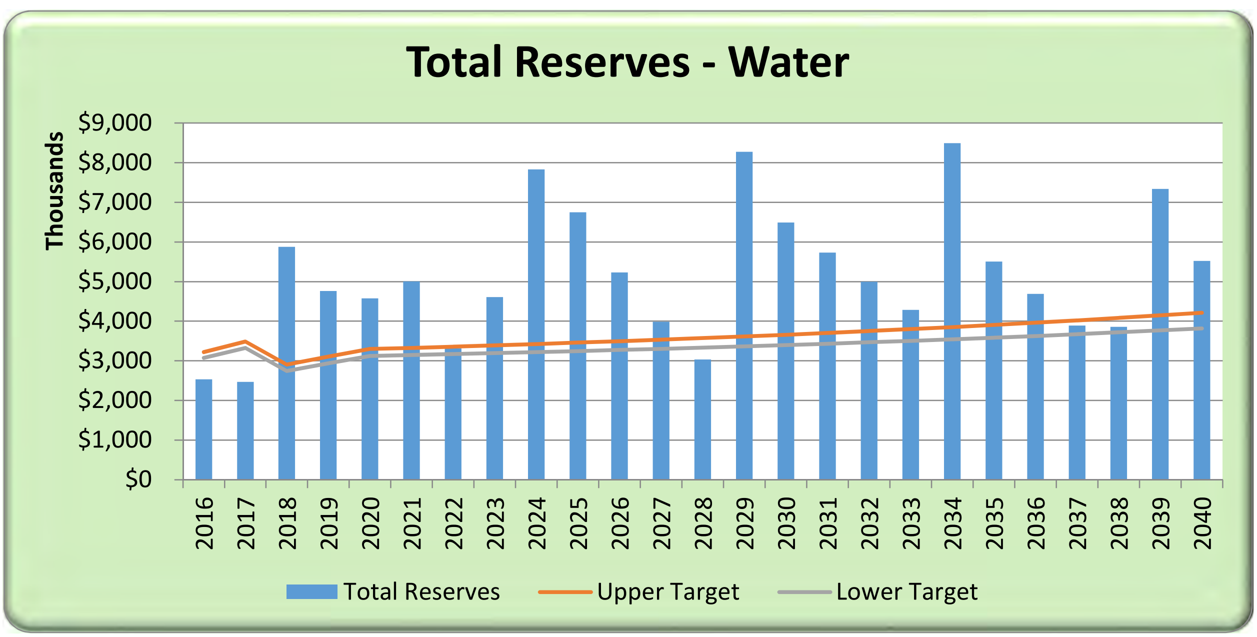


Table 3-3 summarizes the timing, quantity, and cost of water purchases required to offset the District's reduced production allocation and meet customer demand, including new demand. RFC estimates that the District must purchase 2,221 AF in total at an estimated cost of $29.96 million.

Table 3-3: Total Water Purchases and Financial Impact

Fiscal Year	Purchase (AF)	Purchase ($)
FY 2020	0,450 AF	$4,309,224
FY 2025	0,467 AF	$5,225,102
FY 2030	0,486 AF	$6,352,189
FY 2035	0,351 AF	$5,321,938
FY 2040	0,219 AF	$3,792,022
FY 2045	0,247 AF	$4,954,976
Total	**2,221 AF**	**$29,955,451**

Table 3-2 provides a schedule of commodity water rates to 2040. The rates are increased each year by the revenue adjustments in

Figure 3-1. We estimate that the unit rate in 2040 will exceed $9.00/hcf from the current $3.28/hcf for the uniform Non-Residential rate. If extended to the year 2050 (buildout) the unit rate is estimated at $11.98/hcf for the uniform Non-Residential rate.

Table 3-4: Rate Impacts to 2040 (SGMA Plus County Zoning)

Commodity Charges	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028
Tier 1	$3.10	$3.32	$3.56	$3.81	$4.08	$4.37	$4.68	$4.97	$5.27	$5.59	$5.93	$6.29
Tier 2	$3.42	$3.66	$3.92	$4.20	$4.50	$4.82	$5.16	$5.47	$5.80	$6.15	$6.52	$6.92
Non-Residential	$3.28	$3.52	$3.77	$4.04	$4.33	$4.64	$4.97	$5.27	$5.59	$5.93	$6.29	$6.67
Commodity Charges	**FY 2029**	**FY 2030**	**FY 2031**	**FY 2032**	**FY 2033**	**FY 2034**	**FY 2035**	**FY 2036**	**FY 2037**	**FY 2038**	**FY 2039**	**FY 2040**
Tier 1	$6.67	$6.81	$6.95	$7.09	$7.24	$7.39	$7.54	$7.70	$7.86	$8.02	$8.19	$8.36
Tier 2	$7.34	$7.49	$7.64	$7.80	$7.96	$8.12	$8.29	$8.46	$8.63	$8.81	$8.99	$9.17
Non-Residential	$7.08	$7.23	$7.38	$7.53	$7.69	$7.85	$8.01	$8.18	$8.35	$8.52	$8.70	$8.88

Appendix F:

Raftelis Financial Consultants (RFC) 10/14/2017.

Borrego Water District Water Rates Affordability Assessment.

Prepared for BWD.

October 4, 2017

Borrego Water District

Water Rates Affordability Assessment

Prepared by

RAFTELIS FINANCIAL CONSULTANTS

Table of Contents

1 Introduction

1.1 Scope of Work

The Borrego Water District (District) engaged Raftelis Financial Consultants (Raftelis) to examine the affordability of water rates charged to the District's customers. To assess affordability Raftelis relies upon direction from longstanding EPA guidance on affordability, the United States Conference of Mayors, and research by affordability experts. The assessment herein analyzes both existing rates and affordability and projected future rates and affordability under the SGMA Compliance water supply scenario identified in our Memorandum titled "County Zoning and SGMA Impact Assessment" dated November 18, 2016. The affordability assessment relies upon the amended Water Financial and Rate Model created for the SGMA Impact Assessment and corresponding demand projections, basin yield assumptions, financing assumptions, and projected rates to the year 2040.

The intention is for the District to be able to understand the affordability of existing rates and water allocation and to estimate the affordability impacts of SGMA compliance in the Borrego Groundwater Basin over the long term.

1.2 Background

Borrego Groundwater Basin: The sole water supply source for the District is the Borrego Groundwater Basin. The basin is in critical overdraft. The State of California enacted the Sustainable Groundwater Management Act (SGMA) in 2014 to achieve basin sustainability by 2040. The Borrego Water Coalition (BWC) has recommended that all current entities withdrawing water from the Borrego Basin reduce their withdrawals no later than 2040 by approximately 70% based on the most current US Geological Survey (USGS) study in 2015. The District does not currently have adequate municipal water available to serve its present customers under the existing basin withdrawal reduction estimated and will be required to purchase additional water by acquiring irrigated farmland to fallow.

Environmental Protection Agency (EPA) and Affordability Indicators: The indicator of percentage of median household income (%MHI) grows out of EPA guidelines for water quality standards and Combined Sewer Overflow (CSO) compliance. Initially called a Residential Indicator (RI), the factor was used by EPA to signal the economic effect on small wastewater systems. The RI sought to identify a measurement that would reasonably estimate a utility's ability to comply with new standards and regulations. Similarly, EPA developed an affordability standard for small community potable water systems serving 10,000 or fewer people. An affordability standard of 2.5 percent and 2 percent of national median household income for water and sewer bills respectively was selected. The 2.5 percent threshold has never been formalized by EPA and, though arbitrary, use of %MHI in assessing affordability has become the standard.

Shortcomings of %MHI Manual Teodoro details the problems with using %MHI in assessing affordability and we summarize here. First, median income households are unlikely to have economic hardship from utility rates except under the most extreme conditions. The focus instead should be on lower-income households, the working poor, and those below the poverty line who are much more likely to struggle with affordability as a percentage of their annual incomes. Second, average water consumption is a poor indicator of affordability. Affordability should relate to essential needs associated with indoor water use for health and sanitation, not the ability to irrigate outdoors, provide for water intensive hobbies, home business ventures, or wasteful use. Using average water consumption and median household income does little to inform about those who struggle with affordability for water and sewer service. Lastly, 2.5 %MHI is an arbitrary value without a rationale. There is no reason why 1 %MHI or 5 %MHI should not have been selected in the first place. Nevertheless, the indicator is well established and at the least allows for a comparison between water utilities of a similar size, geographic and water supply characteristic, and customer demographics.

Minimum Wage Hours: A novel approach to defining affordability of water and sewer service comes from Manual Teodoro of Texas A&M University. Many households that struggle to cover basic costs for essential services have labor compensated at or near the minimum wage. Therefore, the number of hours required at minimum wage to pay for basic water service should provide a real world indicator that relates to local conditions.

2 RFC Evaluation

The objective of our assessment is to estimate affordability of water service over a long horizon. To estimate affordability Raftelis utilizes the supply and demand assumptions within the SGMA Compliance scenario of the 2016 County Zoning and SGMA Impact Assessment. The following subsections outline all assumptions, data sources, relevant prior work, and methodology for assessing affordability.

2.1 Assumptions

2.1.1 Water Production and Rates

Table 2-1 shows projected water production reductions to achieve SGMA Compliance through water rights purchases and reduced consumption.

Table 2-1: Borrego Water District SGMA Groundwater Allocation

Year	Reduction (% of Baseline)	Historical Demand- (Baseline)	Allocation to Achieve SGMA	Allocation (% of Baseline)
2020	N/A	1741	1741	100%
2025	20%	1741	1393	80%
2030	40%	1741	1045	60%
2035	60%	1741	696	40%
2040	70%	1741	522	30%

Table 2-2 summarizes the amount of water required to be purchased to offset reduced basin pumping and meet customer demand. Each allotment is assumed to be debt financed. The purchase costs are a major component in determining the projected water rates through 2040.

Table 2-2: Total Water Purchases and Financial Impact

Fiscal Year	Purchase (AF)	Purchase ($)
FY 2020	313 AF	$3,003,143
FY 2025	313 AF	$3,521,469
FY 2030	313 AF	$4,128,722
FY 2035	157 AF	$2,418,938
FY 2040	000 AF	$0
Total	**1,097 AF**	**$13,072,272**

Given the water purchase costs in Table 2-2 and the identified financial plan, the projected water commodity rates and fixed charges using the existing cost of service are shown in Table 2-3 and Table 2-4.

Table 2-3: Projected Rates to 2040 (Commodity Charges)

Commodity Charges	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028
Tier 1	$3.10	$3.35	$3.56	$3.78	$4.01	$4.26	$4.52	$4.80	$5.09	$5.40	$5.73	$6.08
Tier 2	$3.42	$3.69	$3.92	$4.16	$4.41	$4.68	$4.97	$5.27	$5.59	$5.93	$6.29	$6.67
Commodity Charges	**FY 2029**	**FY 2030**	**FY 2031**	**FY 2032**	**FY 2033**	**FY 2034**	**FY 2035**	**FY 2036**	**FY 2037**	**FY 2038**	**FY 2039**	**FY 2040**
Tier 1	$6.45	$6.65	$6.85	$7.06	$7.28	$7.50	$7.65	$7.81	$7.97	$8.13	$8.30	$8.47
Tier 2	$7.08	$7.30	$7.52	$7.75	$7.99	$8.23	$8.40	$8.57	$8.75	$8.93	$9.11	$9.30

Table 2-4: Projected Rates to 2040 (Fixed Charges)

Meter Size	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028
3/4"	$35.81	$36.99	$39.21	$41.57	$44.07	$46.72	$49.53	$52.51	$55.67	$59.02	$62.57	$66.33
1"	$46.48	$47.99	$50.87	$53.93	$57.17	$60.61	$64.25	$68.11	$72.20	$76.54	$81.14	$86.01
1-1/2"	$73.16	$75.48	$80.01	$84.82	$89.91	$95.31	$101.03	$107.10	$113.53	$120.35	$127.58	$135.24
2"	$105.17	$108.46	$114.97	$121.87	$129.19	$136.95	$145.17	$153.89	$163.13	$172.92	$183.30	$194.30
Meter Size	**FY 2029**	**FY 2030**	**FY 2031**	**FY 2032**	**FY 2033**	**FY 2034**	**FY 2035**	**FY 2036**	**FY 2037**	**FY 2038**	**FY 2039**	**FY 2040**
3/4"	$70.31	$72.42	$74.60	$76.84	$79.15	$81.53	$83.17	$84.84	$86.54	$88.28	$90.05	$91.86
1"	$91.18	$93.92	$96.74	$99.65	$102.64	$105.72	$107.84	$110.00	$112.20	$114.45	$116.74	$119.08
1-1/2"	$143.36	$147.67	$152.11	$156.68	$161.39	$166.24	$169.57	$172.97	$176.43	$179.96	$183.56	$187.24
2"	$205.96	$212.14	$218.51	$225.07	$231.83	$238.79	$243.57	$248.45	$253.42	$258.49	$263.66	$268.94

2.1.2 Water Consumption

Table 2-5 shows the calculation steps for estimating efficient indoor water demand in any given month. We use the existing State of California efficiency target of 55 gallons per person per day (gpcd) for indoor use and multiply by the average family size[1] in the Borrego Springs CDP (rounded to the nearest whole person of three) and the average number of days in a month to calculate the total gallons of an efficient household per month. Total gallons of 5,033 is divided by 748 to convert from gallons to the billing unit of hundred cubic feet (hcf). 7 hcf represents the District's existing Tier 1 allotment.

Table 2-5: Essential (Indoor) Use Calculation

Variable	Value	Unit
Efficient Use	55	gpcd
Persons per Household (rounded)	3.00	pph
Average Month	30.5	Days
Total Gallons	5,033	gallons
Unit Conversion	748	gallons/hcf
Units (hcf) per month	7	hcf

Table 2-6 shows the consumption analysis for BWD residential users for FY 2015. Total residential use is divided by the number of accounts with use greater than zero in any given month. The average by month is shown in the last row of the table. The winter low, used as part of our analysis, is 15 hcf per month (January and February).

Table 2-6: FY 2015 Residential Demand Analysis

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
Residential Tier 1	34,088	30,993	34,814	29,914	28,521	23,657	21,497	21,527	22,325	30,995	26,744	30,853
Residential Tier 2	8,676	7,127	9,464	8,563	7,268	3,444	2,558	2,130	2,333	4,808	3,322	5,265
Accounts	1522	1510	1515	1534	1573	1580	1583	1591	1589	1608	1560	1539
Average Consumption	28	25	29	25	23	17	**15**	**15**	16	22	19	23

[1] From the 2010 US Census average household size in the Borrego CDP is 2.18 persons and average family size is 2.76 persons.

The winter low of 15 hcf corresponds to the District's long term goal of 0.4 acre feet per year (AFY) per equivalent dwelling unit (EDU). The calculation steps for converting 0.4 AFY to hcf is shown in Table 2-8. 0.4 AFY is multiplied by the number of gallons in an acre foot to yield the total gallons per EDU per year. Total gallons is divided by 748 to convert gallons to hcf. Hcf/year is divided by 12 to determine the hcf per EDU per month. Raftelis rounds up to the nearest whole billing unit.

Table 2-7: Future/New EDU Definition

Unit	
AFY	0.4
Gallons per acre foot	325,851
Gallons per year	130,340
hcf/year	174.25
hcf/month	14.52
Hcf/month (rounded)	15

The calculations for efficient indoor demand and winter low/new EDU demand become our lower and upper bounds in relating affordability in Section 3.

2.2 Data

Table 2-8 shows per capita income growth from the United States Bureau of Economic Analysis (BEA) for San Diego County. The 30 year annual average change in per capita income is 3.97 percent. The average income growth rate is used to estimate changes in customer incomes to 2040.

Table 2-8: 30 Year Historical Income Growth San Diego County

Year	Per Capita Income	Income Growth Rate	Year	Per Capita Income	Income Growth Rate
1986	17652	5.57%	**2001**	34158	1.78%
1987	18433	4.42%	**2002**	35224	3.12%
1988	19484	5.70%	**2003**	37133	5.42%
1989	20494	5.18%	**2004**	40314	8.57%
1990	21029	2.61%	**2005**	42093	4.41%
1991	21542	2.44%	**2006**	44150	4.89%
1992	22286	3.45%	**2007**	44912	1.73%
1993	22732	2.00%	**2008**	45383	1.05%
1994	23262	2.33%	**2009**	43269	-4.66%
1995	24262	4.30%	**2010**	43995	1.68%
1996	25603	5.53%	**2011**	46374	5.41%
1997	26970	5.34%	**2012**	47961	3.42%
1998	29331	8.75%	**2013**	48938	2.04%
1999	31058	5.89%	**2014**	51174	4.57%
2000	33560	8.06%	**2015**	53298	4.15%
Average per Capita Income Growth Rate					**3.97%**

Table 2-9 shows the historical change in the Consumer Price Index (CPI) in the United States over the last 30 years. The average rate of inflation is estimated at 2.66 percent per year. CPI is used to estimate changes in minimum wage over the horizon to 2040 reflecting the adoption of legislation in California adjusting the minimum wage annually by CPI.

Table 2-9: 30 Year Historical Consumer Price Index

Year	Inflation	Year	Inflation
1986	4.05%	**2002**	2.35%
1987	4.10%	**2003**	1.50%
1988	4.45%	**2004**	1.80%
1989	4.45%	**2005**	2.15%
1990	5.05%	**2006**	2.45%
1991	4.95%	**2007**	2.35%
1992	3.60%	**2008**	2.30%
1993	3.30%	**2009**	1.70%
1994	2.85%	**2010**	0.95%
1995	3.00%	**2011**	1.65%
1996	2.70%	**2012**	2.10%
1997	2.40%	**2013**	1.75%
1998	2.30%	**2014**	1.75%
1999	2.05%	**2015**	1.80%
2000	2.40%	**2016**	2.20%
2001	2.65%	**2017**	2.00%
Average CPI Inflation			**2.66%**

Table 2-10 shows minimum wage projections to 2040 for the State of California. 2017 through 2023 represent adopted State-wide increases for employers that employee 25 employees or less. Using the wage scale for small employers yields more conservative affordability estimates particularly as Raftelis is unfamiliar with the size and location of employers of District customers. The current minimum wage in California is $10.00 per hour. Years 2017 through 2023 show the adopted minimum wage schedule by the State of California. Future years are adjusted by historical CPI inflation.

Table 2-10: Minimum Wage Projections

Year	Prior Year Minimum Wage	CPI (estimate)	Minimum Wage
2017	N/A	N/A	$10.00
2018	$10.00	N/A	$10.50
2019	$10.50	N/A	$11.00
2020	$11.00	N/A	$12.00
2021	$12.00	N/A	$13.00
2022	$13.00	N/A	$14.00
2023	$14.00	N/A	$15.00
2024	$15.00	2.66%	$15.40
2025	$15.40	2.66%	$15.81
2026	$15.81	2.66%	$16.23
2027	$16.23	2.66%	$16.66
2028	$16.66	2.66%	$17.10
2029	$17.10	2.66%	$17.56
2030	$17.56	2.66%	$18.03
2031	$18.03	2.66%	$18.51
2032	$18.51	2.66%	$19.00
2033	$19.00	2.66%	$19.50
2034	$19.50	2.66%	$20.02
2035	$20.02	2.66%	$20.55
2036	$20.55	2.66%	$21.10
2037	$21.10	2.66%	$21.66
2038	$21.66	2.66%	$22.24
2039	$22.24	2.66%	$22.83
2040	$22.83	2.66%	$23.44

As a validity check, the California Department of Transportation (CalTrans) produces county wide economic forecast models for income growth. CalTrans estimates real (income growth less inflation) salaries will increase by 1.6 percent and real income growth by 1.9 percent between 2016 and 2021. This is slightly higher than the 1.25 percent we estimate in Table 2-8 less Table 2-9, albeit for a shorter horizon. This may be more heavily influenced by the larger relative increases in the minimum wage to $15 per hour by 2022.

Income ranges are from the 2015 American Community Survey (ACS) performed by the Census Bureau. Table 2-11 shows distribution for the estimated 1,172 households in the Borrego Springs Census Designated Place (CDP). Median household income is estimated at $31,563. Mean household income is estimated at $41,053. The 20th percentile of income is generally used to estimate impacts to the "working poor"; that is households whose earnings qualify them for some but not all available assistance for food, housing, and other needs. For the Borrego Springs CDP the 20th percentile is $3,320 below the federal poverty line for a three person household. For comparison the poverty line for a two person household and a four person household is $16,240 and $24,600 respectively. 37.3 percent of households in the Borrego Springs CDP are below $24,999.

Table 2-11: Income Distribution, Borrego Springs CDP

Income Range	Households/Percentages
Total Households	1,172
Less than $10,000	3.70%
$10,000 to $14,999	9.70%
$15,000 to $24,999	23.90%
$25,000 to $34,999	17.20%
$35,000 to $49,999	13.30%
$50,000 to $74,999	19.70%
$75,000 to $99,999	9.00%
$100,000 to $149,999	2.00%
$150,000 to $199,999	1.50%
$200,000 or more	0.00%
Median income (dollars)	31,563
Mean income (dollars)	41,053
20th Percentile[2]	$17,100
Poverty Level (3 person household)[3]	$20,420

Raftelis attempted to determine median income and income distribution for three subsets of residential customers: Single Family Residential, Multi-Family Residential, and Other (mobile home, camper, etc.). Unfortunately, income level by customer class using residential units is not available at a scale fine enough to relate to BWD. Public Use Microdata Areas (PUMA) data available from the Census includes much of East San Diego County and a population of over 100,000. Comparing the incomes in the PUMA dataset to the income range and median in the 2015 ACS for the Borrego CDP shows the two are not relatable. Should finer scale data become available, Raftelis would be able to analyze affordability within the larger Residential class and amend this assessment.

2.3 Methodology

To determine affordability of water service now and in future conditions (SGMA) Raftelis utilized the modified Financial Plan and Rate Model produced for the SGMA Impact Assessment. The projected rates under the SGMA scenario are used to calculate customer bills at three levels of use: essential, efficient, and target average. Essential use represents the efficient indoor demand of a three person household as calculated in Table 2-5. Target average represents the existing low winter use as well as the assumed baseline demand for a new EDU (Table 2-6 and Table 2-7). Efficient is simply the mid-point of efficient and target average to evaluate affordability at an additional level of consumption between the upper and lower bounds.

[2] From the American Community Survey (2009-2013) of the US Census Bureau via Statistical Atlas (https://statisticalatlas.com)

[3] 2017 poverty guidelines from United States Health and Human Services as of January 26, 2017.

Table 2-12: Levels of Consumption

Essential	Efficient	Target Average
7 hcf	11 hcf	15 hcf

Annual bills are calculated at the three levels of consumption using existing FY 2018 rates. Bill calculations are repeated for each five year interval beginning in FY 2020 through FY 2040 using the projected rates in Table 2-3 and Table 2-4.

Table 2-13: Annual Bills: 2018-2040

FY 2018 Annual Bill			FY 2020 Annual Bill			FY 2025 Annual Bill		
Essential	Efficient	Target Average	Essential	Efficient	Target Average	Essential	Efficient	Target Average
$725	$902	$1,080	$816	$1,016	$1,216	$1,096	$1,364	$1,632
FY 2030 Annual Bill			**FY 2035 Annual Bill**			**FY 2040 Annual Bill**		
Essential	**Efficient**	**Target Average**	**Essential**	**Efficient**	**Target Average**	**Essential**	**Efficient**	**Target Average**
$1,428	$1,778	$2,128	$1,641	$2,044	$2,447	$1,814	$2,217	$2,620

Estimated annual incomes for each income bracket are inflated by the annual average growth rate from Table 2-8. The midpoint of each income range from the 2015 ACS survey is used to project future income. For example, in the $25,000-$34,999 range future incomes are projected off of $29,999 from the 2015 survey. This is true for all income ranges except for the lowest range (Less than $10,000) where the upper limit is used.

Table 2-14: Annual Incomes: 2018-2040

	FY 2018 Household Income	FY 2020 Household Income	FY 2025 Household Income	FY 2030 Household Income	FY 2035 Household Income	FY 2040 Household Income
Less than $10,000	$11,239	$12,150	$14,762	$17,936	$21,793	$26,478
$10,000 to $14,999	$14,049	$15,187	$18,452	$22,419	$27,240	$33,096
$15,000 to $24,999	$22,478	$24,299	$29,523	$35,871	$43,583	$52,953
$25,000 to $34,999	$33,717	$36,449	$44,285	$53,807	$65,376	$79,431
$35,000 to $49,999	$47,767	$51,636	$62,738	$76,227	$92,616	$112,529
$50,000 to $74,999	$70,246	$75,936	$92,263	$112,100	$136,201	$165,485
$75,000 to $99,999	$98,344	$106,311	$129,169	$156,940	$190,683	$231,680
$100,000 to $149,999	$140,492	$151,874	$184,527	$224,201	$272,405	$330,972
$150,000 to $199,999	$196,690	$212,624	$258,339	$313,882	$381,368	$463,363
$200,000 or more	$224,789	$243,000	$295,245	$358,724	$435,850	$529,559
Median income (dollars)	$35,475	$38,349	$46,594	$56,612	$68,784	$83,573
20th Percentile	$19,220	$20,777	$25,244	$30,671	$37,265	$45,277
Poverty Level (3 person household)	$22,951	$24,810	$30,145	$36,626	$44,500	$54,068

3 Results

This section documents the affordability assessment results utilizing the assumptions, data, and methodology described in Section 2. We present three metrics: percent of household income, hours at minimum wage, and required income.

3.1 Percent of Household Income

Table 3-1 illustrates the percentage of 2018 annual household income which goes towards water service at various levels of use. On the "heat map" colors in the red spectrum represent a higher percentage of income towards water service. Colors in the green spectrum represent lower percentages.

Those at the median income pay 2 percent for essential use, 2.5 percent for efficient use, and 3 percent for target average use in FY 2018. Those at the 20th percentile and those at the poverty level spend between 3.2 and 3.8 percent of their income solely for essential water needs. By 2040 those households become slightly worse off spending 3.4 and 4 percent respectively for essential water service.

For households with incomes greater than $34,999 the percent of income spent on income is below 2.5 percent in FY 2018. For those below $34,999 the only households under the 2.5 percent threshold are essential water users in the $25,000-$34,999 range. All other income ranges spend greater than 2.5 percent of annual income on water service.

Table 3-2 through Table 3-6 illustrate the percentage of household income for each five year interval for years 2020 through 2040.

Table 3-1: Annual Water Bill as Percent of Household Income (FY 2018)

Income Range	Essential 7 hcf	Efficient 11 hcf	Target Average 15 hcf
Less than $10,000	6.5%	8.0%	9.6%
$10,000 to $14,999	5.2%	6.4%	7.7%
$15,000 to $24,999	3.2%	4.0%	4.8%
$25,000 to $34,999	2.2%	2.7%	3.2%
$35,000 to $49,999	1.5%	1.9%	2.3%
$50,000 to $74,999	1.0%	1.3%	1.5%
$75,000 to $99,999	0.7%	0.9%	1.1%
$100,000 to $149,999	0.5%	0.6%	0.8%
$150,000 to $199,999	0.4%	0.5%	0.5%
$200,000 or more	0.3%	0.4%	0.5%
Median income (dollars)	2.0%	2.5%	3.0%
20th Percentile	3.8%	4.7%	5.6%
Poverty Level (3 person household)	3.2%	3.9%	4.7%

Table 3-2: Annual Water Bill as Percent of Household Income (FY 2020)

Income Range	Essential 7 hcf	Efficient 11 hcf	Target Average 15 hcf
Less than $10,000	6.7%	8.4%	10.0%
$10,000 to $14,999	5.4%	6.7%	8.0%
$15,000 to $24,999	3.4%	4.2%	5.0%
$25,000 to $34,999	2.2%	2.8%	3.3%
$35,000 to $49,999	1.6%	2.0%	2.4%
$50,000 to $74,999	1.1%	1.3%	1.6%
$75,000 to $99,999	0.8%	1.0%	1.1%
$100,000 to $149,999	0.5%	0.7%	0.8%
$150,000 to $199,999	0.4%	0.5%	0.6%
$200,000 or more	0.3%	0.4%	0.5%
Median income (dollars)	2.1%	2.6%	3.2%
20th Percentile	3.9%	4.9%	5.9%
Poverty Level (3 person household)	3.3%	4.1%	4.9%

Table 3-3: Annual Water Bill as Percent of Household Income (FY 2025)

Income Range	Essential 7 hcf	Efficient 11 hcf	Target Average 15 hcf
Less than $10,000	7.4%	9.2%	11.1%
$10,000 to $14,999	5.9%	7.4%	8.8%
$15,000 to $24,999	3.7%	4.6%	5.5%
$25,000 to $34,999	2.5%	3.1%	3.7%
$35,000 to $49,999	1.7%	2.2%	2.6%
$50,000 to $74,999	1.2%	1.5%	1.8%
$75,000 to $99,999	0.8%	1.1%	1.3%
$100,000 to $149,999	0.6%	0.7%	0.9%
$150,000 to $199,999	0.4%	0.5%	0.6%
$200,000 or more	0.4%	0.5%	0.6%
Median income (dollars)	2.4%	2.9%	3.5%
20th Percentile	4.3%	5.4%	6.5%
Poverty Level (3 person household)	3.6%	4.5%	5.4%

Table 3-4: Annual Water Bill as Percent of Household Income (FY 2030)

Income Range	Essential 7 hcf	Efficient 11 hcf	Target Average 15 hcf
Less than $10,000	8.0%	9.9%	11.9%
$10,000 to $14,999	6.4%	7.9%	9.5%
$15,000 to $24,999	4.0%	5.0%	5.9%
$25,000 to $34,999	2.7%	3.3%	4.0%
$35,000 to $49,999	1.9%	2.3%	2.8%
$50,000 to $74,999	1.3%	1.6%	1.9%
$75,000 to $99,999	0.9%	1.1%	1.4%
$100,000 to $149,999	0.6%	0.8%	0.9%
$150,000 to $199,999	0.5%	0.6%	0.7%
$200,000 or more	0.4%	0.5%	0.6%
Median income (dollars)	2.5%	3.1%	3.8%
20th Percentile	4.7%	5.8%	6.9%
Poverty Level (3 person household)	3.9%	4.9%	5.8%

Table 3-5: Annual Water Bill as Percent of Household Income (FY 2035)

Income Range	Essential 7 hcf	Efficient 11 hcf	Target Average 15 hcf
Less than $10,000	7.5%	9.4%	11.2%
$10,000 to $14,999	6.0%	7.5%	9.0%
$15,000 to $24,999	3.8%	4.7%	5.6%
$25,000 to $34,999	2.5%	3.1%	3.7%
$35,000 to $49,999	1.8%	2.2%	2.6%
$50,000 to $74,999	1.2%	1.5%	1.8%
$75,000 to $99,999	0.9%	1.1%	1.3%
$100,000 to $149,999	0.6%	0.8%	0.9%
$150,000 to $199,999	0.4%	0.5%	0.6%
$200,000 or more	0.4%	0.5%	0.6%
Median income (dollars)	2.4%	3.0%	3.6%
20th Percentile	4.4%	5.5%	6.6%
Poverty Level (3 person household)	3.7%	4.6%	5.5%

Table 3-6: Annual Water Bill as Percent of Household Income (FY 2040)

Income Range	Essential 7 hcf	Efficient 11 hcf	Target Average 15 hcf
Less than $10,000	6.9%	8.4%	9.9%
$10,000 to $14,999	5.5%	6.7%	7.9%
$15,000 to $24,999	3.4%	4.2%	4.9%
$25,000 to $34,999	2.3%	2.8%	3.3%
$35,000 to $49,999	1.6%	2.0%	2.3%
$50,000 to $74,999	1.1%	1.3%	1.6%
$75,000 to $99,999	0.8%	1.0%	1.1%
$100,000 to $149,999	0.5%	0.7%	0.8%
$150,000 to $199,999	0.4%	0.5%	0.6%
$200,000 or more	0.3%	0.4%	0.5%
Median income (dollars)	2.2%	2.7%	3.1%
20th Percentile	4.0%	4.9%	5.8%
Poverty Level (3 person household)	3.4%	4.1%	4.8%

Figure 3-1 and Figure 3-2 show graphical displays of affordability across all income ranges and the three levels of use: essential, efficient, and target average. In FY 2018, all income levels below the median of $31,563 at all three levels of use pay greater than 2 percent of household income towards water service. Those at or below the poverty level of $20,420 and the 20th percentile of $17,100 pay greater than 3 percent for essential water service. That percentage goes towards 4 percent for efficient use and 5 percent for average target use. In FY 2040 most households are slightly worse off in percentage terms than in FY 2018.

Figure 3-1: Percent Household Income, FY 2018

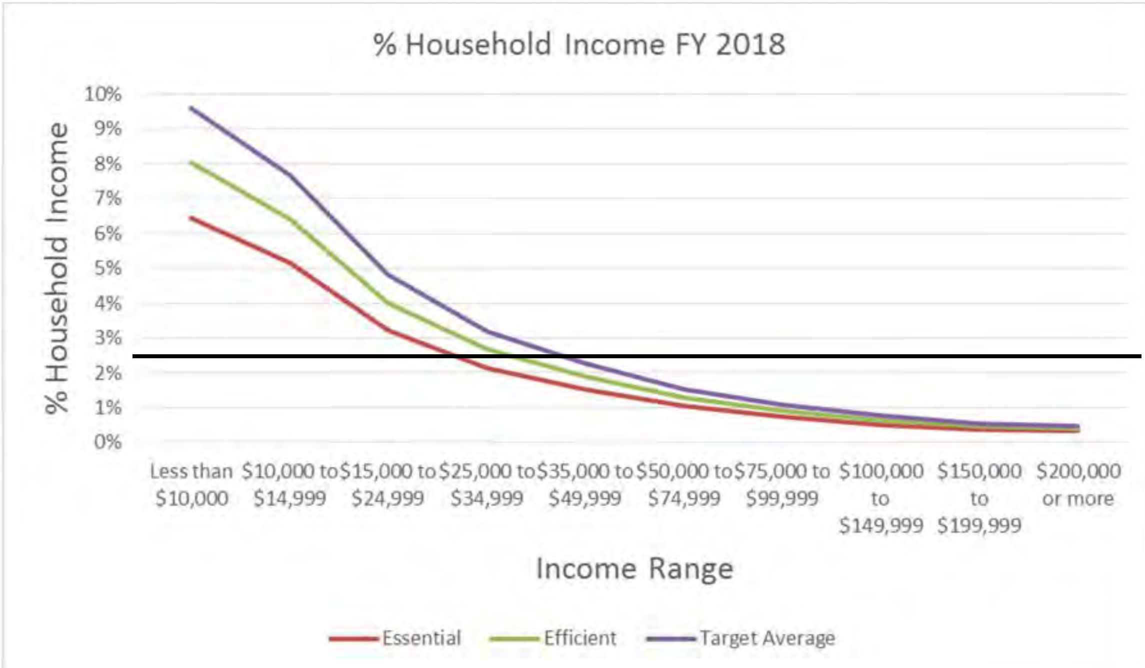


Figure 3-2: Percent Household Income, FY 2040

3.2 Hours at Minimum Wage

As described in the Section 1, a novel metric for evaluating affordability is to determine how many hours at minimum wage it takes a household to pay for their water service. Utilizing the current minimum wage, adopted minimum wage increases through 2022, and future CPI adjustments, Raftelis estimated the number of hours required at minimum wage to pay for water service at the three levels of use. Table 3-7 shows the calculation and results for hours at minimum wage for essential use, efficient use, and target average use. Figure 3-3 is a graphical display of the results from Table 3-7.

At the existing minimum wage of $10.50 per hour a household using only 7 hcf per month for essential needs must work for 5.8 hours to pay for essential water service. The same household using the target average of 15 hcf per month would have to work 8.6 hours, or approximately one day's labor per month to pay for water service. The hours required dips slightly in FY 2020 as gains in the minimum wage outpace increases in costs for water service. However, the trend reverses in 2025 when the minimum wage is adjusted by CPI and water service costs increase at a higher rate. In 2040 the same household would have to work 6.2 hours for essential use or 9 hours for average target use.

While there is no standard number of hours to suggest what is affordable or unaffordable, Teodoro suggests a value of no more than 8.0 for combined water and sewer service which represents eight hours of labor at minimum wage for a monthly bill. In many outcomes in Table 3-7 the eight hour rule is surpassed for water service alone.

Table 3-7: Hours Required at Minimum Wage

	FY 2018			FY 2020			FY 2025		
	Essential	Efficient	Target Average	Essential	Efficient	Target Average	Essential	Efficient	Target Average
Minimum Wage ($/hr)	$10.50	$10.50	$10.50	$12.00	$12.00	$12.00	$15.81	$15.81	$15.81
Hours per month	**5.8 hrs**	**7.2 hrs**	**8.6 hrs**	**5.7 hrs**	**7.1 hrs**	**8.5 hrs**	**5.8 hrs**	**7.2 hrs**	**8.6 hrs**
	FY 2030			**FY 2035**			**FY 2040**		
	Essential	Efficient	Target Average	Essential	Efficient	Target Average	Essential	Efficient	Target Average
Minimum Wage ($/hr)	$18.03	$18.03	$18.03	$20.55	$20.55	$20.55	$23.44	$23.44	$23.44
Hours per month	**6.6 hrs**	**8.2 hrs**	**9.8 hrs**	**6.7 hrs**	**8.3 hrs**	**9.9 hrs**	**6.5 hrs**	**7.9 hrs**	**9.3 hrs**

Figure 3-3 shows the data from Table 3-7 in graphical form.

Figure 3-3: Hours Required at Minimum Wage

3.3 Income Requirement

Our income requirement metric uses the EPA affordability threshold of 2.5 percent for water service to identify the amount of income a household needs to be able to pay for water service at various levels of use. Table 3-8 shows the annual incomes required at uses of 7 hcf to 50 hcf per month in the current fiscal year, FY 2025, and FY 2040. For example in FY 2018 a household needs to make $36,096 annually in order to spend less than 2.5 percent of income on water service. That amount is $54,557 in FY 2025 and $90,408 in FY 2040. Recall 7 hcf represents the existing Tier 1 threshold (efficient indoor use) and 15 hcf represents the existing winter average and target long term average use. For reference, current annual average water use per account is approximately 22 hcf monthly and current peak summer average use per account is approximately 29 hcf.

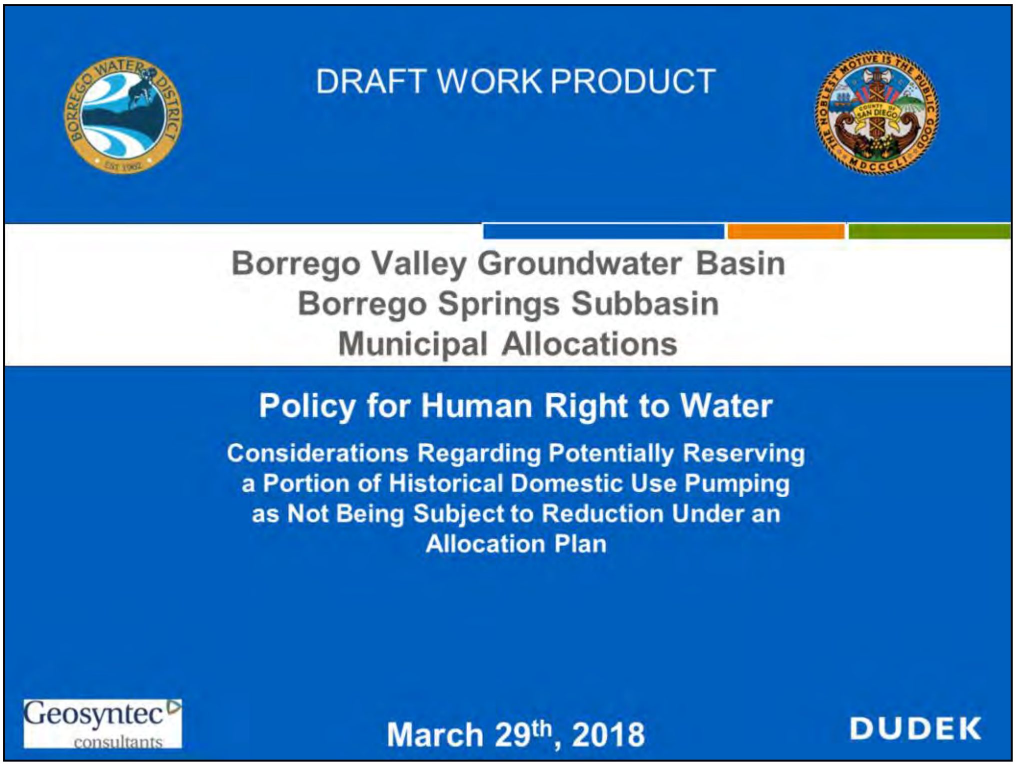
Table 3-8: Income Required to Keep Below 2.5% Household Income

Year	7 hcf	11 hcf	15 hcf	20 hcf	25 hcf	30 hcf	35 hcf	40 hcf	45 hcf	50 hcf
FY 2018	$29,011	$36,096	$43,181	$52,037	$60,893	$69,749	$78,605	$87,461	$96,317	$105,173
FY 2025	$43,824	$54,557	$65,290	$78,706	$92,122	$105,538	$118,954	$132,370	$145,786	$159,202
FY 2040	$72,552	$90,408	$108,264	$130,584	$152,904	$175,224	$197,544	$219,864	$242,184	$264,504

Appendix G:

<u>Dudek 3/29/2018.</u>

Policy for Human Right to Water.
BWD Board presentation
(in Microsoft PowerPoint, with notes).



As per Agenda Packet Items II.A and II.B: Technical and Policy Issues this part of the presentation introduces the Recommendation for Considering Human Right to Water Use and Municipal Allocations.

SGMA Allocation Plan

- Under the Sustainable Groundwater Management Act (SGMA), a Groundwater Sustainability Agency (GSA) has the authority to adopt an allocation plan, but no authority to determine water rights (Water Code Sections 10726.4 and 10726.8).
- An allocation plan is a proposal to reduce groundwater production to sustainable levels over time. In composing a draft allocation plan, the GSA is attempting to respect water rights priorities to the greatest extent feasible, but with the understanding that the GSA is afforded discretion in proposing allocations and the GSA has the duty to follow established State policy.
- In Borrego, discussions have occurred to set base production rights as the highest year of pumping between 2010 and 2015. In turn, it is expected that an approximate 70% reduction would be needed to return pumping levels to the basin safe yield of approximately 5,700 acre feet per year.

DUDEK

Domestic Use

- The Basin provides water for domestic, irrigation and other uses.
- The California Legislature has set several relevant priorities that overlay the GSA's preparation of an allocation plan. These priorities include:
  - (1) Domestic use is the highest use of water, followed by irrigation use. (Water Code, section 106)
  - (2) "It is hereby declared to be the established policy of this State that the right of a municipality to acquire and hold rights to the use of water should be protected to the fullest extent necessary for existing and future uses." (Water Code, section 106.5)
  - (3) Most recently, the Legislature has formally established a human right to water. (Water Code, section 106.3)

DUDEK

Human Right to Water

Assembly Bill (AB) 685 (2012)

- California became the first state in the nation to legally recognize the human right to water with the adoption of AB 685 that was signed into law by Governor Jerry Brown on September 25, 2012.
- AB 685 creates an ongoing obligation for state agencies to explicitly consider the human right to water in every relevant agency decision and activity.
- The California Water Code requires all relevant state agencies, specifically Department of Water Resources, the State Water Recourses Control Board, and California Department of Public Health, to "consider" how state actions impact the human right to water.

DUDEK

Human Right to Water

California Water Code

California Water Code 106.3 (a)

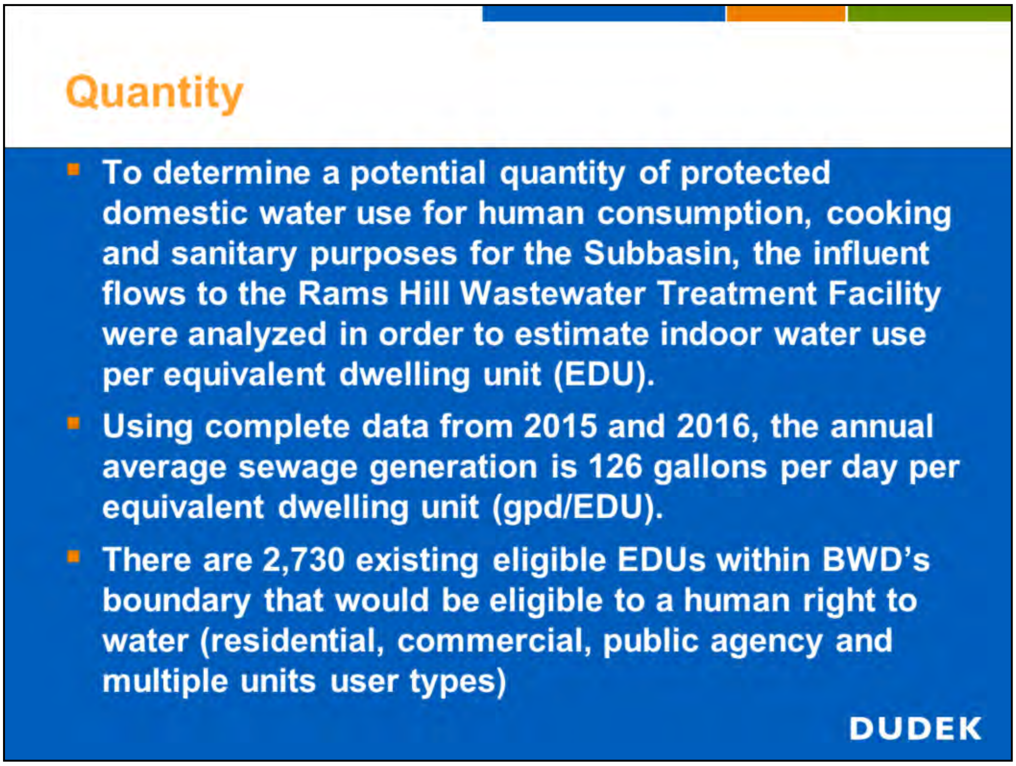
- "It is hereby declared to be the established policy of the state that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes."
- Domestic Use
  - **Quantity**
  - **Quality**
  - **Affordability**
  - **Accessibility**

DUDEK

Domestic Use Allocations

- With the previously discussed declarations of State policy in mind, and with the discretion provided to the GSA under SGMA, the GSA is exploring various options regarding the protection of existing domestic water use within the Borrego Springs Subbasin.
- One option under consideration in the draft allocation plan is whether a portion of historical domestic pumping, both that conducted by the Borrego Water District and by other pumpers (e.g. Small Water Systems), should be exempted from any reductions over time.

DUDEK



Dudek reviewed the influent flows to the Rams Hill Wastewater Treatment Facility in order to estimate indoor water use as a proxy to develop an estimate of the daily water quantity specific to the Subbasin for the human right to water. Using complete data from 2015 and 2016, the annual average sewage generation per equivalent dwelling unit (EDU) is 126 gallons per day per equivalent dwelling unit (gpd/EDU). Assuming 2.2 residents per dwelling unit, this works out to 57.3 gallons per capita per day (gpcd). For comparison, the State of California efficient indoor water use is 55 gpcd.

There are 2,730 existing eligible EDUs out of a total 3,103 EDUs within the District boundary. 373 existing EDUs were excluded from the calculation of human right to water as they are irrigation accounts.

As per request of the Advisory Committee (AC), the next slide presents District-wide Equivalent Dwelling Unit Information.

Equivalent Dwelling Use Information

Equivalent Dwelling Unit (EDU) Information [a]

User Type	Average Monthly Water Use (gallons)	Annual Water Usage Per Account (acre-feet)	Number of Users (connections)	Average Monthly Use per Connection (gallons)	Number of EDUs
Residential	27,226,209	0.55	1,823	14,935	1,823
Commercial	5,801,234	1.96	109		388[b]
Public Agency	2,917,724	3.07	35		195
Irrigation	5,565,535	3.66	56		373
Multiple Units	4,828,026	5.08	35		323
Golf Course	0	0	1		0
				Total EDUs	**3,103[c]**

Notes:
[a] Based on customer use by code for fiscal year 2015. BWD did not supply groundwater to Rams Hill Golf Course in fiscal year 2015.
[b] To calculate EDU by user type divide user type average monthly water use by average monthly water use per residential connection.
[c] Total EDUs rounded to nearest whole number.
Source: BWD 2016

DUDEK

***Question:** Members of the Advisory Committee (AC) requested clarification at the March 29, 2018 AC meeting regarding the number of equivalent dwelling units (EDUs) that were allocated water use for human right to water. A response is provided as follows:*

EDU calculations have been prepared for municipal water use during the 2015 fiscal year. The annual water use per residential account is 0.55 acre-feet with a total of 1,823 residential EDUs. The total EDUs currently served by the BWD, including residential, commercial, public agency, irrigation, and multiple units, is 3,103.

There are 2,730 existing eligible EDUs within BWD's boundary that were allocated a human right to water (residential, commercial, public agency and multiple units user types). The 373 EDUs for irrigation were not included in the calculation of the human right to water.

Quantity

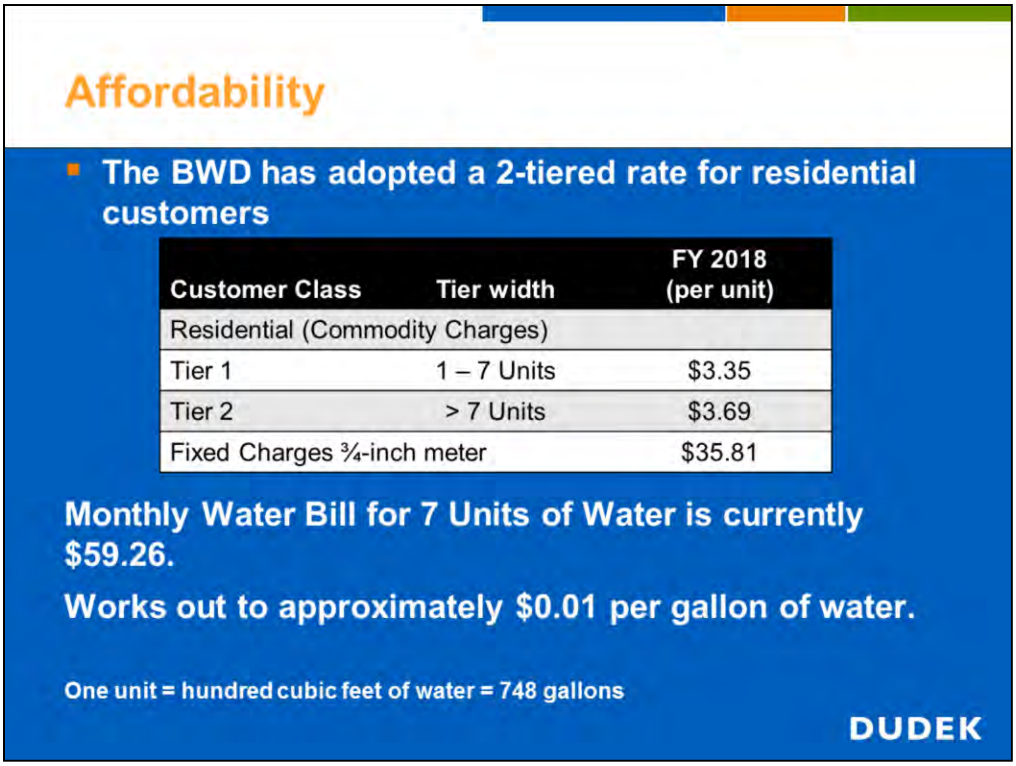
- Multiplying the existing eligible EDUs types by the average annual sewage generation per EDU results in a estimated BWD-wide human right to water of 385 AFY (2,730 EDU * 126 gpd/EDU = 343,980 gpd = 385 AFY).
- 385 acre-feet is the volume of water that would not require any pumping curtailment were this proposal to move forward. This represents about 2% of the estimated current annual groundwater withdrawals in the Subbasin, which are about 19,600 acre-feet; about 7% of the estimated sustainable yield of 5,700 acre-feet; and about 25% of the current annual BWD pumping.

DUDEK

Quality

- BWD well water currently meets all state and federal drinking water standards without treatment.
- The District continuously monitors groundwater quality to ensure access to safe and clean water.
- Implementation of the Groundwater Sustainability Plan (GSP) explicitly requires ongoing evaluation of water quality and avoidance of undesirable water quality conditions.
- Further evaluation is ongoing to determine the probability of the need for future water treatment due to both natural and anthropogenic sources of contaminants of concern (e.g. arsenic and nitrate).

DUDEK



The Borrego Water District (BWD) has adopted a two-tiered rate for residential customers. Tier 1 is based on the existing State of California efficiency target of 55 gallons per person per day (gpcd) for indoor use multiplied by the average family size in the Borrego Springs, which was rounded up to 3 persons per household. Using an average month of 30.5 days this works out to 5,033 gallons per month. The District bills in units of hundred cubic feet (hcf). There are 748 gallons in a hundred cubic feet. 7 hcf or 7 units represents the District's existing Tier 1 allotment.

A ratepayers current water bill for 7 units of water is currently $59.26, which includes fixed charges for a ¾-inch meter of 35.81 plus the commodity charge of $3.35 per unit. This works out to about 1 cent per gallon of water.

Affordability

BWD Annual Water Bill as Percent of Household Income (FY 2018)

Income Range	Essential 7 units	Efficient 11 units	Target Average 15 units
Less than $10,000	6.5%	8.0%	9.6%
$10,000 to $14,999	5.2%	6.4%	7.7%
$15,000 to $24,999	3.2%	4.0%	4.8%
$25,000 to $34,999	2.2%	2.7%	3.2%
$35,000 to $49,999	1.5%	1.9%	2.3%
$50,000 to $74,999	1.0%	1.3%	1.5%
$75,000 to $99,999	0.7%	0.9%	1.1%
$100,000 to $149,999	0.5%	0.6%	0.8%
$150,000 to $199,999	0.4%	0.5%	0.5%
$200,000 or more	0.3%	0.4%	0.5%
Median income (dollars)	2.0%	2.5%	3.0%
20th Percentile	3.8%	4.7%	5.6%
Poverty Level (3 person household)	3.2%	3.9%	4.7%

The table illustrates the percentage of 2018 annual household income which goes towards water service at various levels of use, essential, efficient and target average. The essential category corresponds to the District's residential Tier 1 rate of 7 hundred cubic feet or 175 gallons per day per connection.

Colors in the red spectrum represent a higher percentage of income towards water service. Colors in the green spectrum represent lower percentages.

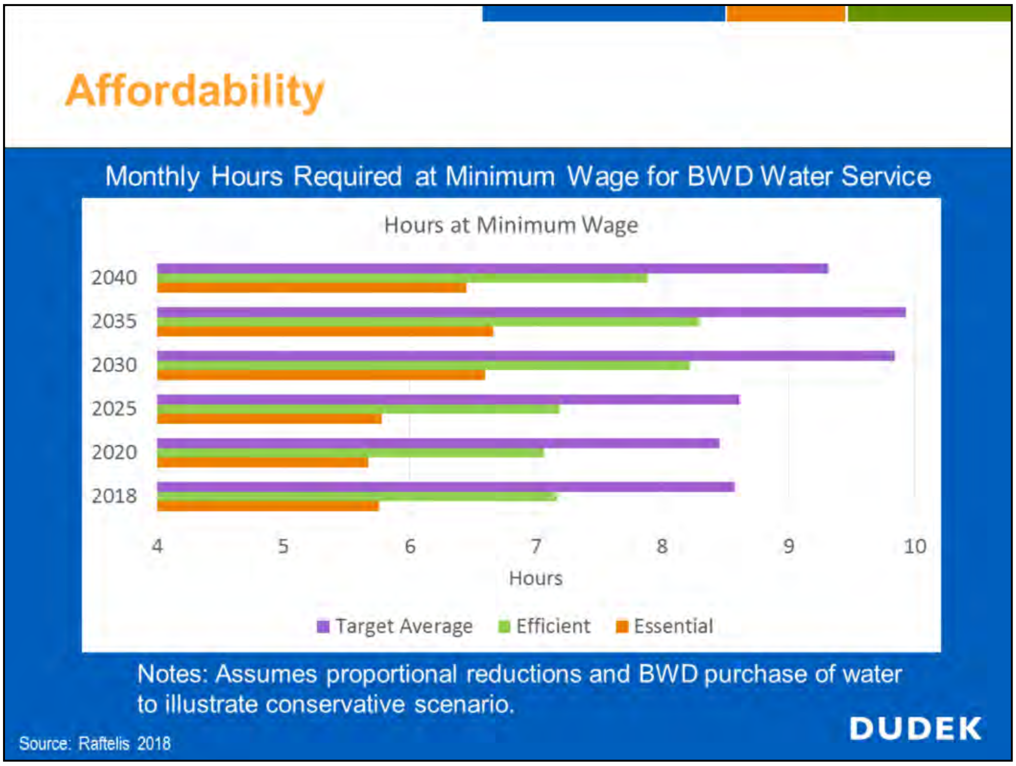
An affordability standard of 2.5% and 2% of national median household income for water and sewer bills respectively was selected based on U.S. Environmental Protection Agency (EPA) guidelines for water quality standards and Combined Sewer Overflow (CSO) compliance.

The 2.5 percent threshold has never been formalized by EPA and, though arbitrary, use of %MHI in assessing affordability has become the standard.[1]

Those at the median income pay 2 percent for essential water use, 2.5 percent for efficient water use, and 3 percent for target average water use in FY 2018. Those at the 20th percentile and those at the poverty level spend between 3.2 and 3.8 percent of their income solely for essential water needs.

This analysis indicates that water rates are not currently affordable for many residents and emphasizes the need to insulate the SDAC community from rate increases.

[1]. Borrego Springs median household income is $36,583.

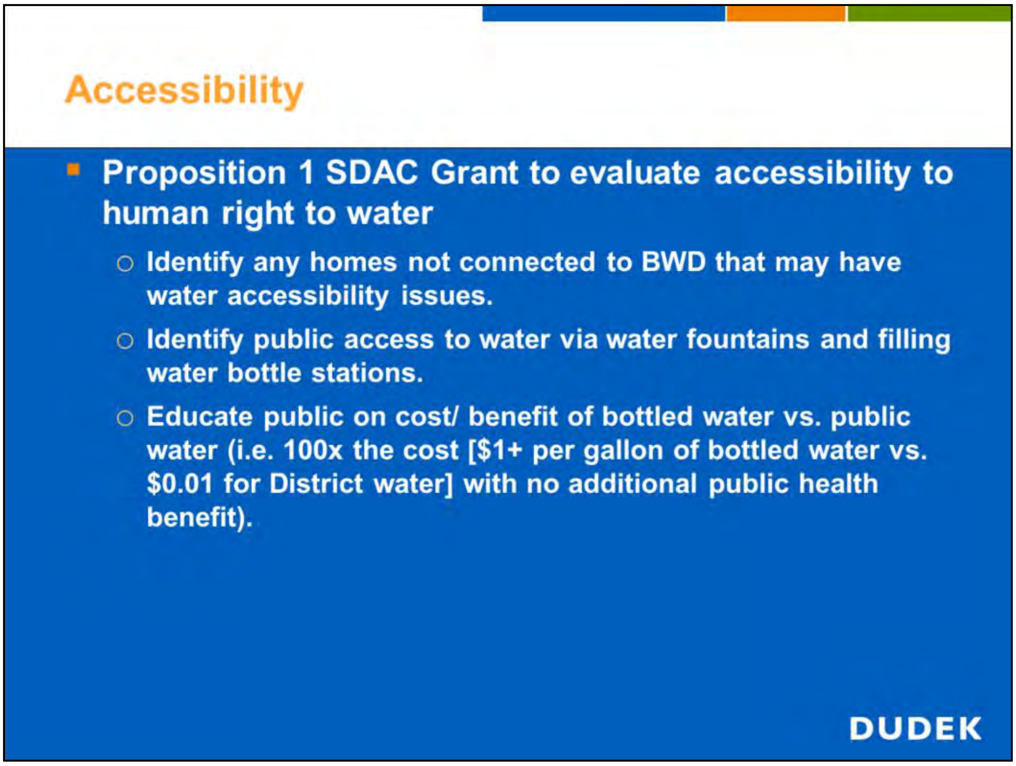


Another metric for evaluating affordability is to determine how many hours at minimum wage it takes a household to pay for their water service. Utilizing the current minimum wage, adopted minimum wage increases through 2022, and future consumer price index (CPI) adjustments, Raftelis estimated the number of hours required at minimum wage to pay for water service at the three levels of use.

At the existing minimum wage of $10.50 per hour a household using only 7 units per month for essential needs, one must work for 5.8 hours to pay for essential water service. The same household using the target average of 15 units per month would have to work 8.6 hours, or approximately one day's labor per month to pay for water service. The hours required dips slightly in FY 2020 as gains in the minimum wage outpace increases in costs for water service.

An eight hour rule has been suggested for combined water and sewer service which represents eight hours of labor at minimum wage for a monthly bill. In many outcomes the eight hour rule is surpassed for water service alone.

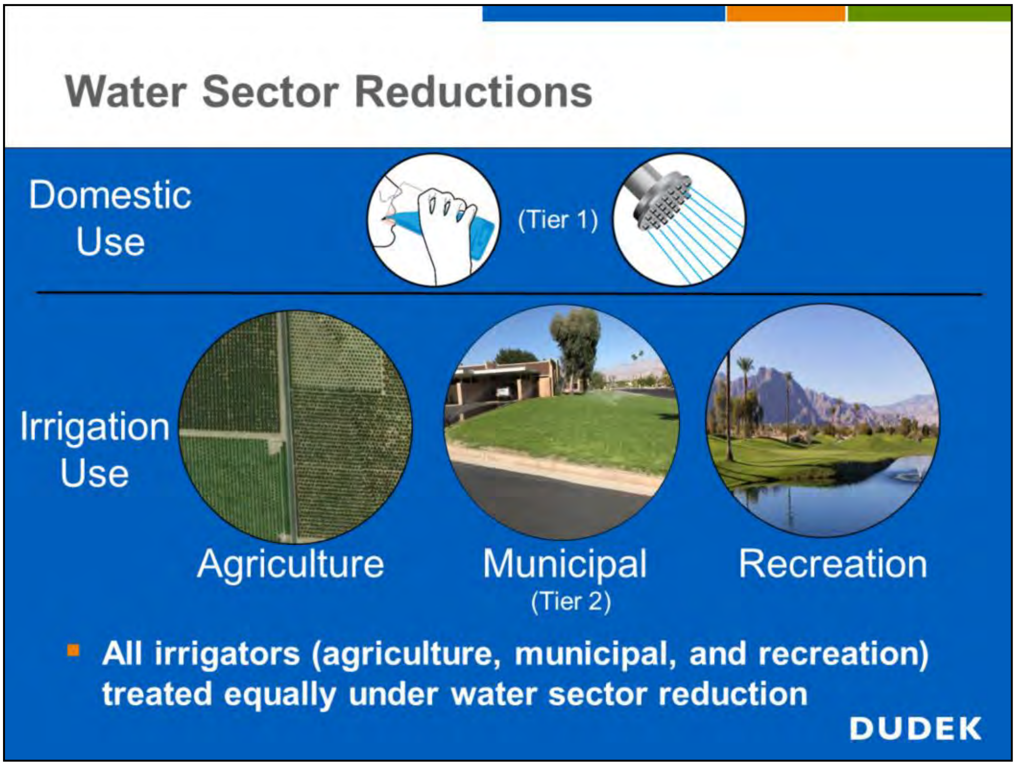
This analysis supports the conclusion that the SDAC community should be insulated from cost increases due to SGMA compliance.



The Proposition 1 SDAC grant will evaluate accessibility to water including identifying homes not currently connected to the Borrego Water District (BWD) that have water accessibility issues. For instance, the Groundwater Sustainability Agency (GSA) has already identified homes that are required to haul water to their properties or have domestic wells that are impacted by elevated nitrates that are just below California drinking water maximum contaminant levels (MCLs).

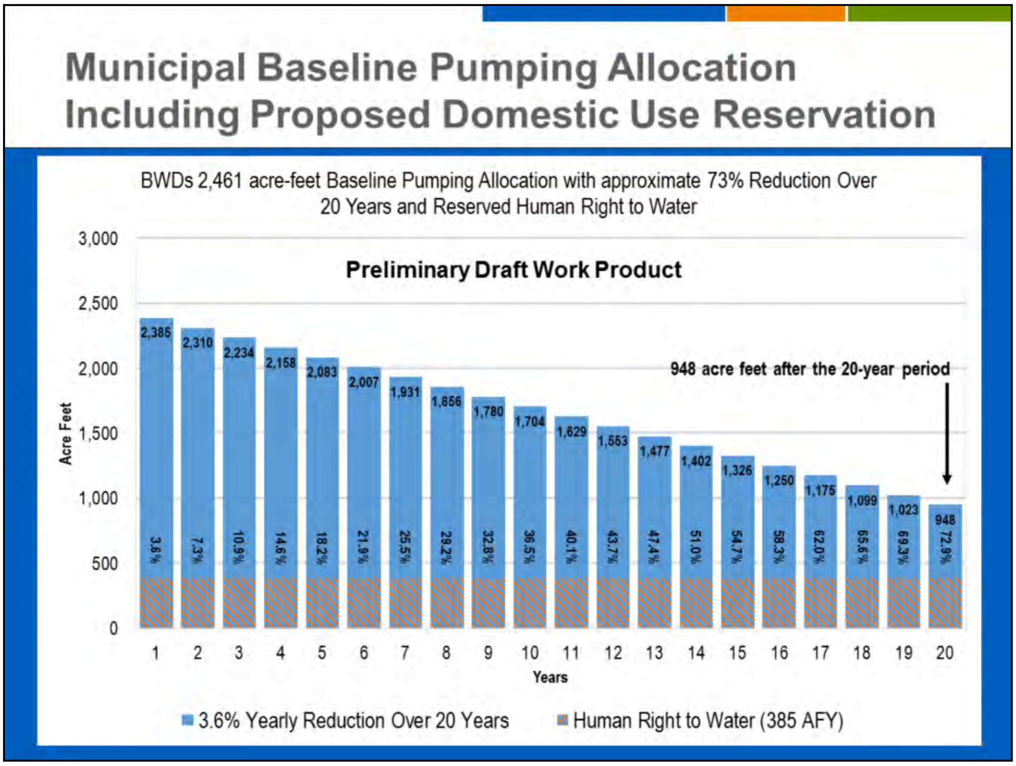
The Proposition 1 SDAC grant will evaluate public access to BWD supplied water via fountains and make recommendations for need to increase access, if necessary.

Also the GSA, plans to educate the public and SDAC community on the cost/benefit of bottled water versus BWD water as there is often a misperception that bottled water is better. Bottled water costs 100 times more than BWD water with no additional health benefit. Bottled water often derives from a municipal source or from “spring” sources that are not as highly regulated as municipal drinking water systems.



California Water Code (CWC) § 106 states, “It is hereby declared to be the established policy of this State that the use of water for domestic purposes is the highest use of water and that the next highest use is for irrigation”. Domestic use is water adequate for human consumption, cooking, and sanitary purposes. Domestic use does not include water for outdoor irrigation. All irrigators (agriculture, municipal, and recreation treated equally under water sector reduction).

All irrigators (agriculture, municipal and recreation) are treated equally under the proposed water sector reductions.

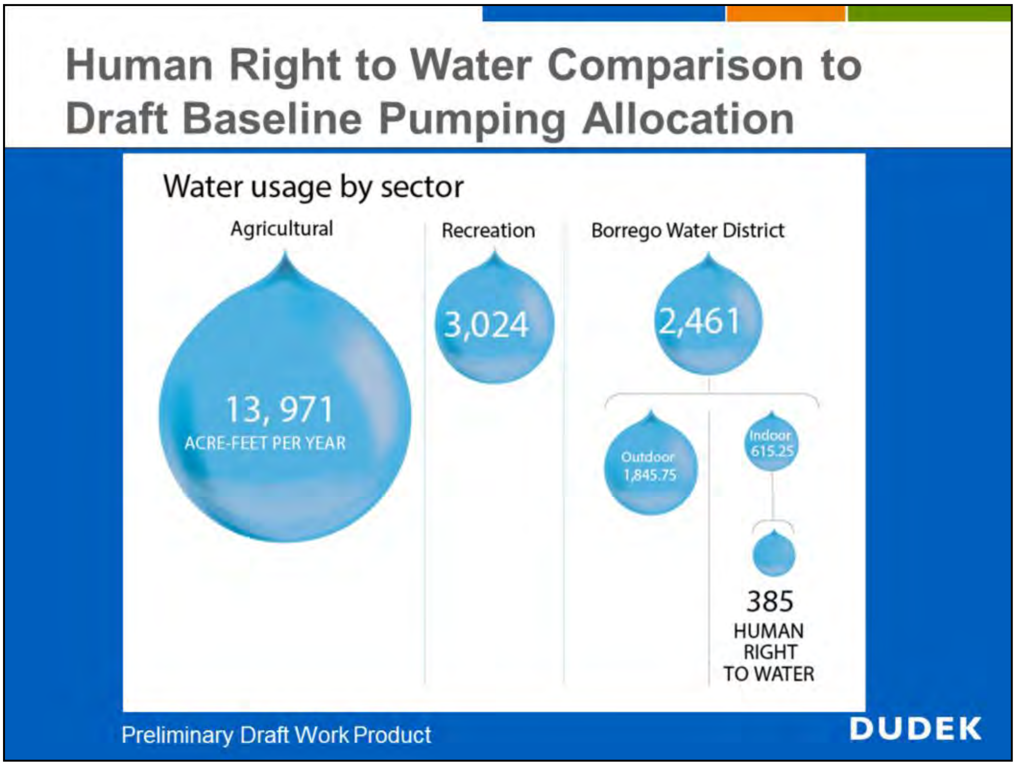


This graph represents the working draft baseline pumping allocation for the Borrego Water District (BWD). Over the 20-year implementation period, the human right to water remains static for existing domestic use at 385 acre-feet per year. The human right to quantity is subtracted from the BWD's maximum baseline pumping allocation of 2,461 acre-feet per year (AFY) that was assigned based on the 5-year period January 1, 2010 to December 31, 2014 (2,461 AFY – 385 AFY = 2,076 AFY).

The municipal allocation not reserved for human right to water incurs proportional reduction over the 20-year SGMA implementation period to achieve Subbasin sustainability. Based on a linear reduction over 20 years, the reduction rate is 3.65% per year or about 73% over 20 years. The unreserved portion of the municipal pumping allocation reduces from 2,076 AFY to 563 AFY. Adding in the reserved Human Right to Water of 385 AFY results in a sustainable municipal pumping allocation of 948 AFY.

For comparison, the BWD pumped 1,568 acre-feet in 2017. Thus, the proposed sustainable municipal allocation is about 62% of the current BWD groundwater production.

The BWD will not necessarily need to physically reduce annual groundwater production. The BWD could either implement end use efficiency/ conservation measures such as turf replacement or acquire additional pumping allocation from a proposed land fallowing and water transfer program.



This graphic illustrates that the Human Right to Water represents a small drop of total Borrego Springs Subbasin production. The Human Right to Water amounts to 2% of the estimated current total Subbasin production.

Reserving an allocation of 385 AFY for the Human Right to Water results in an increased proportional reduction of about 3% for all sectors (Agriculture, Municipal and Recreation).

Appendix H:

<u>SquarMilnar 1/11/2019.</u>

Borrego Water District Financial Statements

June 30, 2018 and 2017.

Prepared for BWD.

squarmilner

Certified Public Accountants
and Financial Advisors

Borrego Water District
Financial Statements
June 30, 2018 and 2017

INDEX TO THE FINANCIAL STATEMENTS

January 11, 2019

To the Honorable President and Members of the Board of Directors and Customers of the Borrego Water District:

State law requires that all general-purpose local governments and special districts publish each fiscal year a complete set of financial statements presented in conformity with generally accepted accounting principles (GAAP) and audited in accordance with generally accepted auditing standards by a firm of licensed certified public accountants. The Annual Financial Report of the Borrego Water District (BWD or District) for fiscal year ended June 30, 2018 is hereby submitted as required. Squar Milner LLP, a firm of licensed certified public accountants, has audited the District's financial statements.[1]

Generally Accepted Accounting Principles (GAAP) requires that management provide a narrative introduction, overview, and analysis to accompany the financial statements in the form of the Management's Discussion and Analysis (MD&A) section. This letter of transmittal is designed to complement the MD&A and should be read in conjunction with it. The District's MD&A can be found immediately after the Independent Auditors' Report.

Management assumes full responsibility for the completeness and reliability of the information contained in this letter, the MD&A and the accompanying financial statements, based upon a comprehensive framework of internal control that it has established for this purpose. Because the cost of internal control should not exceed anticipated benefits, the objective is to provide reasonable, rather than absolute, assurance that the financial statements are free of any material misstatements.

The goal of the independent audit was to provide reasonable assurance that the financial statements of the District for the fiscal year ended June 30, 2018 are free of material misstatements. The independent audit involved examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements; assessing the accounting principles used and significant estimates made by management; and evaluating the overall financial statement presentation. The independent auditor concluded based upon the audit, that there was a reasonable basis for rendering an unqualified opinion that the District's financial statements for the fiscal year ended June 30, 2018 are fairly presented in conformity with GAAP. The Independent Auditors' Report is presented as the first component of the financial section of this report.

PROFILE OF THE DISTRICT

The District was established in 1962 as a State of California special district (Water Code § 35565) to provide water, sewer, and flood control and gnat abatement for areas in the Borrego Springs community. Borrego Springs is an unincorporated destination community of approximately 3,500 full-time and more than 6,000 winter residents, that is located in the northeast corner of San Diego County approximately 90 miles drive from San Diego.

[1] Squar Milner is one of the nation's top 70 accounting and advisory firms with over 300 professionals based in Southern California (www.squarmilner.com).

Borrego Springs is surrounded on all sides by the Anza-Borrego Desert State Park (the Park). The Park, which encompasses over 248,880 hectares (615,000 acres) in and around the Borrego Valley, was established in 1933 to protect this unique desert environment. The military presence of both the Army and Navy during World War II brought the first paved roads and electricity to Borrego Springs. After the war, developers subdivided the area, attempting to create a resort community by capitalizing on the tourism generated by the Park. The Park is the largest state park in California. It was designated as a National Natural Landmark in 1974 and a Biosphere Reserve in the 1980's by the United Nations. The Park contains approximately 85% of State designated wilderness area within California and is approximately the size of Rhode Island. The Park attracts more than 500,000 visitors to Borrego on an average year to more than a million visitors on a super bloom year as we have had in the spring of 2017. An economic study developed for the Anza-Borrego Foundation (ABF) estimates the revenue generated by visitation to the Park during an average year is approximately $40 million annually to the region, mostly in San Diego County (BBC Consulting, 2012).

Infrastructure

The District has 9 active municipal production wells connected to 90 miles of distribution lines to serve its approximately 2,125 residential, commercial, institutional, and irrigation customers. The District also provides sewer and wastewater treatment services to approximately 830 customers located primarily in the Town Center, Club Circle and Rams Hill development. The estimated replacement cost value of the District's water, sewer and wastewater treatment facility infrastructure is approximately $62,500,000.

Governance

A five-member board of directors works as a team to govern the affairs of the District. The board is elected at large by the registered voters residing within the District's boundaries, with vacant positions that occur between elections appointed by the existing board and during election years by the San Diego County Board of Supervisors if there is no competition for a seat on the board. The directors, who are elected or appointed, are residents and have similar concerns as their constituents. The board members, who serve four-year staggered terms, are responsible for establishing the direction of the District through adopting policies and ordinances for the smooth running of the District; ensuring that sound fiscal policy exists; that management practices and controls are in place for accountability; adopting the annual budget; approving personnel policies and organizational structure; hiring the District's General Manager; and hiring other advisors to the board, such as the District's legal counsel, financial and other advisors, as required. The General Manager is responsible for carrying out the policies and ordinances approved by the District board, for overseeing the day-to-day operations of the District, and for meeting the financial objectives set forth in the annual budget approved by the board.

Groundwater Supply, Usage & Availability

One hundred years ago Native Americans inhabited the Borrego Valley and utilized the springs and surface water sources issuing from the nearby mountain ranges. Cattlemen began homesteading the Borrego Valley in about 1875. The first successful modern well was dug in 1926. Agricultural development began primarily after 1945. Today, all human water used annually is pumped from the Borrego Springs Subbasin (Borrego Basin: basin) of the Borrego Valley Groundwater Basin (BVGB).

The basin is made up of three aquifers: upper, middle and lower aquifers, each with different physical characteristics. These three aquifers, Pleistocene (2.5 million years ago) to Holocene (11,700 years ago) era water deposits, are the community's sole source of water. Historically, the upper aquifer has been the principle source of groundwater in Borrego Valley. At this time there are no plans to import water from outside the Borrego Valley due to the economic cost of a pipeline and the uncertainty of available and affordable imported supply from the Colorado River. Readers may consult the *Southeast California Regional Basin Study Evaluates Water Supply and Demand in Borrego, Coachella and Imperial Valleys* by the Bureau of Reclamation for more information. Importation of new supply from nearby groundwater basins has also been ruled out due to availability of potential adequate supply and cost. Readers may consult the *Borrego Spring Pipeline Feasibility Study: Final Report* by the US Environmental Protection Agency – Region 9 (2012).

Annual agricultural irrigation, golf course irrigation, and municipal uses require about four times more water than is available through average annual natural recharge of the basin. Of the current average annual withdrawals from the basin, agricultural irrigation in the Borrego Valley accounts for about 14,000 acre-feet per year (AFY; approximately 70%) of the average annual uses, recreational uses (primarily golf courses) account for about 3,000 AFY (approximately 20%) of the average annual uses and municipal uses account for less than 2,000 AFY (approximately 10%) of the total annual uses. The natural net replenishment (recharge less outflows) of the basin of approximately 5,700 AFY annually is based on 66 years of historic data. The actual annual natural net recharge can fluctuate in the arid climate from less than 1,000 AFY in dry years to more than 25,000 AFY in exceptionally wet years.

The current rate of groundwater pumping produces an average annual basin storage change (overdraft) of about 13,300 acre-feet (AF) of water per year based on current withdrawal rates and the estimated average annual net replenishment rate. The largest water level declines are found in the northern part of basin where most of the approximately 3,700 acres of primarily citrus agricultural acreage is concentrated and in the southwestern part of the basin where municipal use is primarily located.

Groundwater-level declines of more than 100 feet in some parts of the groundwater basin have been observed. Anthropogenic activities have resulted in an increase in pumping lifts, reduced well efficiency, dry wells, changes in water quality, loss of natural groundwater discharge, and changes to the desert ecosystems of the Park. Today, water levels in the basin are declining on average about 2.7 feet a year. However, if the present rate of withdrawals continues, water levels are projected to drop at an ever-faster rate in the future as more withdrawals occur from the middle and lower aquifers of the basin. At the current rate of use, the groundwater supply is not sustainable. Readers should review a recent study (2015) by the USGS, *Hydrogeology*, *Hydrologic Effects of Development, and Simulation of Groundwater Flow in the Borrego Valley, San Diego County* for more complete information.

Even with the current overdraft, the basin likely has adequate water supply possibly for hundreds of years. However, as water levels continue to drop in the basin, water quality may also decline, which may require expensive additional treatment for potable uses. Thus, the cost of municipal water supply for potable uses will most likely continue to increase annually over time. Presently, the basin is usefully divided into three Basin Management Areas (South, Central, North) based on differences in transmissivity (how fast groundwater flows from one area to the next) and depending on the Management Area, wells are often screened in the three different aquifers of the basin and exhibit different water quality characteristics.

The District believes that sustainable groundwater management requires the development, implementation and updating of management plans based on the best available science, monitoring, forecasting, use of technological resources and best management practices. Although the District adopted a groundwater management plan (GMP) for the basin under Assembly Bill 3030 (AB 3030) in 2002, this plan was never fully implemented and contained no timelines, defensible reduction methods, nor funding sources necessary to implement a plan to adequately address the basin overdraft.

On January 1, 2015, the Sustainable Groundwater Management Act (SGMA; the Act) replaced AB 3030. The Act gives Groundwater Sustainability Agencies (GSAs) the authority to limit extractions, impose fees and penalties, and require metering and water quality monitoring on all basin pumpers other than deminimis pumpers (pumpers who can prove they use less than 2 AFY). GSAs are charged with developing and adopting a Groundwater Sustainability Plan (GSP) that produces basin sustainability in no more than twenty (20) years from 2020 for medium California Statewide Groundwater Monitoring (CASGEM) basins in critical overdraft (the California Department of Water Resources [DWR] designation for the basin). Both the District and San Diego County (County) have agreed to a Memorandum of Understanding (MOU) to become a multi-agency GSA for the basin; the District on September 20, 2015; the County on October 19, 2016. SGMA-mandated supply constraints will add additional pressure on water rates, as the District will likely be required to purchase irrigated farmland to fallow in order to transfer underlying water rights for municipal use. An Advisory Committee comprising nine members representing agriculture, recreation, municipal ratepayers, the Park, the Borrego Springs Community Sponsor Group and Borrego Valley Stewardship Council was established in February 2017 to advise the Core Team of the District and County responsible for developing the GSP for the basin.

The Borrego Water Coalition (BWC; Coalition) submitted a set of policy recommendations on November 6, 2014 to the District and to the County for consideration in a GSP to address the overdraft of the basin and that meets the criteria established by the SGMA for managing the basin in a sustainable manner (i.e. produces *no undesirable results*). The Coalition comprises local leaders from the Chamber of Commerce, agriculture, the District, education, golf, lodging, Park and recreation. The Coalition members represent major pumpers and water users of the basin who collectively account for more than an approximately eighty percent (80%) of the annual withdrawals from the basin. The District also is a signatory to the Borrego Valley Stewardship Council, a convening entity of individuals and member organizations interested in developing economic sustainability development initiatives for the destination community of Borrego Springs, given the location of the community as a gateway to the Park.

The District is not a member of the San Diego County Water Authority (SDCWA), the regional member of the Metropolitan Water District of Southern California (MWD) that imports supplemental water into San Diego County.

California's Ongoing Drought

Because the Borrego Valley relies solely on the Borrego Basin for its municipal, recreational, and farming irrigation uses, the California drought has produced no physical impairment of water supply for the District and is not expected to do so in the near future. Although in 2017, the California drought was officially declared over, Borrego water users continue to make investments to use water more efficiently and to engage in water conservation programs. The desert environment provides more impetus to use water wisely than periodic drought declarations from Sacramento.

FACTORS AFFECTING FINANCIAL CONDITION

The information presented in the financial statements is perhaps best understood when it is considered from the broader perspective of the specific environment within which the District operates.

Local Economy

Located in an arid desert climate, Borrego's economy has been made possible by the overuse of groundwater supplies that have been depleted far faster than those supplies can be replenished. This is true of the agricultural, recreational and municipal water use sectors. Thus, uncertainty over the costs of long-term water supply, potential future costs for treating groundwater to meet safe drinking water quality standards, and the economic impacts of meeting SGMA objectives for the Borrego Basin may be slowing investments for new development in the Borrego Valley (Valley). For example, one result of SGMA is to change the present cost of groundwater from zero dollars to as yet some undetermined positive amount for use.

Previous Fiscal Years Spending by the District

The District has largely addressed the financial situation that was inherited from the 2007 Board and general manager's decisions that between FY 2008 – FY 2011 spent more than $6.3 million of the District's $6.5 million cash reserves and potentially obligated the District to spend another $7.0 million for unfunded projects. These spending and future obligations resulted in the District no longer having the financial stability to obtain new debt to pay for necessary long-term capital improvement projects (CIP). With the cancellation of many of the future obligations incurred by the 2007 board, reduction of annual operating and maintenance (O&M) expenses by more than $1.2 million, careful cash flow management, and Proposition 218 approved rate increases during the period 2011-2017, the District now should have sufficient annual cash flow and cash reserves to entertain necessary borrowing to complete needed CIP. Timely investments in CIP are necessary to produce the lowest economic cost provision of municipal water, sewer and wastewater treatment services for the District's customers.

Long-Term Financial Planning

The District's present Board of Directors is aware of the need to restore the District's financial stability and to maintain its creditworthiness to borrow. Through a coordinated strategic process, the Board has established a series of policies and plans to effectively meet the District's anticipated future revenue needs. The principles the District has adopted for returning to revenue sufficiency include: (a) the active management and projection of monthly cash flow during the year; (b) holding O&M expenditures to the annual budget; (c) minimal increases in salaries and benefits for employees; (d) refinancing of existing debt obligations where such refinancing would produce a material reduction in future long term cash obligations; (e) deferring large infrastructure repair and replacement (R&R) capital expenditures until the District is able to borrow again in the public bond markets; and (f) implementing annual water and sewer rate increases to increase cash flow and to accumulate cash reserves.

The primary driver for the long-term financial viability of the District, as well as the economy of the Valley is the overdraft's impact on water quality (see section on Groundwater Supply, Usage & Availability above). In order to accomplish this objective, the District needs to maintain financial stability and a good credit standing with the bond markets in order to accommodate raising new debt. Debt is expected to be issued in July 2018.

RELEVANT FINANCIAL POLICIES

Reserve Policy

The District has established a Reserve Fund Policy to anticipate and to prepare for future funding requirements as well as for unforeseen events. The Reserve Fund Policy establishes restricted and unrestricted reserves and describes the flow of funds to and from the various reserves. A copy of the District's current approved Reserve Policy is available on the District's website as part of the FY 2018 budget document.

Risk Management

The District is a member of the California Joint Powers Insurance Authority (JPIA). The JPIA pools for the first $500,000 of general, auto & public officials liability coverage and has purchased excess coverage up to $60 million. The JPIA provides coverage on repair or replacement against loss of District property caused by earthquake or flood of $20 million.

Pension and Other Post-Employment Benefits

The District contributes to the California Public Employees Retirement System (CalPERS), an agent multiple-employer public employees defined benefit pension plan for its personnel. CalPERS provides retirement and disability benefits, annual cost-of-living adjustments, and death benefits to plan members and beneficiaries. Additional information about the District's pension arrangements and post-employment benefits can be found in the notes to the financial statements. In FY 2012, the Board changed the pension program from three percent (3%) per year of active service at retirement that was instituted by the prior Board in 2009, back to its previous two percent (2%) per year of active service at retirement. This pension policy is in effect for employees of the District hired after April 1, 2012.

Investment Policy

The Investment Policy establishes guidelines for the investment of available funds. The Investment Policy incorporates the Prudent Investor Standards. The primary objectives, in priority order, of the District's investment activities are the following: 1) safety, 2) liquidity, and 3) yield. The District's funds are invested in a variety of investments, in accordance with California government code, as described in the notes to the financial statements. The District minimizes interest rate risk by investing a greater portion of its funds in short term investments and minimizes credit risk by investing a majority of its funds diversified investment pools.

Internal Controls

The District is responsible for establishing and maintaining an internal control structure designed to ensure that the District's assets are protected from loss, theft, or misuse, and to ensure that adequate accounting data are compiled for the preparation of financial statements in conformity with GAAP. The internal structure is designed to provide reasonable assurance that these objectives are met. The concept of reasonable assurance recognizes that; 1) the cost of control should not exceed the benefits likely to be derived; and 2) the valuation of costs and benefits requires estimates and judgments by management.

Respectfully submitted,

/s/ *Geoff Poole*

General Manager

INDEPENDENT AUDITOR'S REPORT

Board of Directors
Borrego Water District
Borrego Springs, California

We have audited the accompanying financial statements of Borrego Water District, as of and for the fiscal years ended June 30, 2018 and 2017, and the related notes to the financial statements, which collectively comprise the Borrego Water District's basic financial statements as listed in the index to the financial statements.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America and the State Controller's Minimum Audit Requirements for California Special Districts. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Borrego Water District, as of June 30, 2018 and 2017, and the changes in financial position and cash flows thereof for the fiscal year then ended, in accordance with accounting principles generally accepted in the United States of America, as well as accounting systems prescribed by the State Controller's Office and state regulations governing special districts.

Other Matters

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the management's discussion and analysis, schedules of proportionate share of the net pension liability and plan contributions be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

O*ther Information*

Our audit was conducted for the purpose of forming opinions on the financial statements that collectively comprise Borrego Water Districts basic financial statements. The other supplementary information, as listed in the index to the financial statements, is presented for purposes of additional analysis and is not a required part of the basic financial statements. The Organization information, as listed in the index to the financial statements, is the responsibility of management and derived from and relates directly to the underlying accounting and other records used to prepare the basic financial statements. Such information has been subjected to the auditing procedures applied in the audit of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the information is fairly stated in all material respects in relation to the financial statements as a whole.

The assessed valuation information, as listed in the index to the financial statements, has not been subjected to the auditing procedures applied in the audit of the basic financial statements and, accordingly, we do not express an opinion or provide any assurance on it.

Squar Milner LLP

SQUAR MILNER LLP

San Diego, California
January 11, 2019

As management of the Borrego Water District (the "District"), we offer the readers of the District's financial statements this narrative overview and analysis of the financial activities of the District for the fiscal year ended June 30, 2018. We encourage readers to consider the information presented here in conjunction with the District's basic financial statements, which begin immediately following this analysis. This annual financial report consists of three main parts (1) Management's Discussion and Analysis, (2) Basic Financial Statements, and (3) Required Supplemental Information.

The financial statements consist of a series of financial statements prepared in accordance with the Governmental Accounting Standards Board Statement No. 34, *Basic Financial Statements – Management Discussion and Analysis for State and Local Governments*.

FINANCIAL HIGHLIGHTS

During the fiscal year ended June 30, 2018, the following events impacted, or have the potential to impact, the finances of the District:

- On June 19, 2018, the District's Board approved a budget for fiscal year 2019 that included sewer rate changes that will result in an approximate revenue increase of 8.89% for sewer service charges; an increase of 6.00% for water base rates; and an increase of 6.00% for water commodity rates over the FY 2018 rates in effect. The new rates took effect July 1, 2018 and are reflected initially in customers' August billings.

- The income from operations for the fiscal year ended June 30, 2018, was $937,411 compared with income from operations of $1,111,975 for fiscal year ended June 30, 2017.

- Cash and cash equivalents increased to $4,672,115 at June 30, 2018, from $4,149,656 at June 30, 2017.

- Capital assets increased to $13,595,833 at June 30, 2018, from $13,419,035 at June 30, 2017.

- The change in net position for the fiscal year ended June 30, 2018, was an increase of $688,569 compared to an increase in net position of $1,024,974 for fiscal year 2017.

More information about the overall analysis of the District's financial position and results of operations is provided in the following sections.

OVERVIEW OF THE FINANCIAL STATEMENTS

The discussion and analysis is intended to serve as an introduction to the District's basic financial statements.

Basic Financial Statements, the basic financial statements include District financial statements.

OVERVIEW OF THE FINANCIAL STATEMENTS (continued)

The District, as a whole, is reported in the District's statements and uses accounting methods similar to those used by companies in the private sector.

The *Statements of Net Position*, a District statement, presents information on all of the District's assets and liabilities, with the difference between the two reported as net position. Over time, increases or decreases in net position may serve as a useful indicator of whether the financial position of the District is improving or deteriorating.

The *Statements of Revenues, Expenses and Changes in Net Position*, a District statement, presents information showing how the District's net position changed during the most recent fiscal year. All changes in net position are reported as soon as the underlying event giving rise to the change occurs, regardless of the timing of related cash flows. Thus, revenues and expenses are reported in this statement for income items that will only result in cash flows in future fiscal periods.

The *Statements of Cash Flows* provides information regarding the District's cash receipts and cash disbursements during the year.

The *Notes to the Basic Financial Statements* are included to provide more detailed data and explain some of the information in the statements.

In addition to the basic financial statements and notes, this report also presents required supplementary information and the supplementary information, as listed in the table of contents.

Statements of Net Position

The Statements of Net Position presents the District's financial position (assets and liabilities) as of June 30, 2018 and 2017. Assets in excess of liabilities (Net Position) were $14,816,900 and $14,128,331 as of June 30, 2018 and 2017, respectively. In accordance with generally accepted accounting principles (GAAP), capital assets are recorded at historical cost. Net position is accumulated from revenues in excess of expenses, and contributed capital combined with the beginning balance of net position as presented in the Statement of Revenues, Expenses and Changes in Net Position.

Statements of Revenues, Expenses, and Changes in Net Position

The Statements of Revenues, Expenses, and Changes in Net Position presents the District's results of operations for the year ended June 30, 2018 and 2017. In accordance with GAAP, revenues are recognized (recorded) when water, sewer or other services are provided, and expenses are recognized when incurred. Operating revenues and expenses are related to the District's core activities (providing water, sewer, pest control and flood control services). Non-operating revenues and expenses are not directly related to the core activities, e.g. investment income, interest expense, etc. The operating income for the fiscal year ended June 30, 2018 of $937,411 is combined with net non-operating revenues and expenses of ($116,755), to arrive at the change of net position of $688,569. The increase in net position is added to the beginning net position of $14,128,331 to arrive at the ending net position of $14,816,900 as of June 30, 2018.

OVERVIEW OF THE FINANCIAL STATEMENTS (continued)

One of the most important questions asked about the District's finances is, "How has the District's position changed as the result of this year's activities?" The Statements of Net Position and the Statements of Revenues, Expenses, and Changes in Net Position present information about the District's activities that help answer this question. These two statements report the net position of the District and the changes to them. The District's net position, the difference between assets and liabilities, may be thought of as one way to measure its financial health or financial position. Over time, increases or decreases in net position can be an indicator as to whether the financial health is improving or deteriorating. However, it is incumbent upon the observer to consider other non-financial factors such as the regulatory climate, economic conditions, population growth, zoning changes, environmental changes, etc.

Analysis of Net Position

Our analysis will start with a summary of the District's Net Position as presented in the following table:

Borrego Water District's Net Position

			Variance	
	2018	**2017**	**$**	**%**
ASSETS				
Cash and cash equivalents	$ 4,672,115	$ 4,149,656	$ 522,459	12.59%
Capital assets	13,595,833	13,419,035	176,798	1.32%
Other assets	610,664	584,222	26,442	4.53%
TOTAL ASSETS	18,878,612	18,152,913	725,699	4.00%
DEFERRED OUTFLOWS OF RESOURCES	493,258	459,290	33,968	7.40%
LIABILITIES				
Current liabilities	731,511	441,654	289,857	65.63%
Noncurrent liabilities	3,719,131	3,879,142	(160,011)	-4.12%
TOTAL LIABILITIES	4,450,642	4,320,796	129,846	3.01%
DEFERRED INFLOWS OF RESOURCES	104,328	163,076	(58,748)	-36.02%
NET POSITION				
Net investment in capital assets	10,571,327	10,145,914	425,413	4.19%
Unrestricted	4,245,573	3,982,417	263,156	6.61%
TOTAL NET POSITION	$ 14,816,900	$ 14,128,331	$ 688,569	4.87%

OVERVIEW OF THE FINANCIAL STATEMENTS (continued)

Analysis of Revenues and Expenses

The Water District's Revenues, Expenses and Changes in Net Position for the fiscal years ended June 30, 2018 and 2017:

Borrego Water District's Revenues, Expenses and Changes in Net Position

			Variance	
	2018	**2017**	**$**	**%**
OPERATING REVENUES				
Water revenue	$ 3,435,123	$ 3,138,560	$ 296,563	9.45%
Sewer service charges	606,802	556,412	50,390	9.06%
Availability charges	243,957	247,815	(3,858)	-1.56%
Other income	500	1,019	(519)	-50.93%
Total operating revenues	4,286,382	3,943,806	342,576	8.69%
OPERATING EXPENSES				
Water operations	2,067,004	1,995,965	71,039	3.56%
Sewer operations	573,203	468,838	104,365	22.26%
General and administrative	708,764	367,028	341,736	93.11%
Total operating expenses	3,348,971	2,831,831	517,140	18.26%
INCOME FROM OPERATIONS	937,411	1,111,975	(174,564)	-15.70%
NON OPERATING EXPENSES, NET	(116,755)	(87,001)	(29,754)	34.20%
INCOME BEFORE CONTRIBUTIONS AND IMPAIRMENTS	820,656	1,024,974	(204,318)	-19.93%
LOSS ON DISPOSALS	(132,087)	-	(132,087)	0.00%
CHANGE IN NET POSITION	688,569	1,024,974	(336,405)	-32.82%
TOTAL NET POSITION, BEGINNING	14,128,331	13,103,357	1,024,974	7.82%
TOTAL NET POSITION, ENDING	$ 14,816,900	$ 14,128,331	$ 688,569	4.87%

A discussion of the significant variances of the Borrego Water District's Revenues and Expenses are presented below.

- Slight increase in revenue due to rate increases enacted in August 2018.
- Increase in the cost of providing water and sewer service, primarily due to better allocation of overhead and increases in salaries.
- General and Administrative expense increased due primarily to increases in maintenance and repairs, ground water management, and employee benefits expenses.

BUDGET HIGHLIGHTS

Fiscal Year 2018 Actual vs. Fiscal Year 2018 Budget

	2018 Actual	2018 Budget	Variance $	Variance %
REVENUES				
Operating revenue	$ 4,286,382	$ 4,045,144	$ 241,238	5.96%
Nonoperating revenue	36,895	68,903	(32,008)	-46.45%
Total revenue	4,323,277	4,114,047	209,230	5.09%
EXPENSES				
Operating expenses	3,348,971	4,857,313	(1,508,342)	-31.05%
Other non-operating expenses	153,650	145,986	7,664	5.25%
Total expenses	3,502,621	5,003,299	(1,500,678)	-29.99%
Loss on Disposals	(132,087)	-	(132,087)	0.00%
CHANGE IN NET POSITION	$ 688,569	$ (889,252)	$ 1,577,821	-177.43%

Borrego Water District does not budget for depreciation, but prefers to budget for actual capital assets using the internally generated 10 year Capital Improvement Budget.

CAPITAL ASSETS AND DEBT ADMINISTRATION

Capital Assets

At the end of the fiscal year the District had a net investment in various categories of capital assets as shown in the following table:

Borrego Water District's Capital Assets

			Variance	
	2018	**2017**	**$**	**%**
Land	$ 1,013,650	$ 1,013,650	$ -	0.00%
Flood control facilities	4,287,340	4,287,340	-	0.00%
Sewer facilities	6,459,962	6,277,141	182,821	2.91%
Water facilities	11,621,512	11,008,923	612,589	5.56%
General facilities	1,006,881	1,006,881	-	0.00%
Telemetry	46,459	46,459	-	0.00%
Equipment and furniture	539,063	528,516	10,547	2.00%
Vehicles	594,050	582,802	11,248	1.93%
Construction in progress	156,319	236,968	(80,649)	-34.03%
Fallowed water credits	953,650	1,030,650	(77,000)	-7.47%
Water rights-ID #4	185,000	185,000	-	0.00%
Total assets	26,863,886	26,204,330	659,556	2.52%
Less accumulated depreciation	(13,268,053)	(12,785,295)	(482,758)	-3.78%
Net capital assets	$ 13,595,833	$ 13,419,035	$ 176,798	1.32%

Debt Administration

On October 1, 2008, the District issued $2,775,000 of 2008 Bonds while concurrently redeeming all of its outstanding 1997 and 1998 Certificates of Participation.

The bonds are payable in annual principal installments of $25,000 to $245,000 on October 1 of each year beginning 2014 through 2028. Interest is payable semi-annually on April 1 and October 1 at an interest rate of 4.50% per annum. The bonds are payable solely from installment payments to be made by the District to the Borrego Water District Public Facilities Corporation. The installment payments are a special obligation of the District payable solely from revenues of Improvement District No. 4 and certain funds and accounts created by agreement.

CAPITAL ASSETS AND DEBT ADMINISTRATION (continued)

Debt Administration (continued)

The annual requirements to amortize the Installment Purchase Agreement are as follows:

Year Ending June 30,	Principal	Interest	Totals
2019	$ 160,000	94,500	254,500
2020	165,000	87,188	252,188
2021	175,000	79,538	254,538
2022	180,000	71,550	251,550
2023	185,000	67,500	252,500
Thereafter	1,315,000	184,338	1,499,338
	$ 2,180,000	$ 584,614	$ 2,764,614

On May 22, 2015, the District entered into a 10-year promissory note agreement with Compass Bank in the amount of $1,125,000 in order to refinance the Viking Ranch note. Payments of principal and interest of $35,872, at 4.95% interest per annum, are due quarterly starting September 1, 2015 through June 1, 2025. The note is secured by a pledge and lien on net water revenues from the water enterprise, as defined in the agreement.

The future debt service for the note payable is as follows:

Year Ending June 30,	Principal	Interest	Totals
2019	$ 103,558	$ 39,900	$ 143,458
2020	108,811	34,676	143,487
2021	114,298	29,189	143,487
2022	120,062	23,426	143,488
2023	126,116	17,371	143,487
Thereafter	271,661	15,342	287,003
	$ 844,506	$ 159,904	$ 1,004,410

ECONOMIC FACTORS AND FUTURE YEAR'S BUDGET AND RATES

The District's Board of Directors and management considered many factors when setting the fiscal year 2018 - 2019 budget, user fees and charges. The District attempts to balance revenues with operating expenses that have increased due to inflationary factors, such as cost of living, cost of water, and insurance coverage.

These indicators were taken into consideration when adopting the District's budget for the fiscal year 2018 - 2019. The budget has been structured to contain costs, but at the same time, continue the District's philosophy of providing the highest levels of service and continue efforts towards securing a sustainable water supply for the community.

Fiscal Year 2018 Actual vs. Fiscal Year 2019 Budget

	2019 Budget	2018 Actual	Variance $	Variance %
REVENUES				
Operating Revenue	$ 4,639,295	$ 4,286,382	$ 352,913	8.23%
Nonoperating	68,300	36,895	31,405	85.12%
Total revenue	4,707,595	4,323,277	384,318	8.89%
EXPENSES				
Operating expenses	3,717,354	3,348,971	368,383	11.00%
Other non operating expenses	134,400	153,650	(19,250)	-12.53%
Total expenses	3,851,754	3,502,621	349,133	9.97%
Loss on disposals	-	(132,087)	132,087	-100.00%
CHANGE IN NET POSITION	$ 855,841	$ 688,569	$ 167,272	24.29%

Borrego Water District does not budget for depreciation, but prefers to budget for actual capital assets using the internally generated 10-year Capital Improvement Budget.

CONTACTING THE DISTRICT'S FINANCIAL MANAGER

This financial report is designed to give ratepayers, customers, investors, and creditors a general overview of the District's finances and to demonstrate the District's accountability for the money it receives and the stewardship of the facilities it maintains. If you have questions about this report or need additional information, contact Geoff Poole, General Manager or Kim Pitman, Fiscal Officer at the Borrego Water District, 806 Palm Canyon Drive, Borrego Springs, California, 92004 or by telephone at (760) 767-5806.

BORREGO WATER DISTRICT
STATEMENTS OF NET POSITION
June 30, 2018 and 2017

	2018	2017
ASSETS		
Current assets:		
Cash and cash equivalents	$ 4,672,115	$ 4,149,656
Accounts receivable:		
Water and sewer, net of allowance	464,153	425,353
Inventory	114,684	128,214
Prepaid expenses	31,827	30,655
Total current assets	5,282,779	4,733,878
Capital assets:		
Land	1,013,650	1,013,650
Construction in progress	156,319	236,968
Fallowed water credits	953,650	1,030,650
Water rights - ID 4	185,000	185,000
Capital assets being depreciated, net	11,287,214	10,952,767
Total capital assets, net	13,595,833	13,419,035
TOTAL ASSETS	18,878,612	18,152,913
DEFERRED OUTFLOWS OF RESOURCES		
Debt refunding costs, net of amoritization	92,538	102,542
Pension related costs	400,720	356,748
TOTAL DEFERRED OUTFLOWS OF RESOURCES	493,258	459,290

The accompanying notes are an integral part of these financial statements.

BORREGO WATER DISTRICT
STATEMENTS OF NET POSITION
June 30, 2018 and 2017

	2018	2017
LIABILITIES		
Current liabilities:		
Accounts payable	$ 235,289	$ 100,505
Accrued interest payable	31,674	34,169
Short-term compensated absences	69,427	53,365
Customer deposits	131,563	5,000
Current portion of note payable	263,558	248,615
Total current liabilities	731,511	441,654
Noncurrent liabilities:		
Compensated absences	46,285	35,577
Net pension liability	911,898	819,059
Notes payable, net of current portion	2,760,948	3,024,506
Total noncurrent liabilities	3,719,131	3,879,142
TOTAL LIABILITIES	4,450,642	4,320,796
DEFERRED INFLOWS OF RESOURCES		
Pension related costs	104,328	163,076
NET POSITION		
Net investment in capital assets	10,571,327	10,145,914
Unrestricted	4,245,573	3,982,417
TOTAL NET POSITION	$ 14,816,900	$ 14,128,331

 The accompanying notes are an integral part of these financial statements.

BORREGO WATER DISTRICT
STATEMENTS OF REVENUES, EXPENSES, AND CHANGES IN NET POSITION
For the Fiscal Years Ended June 30, 2018 and 2017

	2018	2017
OPERATING REVENUES		
Water revenue	$ 3,435,123	$ 3,138,560
Sewer service charges	606,802	556,412
Availability charges	243,957	247,815
Other income	500	1,019
Total operating revenues	4,286,382	3,943,806
OPERATING EXPENSES		
Water operations	2,067,004	1,995,965
Sewer operations	573,203	468,838
General and administrative	708,764	367,028
Total operating expenses	3,348,971	2,831,831
Income from operations	937,411	1,111,975
NON-OPERATING REVENUES (EXPENSES)		
Property taxes	23,946	65,950
Investment income	19,999	5,959
Gain (loss) on disposal of assets	(7,050)	-
Interest expense	(143,646)	(148,906)
Amortization expense	(10,004)	(10,004)
Total non-operating revenues (expenses)	(116,755)	(87,001)
INCOME BEFORE OTHER GAINS AND LOSSES	820,656	1,024,974
LOSS ON DISPOSALS	(132,087)	-
CHANGE IN NET POSITION	688,569	1,024,974
NET POSITION, BEGINNING	14,128,331	13,103,357
NET POSITION, ENDING	$ 14,816,900	$ 14,128,331

The accompanying notes are an integral part of these financial statements.

BORREGO WATER DISTRICT
STATEMENTS OF CASH FLOWS
For the Fiscal Years Ended June 30, 2018 and 2017

	2018	2017
CASH FLOWS FROM OPERATING ACTIVITIES		
Receipts from water and sewer customers	$ 4,003,125	$ 3,652,459
Receipts from availability charges	243,957	247,815
Payments to suppliers	(1,364,042)	(1,056,409)
Payments to employees	(1,151,709)	(1,166,246)
Other receipts	500	1,019
Net cash provided by operating activities	1,731,831	1,678,638
CASH FLOWS FROM NONCAPITAL FINANCING ACTIVITIES		
Property Taxes	23,946	65,950
Net cash provided by noncapital financing activities	23,946	65,950
CASH FLOWS FROM CAPITAL AND REALTED FINANCING ACTIVITIES		
Acquisition and construction of capital assets, net transfers	(865,861)	(462,254)
Proceeds from sale of assets	(1,200)	-
Loss on disposal of assets	8,500	-
Principal paid on long-term debt	(248,615)	(238,880)
Interest payments on long-term debt	(146,141)	(157,628)
Net cash used in investing activities	(1,253,317)	(858,762)
CASH FLOWS FROM INVESTING ACTIVITIES		
Interest received	19,999	5,959
Net cash provided from financing activities	19,999	5,959
NET INCREASE IN CASH AND CASH EQUIVALENTS	522,459	891,785
CASH AND CASH EQUIVALENTS , BEGINNING OF YEAR	4,149,656	3,257,871
CASH AND CASH EQUIVALENTS , END OF YEAR	$ 4,672,115	$ 4,149,656

The accompanying notes are an integral part of these financial statements.

BORREGO WATER DISTRICT
STATEMENTS OF CASH FLOWS
For the Fiscal Years Ended June 30, 2018 and 2017

	2018	2017
RECONCILIATION OF CHANGE IN NET ASSETS TO		
NET CASH PROVIDED BY OPERATING ACTIVITIES		
Income from operations	$ 937,411	$ 1,111,975
Adjustments to reconcile change in income from operations		
to net cash provided by operating activities:		
Depreciation	569,396	647,305
Amortization	10,004	
Loss on disposals	-	-
(Increase) decrease in operating assests:		
Accounts receivable	(38,800)	(42,513)
Other receivables	-	-
Inventories	13,530	5,331
Prepaid expenses	(1,172)	1,315
Deferred outflows of resources	(43,972)	(111,865)
Increase (decrease) in operating liabilities:		
Accounts payable	134,784	51,710
Accrued expenses	-	-
Customer deposits	89,789	(4,060)
Short-term compensated absences	26,770	(22,954)
Net pension liability	92,839	125,707
Deferred inflows of resources	(58,748)	(83,313)
Net cash provided by operating activities	$ 1,731,831	$ 1,678,638

 The accompanying notes are an integral part of these financial statements.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Borrego Water District (the "District") accounts for its financial transactions in accordance with the policies and procedures of the Irrigation District Law, now Division 11, of the California State Water Code. The accounting policies of the District conform to accounting principles generally accepted in the United State of America (GAAP) as applicable to governments and to general practice within California Special Districts. The District accounts for its financial transactions in accordance with the policies and procedures of the State Controller's Office Division of Local Government Fiscal Affairs Minimum Audit Requirement and Reporting Guidelines for California Special Districts.

Reporting Entity

The District's financial statements include the accounts of all its operations. The District evaluated whether any other entity should be included in these financial statements. The criteria for including organizations as component units within the District's reporting entity, as set forth in Governmental Accounting Standards Board (GASB) Statement No. 14, *The Financial Reporting Entity*, subsequently amended by GASB Statement No. 39 *Determining Whether Certain Organizations are Component Units*, and GASB Statement No. 61, *The Financial reporting Entity: Omnibus – an amendment of GASB Statement No. 14 and No. 34*, include whether:

- the organization is legally separate (can sue and be sued in its name)
- the District holds the corporate powers of the organization
- the District appoints a voting majority of the organization's board
- the District is able to impose its will on the organization
- the organization has the potential to impose a financial benefit/burden on the District
- there is fiscal dependency by the organization on the District
- it would be misleading or cause the financial statements to be incomplete to exclude another organization

Based on these criteria, the District has no component units. Additionally, the District is not a component unit of any other reporting entity as defined by the GASB statement.

Basis of Accounting

The District reports its activities as an enterprise fund, which is used to account for operations that are financed and operated in a manner similar to a private business enterprise, where the intent of the District is that the costs of providing water to its customers on a continuing basis be financed or recovered primarily through user charges (water sales and services) or similar funding. Revenues and expenses are recognized on the full accrual basis of accounting. Revenues are recognized in the accounting period in which they are earned and expenses are recognized in the period incurred, regardless of when the related cash flow takes place.

Operating revenues and expenses are generated and incurred through the water sales activities to the District's customers. Administration and depreciation expenses are also considered operating expenses. Other revenues and expenses not included in the above categories are reported as non-operating revenues and expenses.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)

Financial Reporting

The District's basic financial statements are presented in conformance with the provisions of GASB Statement No. 34, *Basic Financial Statements – and Management's Discussion and Analysis – for State and Local Governments*, and subsequently amended by GASB Statement No. 61. This statement established revised financial reporting requirements for state and local governments throughout the United States for the purpose of enhancing the understandability and usefulness of financial reporting.

The District's basic financial statements are also presented in conformance with the provisions of GASB Statement No. 63, *Financial Reporting of Deferred Outflows of Resources, Deferred Inflows of Resources, and Net Position*. The objective of this Statement is to provide guidance to include two classifications separate from assets and liabilities. Amounts reported as deferred outflows of resources are required to be reported in a Statement of Net Position in a separate section following assets. Similarly, amounts reported as deferred inflows of resources are required to be reported in a Statement of Net Position in a separate section following liabilities. In addition, the totals of these two new classifications should be added to the total for assets and liabilities, respectively.

Governmental Accounting Standards Implementation

In February 2015, GASB issued Statement No. 72, *Fair Value Measurement and Application.* This statement addresses accounting and financial reporting issues related to fair value measurements. The definition of fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. This statement provides guidance for determining a fair value measurement for financial reporting purposes. This statement also provides guidance for applying fair value to certain investments and disclosures related to all fair value measurements. This statement became effective in fiscal year 2016. Implementation of this GASB had no significant effect on the District's financial statements.

In June 2015, GASB issued Statement No. 76, *The Hierarchy of Generally Accepted Accounting Principles for State and Local Governments*. This statement establishes the hierarchy of GAAP for all state and local governments. The GAAP hierarchy sets forth what constitutes GAAP for all state and local governmental entities. It establishes the order of priority of pronouncements and other sources of accounting and financial reporting guidance that a governmental entity should apply. This statement became effective in fiscal year 2016. Implementation of this GASB had no significant effect on the District's financial statements.

Assets, Liabilities, and Equity

Cash and Cash Equivalents and Investments

For purposes of the statement of cash flows, cash and cash equivalents consist of short-term highly liquid investments with maturities of ninety days or less from the date of purchase. These include cash on hand, cash held in the restricted assets accounts, and the Local Agency Investment Fund.

The District's investment policy and state statutes authorize the District to invest in obligations of the U.S. Treasury, its agencies and instrumentalities, certificates of deposit with national and state-licensed or chartered banks or federal or state savings and loan associations, money market and mutual funds whose portfolios consist of one or more of the investments, and the Local Agency Investment Fund.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)

Assets, Liabilities, and Equity (continued)

State statutes require all deposits be insured or collateralized. Depositories holding public funds on deposit are required to maintain collateral in the form of a pool of securities with the agent of the depository having a market value of at least 10 to 50 percent in excess of the total amount of all public funds on deposit.

Allowance for Doubtful Accounts

An allowance for doubtful accounts is provided based on anticipated collectability of the outstanding utility receivables and other receivables at year-end. At fiscal year ended June 30, 2018 and 2017, management has not recorded an allowance for doubtful accounts as it estimates all receivables at June 30, 2018 and 2017 to be collectible.

Inventories

Inventories are recorded on the average cost basis. Inventory consists primarily of water meters, water line maintenance materials, and sewer line maintenance materials.

Capital Assets

Purchased or constructed capital assets are reported at cost or estimated historical cost. Donated fixed assets are recorded at their estimated fair value at the date of the donation. The cost of normal maintenance and repairs that do not add to the value of the asset or materially extend the assets' lives are not capitalized. A capitalization threshold of $5,000 is used.

Capital assets are being depreciated using the straight-line method over the following estimated useful lives:

Asset Class	Estimated Useful Lives
Buildings	10-50
Water systems	10-50
Improvement of sites	7-25
Equipment	5-10

Deferred Outflows/Inflows of Resources

In addition to assets, the statement of financial position includes a separate section for deferral of outflows of resources. This separate financial statement element, deferred outflows of resources, represents a consumption of net position that applies to future periods and so will not be recognized as an outflow of resources (expense/expenditures) until then. The District has two items that qualifies for reporting in this category.

The deferred charge of debt refunding costs resulted from the difference in the carrying value of refunded debt and its reacquisition price. The amount is deferred and amortized over the shorter of the life of the refunded or refunding debt. As of June 30, 2018 and 2017, the balance of the debt refunding costs is $92,538 and $102,542, respectively.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)

Assets, Liabilities, and Equity (continued)

Deferred Outflows/Inflows of Resources (continued)

The pension plan related costs are made up of four components: employer contributions paid during the year ended June 30, 2018 and 2017 in the amount of $142,789 and $137,737, respectively, which are deferred under GASB Statement No. 68, *Accounting and Financial Reporting for Pensions – An Amendment of GASB Statement No. 27,* (GASB Statement No. 68); net difference between projected and actual earnings on pension plan investments in the amount of $100,150 and $171,654 as of June 30, 2018 and 2017, respectively, which is amortized on a straight-line basis over five years; adjustments due to differences between expected and actual experience of $14,838 and $5,091 as of June 30, 2018 and 2017, respectively, difference between actual and projected contributions in the amount of $60,125 and $86,120 as of June 30, 2018 and 2017, respectively, which are amortized over straight-line basis over the average expected remaining service lives of all members that are provided with benefits.

As of June 30, 2018 and 2017, the deferred outflow pension related costs are $400,720 and $356,748, respectively.

In addition to liabilities, the statement of financial position will sometimes report a separate section for deferred inflows of resources. This separate financial statement element, deferred inflows of resources, represents an acquisition of net position that applies to future period(s) and so will not be recognized as an inflow of resources (revenue) until that time. The District has one item that qualifies for reporting in this category.

The deferred inflows of resources is made up of three components; net difference between projected and actual earnings on pension plan investments in the amount of $1,709 and $8,140 as of June 30, 2018 and 2017, respectively, which is amortized on a straight-line basis over five years; and adjustment due to differences in proportions in the amount of $62,909 and $108,360 as of June 30, 2018 and 2017, respectively, and change in assumptions in the amount of $126,470 and $54,090 as of June 30, 2018 and 2017, respectively, which are amortized over the straight-line basis over the average expected remaining service lives of all members that are provided with benefits.

As of June 30, 2018 and 2017, the deferred inflow pension related cost is $104,328 and $163,076, respectively.

Compensated Absences

Accumulated unpaid employee vacation benefits and sick leave are recognized as accrued payroll liabilities in the Statement of Net Position. As of June 30, 2018 and 2017, the District had $115,712 and $88,942, respectively, of accrued vacation and sick leave.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)

Assets, Liabilities, and Equity (continued)

Pensions

For purposes of measuring the net pension liability and deferred outflows/inflows of resources related to pensions, and pension expense, information about the fiduciary net position of the District's California Public Employees' Retirement System (CalPERS) plans (Plans) and additions to/deductions from the Plans' fiduciary net position have been determined on the same basis as they are reported by CalPERS. For this purpose, benefit payments (including refunds of employee contributions) are recognized when due and payable in accordance with the benefit terms. Investments are reported at fair value.

GASB Statement No. 68 requires that the reported results must pertain to liability and asset information within certain defined timeframes. As of June 30, 2018 and 2017, the following timeframes are used:

	2018	2017
Valuation Date (VD)	June 30, 2016	June 30, 2015
Measurement Date (MD)	June 30, 2017	June 30, 2016
Measurement Period (MP)	July 1, 2016 to June 30, 2017	July 1, 2015 to June 30, 2016

Interfund Activity

Interfund activity results from loans, services provided, reimbursements or transfers between funds. Loans are reported as interfund receivables and payables as appropriate and are subject to elimination upon consolidation. Reimbursements occur when one fund incurs a cost, charges the appropriate benefiting fund and reduces its related cost as a reimbursement. All other interfund are treated as transfers. Transfers In and Transfers Out are netted and presented as a single "Transfers" line on the government-wide statement of activities. Similarly, interfund receivables and payables are netted and presented as a single "Internal Balances" line of the government-wide statement of net position.

Capital Contributions

Capital contributions represent cash and capital asset additions to the District by property owners, granting agencies or real estate developers desiring services that require capital expenditures or capacity commitments.

Property Taxes

Secured property taxes attach as an enforceable lien on property as of January 1. Taxes are payable in two installments on November 1 and February 1. Unsecured property taxes are payable in one installment on or before August 31. The County of San Diego bills and collects the taxes for the District.

The District receives property taxes under the Teeter Plan, whereby the County of San Diego determines the amounts due and pays the District ratably throughout the year with the County bearing the risk of delinquent property taxes and retaining any interest and penalties earned thereon.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)

Assets, Liabilities, and Equity (continued)

Use of Estimates

The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect certain reported amounts and disclosures. Accordingly, actual results could differ from those estimates.

Reclassifications

Certain reclassifications have been made to the prior year information to conform to the current year presentation.

2. DEFICIT FUND BALANCE OR FUND NET POSITION OF INDIVIDUAL FUNDS

The following are funds having deficit fund balances or fund net positions at year-end, if any, along with remarks which address such deficits.

Violation	Action taken
None reported	Not applicable

3. CASH AND CASH EQUIVALENTS

The summary of cash and cash equivalents is as follows at June 30, 2018 and 2017:

	2018	2017
Cash in banks	$ 4,650,274	$ 4,128,067
Cash on hand	310	361
Local Agency Investment Fund	21,531	21,228
Total cash and cash equivalents	$ 4,672,115	$ 4,149,656

Custodial Credit Risk

Custodial credit risk for *deposits* is the risk that, in the event of the failure of a depository financial institute, a government will not be able to recover its deposits or will not be able to recover collateral securities that are in the possession of an outside party.

The California Government Code and the District's investment policy do not contain legal or policy requirements that would limit the exposure to custodial credit risk for deposits or investments, other than the following provision for deposits. The California Government Code requires that a financial institution secure deposits made by state or local governmental units by pledging securities in an undivided collateral pool held by a depository regulated under state law (unless so waived by the governmental unit).

3. CASH AND CASH EQUIVALENTS (continued)

Custodial Credit Risk (continued)

The market value of the pledged securities in the collateral pool must equal at least 110% of the total amount deposited by the public agencies. California law also allows financial institutions to secure governmental agency deposits by pledging first trust deed mortgage notes having a value of 150% of the secured public deposits. Cash balances held in banks are insured up to $250,000 by the Federal Deposit Insurance Corporation (FDIC). The District maintains its cash in bank deposit accounts that at times may exceed federally insured limits. The District has not experienced any losses in such accounts. At June 30, 2018 and 2017 the District had $4,406,503 and $3,962,205, respectively, in excess of FDIC insured limits, and the remaining balance of the deposits were collateralized under California Law.

Local Agency Investment Fund

The District is a voluntary participant in the Local Agency Investment Fund (LAIF) that is regulated by California Government Code Section 16429 under the oversight of the Treasurer of the State of California. The fair value of the District's deposits in this pool is reported in the accompanying financial statements at amounts based upon the District's pro-rata share of the fair value provided by LAIF for the entire LAIF portfolio (in relation to the amortized costs of that portfolio). The balance available for withdrawal is based on the accounting records maintained by LAIF, which are recorded on an amortized cost basis. At June 30, 2018 and 2017 the District had deposited with LAIF $21,531 and $21,228, respectively.

4. CAPITAL ASSETS

A schedule of changes in capital assets and accumulated depreciation for the fiscal year ended June 30, 2018, is shown as follows:

	Balance June 30, 2017	Additions	Transfers / Deletions	Balance June 30, 2018
Capital assets, not being depreciated:				
Land	$ 1,013,650	$ -	$ -	$ 1,013,650
Construction in progress	236,968	172,821	(253,470)	156,319
Fallowed water credits	1,030,650	-	(77,000)	953,650
Water rights - ID 4	185,000	-	-	185,000
Total capital assets, not being depreciated	2,466,268	172,821	(330,470)	2,308,619
Capital assets, being depreciated:				
Flood control facilities	4,287,340	-	-	4,287,340
Sewer facilities	6,277,141	242,824	(60,003)	6,459,962
Water facilities	11,008,923	743,004	(130,415)	11,621,512
General facilities	1,006,881		-	1,006,881
Telemetry system	46,459	-	-	46,459
Equipment and furniture	528,516	10,547	-	539,063
Vehicles	582,802	39,555	(28,307)	594,050
Total capital assets, being depreciated	23,738,062	1,035,930	(218,725)	24,555,267
Less accumulated depreciation	(12,785,295)	(569,396)	86,638	(13,268,053)
Total capital assets, being depreciated, net	10,952,767	466,534	(132,087)	11,287,214
Capital assets, net of depreciation	$ 13,419,035	$ 639,355	$ (462,557)	$ 13,595,833

4. CAPITAL ASSETS (continued)

The change in capital assets and accumulated depreciation for the fiscal year ended June 30, 2017, is shown as follows:

	Balance June 30, 2016	Additions	Transfers / Deletions	Balance June 30, 2017
Capital assets, not being depreciated:				
Land	$ 1,013,650	$ -	$ -	$ 1,013,650
Construction in progress	279,806	126,345	(169,183)	236,968
Fallowed water credits	1,030,650	-	-	1,030,650
Water rights - ID 4	185,000	-	-	185,000
Total capital assets, not being depreciated	2,509,106	126,345	(169,183)	2,466,268
Capital assets, being depreciated:				
Flood control facilities	4,319,604	-	(32,264)	4,287,340
Sewer facilities	6,132,473	144,668	-	6,277,141
Water facilities	10,648,734	360,189	-	11,008,923
Pipelines, wells, and tanks	151,699	-	(151,699)	-
General facilities	1,006,881	-	-	1,006,881
Telemetry system	46,459	-	-	46,459
Equipment and furniture	386,925	141,591	-	528,516
Vehicles	540,195	42,607	-	582,802
Total capital assets, being depreciated	23,232,970	689,055	(183,963)	23,738,062
Less accumulated depreciation	(12,137,990)	(647,305)	-	(12,785,295)
Total capital assets, being depreciated, net	11,094,980	41,750	(183,963)	10,952,767
Capital assets, net of depreciation	$ 13,604,086	$ 168,095	$ (353,146)	$ 13,419,035

5. LONG TERM OBLIGATIONS

Long-term Obligation Activity

Long-term obligations include debt and other long-term liabilities. Changes in long-term obligations for the fiscal year ended June 30, 2018, are as follows:

	Balance at June 30, 2017	Additions	Payments	Balance at June 30, 2018	Amount due within one year
Refunding Installment Purchase	$ 2,330,000	$ -	$ 150,000	$ 2,180,000	$ 160,000
Compass Bank Note	943,121	-	98,615	844,506	103,558
Total long-term debt	$ 3,273,121	$ -	$ 248,615	$ 3,024,506	$ 263,558

5. LONG TERM OBLIGATIONS (continued)

Changes in long-term obligations for the fiscal year ended June 30, 2017, are as follows:

	Balance at June 30, 2016	Additions	Payments	Balance at June 30, 2017	Amount due within one year
Refunding Installment Purchase	$ 2,475,000	$ -	$ 145,000	$ 2,330,000	$ 150,000
Compass Bank Note	1,037,001	-	93,880	943,121	98,615
Total long-term debt	$ 3,512,001	$ -	$ 238,880	$ 3,273,121	$ 248,615

Refunding Installment Purchase

On October 1, 2008, the District issued $2,775,000 of 2008 Bonds while concurrently redeeming all of its outstanding 1997 Certificates of Participation and 1998 Certificates of Participation. The transaction was a current refunding intended to save the District future interest costs due to lower market interest rates. No new funds were raised by the District. New Installment Purchase Agreements were executed, which will save the District approximately $36,000 per year on debt service. The District reduced its aggregate debt service payments by $312,755 over the next twenty (20) years and obtained an economic gain (difference between the present value of the old and new debt service payments) of $259,110.

The bonds are payable in annual principal installments of $25,000 to $245,000 on October 1 of each year beginning 2013 through 2028. Interest is payable semi-annually on April 1 and October 1 at an interest rate of 4.50% per annum. The installment payments are a special obligation of the District payable solely from revenues of Improvement District No. 4. Accrued interest for the year ended June 30, 2018 and 2017 was $24,525 and $26,213, respectively.

The future debt service for the Installment Purchase Agreement is as follows:

Year Ending June 30,	Principal	Interest	Totals
2019	$ 160,000	94,500	254,500
2020	165,000	87,188	252,188
2021	175,000	79,538	254,538
2022	180,000	71,550	251,550
2023	185,000	67,500	252,500
Thereafter	1,315,000	184,338	1,499,338
	$ 2,180,000	$ 584,614	$ 2,764,614

Compass Bank Note

On May 22, 2015, the District entered into a 10-year promissory note agreement with Compass Bank in the amount of $1,125,000. Payments of principal and interest of $35,872, at 4.95% interest per annum, are due quarterly starting September 1, 2015 through June 1, 2025. The note is secured by a senior pledge

5. LONG TERM OBLIGATIONS (continued)

Compass Bank Note (continued)

of net water system revenues of the District (net of Improvement District Number 4 operations), which is the result of total water revenue for the District, less the revenue that it attributed to Improvement District Number 4, and was $960,288 and $924,729 for the years ended June 30, 2017 and 2016, respectively. The note is further secured by a subordinate pledge of net systems revenues of the District's Improvement District Number 4 operations, which is the total water revenues of Improvement District Number 4 of $2,233,107 and $2,101,326 for the years ended June 30, 2018 and 2017, respectively.

The District had a debt services ratio requirement of 1.25:1, which is calculated by taking the total operating revenue, add back interest expense, and depreciation and amortization expense, then divided by the sum of principal and interest related to debt paid during the year, and was 12.79 and 11.9:1 for the years ended June 30, 2018 and 2017, respectively.

Accrued interest for the year ended June 30, 2018 and 2017 was $7,149 and $7,956, respectively.

The future debt service for the note payable is as follows:

Year Ending June 30,	Principal	Interest	Totals
2019	$ 103,558	$ 39,900	$ 143,458
2020	108,811	34,676	143,487
2021	114,298	29,189	143,487
2022	120,062	23,426	143,488
2023	126,116	17,371	143,487
Thereafter	271,661	15,342	287,003
	$ 844,506	$ 159,904	$ 1,004,410

6. OPERATING LEASES

The District has entered into operating leases for office equipment and facility usage with lease terms in excess of one year. These agreements contain no purchase options. The agreements are non-cancelable leases.

Future minimum lease payments are as follows:

Year ending June 30,	Lease payments
2019	$ 4,199
2020	4,199
2021	348
	$ 8,746

6. OPERATING LEASES (continued)

The District will receive no sublease rental revenues nor pay any contingent rentals associated with these leases. Rent expense for the fiscal years ended June 30, 2018 and 2017 was $4,200 and $5,150, respectively.

7. JOINT VENTURES (JOINT POWERS AGREEMENTS)

The District participates in the following jointly governed organization under a joint power agreement (JPA):

California Water Agencies Joint Powers Insurance Authority (JPIA)

Since 1983, the District has participated in the Association of California Water Agencies Joint Powers Insurance Authority (JPIA), a risk-pooling self-insurance authority. JPIA is a consortium of public agencies

in Southern California established under the provisions of California Government Code. The purpose of the authority is to arrange and administer programs of insurance for the pooling of self-insured losses and to purchase excess insurance coverage. Deposits to JPIA are expensed by the District over the policy term and are subject to retroactive adjustment.

The relationship between the District and the JPIA is such that the JPIA is not a component unit of the District for financial reporting purposes.

8. EMPLOYEE RETIREMENT PLAN

Plan Description, Benefits Provided and Employees Covered

The District contributes to the Miscellaneous 3.0% at 60 Risk Pool under CalPERS, a cost-sharing multiple-employer public employee retirement system defined benefit pension plan administered by CalPERS. A full description of the pension plan benefit provisions, assumptions for funding purposes but not accounting purposes, and membership information is listed in the June 30, 2017 and 2016 Annual Actuarial Valuation Reports. Details of the benefits provided can be obtained at www.calpers.ca.gov under Forms and Publications.

This report is a publically available valuation report that can be obtained from the CalPERS Executive Office, 400 P Street, Sacramento, CA 95814 and www.calpers.ca.gov under Forms and Publications.

Contribution Description

Section 20814(c) of the California Public Employees' Retirement Law ("PERL") requires that the employer contribution rates for all public employers be determined on an annual basis by the actuary and shall be effective on the July 1 following notice of a change in the rate. The total plan contributions are determined through the CalPERS' annual actuarial valuation process. For public agency cost-sharing plans covered by either the Miscellaneous or Safety risk pools, the Plan's actuarially determined rate is based on the

8. EMPLOYEE RETIREMENT PLAN (continued)

estimated amount necessary to pay the Plan's allocated share of the risk pool's costs of benefits earned by employees during the year, and any unfunded accrued liability. The employer is required to contribute the difference between the actuarially determined rate and the contribution rate of employees. For the measurement period ended June 30, 2017 (the measurement date), the active employee contribution rate as a percentage of annual pay is 8.00% for Tier 1, 7.00% for Tier 2 and 6.25% for new employees.

The employer's contribution rate is 12.036% after payment of the Annual Lump Sum Payment Option. For the measurement period ended June 30, 2016 (the measurement date), the active employee contribution rate as a percentage of annual pay is 8.00% for Tier 1, 7.00% for Tier 2, and 6.25% for new employees. The employer's contribution rate is 11.995% after payment of the Annual Lump Sum Payment Option. Employer contributions rates may change if plan contracts are amended. It is the responsibility of the employer to make necessary accounting adjustments to reflect the impact due to any Employer Paid Member Contributions or situations where members are paying a portion of the employer contribution.

The District provides for 3.00% of the contributions required of Tier 1 District employees and 0% for all other employees on their behalf and for their account with the remaining amount to be contributed by the employees.

Actuarial Methods and Assumptions Used to Determine Total Pension Liability

Actuarial Cost Method	Entry Age Normal in accordance with the requirements of GASB Statement No. 68
Actuarial Assumptions	
Discount Rate	7.15%
Inflation	2.75%
Salary Increases	Varies by Entry Age and Service
Investment Rate of Return	7.50% Net of Pension Plan Investment and Administrative Expenses; includes Inflation
Mortality Rate Table	Derived using CalPERS' Membership Data for all Funds
Post Retirement Benefit Increase	Contract COLA up to 2.75% until Purchasing Power Protection Allowance Floor on Purchasing Power applies, 2.75% thereafter

All other actuarial assumptions used in the June 30, 2017 and 2016 valuations were based on the results of an actuarial experience study for the fiscal years 1997 to 2011, including updates to salary increase, mortality and retirement rates. The Experience Study report can be obtained at CalPERS' website under Forms and Publications.

Discount Rate

The discount rate used to measure the total pension liability was 7.15% for the years ended June 30, 2017 and 2016, respectively. To determine whether the municipal bond rate should be used in the calculation of a discount rate for each plan, CalPERS stress tested plans that would most likely result in a discount rate that would be different from the assumed discount rate. The crossover test was performed

8. EMPLOYEE RETIREMENT PLAN (continued)

Discount Rate (continued)

for a miscellaneous agent plan and a safety agent plan selected as being more at risk of failing the crossover test and resulting in a discount rate that would be different from the long-term rate on pension investments. Likely result in a discount rate that would be different from the assumed discount rate. The crossover test was performed for a miscellaneous agent plan and a safety agent plan selected as being more at risk of failing the crossover test and resulting in a discount rate that would be different from the long-term rate on pension investments. Based on the testing of the plans, the test revealed the assets would not run out. Therefore, the long-term expected rate of return of 7.15% for the years ended June 30, 2017 and 2016, respectively, on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability for the PERF C. The stress test results are presented in a detailed report called “GASB Crossover Testing Report” that can be obtained at CalPERS’ website under the GASB Statement No. 68 section.

According to Paragraph 30 of GASB Statement No. 68, the long-term discount rate should be determined without reduction for pension plan administrative expense. The 7.15% for the years ended June 30, 2018 and 2017, respectively, investment return assumption used in this accounting valuation is net of administrative expenses. Administrative expenses are assumed to be 15 basis points. An investment return excluding administrative expenses would have been 7.15% for the year ended June 30, 2018 and 2017, respectively. Using this lower discount rate has resulted in a slightly higher Total Pension Liability and Net Pension Liability. CalPERS checked the materiality threshold for the difference in calculation and did not find it to be a material difference. CalPERS is scheduled to review all actuarial assumptions as part of its regular Asset Liability Management (ALM) review cycle that is scheduled to be completed in February 2018.

Any changes to the discount rate will require Board action and proper stakeholder outreach. For these reasons, CalPERS expects to continue using a discount rate net of administrative expenses for GASB Statements No. 67 and 68 calculations through at least the 2018-19 fiscal year. CalPERS will continue to check the materiality of the difference in calculation until such time as we have changed the District’s methodology.

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class.

In determining the long-term expected rate of return, CalPERS took into account both short-term and long-term market return expectations as well as the expected pension fund cash flows. Using historical returns of all the funds’ asset classes, expected compound returns were calculated over the short-term (first 10 years) and the long-term (11-60 years) using a building-block approach. Using the expected nominal returns for both short-term and long-term, the present value of benefits was calculated for each fund. The expected rate of return was set by calculating the single equivalent expected return that arrived at the same present value of benefits for cash flows as the one calculated using both short-term and long-term returns. The expected rate of return was then set equivalent to the single equivalent rate calculated above and rounded down to the nearest one quarter of one percent.

8. EMPLOYEE RETIREMENT PLAN (continued)

Discount Rate (continued)

The tables below reflects the long-term expected real rate of return by asset class for the years ended June 30, 2018 and 2017. The rate of return was calculated using the capital market assumptions applied to determine the discount rate and asset allocation. These rates of return are net of administrative expenses. The long-term expected real rate of return by asset class for the year ended June 30, 2018, are as follows:

Asset Class	New Strategic Allocation	Real Return Years 1 - 10 (a)	Real Return Years 11+ (b)
Global Equity	47.00%	4.90%	5.38%
Global Fixed Income	19.00%	0.80%	2.27%
Inflation Sensitive	6.00%	0.60%	1.39%
Private Equity	12.00%	6.60%	6.63%
Real Estate	11.00%	2.80%	5.21%
Infrastructure and Forestland	3.00%	3.90%	5.36%
Liquidity	2.00%	-0.40%	-0.90%
Total	100.00%		

(a) An expected inflation of 2.5% used for this period.
(b) An expected inflation of 3.0% used for this period.

The long-term expected real rate of return by asset class for the year ended June 30, 2017, are as follows:

Asset Class	New Strategic Allocation	Real Return Years 1 - 10 (a)	Real Return Years 11+ (b)
Global Equity	51.00%	5.25%	5.71%
Global Fixed Income	20.00%	0.99%	2.43%
Inflation Sensitive	6.00%	0.45%	3.36%
Private Equity	10.00%	6.83%	6.95%
Real Estate	10.00%	4.50%	5.13%
Infrastructure and Forestland	2.00%	4.50%	5.09%
Liquidity	1.00%	-0.55%	-1.05%
Total	100.00%		

(a) An expected inflation of 2.5% used for this period.
(b) An expected inflation of 3.0% used for this period.

8. EMPLOYEE RETIREMENT PLAN (continued)

Sensitivity of the Net Pension Liability to Changes in the Discount Rate

The following presents the net pension liability/(asset) of the Plan as of the measurement date, calculated using the discount rate of 7.15% for the years ended June 30, 2018 and 2017, respectively, as well as what the net pension liability/(asset) would be if it were calculated using a discount rate that is 1 percentage-point lower (6.15%) or 1 percentage-point higher (8.15%) than the current rate:

	June 30, 2018		
	Discount Rate -1.00% 6.15%	Current Discount Rate 7.15%	Discount Rate +1.00% 8.15%
Plan's Net Pension Liability	$ 1,408,020	$ 911,898	$ 501,001

	June 30, 2017		
	Discount Rate -1.00% 6.65%	Current Discount Rate 7.65%	Discount Rate +1.00% 8.65%
Plan's Net Pension Liability	$ 1,255,960	$ 819,059	$ 457,983

Pension Liabilities and Deferred Outflows/Inflows of Resources Related to Pensions

As of June 30, 2018 and 2017, the District reported net pension liabilities for its proportionate shares of the net pension liability for the Miscellaneous Risk Pool in the amount of $911,898 and $819,059, respectively. The District does not participate in the Safety Risk Pool.

The District’s net pension liability for each risk pool is measured as the proportionate share of each risk pool’s net pension liability. GASB 68 indicates that to the extent different contribution rates are assessed based on separate relationships that constitute the collective net pension liability, the determination of the employer’s proportionate share of the collective net pension liability should be made in a manner that reflects those relationships. The allocation method used by CalPERS to determine each employer’s proportionate share reflects those relationships through the employer rate plans they sponsor within the respective risk pools. An actuarial measurement of the employer’s rate plan liability and asset-related information are used where available, and proportional allocations of individual employer rate plan amounts as of the valuation date are used where not available.

In determining an employer’s proportionate share, the employer rate plans included in the Plan were assigned to either the Miscellaneous or Safety risk pool. Estimates of the total pension liability and the fiduciary net position were first determined for the individual rate plans and each risk pool as of the valuation date, June 30, 2017 and 2016. Each employer rate plan’s fiduciary net position was subtracted from its total pension liability to obtain its net pension liability as of the valuation date. The Borrego Water District’s proportionate share percentage for each risk pool at the valuation date was calculated by dividing the Borrego Water District’s net pension liability for each of its employer rate plans within each risk pool by the net pension liability of the respective risk pool as of the valuation date.

8. EMPLOYEE RETIREMENT PLAN (continued)

Pension Liabilities and Deferred Outflows/Inflows of Resources Related to Pensions (continued)

The District's proportionate share of the net pension liability as of June 30, 2017 and 2016, the measurement date, was calculated as follows:

> Each risk pool's total pension liability was computed at the measurement date, June 30, 2017 and 2016, by applying standard actuarial roll-forward methods to the total pension liability amounts as of the valuation date. The fiduciary net position for each risk pool at the measurement date was determined by CalPERS' Financial Office. The net pension liability for each risk pool at June 30, 2017 and 2016, was computed by subtracting the respective risk pool's fiduciary net position from its total pension liability.
>
> The individual employer risk pool's proportionate share percentage of the total pension liability and fiduciary net position as of June 30, 2017 and 2016, was calculated by applying Borrego Water District's proportionate share percentage as of the valuation date (described above) to the respective risk pool's total pension liability and fiduciary net position as of June 30, 2017 and 2016, to obtain the total pension liability and fiduciary net position as of June 30, 2017 and 2016. The fiduciary net position was then subtracted from total pension liability to obtain the net pension liability as of the measurement date.

The District's proportionate share percentage of the net pension liability for each risk pool as of June 30, 2017 and 2016 was 0.023133% and 0.023578%, respectively.

At June 30, 2018, the District reported deferred outflows of resources and deferred inflows of resources related to pensions from the following sources:

	Deferred Outflows of Resources	Deferred Inflows of Resources
Differences between expected and actual experience	$ 2,541	$ (17,379)
Changes in assumptions	150,510	(24,040)
Net difference between projected and actual earnings on pension plan	44,755	-
Adjustment due to differences in proportions	-	(62,909)
Differences between actual and required contributions	60,125	-
Contributions after measurement date	142,789	-
Total	$ 400,720	$ (104,328)

8. EMPLOYEE RETIREMENT PLAN (continued)

Pension Liabilities and Deferred Outflows/Inflows of Resources Related to Pensions (continued)

At June 30, 2017, the District reported deferred outflows of resources and deferred inflows of resources related to pensions from the following sources:

	Deferred Outflows of Resources	Deferred Inflows of Resources
Differences between expected and actual experience	$ 5,717	$ (626)
Changes in assumptions	-	(54,090)
Net difference between projected and actual earnings on pension plan	127,174	-
Adjustment due to differences in proportions	-	(108,360)
Differences between actual and required contributions	86,120	-
Contributions after measurement date	137,737	-
Total	$ 356,748	$ (163,076)

Amounts other than contributions subsequent to the measurement date reported as deferred outflows of resources and deferred inflows of resources related to pensions at June 30, 2018 will be recognized as pension expense as follows:

Measurement Date June 30:	Deferred Outflows / (Inflows) of Resources
2018	(4,052)
2019	121,019
2020	56,666
2021	(20,030)
	$ 153,603

9. SEGMENT INFORMATION

The 2008 Installment Purchase Agreement as described in Note 5 was issued to finance certain capital improvements in Improvement District Number 4. While water and wastewater services are accounted for in a single fund in these financial statements, the investors in the Installment Purchase agreement rely solely on the revenues of Improvement District Number 4 for repayment.

Summary financial information for Improvement District Number 4 is as follows:

9. SEGMENT INFORMATION (continued)

Condensed Statements of Net Position

	2018	2017
Assets		
Current assets	$ 5,062,013	$ 4,323,195
Capital assets, net of depreciation	2,739,195	2,853,443
Total Assets	7,801,208	7,176,638
Deferred Outflows of Resources	340,701	323,442
	2018	**2017**
Liabilities		
Current liabilities	805,021	780,647
Long-term liabilities	2,020,000	2,180,000
Total Liabilities	2,825,021	2,960,647
Deferred Inflows of Resources	65,366	101,789
Net Position		
Net investment in capital assets	719,195	673,443
Unrestricted	4,532,327	3,764,201
Total Net Position	$ 5,251,522	$ 4,437,644

Condensed Statements of Revenues, Expenses and Changes in Net Position

	2018	2017
Operating Revenues		
Water revenue	$ 2,468,835	$ 2,233,107
Other income	86,163	90,075
Total operating revenues	2,554,998	2,323,182
Operating Expenses		
Water operations	1,528,427	1,214,136
General and administrative	127,552	14,243
Total operating expenses	1,655,979	1,228,379
Gain from operations	899,019	1,094,803
Non-Operating Revenues (Expenses)		
Property taxes	12,829	39,570
Investment income	11,822	3,489
Interest expense	(99,788)	(100,013)
Amortization expense	(10,004)	(10,004)
Total non-operating revenues (expenses)	(85,141)	(66,958)
Change In Net Poition	813,878	1,027,845
Net Position, Beginning	4,437,644	3,409,799
Net Position, Ending	$ 5,251,522	$ 4,437,644

9. SEGMENT INFORMATION (continued)

Condensed Statements of Cash Flows

	2018	2017
Net Cash Provided By Operating Activities	$ 1,016,754	$ 1,211,851
Net Cash Flows From Non-Capital and Related Financing Activities	12,829	39,570
Net Cash Flows From Capital and Related Financing Activities	(249,788)	(441,538)
Net Cash Provided by Investing Activities	11,822	3,489
Net Increase in Cash and Cash Equivalents	791,617	813,372
Cash and Cash Equivalents, Beginning	4,065,525	3,252,153
Cash and Cash Equivalents, Ending	$ 4,857,142	$ 4,065,525

10. NONCOMMITMENT DEBT

Community Facilities District No. 2007-01 2007 Special Tax Bonds

On March 14, 2007, the Board of Directors adopted a resolution stating its intention to establish Community Facilities District No. 2007-1 and to authorize bonded indebtedness within the Community Facilities District. On April 25, 2007, the Community Facilities District 2007-1 was formed and an election was held to authorize the Community Facilities District 2007-1 to incur bonded indebtedness of up to $11,000,000 to refinance outstanding balances of the Community Facilities District 95-1 1996 Special Tax Bonds. On June 14, 2007, the Community Facilities District No. 2007-1 issued the 2007 Special Tax Bonds in the amount of $9,530,000. The balance of principal and interest outstanding 2007-1 bonds at June 30, 2016 was $4,889,080.

The bonds consisted of $5,270,000 of 5.75% term bonds due August 1, 2025 with principal payments beginning on August 1, 2010 and $4,260,000 of 5.75% term bonds due August 1, 2032 with principal payments beginning August 1, 2026.

The 2007 Special Tax Bonds do not constitute an indebtedness of the District and are only secured by a pledge of Net Taxes (which consist of the Special Taxes collected minus certain administrative expenses) and amounts on deposit in the Special Tax Fund. In the opinion of the District management and counsel the full faith and credit of the Borrego Water District and the Community Facilities District are not pledged to the payment of the Bonds, nor is the payment of the Bonds secured by any encumbrance, mortgage or other pledge of property of the Borrego Water District or the Community Facilities District.

The Special Tax is to be levied and collected by the county at the same time and in the same manner as general ad valorem property taxes. The Community Facilities District is to receive all Special Taxes in trust and immediately deposit all amounts with the Trustee.

10. NONCOMMITMENT DEBT (continued)

Community Facilities District No. 2007-01 2007 Special Tax Bonds (continued)

For the fiscal year ending June 30, 2016, there was a special tax delinquency rate of approximately 98.26%, in the Community Facilities District. The Community Facilities District has not made any regularly scheduled payments from August 1, 2011 through June 30, 2016. At June 30, 2016, the balance in the reserve fund is $0. Effective March 14, 2017, Community Facilities District 2007-1 was replaced by Community Facilities District 2017-1 resulting in the defeasance and discharge of the bond indebtedness related to Community Facilities District 2007-1.

Community Facilities District No. 2017-01 2017 Special Tax Bonds

On March 14, 2017, the Board of Directors adopted a resolution stating its intention to establish Community Facilities District No. 2017-01 and to authorize bonded indebtedness within the Community Facilities District. On April 18, 2017, the Community Facilities District 2017-1 was formed and an election was held to authorize the Community Facilities District 2017-1 to incur bonded indebtedness of up to $11,600,000 to refinance outstanding balances of the Community Facilities District 2007-1 2007 Special Tax Bonds. On May 25, 2017, the Community Facilities District No. 2017-1 issued Borrego Water District Special Tax Refunding Bonds, Series 2017A (Series 2017A Bonds) and Borrego Water District Special Tax Refunding Bonds, Series 2017B (Series 2017B Bonds).

The Series 2017A Bonds consisted of $1,100.000 of 3.70% term bonds due August 1, 2032 with principal payments beginning on August 1, 2018. The Series 2017B Bonds consisted of $10,500,000 of 4.00% term bonds due August 1, 2042 with mandatory sinking fund redemption beginning August 1, 2021.

The 2017 Special Tax Bonds do not constitute an indebtedness of the District and are only secured by a pledge of Net Taxes (which consist of the Special Taxes collected minus certain administrative expenses) and amounts on deposit in the Special Tax Fund. In the opinion of the District management and counsel the full faith and credit of the Borrego Water District and the Community Facilities District are not pledged to the payment of the Bonds, nor is the payment of the Bonds secured by any encumbrance, mortgage or other pledge of property of the Borrego Water District or the Community Facilities District.

The Special Tax is to be levied and collected by the county at the same time and in the same manner as general ad valorem property taxes. The Community Facilities District is to receive all Special Taxes in trust and immediately deposit all amounts with the Trustee.

For the fiscal year ending June 30, 2018 the balance in the reserve fund is $0.

11. SUBSEQUENT EVENTS

The Organization's management has evaluated events or transactions that may occur for potential recognition or disclosure in the financial statements from the balance sheet date through January 11, 2019, which is the date the financial statements were available to be issued. Management has identified the following events:

11. SUBSEQUENT EVENTS (continued)

Debt Refinancing

On July 10, 2018, the District Board closed on the refinancing of existing District debt that included two outstanding notes: the 2008 Installment Purchase Agreement, and 2015 Loan Agreement with BBVA Compass Bank. Both of these notes were refinanced with BBVA Compass Bank for a 10-year term, fixed interest rate. The refinancing of the 2008 Agreement was structured as Note 2018A at 3.350% interest rate. The refinancing of the 2015 Loan Agreement was structured as 2018B at 4.200% interest rate.

New Debt

On July 10, 2018, the District Board closed on a new 25-year debt of $5,586,000 with Pacific Western Bank at a fixed interest rate of 3.825%. The purpose of this new debt is for certain water, wastewater, and sewer capital improvement projects.

REQUIRED SUPPLEMENTARY INFORMATION

BORREGO WATER DISTRICT
SCHEDULE OF PROPORTIONATE SHARE OF THE NET PENSION LIABILITY
LAST 10 YEARS
June 30, 2018 and 2017

	June 30, 2017	June 30, 2016	June 30, 2015	June 30, 2014
Proportion of the net pension liability	0.009195%	0.009466%	0.01010%	0.01123%
Proportionate share of the net pension liability	$ 911,898	$ 819,059	$ 693,352	$ 699,055
Covered - employee payroll	$ 723,125	$ 658,514	$ 671,180	$ 595,422
Proportionate Share of the net pension liability as percentage of covered-employee payroll	126.11%	124.38%	103.30%	117.41%
Plan fiduciary net position as a percentage of the total pension liability	74.72%	73.72%	77.21%	73.72%

Notes to Schedule:

Change in Benefit Terms: None

Change in Assumptions: None

- Fiscal year 2015 was the first year of implementation, therefore only three years are shown.

See accompanying Independent Auditor's Report.

BORREGO WATER DISTRICT
SCHEDULE OF PLAN CONTRIBUTIONS
LAST 10 YEARS
June 30, 2018 and 2017

	June 30, 2018	June 30, 2017	June 30, 2016	June 30, 2015
Contractually required contributions (actuarially determined)	$ 142,789	$ 137,737	$ 138,613	$ 129,138
Contributions in relation to the actuarially determined contributions	(142,789)	(137,737)	(138,613)	(129,138)
Contribution deficiency (excess)	$ -	$ -	$ -	$ -
Covered-employee payroll	$ 698,023	$ 723,125	$ 671,180	$ 595,422
Contributions as a percentage of covered employee payroll	20.46%	19.05%	20.65%	21.69%

Notes to Schedule:

Valuation date:	June 30, 2017	June 30, 2016	June 30, 2015	June 30, 2014

- Fiscal year 2015 was the first year of implementation, therefore only three years are shown.

See accompanying Independent Auditor's Report.

OTHER SUPPLEMENTARY INFORMATION

The Board of Directors for the fiscal year ended June 30, 2018, was comprised of the following members:

Name	Office	Term	Term expires
Beth Hart	President	4 Years	November 30, 2018
Lyle Brecht	Vice President	4 Years	November 30, 2018
Joseph Tatusko	Treasurer/Secretary	4 Years	November 30, 2018
Raymond Delahay	Director	4 Years	November 27, 2020
Harry Ehrlich	Director	4 Years	November 27, 2020

Administration

Name	Position
Geoff Poole	General Manager
Kim Pitman	Administration Manager

BORREGO WATER DISTRICT
ASSESSED VALUATION
June 30, 2018 and 2017

The assessed valuation of the District at June 30, 2018, is as follows:

Assessed valuation	
Secured property	$ 345,459,681
Total assessed valuation	$ 345,459,681

The assessed valuation of the District at June 30, 2017, is as follows:

Assessed valuation	
Secured property	$ 341,947,744
Total assessed valuation	$ 341,947,744

Appendix I:

Dudek 12/21/2018.

Proposition 1 SDAC Grant Task 5 Water Vulnerability/New Extraction Well Site Feasibility Analysis

DUDEK

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DRAFT MEMORANDUM

To:	Geoff Poole, General Manager, Borrego Water District
From:	Trey Driscoll, PG No. 8511, CHG No. 936
Subject:	Proposition 1 SDAC Grant Task 5 Water Vulnerability/New Extraction Well Site Feasibility Analysis
Date:	December 21, 2018
cc:	Jim Bennett, Leanne Crow, County of San Diego; Jay Jones, Environmental Navigation Services
Attachment(s):	Figures 1–8 Appendix A, BWD Well Logs Appendix B, 2018 Pump Check Data

EXECUTIVE SUMMARY

The Borrego Springs Groundwater Subbasin (Subbasin) is the sole source of water supply for the Borrego Water District (BWD) and has been identified as a critically overdrafted basin (DWR 2016). Declining groundwater levels have resulted in loss of production from existing BWD extraction wells. In portions of the Subbasin, the upper aquifer, as defined by the U.S. Geological Survey (Faunt et al. 2015), has become unsaturated. In these areas, the varying thickness of the underlying middle aquifer has limited the potential to drill deeper at some existing well sites. Likewise, the remaining useful life of aging BWD water wells may result in the need for well replacement within the next few years.

Many of the existing BWD extraction and monitoring wells were acquired through the merger of previous water companies. The BWD had little, if any, oversight on the installation and completion of their existing extraction well network. Historically BWD has relied on well modifications such as installation of well liners for continued use of poorly constructed extraction wells. The BWD must contend with legacy well completion issues and "temporary fix" well modifications that will ultimately lead to well failure for a few of the BWD's extraction wells.

To ensure an adequate and reliable water supply, the BWD is taking proactive measures to plan for timely replacement of extraction wells that are approaching their remaining useful life. This technical memorandum provides recommendations detailing the most favorable and cost-effective locations to drill and construct new extraction wells for the BWD.

1 INTRODUCTION

The overdraft conditions of the Subbasin restricts the available areas where high yielding and reliable extraction wells can be constructed for long-term use by the BWD. To provide the BWD with new extraction well sites, Dudek conducted interviews with BWD staff, reviewed water quality data, compiled existing well information, completed a well site ranking matrix, and updated the BWD water system distribution model. This information was used to provide the BWD with recommended locations to drill and construct new extraction wells.

Detailed steps used to identify proposed extractions wells:

1. Review of BWD water distribution infrastructure and existing well information
2. Review of basin geometry, aquifer thickness, and lithology
3. Review of water quality data
4. Review of well interference
5. Development of well site ranking matrix to take into account the primary factors (Items 1–4) to identify proposed well sites
6. Update the BWD water system distribution model using WaterCAD to predict pressure and flow rate scenarios for new extraction well sites

2 WATER DISTRIBUTION INFRASTRUCTURE AND EXISTING WELL INFORMATION

The BWD water distribution infrastructure was identified and mapped based on details from the updated BWD water system distribution model using WaterCAD. Interviews were conducted with BWD staff to determine existing well conditions. The BWD provided specific details about the overall condition of each well. Input from the BWD on the recommended location of various well sites was considered and reviewed. Information from BWD well logs was reviewed and compiled (Appendix A).

The remaining useful life of BWD wells was estimated. Additionally, the BWD provided the 2018 results of pump hydraulic tests conducted by Pump Check (Appendix B). This information was used to determine potential new well sites based on the existing and future water supply requirements of the BWD.

2.1 Borrego Water District Water Distribution Infrastructure

The BWD is comprised of four improvement districts and six pressure zones. The improvement districts are referred to as Improvement District (ID-) 1, ID-3, ID-4, and ID-5. Improvement district and well number identify BWD wells. The improvement districts are a legacy of the predecessor agencies that existed prior to consolidation of water suppliers into the BWD. The improvement districts were originally designed as separate systems and the remaining infrastructure from these systems contributes to the current pressure zone and water distribution infrastructure (Figure 1).

Six pressure zones make up the current BWD water distribution infrastructure. Pressure Zone 1 includes ID4-18 and supplies water to the Indian Head Tank. Pressure Zone 2 includes ID4-4 and ID4-11 and provides water to the Twin Tanks. Pressure Zone 3 includes ID5-5, which provides water to the Country Club Tank. Pressure Zone 4 includes ID1-16, ID1-10, and the Wilcox well, which is used solely as a backup well, and supplies water to the 900 Tank. Pressure Zone 5 and 6 includes ID1-12 and ID1-8 and supplies water to the RH-1 and RH-2 Tanks. Pressure Zone 5 is directly connected to ID1-8 and ID1-12 and supplies RH-1. Pressure Zone 6 is connected to Pressure Zone 5 through a booster station at RH-1 Tank. Distribution system interties now connect Pressure Zones 1, 2, and 3. Pressure Zone 4, 5, and 6 are connected through interties and act independent of Pressure Zones 1, 2, and 3. The relationship of each pressure zone to water tanks and wells is listed in Table 1.

Table 1
Pressure Zones, Water Tanks, and Wells

Pressure Zone	Water Tanks	Wells	Improvement District	Management Area
Zone 1	Indian Head	ID4-18	No. 4	NMA
Zone 2	Twin Tanks	ID4-4, ID4-11	No. 4	NMA, CMA
Zone 3	Country Club	ID5-5	No. 5	CMA
Zone 4	900 Tank	ID1-16, ID1-10, Wilcox	No. 1, No. 3	CMA, SMA
Zone 5	RH-1	ID1-8, ID1-12	No. 1	CMA, SMA
Zone 6	RH-2	ID1-8, ID1-12	No. 1	CMA, SMA

Notes: NMA = North Management Area; CMA = Central Management Area; SMA = South Management Area.

2.2 Borrego Water District Interviews and Information Review

The BWD provided information regarding the existing condition of each extraction and monitoring well. Current well conditions are summarized in Table 2. The information from Table 2 was used in conjunction with the remaining useful life analysis discussed in Section 2.4 to identify the potential for imminent BWD well failures. Three of the BWD wells (ID1-10, ID4-4, ID4-18) are likely to fail in the short-term (i.e., less than 3–5 years) with two of these wells (ID1-10 and ID4-4) are funded to be replaced in 2019. The locations of BWD extraction and monitoring wells are shown on Figure 1.

Table 2
Borrego Water District Well Comments

Well ID	BWD Comments
Extraction Wells	
ID1-8	Well use is limited due to drawdown from surrounding wells. Potential for arsenic to exceed MCL of 10 µg/L based on historical data.
ID1-10	Well production is decreasing due to declining groundwater levels. Well is being phased out of use. Identified as having high short-term potential to fail.
ID1-12	Well is in good working condition and sufficiently serves the southern portion of the Subbasin.
ID1-16	Well is in good working condition and sufficiently serves the southern portion of the Subbasin.
ID4-4	Water quality and production are good. Pump cannot be lowered in well due to smaller diameter well liner. Identified as having high short-term potential to fail.
ID4-11	Well is in good working condition and produces adequate flow rate.
ID4-18	Well serves a limited demand for the northern section of the Subbasin (Indian Head area). A well liner is installed in ID4-18. Well produces sufficient water supply for the area served but production has decreased over the years. Identified as having medium short-term potential to fail.
ID5-5	Well is in good working conditions and produces adequate flow rate.
Wilcox	Well operates as an emergency backup well and is powered solely by a diesel generator with no on-site power.
Monitoring Wells	
ID4-1	Well was converted to a monitoring well due to partial collapse and possible high nitrate levels.
ID4-2	Well was converted to monitoring well likely due to declining groundwater levels and partial collapse
ID4-3	Well was converted to monitoring well due to water quality.
ID4-5	Well was completed but not brought into production. Sanding due to improper well construction or poor water quality may have contributed to the well's poor production.
ID4-10	Well was converted to monitoring well likely due to declining groundwater levels.
ID5-4	Well went dry or collapsed.
MW-1	Well drilled for monitoring purposes only.
MW-3	Well drilled for monitoring purposes only.
MW-4	Well drilled for monitoring purposes only.
MW-5A	Well drilled for monitoring purposes only.
MW-5B	Well drilled for monitoring purposes only.
Paddock	Well converted to monitoring well due to age. May have collapsed in some areas.
Yaqui Pass/ Anzio	Unknown.

Notes: MCL = maximum contaminant level; µg/L = micrograms per liter; Subbasin = Borrego Springs Groundwater Subbasin.
Source: Holloway, pers. comm. 2018.

Based on the interview with the BWD operations manager both ID1-10 and ID4-4 have high potential for imminent well failure (Holloway, pers. comm. 2018). The production from ID1-10 has decreased due to declining groundwater levels and limited well depth to the point that the well must be re-drilled or rehabilitated in order to provide adequate long-term production. ID4-4 was identified as a well that has historically produced adequate groundwater for the area served, but is now experiencing diminished production. The installation of a well liner limits the ability for lowering the pump and likely contributes to the lack of production from well ID4-4.

ID4-18 was also identified as a well that has shown a decrease in production over the years, likely due to the installation of a well liner and declining groundwater levels.

2.3 Well Completion Information

Well completion information was used to identify well production and well completion details that may show construction modifications or flaws of existing extraction wells. Well modifications such as well liners (sleeves) can decrease well diameter and may significantly limit well production due to limiting the size of the pump the well can accommodate, reducing well efficiency, and reducing the effectiveness of well screen maintenance and well redevelopment. As seen in other wells within the Subbasin, the use of improperly sized filter pack and screen slot size can contribute to well sanding. For instance, well liners were installed in ID4-4 and ID4-18 as a result of well sanding. Well completion information for BWD wells is summarized in Table 3.

According to the well completion information, well modifications were noted in ID4-4 and ID4-18. The installation of a well liner likely contributes to production loss in both of these wells. In addition, the screen slot size for ID4-4 is 0.15 inches, which is significantly larger than other BWD extraction wells drilled in similar material which have slot sizes ranging from 0.06 to 0.09 inches. Although recommended slot size is specific to filter pack sizing based on the geologic conditions at each well site, the larger slot size and filter pack size in well ID4-4 may contribute to excessive production of aquifer formation material (sanding) that limits the production rate of the well.

Table 3
Borrego Water District Extraction Well Completion Information

	Well ID1-8	Well ID1-10	Well ID1-12	ID1-16	Wilcox	Well ID4-4	Well ID4-11	Well ID4-18	Well ID5-5
Improvement District	No. 1, No. 3					No. 4			No. 5
Pressure Zone	4, 5, 6					2		1	3
Well Completion									
Year Drilled	1972	1972	1984	1989	1981	1979	1995	1982	2000
Well Depth	830 feet	392 feet	580 feet	550 feet	502 feet	802 feet	770 feet	570 feet	700 feet
Conductor Size/Depth	24 inches/50 feet	Unknown	26 inches/50 feet	26 inches/50 feet	Unknown	20 inches/50 feet	Unknown	24 inches/50 feet	Unknown
Well Casing Type/Thickness	mild steel/0.25-inch wall thickness	mild steel	mild steel	mild steel	mild steel	mild steel	mild steel/0.25-inch wall thickness	mild steel/0.25-inch wall thickness	steel/0.25-inch wall thickness
Well Casing Diameter	12.75 inches 0–312 feet 8.625 inches 312–830 feet	12.75 inches ID	14.75 inches ID	16 inches ID	12.75 inches ID	Well Sleeved – 14 inches from 0–450 feet, 10 inches from 450–790 (original – 14 inches 0–802 feet)	22 inches ID 0–770 feet	Well Sleeved[a] 12 inches 0–570 feet	16 inches 0–700 feet
Blank Casing Intervals	0–72 feet 240–260 feet 830–850 feet (8.625-inch sump)	0–162 feet 372–392 feet (copper-bearing plate)	0–248 feet 568–580 feet	0–160 feet 540–550 feet	0–242 feet	0–470 feet 500–532 feet 570–586 feet 786–802 feet	0–450 feet 760–770 feet	0–240 feet 300–310 feet 385–395 feet 405–425 feet 440–460 feet 475–490 feet 560–570 feet	0–400 feet
Screen Type	louver 0.070-inch slot	louver 0.070-inch slot	0.09375-inch slot	0.060-inch slot	0.09375-inch slot (22 row)	0.15625-inch slot	0.06-inch slot	0.09375-inch slot (22 row)	0.060-inch slot
Screen Intervals	72–240 feet 260–312 feet 312–830 feet (8.625 inch)	162–372 feet	248–568 feet	160–540 feet	252–502 feet	470–500 feet 532–570 feet 586–786 feet	450–750 feet	240–300 feet 310–385 feet 395–405 feet 425–440 feet 460–475 feet 490–560 feet	400–700 feet
Borehole Diameter/Filter Pack	22 inches from 0-324 feet 17.5 inches from 324-870 feet/ Crystal Silica 6-8 pit run	22 inches/Unknown	36 inches from 0-50 feet 24 inches from 50-768 feet/ well rock 4/9	26 inches/gravel pack (5/16- x 4/16-inch)	Unknown/ gravel pack (5/16- to 4/16-inch)	Unknown/Unknown	22 inches/ 3/8-inch 8x12	Unknown/Unknown (illegible on log)	26-inches/ 8/16-inch
Pump Information									
Original Production[b]	1,100	1,110	2,000	2,000	900	1,155	2,000	570	3,000
Current Production	350	500	965	750	175	450	950	150	900
Pump Type	Byron Jackson	Goulds	Layne & Bowler	Fairbanks	Goulds	Goulds	Unknown	Unknown	Goulds
Motor Type	Newman 125 HP Turbine	PUORP 150 HP	Newman 200 HP	US 200 HP	Diesel 80 HP	GE 150 HP	US 200 HP	Sub 50 HP	US 200 HP
Power	3 phase	3 phase	3 phase	3 phase	N/A	3 phase	3 phase	3 phase	3 phase
Drop Pipe	300 feet galvanized (6 inch) estimated	390 feet, steel, 8 inches	290 feet, steel, 8 inch	400 feet, steel, 8 inch	475 feet, steel, 6 inch	378 feet, steel, 8 inch	345 feet, steel, 8 inch	340 feet, galvanized	260 feet, steel, 10 inch

Source: Appendix A.
Notes: ID = Internal Diameter; HP = horsepower.

[a] Former BWD General Manager Jerry Rowling provided an active BWD production well datasheet which noted that a sleeve had been installed in ID4-18. Sleeve installation information was not made available for this report. Information provided in the table is original completion information.
[b] Original production is typically based on driller maximum production rates that may have overestimated actual production rates.

2.4 Longevity of Existing Wells (Remaining Useful Life)

The useful life of water wells can vary greatly depending on several factors, including type of casing material, well construction methods, scaling and corrosion, biological film issues, and dewatering of the screen interval (groundwater level decline). Roscoe Moss Company completed a study of 34 public supply wells in Arizona, which indicated useful life of mild steel wells at 40 to 50 years and that using corrosion resistant materials such as stainless steel could increase the useful life to 100 years or more (Roscoe Moss 2018). It should be noted that the Arizona wells studied had slightly corrosive water based on a negative Langelier index, iron scale, and iron-related bacteria bio-films that reduced the useful life of the well. Absent these conditions, it is expected that mild steel wells have a useful life of approximately 60 to 75 years. The estimated remaining useful life of BWD extraction wells is based on a 60-year useful lifespan as presented in Table 4.

Table 4
Borrego Water District Remaining Useful Life of Extraction and Monitoring Wells

Well ID	Year Drilled	Age[a]	Useful Life (Years Remaining)[b]	Run to Failure (Years Remaining)[c]
Extraction Wells				
ID1-8	1972	46	14	29
ID1-10	1972	46	14	29
ID4-4[d]	1979	39	21[d]	36[d]
Wilcox	1981	37	23	38
ID4-18[d]	1982	36	24[d]	39[d]
ID1-12	1984	34	26	41
ID1-16	1989	29	31	46
ID4-11	1995	23	37	52
ID5-5	2000	18	42	57
Monitoring Wells				
ID4-1	1945	73	0[e]	2
ID4-2	1978	40	20	35
ID4-3	Unknown	Unknown	Unknown	Unknown
ID4-5	1987	31	29	44
ID4-10	1989	29	31	46
Paddock	Unknown	Unknown	Unknown	Unknown
Yaqui Pass/Anzio	2008	10	50	65
MW-1	2004	14	46	61
MW-3	2004	14	46	61
MW-4	2006	12	48	63
MW-5A	2006	12	48	63

Table 4
Borrego Water District Remaining Useful Life of Extraction and Monitoring Wells

Well ID	Year Drilled	Age[a]	Useful Life (Years Remaining)[b]	Run to Failure (Years Remaining)[c]
MW-5B	2006	12	48	63

[a] Age as of 2018.
[b] Assumes 60 years.
[c] Assumes 75 years.
[d] Well modifications, such as the installation of a well liner, will likely not reach estimated remaining useful life.
[e] Well ID4-1 has no remaining useful life as an extraction well and likely only has about 2 years of remaining useful life as a monitoring well.

Five BWD extraction wells have an estimated remaining useful life of less than 25 years based on the typical lifespan (60 years) of a mild steel well installed in a desert alluvial basin. Wells ID1-8 and ID1-10 have an estimated remaining useful life of approximately 14 years. ID4-4 has an estimated remaining useful life of 21 years based on the typical well lifespan; however, improper well construction and the installation of a well liner limits the actual remaining useful life to a few more years. The Wilcox well has an estimated remaining useful life of 23 years. ID4-18 has an estimated remaining useful life of up to 25 years; however, improper well construction and the installation of a well liner likely limits the remaining useful life of this well to less than 5–10 years even with regular mechanical and/or chemical well redevelopment.

2.5 Pump Check Data

Pump Check, a pumping system analysis company, conducts annual pump and well efficiency tests for BWD extraction wells. BWD proactively performs these tests annually to track pump and motor efficiency (referred to as overall plant efficiency, reported as a percentage). As plant efficiency decreases, it costs more dollars to pump the same volume of water. Once plant efficiency decreases substantially due to pump and motor wear, it becomes more cost effective to replace or repair the equipment than running it to failure. BWD regularly replaces or repairs pumps once they become inefficient. Depending on frequency of use, the cost benefit of replacement or repairs is specific to each well. For example the return on investment (energy savings) for a well that is pumped 24 hours per day will be much quicker than for a well that is only used once per month (e.g., while well ID1-8 plant efficiency is poor at 51%, it is seldom used and may not be cost effective to replace/repair at this time). When pumps are repaired or replaced, a significant investment is required which may include mechanical and chemical redevelopment. For wells that are approaching their remaining useful life, the BWD must decide if it makes sense to invest in an existing well or drill a new replacement well. Table 5 provides a summary of the Pump Check results for BWD wells.

Table 5
2018 Pump Check Results

Well ID	ID1-8	ID1-10	ID1-12	ID1-16	Wilcox	ID4-4	ID4-11	ID4-18	ID5-5
Improvement District	*No. 1, No. 3*					*No. 4*			*No. 5*
Pressure Zone	*4, 5, 6*					*2*		*1*	*3*
Production Rate (gpm)	448	317	890	848	205	395	920	130	542
Static Groundwater Level (Feet; below ground surface)	71.2	213.9	145.5	230.9	305.2	205.4	223.2	311.2	182.1
Drawdown (Feet)	47.7	11.5	10.4	24.3	5.8	63.5	5.8	7.6	16.1
Specific Capacity (gpm/Foot Drawdown)	9.4	27.5	85.5	34.9	35.3	6.2	158.6	17.1	33.7
Overall Plant Efficiency in %	51	53.9	71.9	70.6	NA	71	72.7	50.3	62

Notes: gpm = gallons per minute.

Overall plant efficiency was less than 60% in three BWD extraction wells (ID1-8, ID1-10, and ID4-18). Five wells (ID1-8, ID1-10, ID4-4, Wilcox, and ID4-18) had a flow rate of less than 500 gallons per minute. Drawdown was greater than 50 feet in ID4-4, likely related to the low efficiency of the well liner.

3 WELL SITE RANKING MATRIX

A well site ranking matrix was developed to rank BWD and County of San Diego (County)-owned parcels for a number of relevant categories. Each category was assigned a ranking that ranged from one (“least favorable”) to four (“most favorable”). The rankings for each category were totaled for each parcel. The highest total represented the most favorable parcel for installing an extraction well. Ranking criteria included saturated aquifer thickness, well interference, water quality, and distance to existing BWD water distribution infrastructure.

BWD and County parcels were limited to two areas of the Subbasin. Previous work has divided the Subbasin into three management areas, the North Management Area (NMA), Central Management Area (CMA), and South Management Area (SMA) (Figure 1). The SMA was excluded from the well site ranking matrix due to poor water quality.

According to the San Diego Association of Governments parcel information database, the BWD owns 24 parcels and the County owns 21 parcels in the NMA and CMA of the Subbasin. Parcels owned by the BWD and County were given priority for this evaluation when considering new well sites to limit the cost and time of land acquisition. In the future, the BWD should consider well sites beyond those initially evaluated for this new well site feasibility analysis. These well sites would be located on private property and require land acquisition or obtaining easements.

3.1 Well Site Ranking Matrix Criteria

The following criteria were used to rank wells in the well ranking system.

3.1.1 Saturated Aquifer Thickness

The subsurface of the Subbasin has been divided into three main aquifer units by DWR (DWR 1984) and the U.S. Geological Survey (Faunt et al. 2015). The upper, middle, and lower units have been defined and incorporated into a 3D Rockworks hydrogeologic model, and the Borrego Valley Hydrologic Model completed by the U.S. Geological Survey in cooperation with the BWD that was recently updated by Dudek. The upper aquifer was excluded from the ranking matrix because of the limited saturated thickness and potential for water quality issues as a result of irrigation and septic return flows (Figure 2). The Borrego Valley Hydrologic Model was used to define simulated saturated upper, middle, and lower aquifer thickness (Figures 2–4). Sites with the greatest simulated saturated thickness for the middle and lower aquifers were considered most favorable. It was also assumed that new wells would require a minimum of 50 feet of blank casing extending below the water table to allow for projected groundwater level decline during the 20-year SGMA implementation period and for suitable submergence of well pump intakes.

For BWD and County-owned parcels, the underlying saturated thickness of the middle aquifer ranged from 0 to 668 feet and the lower aquifer ranged from 0 to 3,713 feet. The range of saturated thickness for each aquifer was divided by four to assign a saturated aquifer thickness ranking. The greater the saturated thickness, the higher the score. The aquifer thickness ranking criteria is provided in Table 6.

3.1.2 Well Interference

Well interference was reviewed to determine nearby pumping influences of potential wells. The time and duration of nearby pumping wells can affect the long-term use of a new BWD extraction wells. Distances to nearby agriculture and recreation extraction wells were measured to define the location that would incur the least amount of well interference. Potential BWD and County-owned well sites located at the greatest distance from nearby wells were rated most favorable. Additionally, the two primary pumping centers located north of Henderson Canyon Road underlying the agricultural fields in the NMA, and in the vicinity of Rams Hill Golf Course wells in the SMA were avoided for consideration of new municipal extraction wells (Figure 5). The measured distance to nearby wells used in the analysis ranged from 50 to 9,111 feet. Ranking for well interference was based on a 5,280-foot (1-mile) radius to nearby wells. Parcels located greater than 1 mile (5,280 feet) from a nearby well were assigned a ranking of four. Parcels with a well located less than 1 mile but greater than 0.50 miles were assigned a ranking of three. Parcels with a well located less than 0.50 miles but greater than 0.25 miles were assigned a ranking of two. Parcels with a well located less than 0.25 miles from a nearby well were assigned a ranking of one. Ranking values for well interference are provided in Table 6.

3.1.3 Proximity to Existing Water Distribution Infrastructure

The cost to install additional water distribution infrastructure was considered for the well ranking system. BWD and County-owned parcels that measured the shortest distance from existing water distribution infrastructure were considered most favorable. Measured distance ranged from zero to 8,000 feet. Due to the high cost of installing additional infrastructure, the maximum considered distance for the well ranking system was 1,000 feet. Sites with water distribution infrastructure located less than 100 feet were considered most favorable. The ranking system values for proximity to existing the BWD water distribution system are included in Table 6.

3.1.4 Groundwater Quality

Water quality information was used from BWD extraction wells, BWD monitoring wells, and other nearby wells to address major water quality constituents of concern. Based on a review of recent water quality results, the major constituents of concern in the Subbasin are arsenic, nitrate, fluoride, sulfate, and total dissolved solids (TDS). Wells that exceeded California drinking water maximum contaminant levels (MCLs) specified in Title 22 of the California Code of Regulations for the constituents of concern are mapped with a 1-mile radius to show possible problem areas (Figure 5).

Since arsenic concentrations are detected above the MCL of 10 micrograms per liter (µg/L) for several wells in the SMA, this area is not considered suitable for locating new extraction wells. Wellhead treatment for arsenic was considered too costly at this time given that alternative locations in the Subbasin would likely not require any treatment. Nitrate and TDS concentrations were higher in some areas throughout the Subbasin. These areas were avoided, if possible, but the occurrence of nitrate generally related to surficial sources would likely be aquifer and depth specific and likely only encountered in the upper aquifer.

Table 6
Well Site Ranking Matrix

Category	Ranking Value			
	1	*2*	*3*	*4*
Simulated Saturated Thickness of Middle Aquifer (feet)	Less than 167	Less than 334 but greater than 167	Less than 501 but greater than 334	Less than 668 but greater than 501
Simulated Saturated Thickness of Lower Aquifer (feet)	Less than 928	Less than 1,857 but greater than 928	Less than 2,785 but greater than 1,857	Less than 3,713 but greater than 2,785
Approximate Distance to Nearest Well (feet)	Less than 1,320	Less than 2,640 but greater than 1,320	less than 5,280 but greater than 2,640	Greater than 1 mile (5,280 feet)
Proximity to Existing BWD Water Distribution Infrastructure (feet)	Greater than 1,000 feet	Less than 1,000 feet but greater than 500 feet	Less than 500 feet but greater than 100 feet	Less than 100 feet
1-mile radius: Arsenic Concentration Ranking	Greater than the MCL	Greater than one half of the MCL	Less than half MCL (but with other known issue areas)	Less than half MCL (no known area issues)
1-mile radius: TDS Concentration Ranking[a]	Greater than the MCL	Greater than one half of the MCL	Less than half MCL (but with other known issue areas)	Less than half MCL (no known area issues)
1-mile radius: Nitrate Concentration Ranking	Greater than the MCL	Greater than one half of the MCL	Less than half MCL (but with other known issue areas)	Less than half MCL (no known area issues)

Notes: BWD = Borrego Water District; MCL = maximum contaminant level; TDS = total dissolved solids.
MCL for Arsenic is 10 micrograms per liter (µg/L); Secondary MCL for TDS is 1,000 milligrams per liter (mg/L); MCL for Nitrate is 10 mg/L.
a. Sulfate is a constituent of concern, but TDS was used as surrogate for the water quality analysis.

3.2 Well Ranking System Results

The maximum total well site ranking was 23 and the minimum was 16 (Table 7 and 8). Three parcels scored the maximum value, two County parcels and one BWD parcel. The second highest ranked value was 22. Twelve parcels scored a value of 22, eight BWD parcels and four County parcels. The three parcels that a ranked 23 received primary consideration for a new well site. The location of BWD and County parcels and their corresponding ranking result are included on Figure 7.

Table 7
Well Site Ranking Matrix – Borrego Water District Parcels

Category	BWD Parcel 1	BWD Parcel 2	BWD Parcel 3	BWD Parcel 4	BWD Parcel 5	BWD Parcel 6	BWD Parcel 7	BWD Parcel 8	BWD Parcel 9	BWD Parcel 10	BWD Parcel 11	BWD Parcel 12	BWD Parcel 13	BWD Parcel 14	BWD Parcel 15	BWD Parcel 16	BWD Parcel 17	BWD Parcel 18	BWD Parcel 19	BWD Parcel 20	BWD Parcel 21	BWD Parcel 22	BWD Parcel 23	BWD Parcel 24
Assessor Parcel Number	197-040-23	140-030-09	140-280-30	141-030-41	141-271-09	198-051-07	199-100-23	200-030-32	200-130-01	200-051-11	200-020-24	141-160-50	198-051-04	141-160-54	198-364-20	198-320-32	141-390-60	198-051-02	199-140-28	200-130-02	198-051-03	198-100-21	198-121-04	198-121-06
Management Area	NMA	NMA	NMA	NMA	NMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA
Total Area (acres)	0.12	62.60	0.13	0.98	1.91	1.00	0.99	2.28	78.52	0.05	0.57	0.69	0.33	1.56	0.73	0.00	0.06	0.32	1.13	79.08	0.33	9.58	2.08	2.12
Simulated Saturated Thickness of the Middle Aquifer	19	668	475	420	343	253	342	182	0	220	4	232	253	374	136	0	478	253	84	0	253	0	43	43
Ranking of Simulated Saturated Thickness of the Middle Aquifer	1	4	3	3	3	2	3	2	1	2	1	2	2	3	1	1	3	2	1	1	2	1	1	1
Simulated Saturated Thickness of the Lower Aquifer	181	0	459	221	240	521	2,670	1,138	37	1,498	601	300	521	186	550	215	1,287	521	1,249	37	521	21	132	132
Ranking of Simulated Saturated Thickness of the Lower Aquifer	1	1	1	1	1	1	3	2	1	2	1	1	1	1	1	1	2	1	2	1	1	1	1	1
Approximate Distance to Nearest Well (feet)	6,452	2,241	1,658	2,339	415	4,210	2,257	3,596	738	2,116	2,195	2,237	4,174	1,457	4,741	9,161	1,322	4,046	918	50	4,031	8,664	7,775	7,939
Ranking of Well Interference	4	2	1	2	1	3	2	3	1	2	2	2	3	1	3	4	2	3	1	1	3	4	4	4
Distance to Existing BWD Water Distribution Infrastructure (feet)	190	18,478	50	0	2,240	150	3,299	0	6,971	138	1,458	0	50	0	25	0	192	40	0	5,457	45	890	0	0
Ranking of Proximity to Infrastructure	3	1	4	4	1	3	1	4	1	3	1	4	4	4	4	4	3	4	4	1	4	2	4	4
1-mile radius: Arsenic Concentration Ranking	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1-mile radius: TDS Concentration Ranking	4	4	2	4	4	4	4	4	4	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1-mile radius: Nitrate Concentration Ranking	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Is there already a well located on the parcel (Extraction/Monitoring/ None)	None	None	None	E ID4-4	None	None	None	E ID1-10	None	None	E Wilcox	E ID4-11	M ID4-1	None	None	M ID4-10	M ID4-5	None	E ID1-16	None	None	None	M ID4-2	None
Totals:	21	20	19	22	18	21	21	23	16	19	17	21	22	21	21	22	22	22	20	16	22	20	22	22

Notes: BWD = Borrego Water District; NMA = North Management Area; CMA = Central Management Area; TDS = total dissolved solids
In some instances, multiple model cells were included in a single parcel. In these cases, the thickness of the majority cell was used.

Table 8
Well Site Ranking Matrix – County Parcels

Category	COSD Parcel 1	COSD Parcel 2	COSD Parcel 3	COSD Parcel 4	COSD Parcel 5	COSD Parcel 6	COSD Parcel 7	COSD Parcel 8	COSD Parcel 9	COSD Parcel 10	COSD Parcel 11	COSD Parcel 12	COSD Parcel 13	COSD Parcel 14	COSD Parcel 15	COSD Parcel 16	COSD Parcel 17	COSD Parcel 18	COSD Parcel 19	COSD Parcel 20	COSD Parcel 21
Assessor Parcel Number	141-350-30	141-320-26	140-194-01	141-330-38	141-230-27	201-010-01	199-160-20	141-230-16	141-230-23	141-230-40	199-080-19	141-210-09	142-210-06	141-210-10	198-220-51	141-230-33	141-230-38	141-230-22	198-020-30	760-204-51	198-020-34
Management Area	NMA	NMA	NMA	NMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA	CMA
Total Area (acres)	0.03	0.02	0.68	0.02	13.86	164.50	7.04	18.82	4.00	9.63	11.17	4.47	143.13	4.38	8.59	108.25	186.58	10.23	2.61	186.58	13.37
Simulated Saturated Thickness of the Middle Aquifer	122	203	375	162	343	467	279	413	413	413	221	475	475	475	151	360	365	413	106	365	106
Ranking of Simulated Saturated Thickness of the Middle Aquifer	1	2	3	1	3	3	2	3	3	3	2	3	3	3	1	3	3	3	1	3	1
Simulated Saturated Thickness of the Lower Aquifer	298	214	435	198	3,384	2,051	2,207	3,712	3,712	3,712	845	1,759	1,941	1,961	68	2,326	2,759	3,712	574	2,759	575
Ranking of Simulated Saturated Thickness of the Lower Aquifer	1	1	1	1	4	3	3	4	4	4	1	2	3	3	1	3	3	4	1	3	1
Approximate Distance to Nearest Well (feet)	3,000	3,990	2,236	2,712	5,400	5,000	1,600	5,200	5,200	4,200	1,100	700	8,000	332	3,125	1,900	551	4,800	6,600	551	6,000
Ranking of Well Interference	3	3	2	3	4	3	1	3	3	3	1	1	4	1	3	2	1	3	4	1	4
Distance to Existing BWD Water Supply Infrastructure (feet)	1,200	578	0	324	1,200	8,300	0	3,900	3,900	5,800	100	340	2,800	0	0	0	0	4,100	0	0	0
Ranking of Closeness to Infrastructure	1	2	4	3	1	1	4	1	1	1	4	3	1	4	4	4	4	1	4	4	4
1-mile radius: Arsenic Concentration Ranking	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1-mile radius: TDS Concentration Ranking	2	2	2	2	2	4	2	2	2	2	4	4	4	4	4	2	2	2	4	2	4
1-mile radius: Nitrate Concentration Ranking	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Totals:	16	18	20	18	22	22	20	21	21	21	20	21	23	23	21	22	21	21	22	21	22

Notes: COSD = County of San Diego; NMA = North Management Area; CMA = Central Management Area; BWD = Borrego Water District; TDS = total dissolved solids.
In some instances, multiple model cells were included in a single parcel. In these cases, the thickness of the majority cell was used.

4 WATER SYSTEM DISTRIBUTION MODEL

A hydraulic water model is a mathematical model of a water distribution system that is used to analyze the system's hydraulic behavior. A hydraulic water model was used here to perform an extended-period simulation of the hydraulic behavior of a pressurized pipe network, consisting of pipes, nodes, pumps, valves, storage tanks, and reservoirs. Hydraulic water models can be used by water districts to plan infrastructure improvements, develop operational maintenance strategies, and proactively manage their system. A hydraulic model for the BWD water distribution system was developed in 2005 within the Bentley® WaterCAD software program and updated for this analysis.

The BWD hydraulic model has not been updated since its initial development in 2005. As part of this project, the BWD WaterCAD hydraulic water model was updated to represent current water system conditions. New facilities (constructed and currently under construction, including waterline upsizing and the new 900 Tank), 2016/2017 water demands and updated system controls were input in the BWD's existing water model to simulate existing field conditions. As part of the calibration process, system pressures were confirmed against BWD field pressure data to confirm the accuracy of modeling results. Discrepancies in system pressures pointed to discrepancies in the model, which were corrected. Once modeled system pressures matched field-measured system pressures, calibration was confirmed.

Once updated and calibrated, the WaterCAD model was used to simulate the estimated flow rate and subsequent pressures of an additional BWD extraction well. The proposed extraction well sites are based on the findings of BWD interviews and the well site ranking matrix. Results of the Water System Distribution Model are described in Section 5.3.

5 RESULTS

5.1 Borrego Water District Water Distribution Infrastructure and Existing Well Information

The BWD identified ID1-10, ID4-18, and ID4-4 as wells which are experiencing diminishing production. A review of the BWD well completion report information identified ID4-4 and ID4-18 as having well modifications that has likely result in diminished production. According to the remaining useful life analysis, wells ID1-8, ID1-10, ID4-4, ID4-18, and the Wilcox well have a remaining useful life of less than 25 years based on typical well life. However, both ID4-4 and ID4-18 have low flow rates and sanding issues that resulted in installation of well liners that limits the remaining useful life of these wells. ID4-4 exhibits the highest pumping drawdown (63.5 feet) of all BWD extraction wells that is likely a result of poor well efficiency due to the well liner. ID4-

18 has low plant efficiency and flow rate. Based on this information, ID4-4 and ID4-18 are good candidates for well replacement.

5.2 Well Site Ranking Matrix

The well site ranking matrix included 21 County parcels and 24 BWD parcels. The highest ranked score was 23, of which two were County parcels and one was a BWD parcel. The first County parcel was COSD Parcel 13 on Assessor’s Parcel Number (APN) 142-210-06. This parcel is the site of the Borrego Springs dump and will not be considered for future consideration due to the potential for water quality impairments from leaching of disposed material.

The second County parcel was Parcel 14 on APN 141-210-10. This parcel is located west of the Borrego Springs Airport and is a good candidate for a new extraction well. This parcel could serve Pressure Zone 2, which has a high density of service connections based on the results of the water system distribution model as described in Section 5.3.

The third parcel that received a ranking of 23 was BWD Parcel 8 on APN 200-030-32. This parcel is the site of ID1-10. A replacement well at this location would serve Pressure Zone 4.

5.3 Water System Distribution Model

New well simulations were performed on two areas of the Subbasin. These areas were chosen based on the findings from the well site ranking matrix and in consultation with BWD staff. The two new well scenarios were chosen at the location of current BWD extraction well ID4-4 and the Borrego Springs Airport. The ID4-4 location was selected rather than the ID4-18 location because the existing and future demand from ID4-18 at Pressure Zone 2 is sufficient at this time. The airport location was selected because Pressure Zone 4 is currently sufficiently served by ID1-16, and a new well at ID1-10 is not required at this time. These two scenarios were analyzed through the water system distribution model to provide anticipated pressure zone results of a new extraction well at each location.

Scenario 1: ID4-4 Location

Since ID4-4 is currently tied into the water distribution system, the WaderCAD model was used to simulate a temporary shutdown of the well during construction of a replacement well.

Under this scenario, Pressure Zone 2 would be supplied by ID4-11 while ID4-4 was being replaced. A 24-hour average day demand scenario was run with ID4-4 offline and ID4-11 maintaining water levels in the Twin Tanks. Results of the analysis concluded that ID4-11 could sufficiently supply the Pressure Zone 2 under the condition when ID4-4 is offline for redevelopment.

Scenario 2: Borrego Springs Airport Location

Since no BWD production well is currently installed in the area near the Borrego Springs Airport, the WaterCad model was used to simulate a potential new well in this area of the Subbasin.

Under this scenario, a new 800-gallon-per-minute well located west of the Borrego Springs Airport at approximately 520 feet above mean sea level would be the main source of supply for the Pressure Zone 2 via an existing 8-inch pipeline, with ID4-11 providing backup supply. ID4-4 was considered to be offline. Two simulations were performed for this scenario. First, a 24-hour average day demand scenario was run. The airport well site was able to supply 100% of the demands for Pressure Zone 2 and maintain system pressures within the zone. Subsequently, a 48-hour maximum day demand was run. The airport well and Well ID4-11 were able to supply zone demands and maintain the water levels in the Twin Tanks. No pressures issues were identified.

6 RECOMMENDATIONS

The existing conditions of BWD extraction wells were reviewed to determine their remaining useful life. This included identification of well construction issues and operations and maintenance issues. Well and pump efficiency data were also reviewed for BWD extraction wells.

Based on interviews with the BWD and a review of water quality results, the SMA was excluded due to arsenic concentrations detected above the drinking water standard in several wells. Areas of high nitrate and TDS were identified and avoided for proposed new extraction well sites.

BWD and County-owned parcels were analyzed using a well site ranking matrix. The well site ranking matrix quantified and compared saturated thickness of the upper and middle aquifer, well interference, water quality, and feasibility to connect the well to the existing BWD distribution system. Based on the well ranking system, three parcels received the highest well ranking value of 23. The top four new extraction well sites are listed in Table 9 and shown on Figure 8.

Table 9
Recommended New Extraction Well Sites

Recommended Priority Order	Well Ranking	Parcel Identifier	APN	Location Identifier
1	22	BWD Parcel 4	141-030-41	ID4-4
2	23	COSD Parcel 14	141-210-10	Near Borrego Springs Airport

Table 9
Recommended New Extraction Well Sites

Recommended Priority Order	Well Ranking	Parcel Identifier	APN	Location Identifier
3	23	BWD Parcel 8	200-030-32	ID1-10
4	23	N/A	140-110-06	ID4-18[a]

Notes: APN = Assessor's Parcel Number; BWD = Borrego Water District; COSD = County of San Diego N/A = not applicable.
[a] Water quality analysis indicates that ID4-18 exceeds the TDS and sulfate lower secondary MCL. Additional depth-specific water quality analysis of ID4-18 is required to determine if the ID4-18 well site is recommend for a new extraction well.

The recommended location for a new extraction well is BWD Parcel 4 on APN 141-030-41 at the current location of ID4-4. The new extraction well would replace ID4-4. This location was identified based on diminishing production and the poor well condition of ID4-4. This parcel received a well ranking value of 22, which is one less than the highest value. This location was evaluated with the updated water system distribution model to confirm ability to serve Pressure Zone 2 and maintain water levels in the Twin Tanks. Of the parcels reviewed in this analysis, APN 141-03-41 should be considered the highest priority for a new extraction well site.

The second choice for a new extraction well is COSD Parcel 14 on APN 141-210-10 located west of the Borrego Springs Airport. The site did not receive an evaluation based on BWD data because no production well is currently located at the site. This location received a ranking of 23, which was the highest value from the well site ranking matrix. This location was evaluated with the updated water system distribution model to confirm ability to serve Pressure Zone 2 and maintain system pressures within the zone. The water system distribution model results indicate that this location is capable of serving Pressure Zone 2 without issue. This site should be considered a potential future location for a new extraction well. An exploration borehole and test well should be drilled in this area prior to completion of an extraction well to confirm well yield and water quality.

The third and fourth locations would be a replacement well for ID1-10 or ID4-18 located on APN 200-030-32 and 140-110-06, respectively. Based on information provided by the BWD, ID1-10 has had diminishing production due to declining groundwater levels and is currently being phased out. A new well at this location could supply a backup for pressure Zone 4 in the SMA. ID4-18 was also identified as a well that has had decreased production. A new well in this location could provide a more reliable source of water from Pressure Zone 1 in the NMA. The parcel ID4-18 is located on was not evaluated by the well-site ranking matrix because the parcel is not owned by the BWD or County. A new well at these locations was not simulated using the WaterCAD model. Since both locations currently connect to the existing BWD distribution system, it is likely that there should be no pressure issues with new production wells in these locations.

After a review of this analysis by the BWD, additional site-specific analysis should be conducted for the most favorable well sites to develop a preliminary well design. Final well design should be based on results of pilot borehole drilling.

Additionally, the well-site ranking matrix identified 12 parcels that received a well ranking of 22, which is less than one from the highest ranked value. These locations could be considered in the future for a new well sites.

In the future, the BWD should consider well sites beyond those initially evaluated for this new well site feasibility analysis. These well sites would be located on private property and require land acquisition or obtaining easements.

7 REFERENCES CITED

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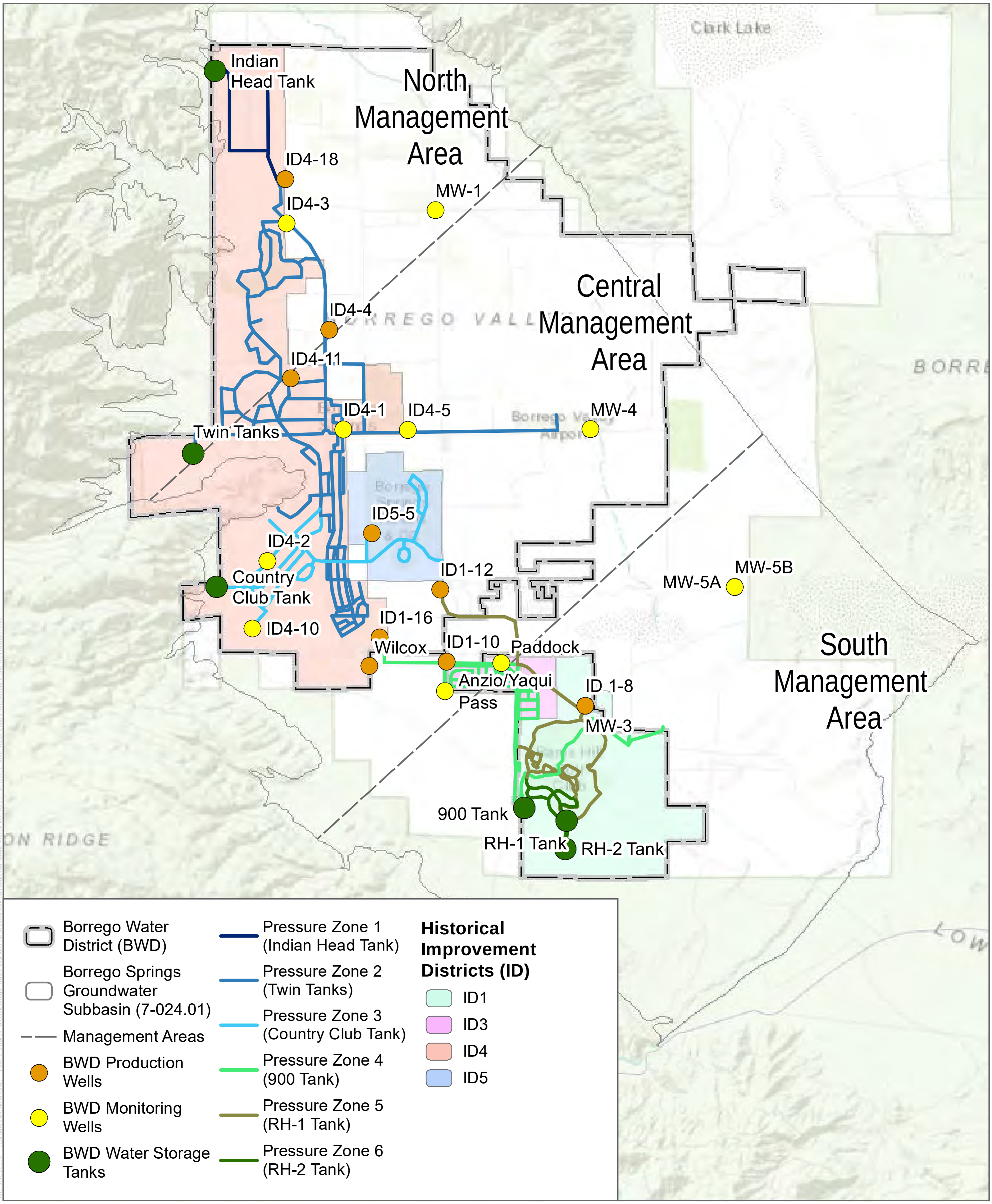
Holloway, G. 2018. “BWD Well Conditions.” Verbal communication from G. Holloway (Borrego Water District) to Trey Discoll and Hugh McManus (Dudek). July 25, 2018.

Roscoe Moss (Roscoe Moss Company). 2018. Technical Memorandum 004-2. Case Study Increased Well Efficiency, Extended Lifetime and Reduced Maintenance through Selection of Stainless Steel Casing and Well Screen – Sun City and Sun City West, Arizona. Site accessed: August 25, 2018: https://roscoemoss.com/wp content/uploads/techmemos/TechMemo004-2_Increased_Efficiency_of_Steel_Well_Casing_and.pdf.



SOURCE: USGS; BWD; DWR; NAIP 2016

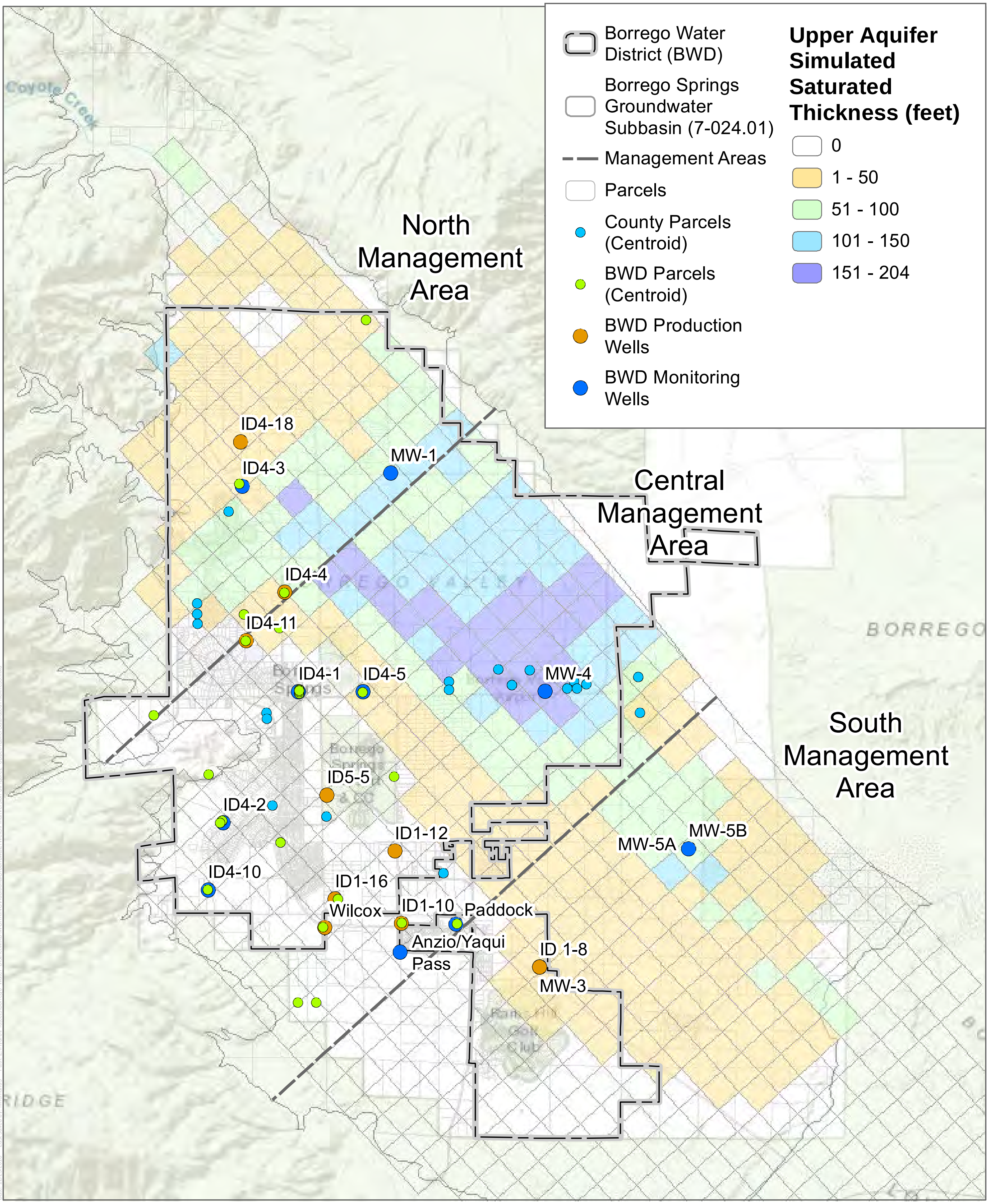
DUDEK

0 5,000 10,000 Feet

FIGURE 1

Borrego Water District Water Distribution Infrastructure and Well Network

Proposition 1 SDAC Grant Task 5 Water Vulnerability/ New Extraction Well Site Feasibility Analysis



SOURCE: USGS 2015; BWD; DWR

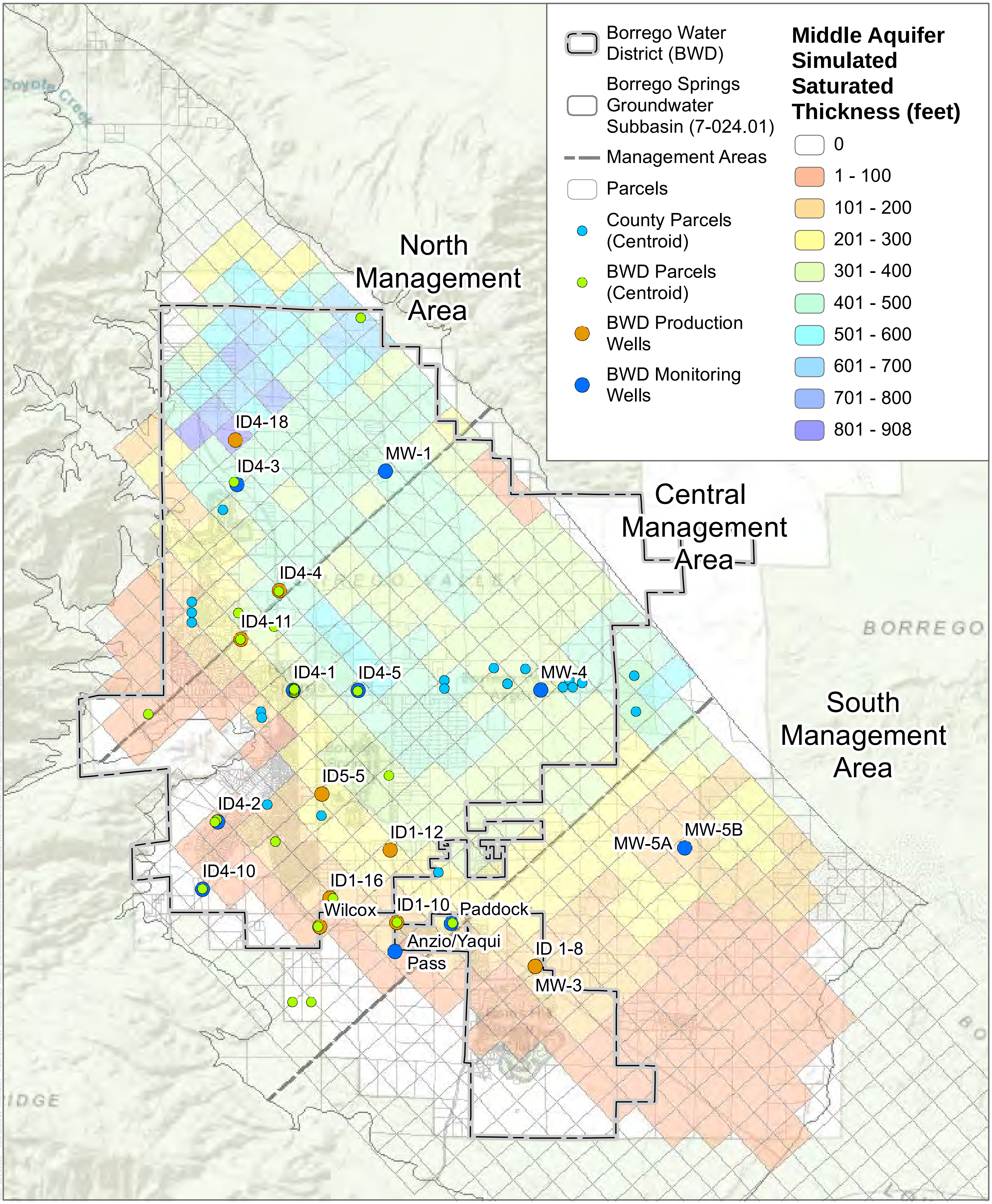
DUDEK

0 4,625 9,250 Feet

FIGURE 2

Upper Aquifer Simulated Saturated Thickness

Proposition 1 SDAC Grant Task 5 Water Vulnerability/ New Extraction Well Site Feasibility Analysis



SOURCE: USGS 2015; BWD; DWR

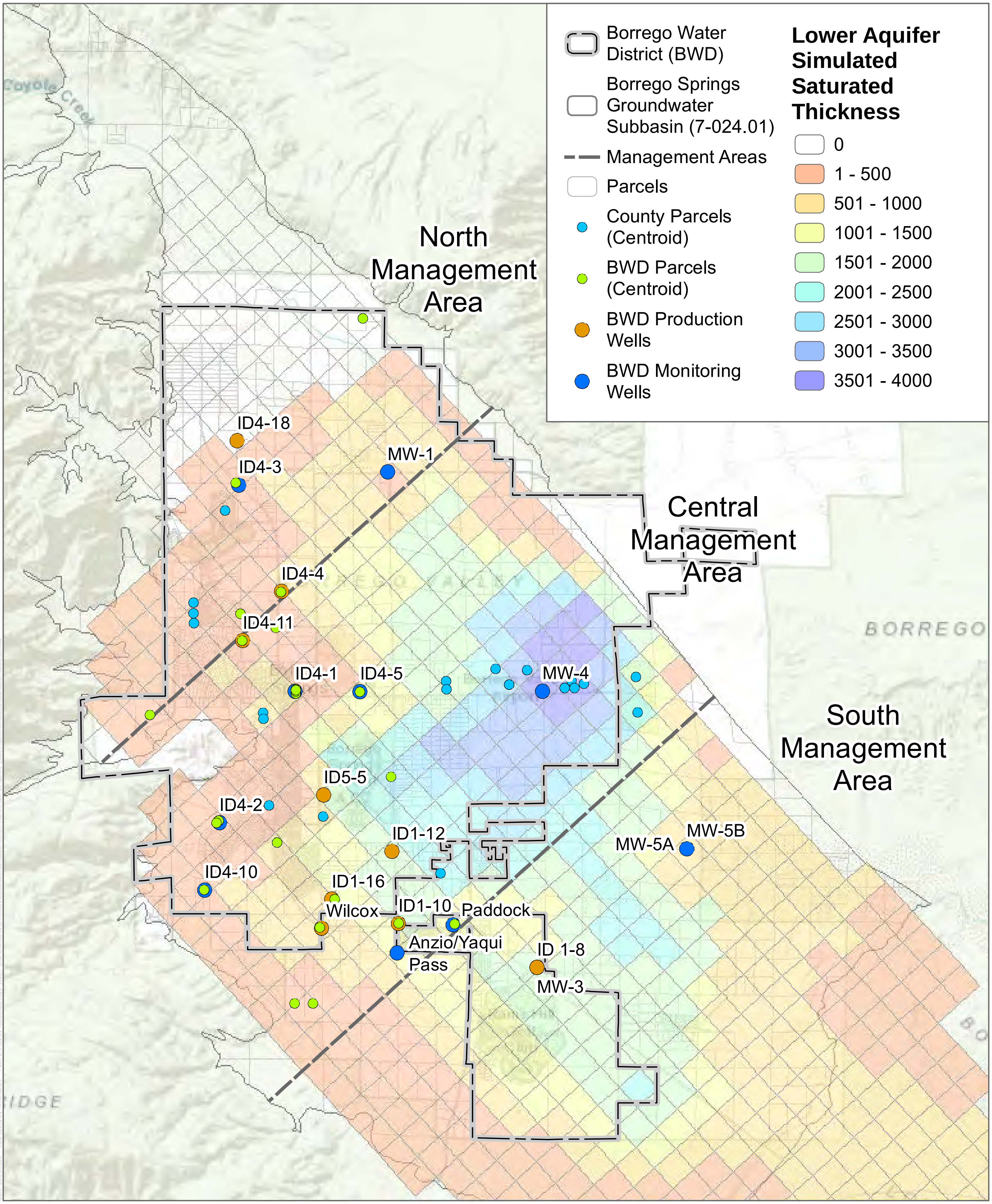
DUDEK

0 4,625 9,250 Feet

FIGURE 3

Middle Aquifer Simulated Saturated Thickness

Proposition 1 SDAC Grant Task 5 Water Vulnerability/ New Extraction Well Site Feasibility Analysis



SOURCE: USGS 2015; BWD; DWR

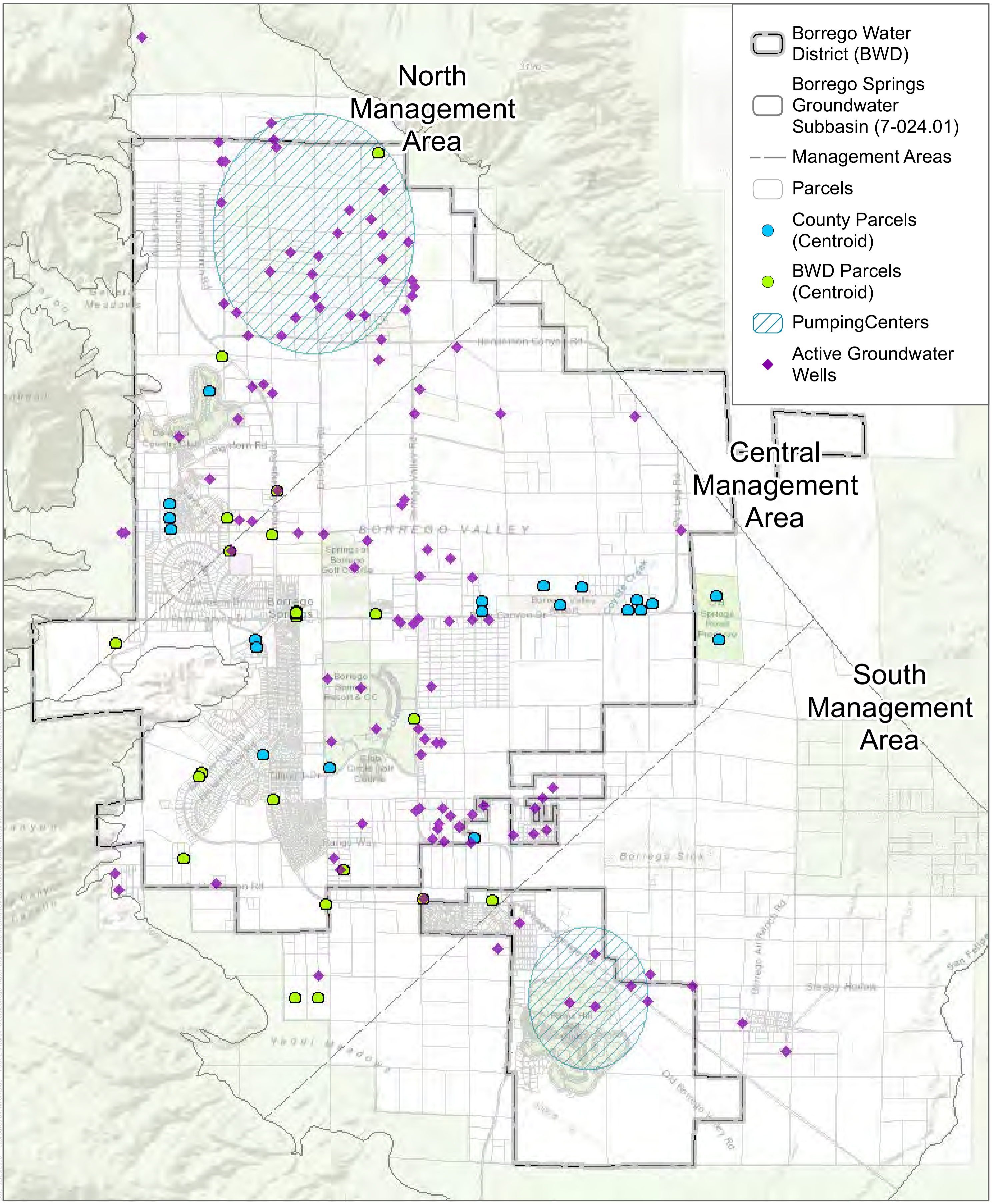
FIGURE 4

Lower Aquifer Simulated Saturated Thickness

Proposition 1 SDAC Grant Task 5 Water Vulnerability/ New Extraction Well Site Feasibility Analysis

DUDEK

0 4,625 9,250 Feet



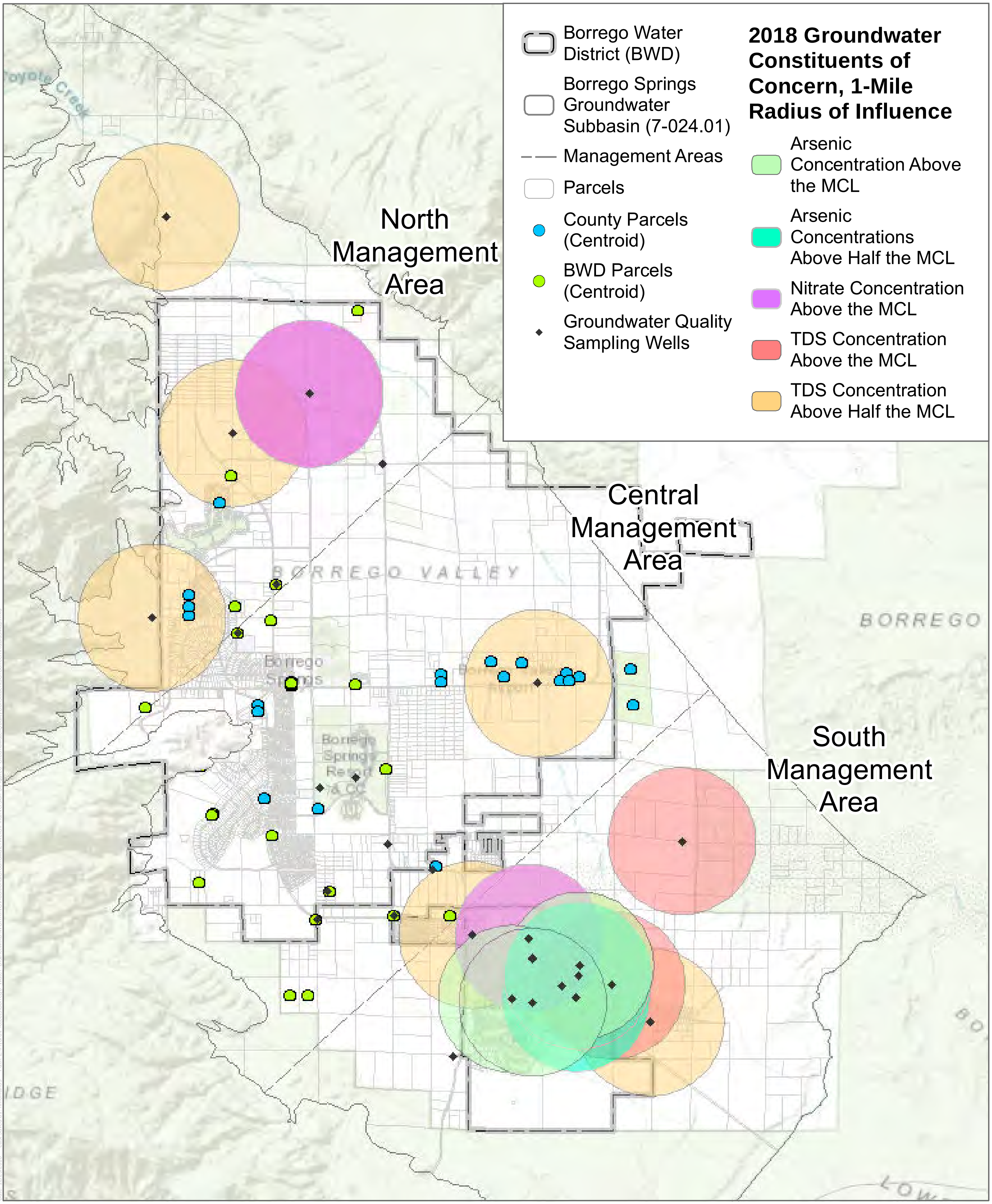
SOURCE: USGS; BWD; DWR; NAIP 2016

FIGURE 5

Well Interference

DUDEK

0 3,750 7,500 Feet



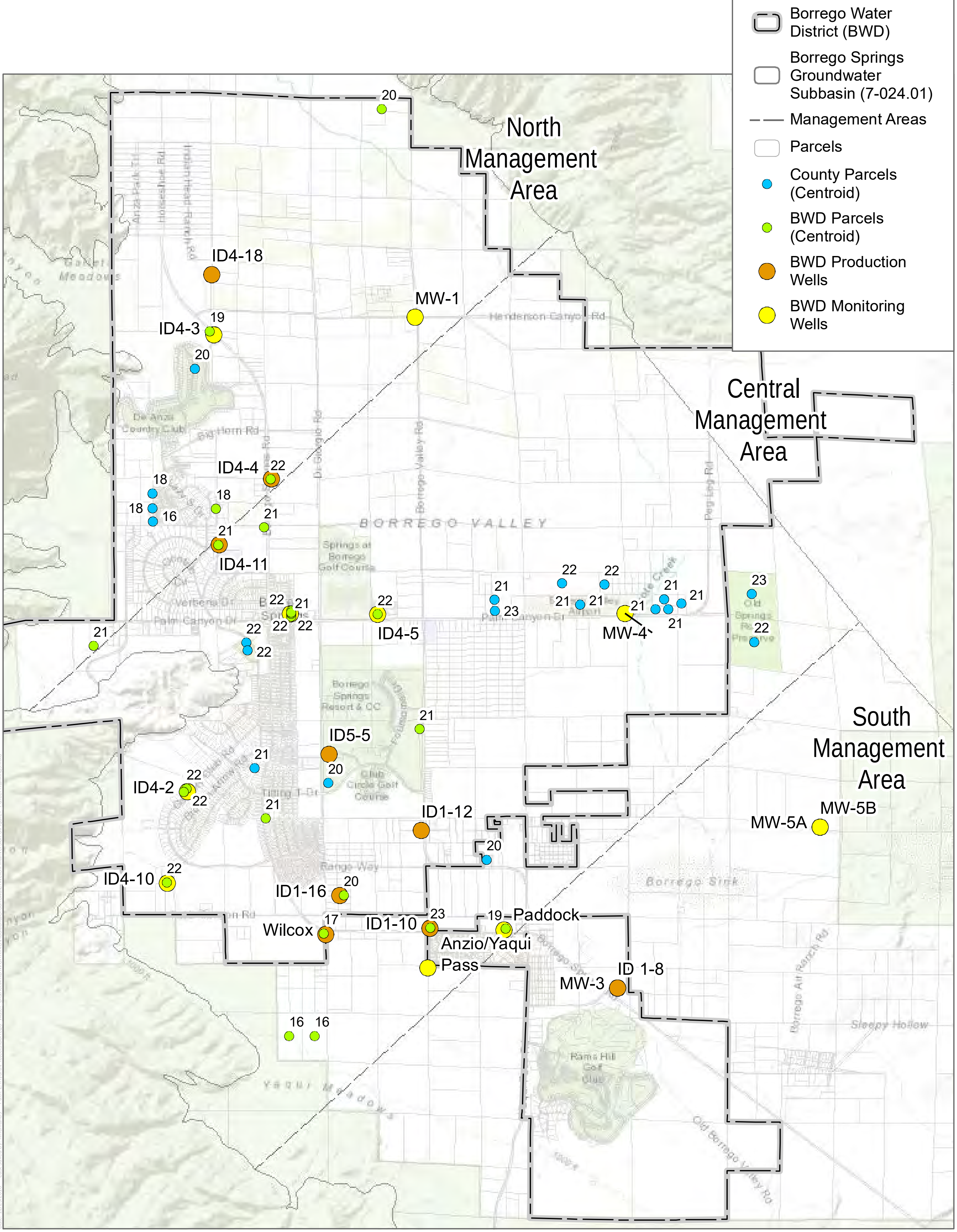
SOURCE: USGS; BWD; DWR; NAIP 2016

DUDEK

FIGURE 6

Groundwater Quality Constituents of Concern One-Mile Radius Map

Proposition 1 SDAC Grant Task 5 Water Vulnerability/ New Extraction Well Site Feasibility Analysis



SOURCE: USGS; BWD; DWR; NAIP 2016

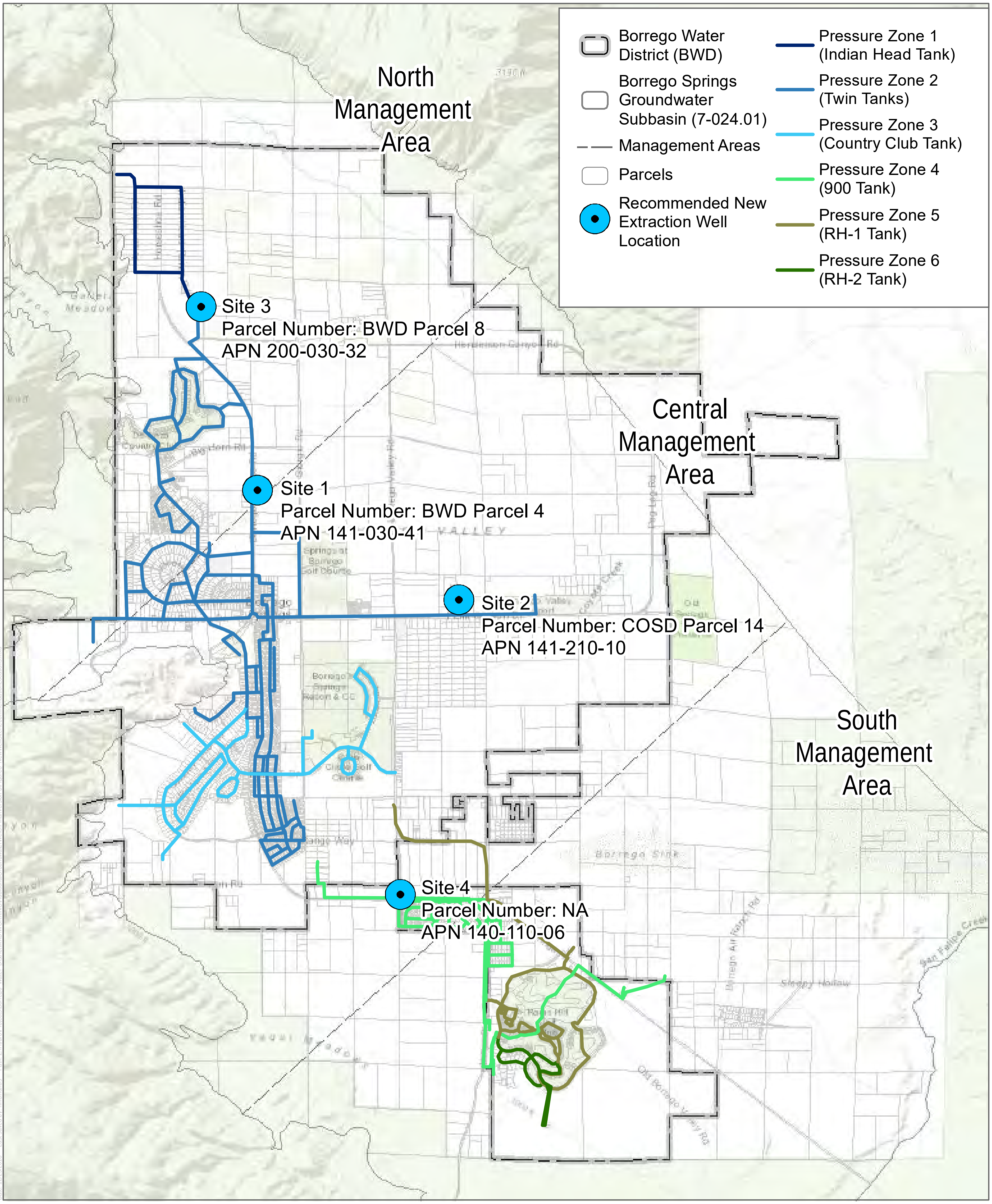
DUDEK

0 3,300 6,600 Feet

FIGURE 7

Well Ranking Results

Proposition 1 SDAC Grant Task 5 Water Vulnerability/ New Extraction Well Site Feasibility Analysis



SOURCE: USGS; BWD; DWR; NAIP 2016

DUDEK

FIGURE 8

Recommended New Extraction Well Locations

Proposition 1 SDAC Grant Task 5 Water Vulnerability/ New Extraction Well Site Feasibility Analysis

APPENDIX A
BWD Well Logs

RM114

ROSCOE MOSS COMPANY

4360 WORTH STREET
LOS ANGELES, CAL.

l No. 8 Drilled for DiGiorgio Corporation
ne (Borrego Springs Water Company)
ress P. O. Box B
Borrego Springs, California 92004
cation

rted Work July 20, 1972
mpleted Work August 2, 1972
tal Depth Drilled 938 Feet
tal Depth Completed -0-
lled By Hydraulic, Reverse Rotary Hydraulic Rotary

	DIAMETER	FROM	TO
PILOT BORE	12-1/4 in.	0 ft.	ft.
	29 in.	0 ft.	50 ft.
CONDUCTOR BORE	in.	ft.	ft.
	in.	ft.	ft.
COMPLETED WELL BORE	in.	ft.	ft.
	in.	ft.	ft.
	in.	ft.	ft.

CASING AND SCREEN SCHEDULE

Conductor Casing

aterial Mild Steel
iameter (OD) (ID) 24 in. Wall Thickness 1/4 in.
nstalled From 0 ft. To 50 ft.
emented From 2 ft. To 50 ft.

Well Casing

DIAMETER (ID) (OD)	WALL	MATERIAL	FROM	TO
None				

Screen

Type None
Material

DIAM. (ID) (OD)	WALL	NO. PERF. PER ROW	ROWS PER FOOT	SIZE	FROM	TO

Formation: Mention size of water gravel —

ft.	to	ft.	
0		35	~~Fine to coarse sand with~~ silty clay
75		108	Fine to coarse sand and gravel with silt
108		190	Fine ~~to~~ coarse sa~~n~~d and gravel with silty clay streaks
190		218	Brown clay with sand and gravel streaks
218		230	Brown and red clay
230		302	Boarse to very coarse sand with clay streaks
302		383	Fine to coarse sand and gravel ~~wsty~~ with clay strks
383		390	Brown and red clay
390		465	Fine to coarse sand, some gravel with clay streaks
465		505	Fine to coarse sand with shale streaks
505		519	Fine sand and red clay
519		546	Fine to very coarse cemented sand with grey clay streaks
546		610	Grey blue clay with fine sand streaks
610		627	Fine to coarse sand with grey clay streaks
627		654	Fine silty sand with clay streaks
654		745	Fine to very coarse sand some gravel with red & grey clay streaks
745		795	Red & grey caly with fine to coarse sand streaks, some gravel
795		817	Fine to coarse sand and gravel
817		859	Red and gray sticky clay with fine to coarse sand streaks

Formation: Mention size of water gravel —

ft.	to	ft.	
~~859~~		~~871~~	~~Fine to coarse sand~~ with thin cemented streak some clay

Completed Work August 2, 1972

Total Depth Drilled 938 Feet

Total Depth Completed -0-

Drilled By Hydraulic, Reverse Rotary Hydraulic Rotary

	DIAMETER	FROM	TO
PILOT BORE	12-1/4 in.	0 ft.	ft.
	29 in.	0 ft.	50 ft.
CONDUCTOR BORE	in.	ft.	ft.
	in.	ft.	ft.
COMPLETED WELL BORE	in.	ft.	ft.
	in.	ft.	ft.
	in.	ft.	ft.

CASING AND SCREEN SCHEDULE

Conductor Casing

Material Mild Steel

Diameter (OD) (ID) 24 in. Wall Thickness 1/4 in.

Installed From 0 ft. To 50 ft.

Cemented From 2 ft. To 50 ft.

Well Casing

DIAMETER (ID) (OD)	WALL	MATERIAL	FROM	TO
None				

Screen

Type None

Material

DIAM. (ID) (OD)	WALL	NO. PERF. PER ROW	ROWS PER FOOT	SIZE	FROM	TO

Water level when first started Test ft.

Draw down from standing level ft.

No. of gallons per minute pumped when Test first started

No. of gallons per minute pumped when Test completed

Draw down at completion of Test ft.

Hours Testing Well

No. of tons gravel installed

Gravel size: From in. To in. (Screen Size)

	" "		" and gravel streaks
218	" "	230	" Brown and red clay
230	" "	302	" Boarse to very coarse
	" "		" sand with clay streaks
302	" "	383	" Fine to coarse sand and
	" "		" gravel ~~wxx~~ with clay strk
383	" "	390	" Brown and red clay
390	" "	465	" Fine to coarse sand, som
	" "		" gravel with clay streaks
465	" "	505	" Fine to coarse sand with
	" "		" shale streaks
505	" "	519	" Fine sand and red clay
519	" "	546	" Fine to very coarse cem-
	" "		" ented sand with grey clay
	" "		" streaks
546	" "	610	" Grey blue clay with fine
	" "		" sand streaks
610	" "	627	" Fine to coarse sand with
	" "		" grey clay streaks
627	" "	654	" Fine silty sand with clay
	" "		" streaks
654	" "	745	" Fine to very coarse sand
	" "		" some gravel with red &
	" "		" grey clay streaks
745	" "	795	" Red & grey caly with fine
	" "		" to coarse sand streaks,
	" "		" some gravel
795	" "	817	" Fine to coarse sand and
	" "		" gravel
817	" "	859	" Red and gray sticky clay
	" "		" with fine to coarse sand
	" "		" streaks

Formation: Mention size of water gravel —

859	ft. to	871	ft. ~~Fine to coarse sand~~
	" "		" with thin cemented streaks
	" "		" some clay
871	" "	889	" Brown clay with fine to
	" "		" coarse sand streaks
889	" "	918	" Fine to coarse sand
	" "		" with clay streaks
918	" "	938	" Red and gray clay, some
	" "		" shale with fine to coarse
	" "		" sand streaks
	" "		"

of conductor pipe cemented in place (only)

AND THEN CASED AT A LATER DATE.

Date of report 8/2/72

Don Pittman

Type and Rig No. used Hyd. Rotary #9, Lloyd ~~Yes~~ Driller Wells

Superintendent

rm RM114

101-B

ROSCOE MOSS COMPANY

4360 WORTH STREET
LOS ANGELES, CAL.

ell No. 8 Drilled for DiGiorgio Corporation

ame (Borrego Springs Water Company)

ddress P. O. Box "B"

Borrego Springs, Calif. 92004

ocation Continuation of log done for same well mpleted 8/2/72 showing additional work done d casing installed.

arted Work September 10, 1972

ompleted Work September 21, 1972

otal Depth Drilled 938

otal Depth Completed 850

rilled By Hydraulic, Reverse Rotary Hydraulic Rotary

	DIAMETER	FROM	TO
PILOT BORE	12-1/4 in.	0 ft.	938 ft.
	in.	ft.	ft.
CONDUCTOR BORE	29 in.	0 ft.	50 ft.
	in.	ft.	ft.
COMPLETED WELL BORE	22 in.	50 ft.	324 ft.
	17-1/2 in.	324 ft.	870 ft.
	in.	ft.	ft.

CASING AND SCREEN SCHEDULE

Conductor Casing

aterial Mild Steel copper bearing plate

ameter ~~(OD)~~ (ID) 24 in. Wall Thickness 1/4 in.

stalled From 0 ft. To 50 ft.

emented From 2 ft. To 50 ft.

Well Casing

DIAMETER ~~(ID)~~ (OD)	WALL	MATERIAL	FROM	TO
2-3/4	1/4	Mild steel	0	72
2-3/4	1/4	copper-bearing	240	260
8-5/8	1/4	plate	830	850

Screen

pe Standard Machine Louver

terial Mild steel copper-bearing plate

DIAM. D) (OD)	WALL	NO. PERF. PER ROW	ROWS PER FOOT	SIZE	FROM	TO
2-3/4	1/4	8	4.5	.070	72	240

Formation: Mention size of water gravel — ft. to ft.

(FOR AQUIFER FORMATION SEE PRECEDING WELL LOG) WELL WAS ORIGINAL DRILLED AND NOT CASED & THEN AT A LATER DATE RE-OPENED AND CASED AS LISTED.

Development Record

Was Well Swabbed? Yes

Method Line swab

No. of Hours

Total Material Removed

otal Depth Drilled 938

otal Depth Completed 850

rilled By Hydraulic, Reverse Rotary Hydraulic Rotary

	DIAMETER	FROM	TO
PILOT BORE	12-1/4 in.	0 ft.	938 ft.
	in.	ft.	ft.
CONDUCTOR BORE	29 in.	0 ft.	50 ft.
	in.	ft.	ft.
COMPLETED WELL BORE	22 in.	50 ft.	324 ft.
	17-1/2 in.	324 ft.	870 ft.
	in.	ft.	ft.

CASING AND SCREEN SCHEDULE

Conductor Casing

aterial Mild Steel copper bearing plate

iameter ~~(OD)~~ (ID) 24 in. Wall Thickness 1/4 in.

stalled From 0 ft. To 50 ft.

emented From 2 ft. To 50 ft.

Well Casing

DIAMETER ~~(ID)~~ (OD)	WALL	MATERIAL	FROM	TO
2-3/4	1/4	Mild steel	0	72
2-3/4	1/4	copper-bearing	240	260
8-5/8	1/4	plate	830	850

Screen

ype Standard Machine Louver

aterial Mild steel copper-bearing plate

DIAM. (ID) (OD)	WALL	NO. PERF. PER ROW	ROWS PER FOOT	SIZE	FROM	TO
2-3/4	1/4	8	4.5	.070	72	240
2-3/4	1/4	8	4.5	.070	260	312
8-5/8	1/4	6	6	.070	312	830

ter level when first started Test 151 ft.

aw down from standing level 27 ft.

. of gallons per minute pumped when Test first started 253

. of gallons per minute pumped when Test completed 1100

aw down at completion of Test -80- ft.

urs Testing Well 30.

. of tons gravel installed 70 Tons

vel size: From in. To in. (Screen Size)

Crystal Silica 6-8 pit run

Development Record

Was Well Swabbed? Yes

Method Line swab

No. of Hours

Total Material Removed

Gravel Added

Rig No. 37 Developer Ronald A. Foster

Give any additional data which may be of future value

Date of report September 26, 1972

Donald G. Pittman

Driller

Type and Rig No. used Hydraulic Rotary #9, Lloyd Well

Superintende

D1-10

ROSCOE MOSS COMPANY

4360 WORTH STREET
LOS ANGELES, CAL.

RM114

Well No. 10 Drilled for DiGiorgio Corporation
Name (Borrego Springs Water Company)
Address P. O. Box "B"
Borrego Springs, Calif. 92004
Location N. W. Corner of Section 22, Twp. 11-S, Rg. 6-E, Borrego Springs, Calif. (San Diego County)
Started Work August 16, 1972
Completed Work September 9, 1972
Total Depth Drilled 816
Total Depth Completed 392
Drilled By Hydraulic, Reverse Rotary Hydraulic Rotary

	DIAMETER	FROM	TO
PILOT BORE	12-1/4 in.	0 ft.	816 ft.
	in.	ft.	ft.
CONDUCTOR BORE	29 in.	0 ft.	50 ft.
	in.	ft.	ft.
COMPLETED WELL BORE	22 in.	50 ft.	429 ft.
	in.	ft.	ft.
	in.	ft.	ft.

CASING AND SCREEN SCHEDULE

Conductor Casing

Material Mild Steel Copper-Bearing Plate
Diameter (OD) (ID) 24 in. Wall Thickness 1/4 in.
Installed From 0 ft. To 50 ft.
Cemented From 1 ft. To 50 ft.

Well Casing

DIAMETER (ID) (OD)	WALL	MATERIAL	FROM	TO
12-3/4	1/4	Mild steel	0	162
12-3/4	1/4	copper-bearing plate	372	392

Screen

Type Standard Machine Louver
Material Mild steel copper-bearing plate

DIAM. (ID) (OD)	WALL	NO. PERF. PER ROW	ROWS PER FOOT	SIZE	FROM	TO
12-3/4	1/4	9	4.5	.070	162	372

Water level when first started Test 130 ft.
Draw down from standing level 11 ft.
No. of gallons per minute pumped when Test first started 233
No. of gallons per minute pumped when Test completed 1110
Draw down at completion of Test 65 ft.
Hours Testing Well 24
No. of tons gravel installed 45
Gravel size: From in. To in. (Screen Size)

Formation: Mention size of water gravel —

From (ft.)	To (ft.)	Formation
0	40	Fine to coarse sand
40	77	Fine to coarse sand with some gravd
77	110	Fine to coarse sand with brown sand, clay streak
110	137	Fine to coarse sand
137	170	Fine to coarse sand with brown sandy clay streak
170	179	Cemented sand with some gravel
179	227	Fine to coarse sand with gravel
227	308	Cemented sand
308	385	Fine to coarse cemented sand with some gravel
385	391	Sandy red clay
391	399	Very fine sand
399	416	Fine to coarse sand with silt streaks
416	443	Fine to coarse with silt streaks
443	471	Fine to coarse sand and sandy clay with pink cla streaks
471	483	Very fine to medium sanc
483	517	Fine to very coarse sanc
517	588	Fine to coarse sand with sandy clay streaks
588	757	Fine to coarse sand, sor silt
757	816	Grey and blue clay with pink clay streaks.

Development Record

Was Well Swabbed? Yes
Method Bailer and wet swab.
No. of Hours 14
Total Material Removed 5 feet
Gravel Added 14 feet
Rig No. 53 Developer Wallace Wilson

Give any additional data which may be of future value

Date of report September 22, 1972
Donald G. Pittman
Driller

Type and Rig No. used Hydraulic Rotary #9, Lloyd W

DUPLICATE Driller's Copy 1D1 1c

Well 12

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in

No. 157263

Notice of Intent No.
Local Permit No. or Date W30037

State Well No.
Other Well No.

(1) OWNER: Name Digiorgio Development Corp.
Address P.O. Box A
City Borrego Springs, CA Zip 92004

(2) LOCATION OF WELL (See instructions):
County San Diego Owner's Well Number
Well address if different from above
Township 11S Range 6E Section
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well [X] Deepening [ ]
Reconstruction [ ]
Reconditioning [ ]
Horizontal Well [ ]
Destruction [ ] (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic [ ]
Irrigation [X]
Industrial [ ]
Test Well [ ]
Stock [ ]
Municipal [ ]
Other [ ]

(5) EQUIPMENT:
Rotary [X] Reverse [ ]
Cable [ ] Air [ ]
Other [ ] Bucket [ ]

(6) GRAVEL PACK:
Yes [X] No [ ] Size 4/7 well rock
Diameter of bore 0 to 50 is 36", 50 to 768 is 24"
Packed from 0 to 580 ft.

(7) CASING INSTALLED:
Steel [X] Plastic [ ] Concrete [ ]

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	50	26"		conductor		
50	580	14 3/4	5/16	248	568	20 rows

40 cuts of 3/32 x 2¼"

(9) WELL SEAL:
Was surface sanitary seal provided? Yes [X] No [ ] If yes, to depth 50 ft.
Were strata sealed against pollution? Yes [ ] No [X] Interval ft.
Method of sealing sanitary seal, conductor casing cement grout

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion 82' 6" ft.

(11) WELL TESTS: Aug. 18 & 19
Was well test made? Yes [X] No [ ] If yes, by whom? contractor
Type of test Pump [X] Bailer [ ] Air lift [ ]
Depth to water at start of test ft. At end of test ft.
Discharge 2,000+ gal/min after 24 hours from 113 ft. Water temperature
Chemical analysis made? Yes [ ] No [X] If yes, by whom?
Was electric log made? Yes [X] No [ ] If yes, attach copy to this report

(12) WELL LOG: Total depth 768 ft. Depth of completed well 580 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	12	White sand
12	13	Gravel & sand
13	20	Sand
20	28	Sand with clay
28	54	Clay w/ little sand
54	60	Sand & clay with small cobbles
60	94	Sand with little cobbles
94	96	Sand & brown clay
96	143	Gray clay & sand
143	150	Gray & brown clay with light cobbles
150	154	Cobbles & sand with some clay
154	176	Sand & cobbles
176	185	Cobbles & sand
185	205	Sand & cobbles
205	208	Cobbles and loose sand
208	234	Sand & cobbles
234	235	Boulder
235	294	Hard cobbles
294	340	Cobbles with clay & sand
340	380	Sand & clay with cobbles
380	384	Sand & clay
384	387	Cobbles & sand with clay
387	550	Sand & clay with cobbles
550	554	Cobbles
554	560	Sand & cobbles with clay
560	596	Sand with clay
596	645	Brown clay
645	652	Clay with sand
652	665	Clay
665	725	Clay with sand
725	768	Clay

Work started July 11 1984 Completed July 31 1984

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (signature) (Well Driller)
NAME AMERICAN DRILLING, INC.
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 278
City Aguanga, CA Zip 92302
License No. 324684 Date of this report Aug. 20, 1984

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

101

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in

No. 338383

Notice of Intent No. ______
Local Permit No. or Date ______

State Well No. ______
Other Well No. ______

(1) OWNER: Name Borrego Springs Dev. Corp.
Address P.O. Box 9
City Borrego Springs, Ca. ZIP 92004

(2) LOCATION OF WELL (See instructions):
County San Diego Owner's Well Number W-16
Well address if different from above ______
Township 11S Range 6E Section 16
Distance from cities, roads, railroads, fences, etc. ______

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well [X] Deepening [ ]
Reconstruction [ ]
Reconditioning [ ]
Horizontal Well [ ]
Destruction [ ] (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic [ ]
Irrigation [ ]
Industrial [ ]
Test Well [X]
Municipal [ ]
Other [ ]
(Describe)

(5) EQUIPMENT:
Rotary [X] Reverse [ ]
Cable [ ] Air [ ]
Other [ ] Bucket [ ]

(6) GRAVEL PACK:
Yes [X] No [ ] Size 5/16 x 4/16
Diameter of bore 26"
Packed from 50 to 550 ft.

(7) CASING INSTALLED:
Steel [X] Plastic [ ] Concrete [ ]

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	550	16"	.250	160	540	.060

(9) WELL SEAL:
Was surface sanitary seal provided? Yes [X] No [ ] If yes, to depth 50 ft.
Were strata sealed against pollution? Yes [ ] No [X] Interval ______ ft.
Method of sealing Cement Grout

(10) WATER LEVELS:
Depth of first water, if known ______ ft.
Standing level after well completion 172' ft.

(11) WELL TESTS:
Was well test made? Yes [X] No [ ] If yes, by whom? C.V. Pump
Type of test Pump [X] Bailer [ ] Air lift [ ]
Depth to water at start of test 172' ft. At end of test 230 ft.
Discharge 2500 gal/min after 72 hours Water temperature ______
Chemical analysis made? Yes [ ] No [ ] If yes, by whom? ______
Was electric log made Yes [X] No [ ] If yes, attach copy to this report

(12) WELL LOG: Total depth 705 ft. Completed depth 550 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	65	Coarse med to fine sand
		and gravel mixed
65	420	Coarse med to fine sand
		and gravel w/small rocks
420	490	Fine med to coarse sand
490	520	Fine med to coarse sand
		w/a couple thin streaks
		brown clay
520	640	Fine med to coarse sand
640	705	Fine med to coarse sand
		w/boulders (very tight)

Work started 5/8 19 89 Completed 7-20 19 89

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed [signature]
(Well Driller)
NAME Coachella Valley Pump & Supply, Inc.
(Person, firm, or corporation) (Typed or printed)
Address P.O. Drawer 999
City Indio, Ca. ZIP 92202
License No. 161541 Date of this report ______

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

104-95

TRIPLICATE
Retain this copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do Not Fill In

№ 61425

State Well No.

Other Well No.

(1) OWNER:

Name: Borrego Springs Water District

Address: P. O. Box B - Borrego Springs, Ca. 92004

(2) LOCATION OF WELL:

County: San Diego — Owner's number, if any: Well No. 4

Township, Range, and Section:

Distance from cities, roads, railroads, etc.: Borrego Springs Road, Borrego Springs, Ca.

(3) TYPE OF WORK (check):

New Well [X] Deepening [ ] Reconditioning [ ] Destroying [ ]

If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic [X] Industrial [ ] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [ ]

(5) EQUIPMENT:

Rotary [ ]
Cable [X]
Other [ ]

(6) CASING INSTALLED:

STEEL: SINGLE [ ] DOUBLE [X] OTHER:

If gravel packed

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
0	50	20ID	5/16			
0	802	14ID	10 ga.			

Size of shoe or well ring: 14"x14"x1-1/4" Heat treated

Describe joint: Welded

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen: Moss Hydraulics

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
470	500	6	12	5/32 x 2-1/4"
532	570	6	12	5/32 x 2-1/4"
586	786	6	12	5/32 x 2-1/4"

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes [X] No [ ] To what depth 50 ft.

Were any strata sealed against pollution? Yes [ ] No [X] If yes, note depth of strata

From ft. to ft.

From ft. to ft.

Method of sealing: Cement Grout

(9) WATER LEVELS:

Depth at which water was first found, if known: 150 ft.

Standing level before perforating, if known: 139 ft.

Standing level after perforating and developing: 139 ft.

(10) WELL TESTS:

Was pump test made? Yes [X] No [ ] If yes, by whom? R. M. Co.

Yield 1155 gal./min. with 90 ft. drawdown after 127 hrs.

Temperature of water — Was a chemical analysis made? Yes [ ] No [X]

Was electric log made of well? Yes [ ] No [X] If yes, attach copy

(11) WELL LOG:

Total depth 802 ft. Depth of completed well 802 ft.

Formation: Describe by color, character, size of material, and structure

From ft.	To ft.	Formation
0	25	Sand
25	40	Sandy clay
40	125	Sandy clay some gr
125	210	Sand, Clay, gravel to 1/4"
210	225	Hard sandy clay, fi gravel
225	235	Hard packed sand
235	250	Hard clay
250	254	Clay & gravel to 1/
254	274	Hard clay
274	278	Sand
278	282	Loose gravel up to 2-1/2"
282	286	Sand, some gravel
286	346	Sandy
346	350	Hard clay
350	354	Sandy
354	358	Sand&gravel to 3"
358	394	Sand
394	418	Sandy
418	426	Sand, &some gravel 3"
426	430	Sand
430	438	Hard sand
438	458	Sandy
458	466	Hard sand
466	470	Sand, some gravel to 1-1/2"
470	494	Sand, small gravel to 1/4"
494	502	Sand, fine gravel
502	514	Hard sand
514	526	Sand, fine gravel
526	530	Clay
530	534	Sand&gravel to 1-1/
534	538	Sand&small gravel to 1/4"

Work started 4-4 1979, Completed 5-23 1979

LOG CONTINUES PAGE 2

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Roscoe Moss Company (Person, firm, or corporation) (Typed or printed)

Address 4360 Worth Street, Los Angeles, Ca. 9003

[SIGNED] Joe Garcia (Well Driller)

License No. 624 (C-57) Dated Nov. 28, 1979, 19

SKETCH LOCATION OF WELL ON REVERSE SIDE

DWR 188 (REV. 9-68)

Borrego Springs Water District
Well No. 4 Well Log:

Page 2. . . . .

Ft.	Ft. to	Ft.
538	546	San & fine gravel
546	554	Sand & small gravel to 1/4"
554	574	Sand & gravel to 3"
574	582	Sandy clay
582	606	Sand& small gravel to 1/4"
606	610	Hard sandy clay
610	618	Sand & gravel to 1-1/2"
618	630	Sand & small gravel to 1/8"
630	634	Sand
634	666	Sand & small gravel to 1/8"
666	674	Sand & fine gravel
674	686	Sand & gravel to 1/8"
686	746	Sand & gravel to 1/2"
746	762	Sand & small gravel to 1/8"
762	778	Sand, clay, small gravel to 1/8"(gray)
778	786	Sand, & small gravel to 3/8"
786	802	Sand, clay, &gravel to 3".

ROSCOE MOSS COMPANY

Form RM 114

4360 WORTH STREET
LOS ANGELES, CAL.

JUN 6 - 1979

Well No. Well No. 4 Job No. A-511

Owner Borego Springs Water District

Address P. O. Box B, Borrego Springs, Ca. 92004

Location T ____ R ____ Sec. ____
¼ ¼ ¼

Borego Springs Road

Started Work 4-4-79

Completed Work 5-23-79

Total Depth Drilled 802'

Depth Water First Encountered 150'

MATERIALS

Conductor Casing

Material Mil Steel

Diameter (OD) (ID) 20" in. Wall Thickness 5/16 in.

Installed From 0 ft. To 50' ft.

Cemented From 45 ft. To 50' ft.

Well Casing

DIAMETER (OD)(ID)	WALL OR GAUGE	MATERIAL	FROM	TO
14" ID	10	Kai Wel	0	802'

Starter Used 18 ft. of 2 ply 8 wall or gauge

Size Shoe 14x14x1¼" Heat treated shoe

PERFORATIONS

Type of Perforator Used Moss Hydraulics

FROM	TO	WIDTH	LENGTH	Rows per FOOT	Perf.
470	500	5/32	2¼	12	6 per row
532	570	5/32	2¼	12	6 per row
586	786	5/32	2¼	12	6 per row

Formation: Mention size of water gravel —

From (ft.)	To (ft.)	Formation
0	25	Sand.
25	40	Sandy clay.
40	125	Sandy clay, some gravel.
125	210	Sand, clay, gravel to ¼".
210	225	Hard sandy clay, fine gra
225	235	Hard packed sand.
235	250	Hard clay.
250	254	Clay & gravel to 1/8".
254	274	Hard clay.
274	278	Sand.
278	282	Loose gravel up to 2½".
282	286	Sand, some gravel.
286	346	Sandy.
346	350	Hard clay.
350	354	Sandy.
354	358	Sand & gravel to 3".
358	394	Sand.
394	418	Sandy.
418	426	Sand, &some gravel to 3".
426	430	Sand.
430	438	Hard sand.
438	458	Sandy.
458	466	Hard sand.
466	470	Sand, some gravel to 1½".
470	494	Sand, small gravel to ¼".
494	502	Sand, fine gravel.
502	514	Hard sand.
514	526	Sand, fine gravel.
526	530	Clay.
530	534	Sand & gravel to 1½".
534	538	Sand & small gravel to ¼"
538	546	Sand & fine gravel.
546	554	Sand& small gravel to ¼".
554	574	Sand & gravel to 3".
574	582	Sandy clay.
582	606	Sand & small gravel to ¼"
606	610	Hard sandy clay.
610	618	Sand & gravel to 1½".

See back of paper for rest of formation.

If Well Is Reduced, Indicate:

Amount of Lap at Reduction ____ ft.

Amount of Lap at Reduction ____ ft.

Amount of lap at Reduction ____ ft.

Method of Sealing at Reduction ____

Give any additional data which may be of future value ____

Formation: Mention size of water gravel.

618	ft.-to	630	ft.	Sand & small gravel to 1/8".
630	"	634	"	Sand.
634	"	666	"	Sand and small gravel to 1/8"
666	"	674	"	Sand and fine gravel.
674	"	686	"	Sand and gravel to 1/8".
686	"	746	"	Sand and gravel to ½".
746	"	762	"	Sand and small gravel to 1/8".
762	"	778	"	Sand, clay, small gravel 1/8" (gray).
778	"	786	"	Sand, and small gravel to 3/8".
786	"	802	"	Sand, clay, and gravel to 3".

ID 4-11

TRIPLICATE
Owner's Copy
Page 1 of 1
Owner's Well No. 11
Date Work Began 3/30/95, Ended
Local Permit Agency Co. of San Diego, Environmental Health
Permit No. W62937 Permit Date 3/30/95

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 460084

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) XXX VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0'	30'	Fine to coarse sand gravel
30'	60'	Brown Clay
60'	90'	Brown, Silty, Clay, Strike, sand gravel
90'	120'	Brown, silty clay
120'	190'	Brown, Silty clay, strike fine med sand.
190'	220'	Brown, Clay
220'	280'	Brown, clay strike, fine med sand gravel, lime.
280'	400'	Fine med coarse sand
400	430'	Fine to coarse sand gravel strike brown clay
430'	570'	Fine to coarse sand
570'	740'	Fine to coarse sand
740'	770'	Fine med coarse sand thin strike e brown clay
770'	800'	Fine, med sand tight cement sand

TOTAL DEPTH OF BORING 800' (Feet)
TOTAL DEPTH OF COMPLETED WELL 770' (Feet)

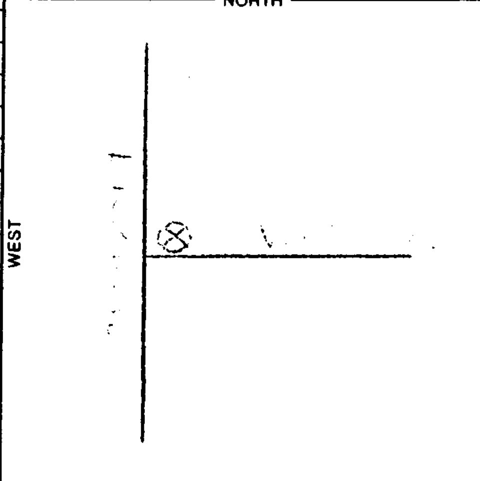
WELL OWNER

Name Borrego Springs Water Company
Mailing Address P.O. Box 369
CITY Vista STATE CA ZIP 92805

WELL LOCATION

Address 2201 Diegumo
City Borrego Springs CA 92004
County San Diego
APN Book ___ Page ___ Parcel 141-030-36
Township 10S Range R6E Section 32
Latitude ___ DEG. MIN. SEC. NORTH Longitude ___ DEG. MIN. SEC. WEST

LOCATION SKETCH



Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

XX NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING
WATER SUPPLY
___ Domestic
___ Public
___ Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
XX OTHER (Specify) Community

DRILLING METHOD Rotary FLUID Bentonite

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL 162' (Ft.) & DATE MEASURED 5/16/95
ESTIMATED YIELD* 185' (GPM) & TEST TYPE 2000
TEST LENGTH 7 1/2 (Hrs.) TOTAL DRAWDOWN 23 (Ft.)
* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0'	450'	22"	XX					14"	.250	
450'	760'	22"		XX				14"	.250	.060
760'	770'	22"	XX					14"	.250	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0'	50'	XXX			
50'	150'			XXX	3/8"
150'	770'				8 x 12

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Ari-Cal Pump & Supply, Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

PO Drawer 090 Indio, CA 92202
ADDRESS CITY STATE ZIP

Signed [signature] 7-11-95 490061
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 230419

Notice of Intent No. 197556
Local Permit No. or Date

State Well No.
Other Well No. WELL 18

(1) OWNER: Name Di Giorgio Development Corp
Address 3230 5th Ave Suite A
City San Diego Zip 92103

(2) LOCATION OF WELL (See instructions):
County San Diego Owner's Well Number
Well address if different from above Henderson Canyon & Borrego Spr Rd.
Township 10 S Range 6 E Section 18
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☒
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size #4 x #7
Diameter of bore 12"
Packed from 41 yds. to ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	50	24	.250	240	300	3/32" x
0	570	12	3/4" x	310	385	2½" x
			.250	395	405	22 row

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing cement grout

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion 226 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? R. Anderson
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge 1200 gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 699 ft. Depth of completed well 570 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	34	Fine-med. sand w/few rocks
		@ 31'
34	42	Loose medium sand
42	44	Cemented sand
44	66	Loose sand & gravel,
		occasional rock
66	105	Tighter sand & gravel
105	243	Looser sand & gravel,
		occasional rocks, semi
		consolidated sand & gravel
243	273	Semi-consolidated sand
273	280	Consolidated sand
280	308	Semi consolidated sand
		and gravel
308	314	Consolidated sand
314	330	Semi consolidated sand &
		gravel
330	341	Consolidated sand & gravel
341	375	Semi consolidated sand &
		gravel
375	380	Consolidated sand & gravel
380	410	Semi consolidated sand &
		gravel
410	455	Very silty sand & gravel
455	477	Slightly cleaner sand &
		gravel
477	507	Silty sand & gravel
507	560	Slightly cleaner sand &
		gravel
560	565	Silty sand & some gravel
565	570	Very silty sand & gravel
570	585	Silty sand & gravel
585	590	Very silty sand
590	699	Silty sand & gravel w/
		occasional boulders that
		drill very rough.

PERFORATION CONTINUED
425-440' 460-475' 490-560'

Work started 19 82 Completed 19 82

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED
(Well Driller)

NAME REX ANDERSON CORPORATION
(Person, firm, or corporation) (Typed or printed)
Address P.O. BOX 384
City Julian Zip 92036
License No. A 305739 Date of this report March 1982

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 765054

Page 1 of 1

Owner's Well No. 2

Date Work Began 5/15/00 Ended 6/1/00

Local Permit Agency San Diego Co. Dept. Enviromental Health

Permit No. W30559 Permit Date 4/26/00

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD Rotary FLUID Bentonite

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION (Describe material, grain size, color, etc.)
0 to 37	Medium sand with streaks of fine sand
37 to 67	Coarse medium to fine sand
67 to 97	Coarse fine to medium sand
97 to 708	Coarse medium sand with thin streaks of fine sand

TOTAL DEPTH OF BORING 708 (Feet)

TOTAL DEPTH OF COMPLETED WELL 700 (Feet)

WELL OWNER

Name Cameron Brothers

Mailing Address 7756 BalboaAve

San Diego, CA 92111
CITY STATE ZIP

WELL LOCATION

Address Borrego Springs Country Club

City Borrego Springs

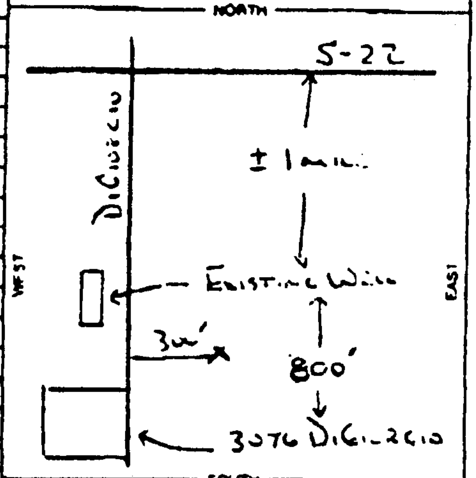
County San Diego

APN Book 199 Page 080 Parcel 14

Township ___ Range ___ Section ___

Latitude ___ NORTH Longitude ___ WEST
DEG. MIN. SEC. DEG. MIN. SEC.

LOCATION SKETCH



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
X Domestic ___ Public
X Irrigation ___ Industrial

MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 200 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 160' (Ft.) & DATE MEASURED 6/1/00

ESTIMATED YIELD * 50 (GPM) & TEST TYPE 3000 GPM / Turbine

TEST LENGTH 24 (Hrs.) TOTAL DRAWDOWN 50 (Ft.)

* May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE: BLANK	TYPE: SCREEN	TYPE: CON-DUCTOR	TYPE: FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 to 400	26"	X				Steel	16"	.250	
400 to 700	26"		X			Steel	16"	.250	.060

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 to 100	X			
100 to 700			X	8 x 16

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Palm Springs Pump Company
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

PO Box 94 Thermal CA 92274
ADDRESS CITY STATE ZIP

Signed [signature] 8/12/00 749713
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11/97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

County Mail Station —A-21

FIRST CARBON COPY
send to County Health Dept. Room 104

ASSESSORS PARCEL NUMBER: 200 130 01

COUNTY OF SAN DIEGO
DEPARTMENT OF HEALTH SERVICES
1700 PACIFIC HIGHWAY, SAN DIEGO, CA 92101

Notice of Intent No. 154172
Local Permit No. or Date

WATER WELL DRILLERS REPORT
(INSERT under ORIGINAL PAGE w/carbon of State Form)

State Well No.
Other Well No.

(1) OWNER: Name THOMAS WILCOX
Address ONE MONTGOMERY STREET
City SAN FRANCISCO Zip 94104

(2) LOCATION OF WELL (See instructions):
County SAN DIEGO Owner's Well Number
Well address if different from above BORREGO SPRINGS
Township 11S Range 6E Section 21
Distance from cities, roads, railroads, fences, etc. SEE ATTACHED

FOR HEALTH DEPARTMENT USE ONLY
Completed Well Construction:
Date 13 [illegible]
Date Inspected
Comments [illegible]
Water Sample Taken?
Sanitarian's Approval: [illegible]

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item (2)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other COMMERCIAL ☐

(5) Equipment:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) Gravel Pack:
Yes ☒ No ☐ Size 5/16" x 1/16
Diameter of above 12"
Packed from 35 YAS to ____ ft.

(7) Casing Installed:
Steel ☒ Plastic ☐ Concrete ☐

(8) Perforations:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot Size
0	502	12¾	.250	242	502	3/32" x 2½" x 22 ROW

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ____ ft.
Method of sealing CEMENT GROUT

(10) WATER LEVELS:
Depth of first water, if known ____ ft.
Standing level after well completion 245.9 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? R. ANDERSON
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test ____ ft. At end of test ____ ft.
Discharge 900+ gal/min after ____ hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth ____ ft. Depth of completed well 502 ft.

from ft. to ft.	Formation (Describe by color, character, size or material)
0 - 8	SAND + GRAVEL, QUITE LOOSE
8 - 14	TIGHTER SAND + GRAVEL
14 - 17	ROCKS (COULD FROM 135" TO 11")
17 - 33	SEMI-CONSOLIDATED SAND + GRAVEL
33 - 76	FAIRLY LOOSE SAND + GRAVEL
	W/ROCKS @ 38' + 42'
76 - 82	TIGHTER SAND + GRAVEL
82 - 89	LOOSE SAND + GRAVEL
89 - 91	CEMENTED SAND + GRAVEL
91 - 122	FAIRLY LOOSE SAND + GRAVEL
	W/OCCASIONAL CHATTER
122 - 123	CEMENTED SAND + GRAVEL
123 - 141	LOOSER SAND + GRAVEL
141 - 141'6"	CEMENTED (VERY HARD)
141'6" - 143	LOOSE SAND + GRAVEL
143 - 152	TIGHTER SAND + GRAVEL
152 - 212	CONSOLIDATED SAND + GRAVEL
	DRILLS SLOW W/SLIGHT ROUGHNESS
212 - 223	SEMI-CONSOLIDATED SAND + GRAVEL
223 - 224	CEMENTED SAND
224 - 231	CONSOLIDATED SAND + GRAVEL
231 - 251	SEMI-CONSOLIDATED SAND AND
	SMALL GRAVELS - SLIGHTLY
	LOOSER DRILLING.
251 - 283	CONSOLIDATED SAND + SMALL
	GRAVEL - TIGHTER + ROUGHER DRLG
283 - 287	ROUGH + SLOW DRLG.
	CEMENTED SAND.
287 - 315	SEMI-CONSOLIDATED SAND + SMALL
	GRAVELS. DRILLS LOOSER PAST 29[illegible]
315 - 325	SEMI-CONSOLIDATED SAND + LIGHT
	GRAVEL
325 - 385	CONSOLIDATED (CEMENTED?) SANDS
	W/OCCASIONAL ROUGH SPOTS. VERY
	ROUGH FROM 363-365.
385 - 435	CONSOLIDATED SAND + LIGHT GRAVEL
435 - 437	CONSOLIDATED SAND + SMALL GRAVEL
437 - 447	SEMI-CONSOLIDATED SAND
447 - 487	CONSOLIDATED SAND W/CLAY OVE[illegible]

Work started 8/26/81 19__ Completed 11/19 1981

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED Rex E. Anderson (Well Driller)
NAME REX ANDERSON CORPORATION (Person, firm, or corporation) (Typed or printed)
Address P.O. BOX 384
City JULIAN Zip 92036
License No. A 305734 Date of this report 12-28-81

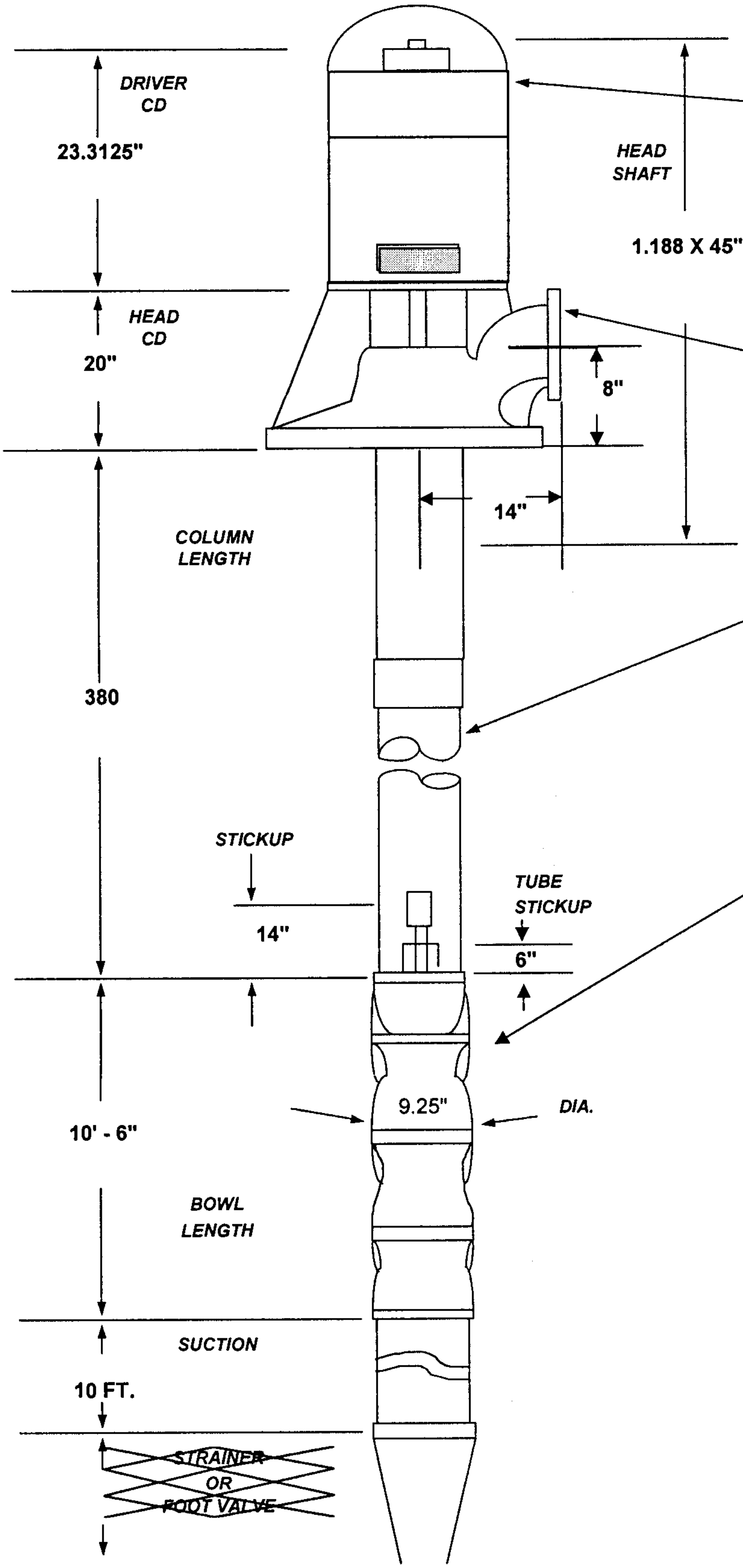
 CONFIDENTIAL — NOT FOR PUBLIC USE — WATER CODE SEC. 13752

HVPS, Inc.

CUSTOMER : BORREGO WATER DISTRICT
WELL #: WILCOX WELL
W.O. # 14514
DATE : 10/27/00

DESIGN CONDITIONS

GPM: 350 FTDH: 570 BHP: 61.2



MOTOR NAMEPLATE INFO.

MFG. AMARILLO VOLTS
MODEL 80A FRAME RPM 1775
ENCL BD 16.5 SHAFT DI 1.188
ID/SER #

SIZE AND TYPE HEAD

INLET 6 OUTLET 6 BASE 14" 150# FLG.
MOTOR B 16.5 MAKE GOULDS MODEL 6 X 16.5 L
TOP COLUM NIPPLE SIZE: 6" LENGTH: 12"

COLUMN ASSY. AND TYPE

TOP COLUMN: 6" OIL TUBE: 2" SHAFT: 1.188"
TPI: 14 TPI: 12
BOTTOM COLUMN: 6" OIL TUBE: 2" SHAFT: 1.188
TPI: 14 TPI: 12

BOWL ASSY. INFO.

DIA.: 9.5" #STAGES 13 IMP DIA: 6.8125"
BOWL #: IMP #
MAKE: OULDS MODEL: 9RCLC
SER #: FR430294

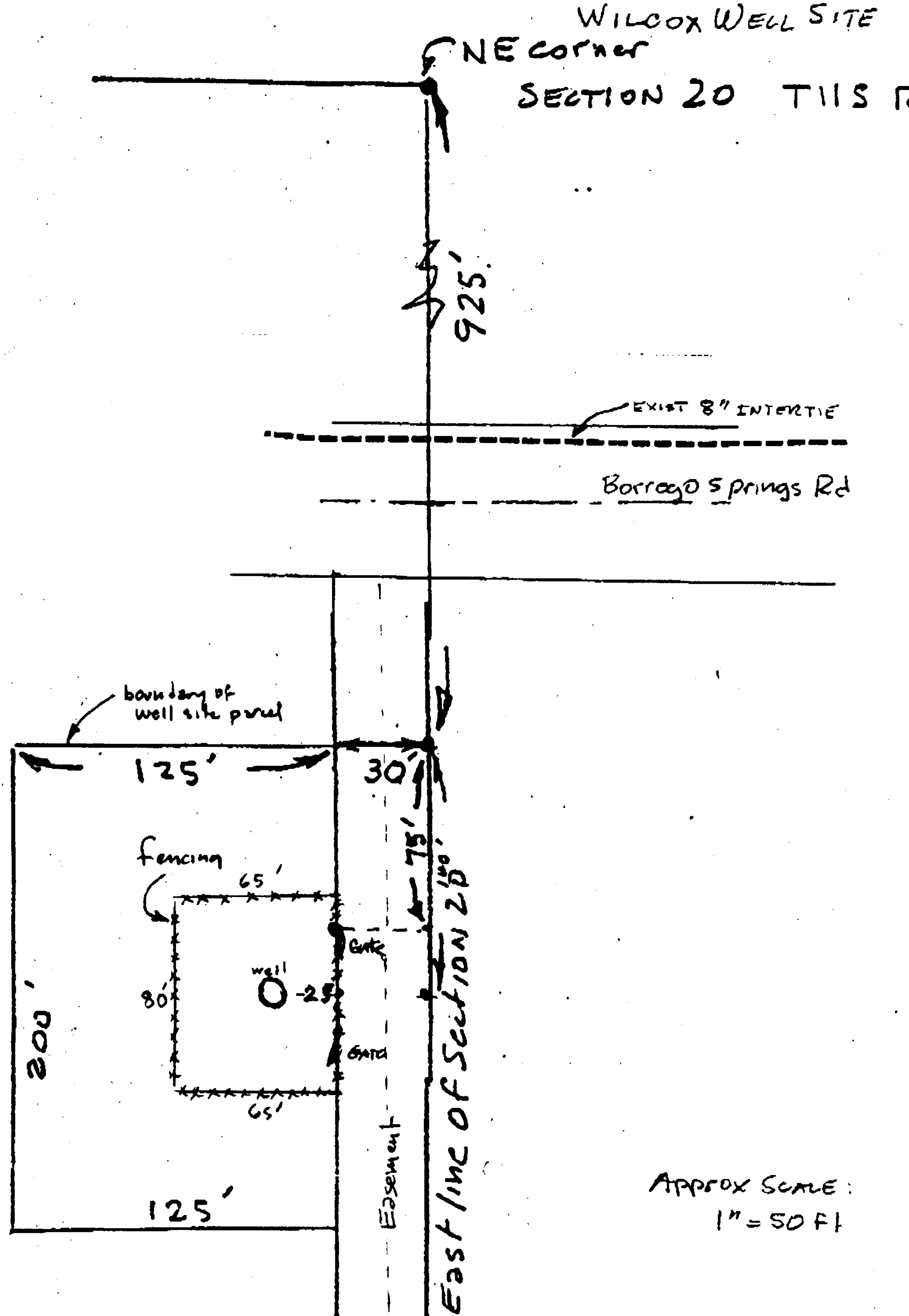
SUCTION INFO. (LIST ADAPTIONS)

6" X 10FT. LONG T.O.E. SUCTION NIPPLE

OTHER ADAPTIONS:

WELL DIAMETER AND DEPTH

12" DIA. , 482' DEEP


WILCOX WELL SITE
NE corner
SECTION 20 T11S
925'
EXIST 8" INTERTIE
Borrego Springs Rd
boundary of well site parcel
125'
30'
75'
fencing
65'
well
80'
200'
Gate
Gate
65'
125'
Easement
East line of Section 20
Approx Scale: 1" = 50 Ft

COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC HEALTH
1600 PACIFIC HIGHWAY
SAN DIEGO' CALIF. 92101

WELL PERMIT APPLICATION

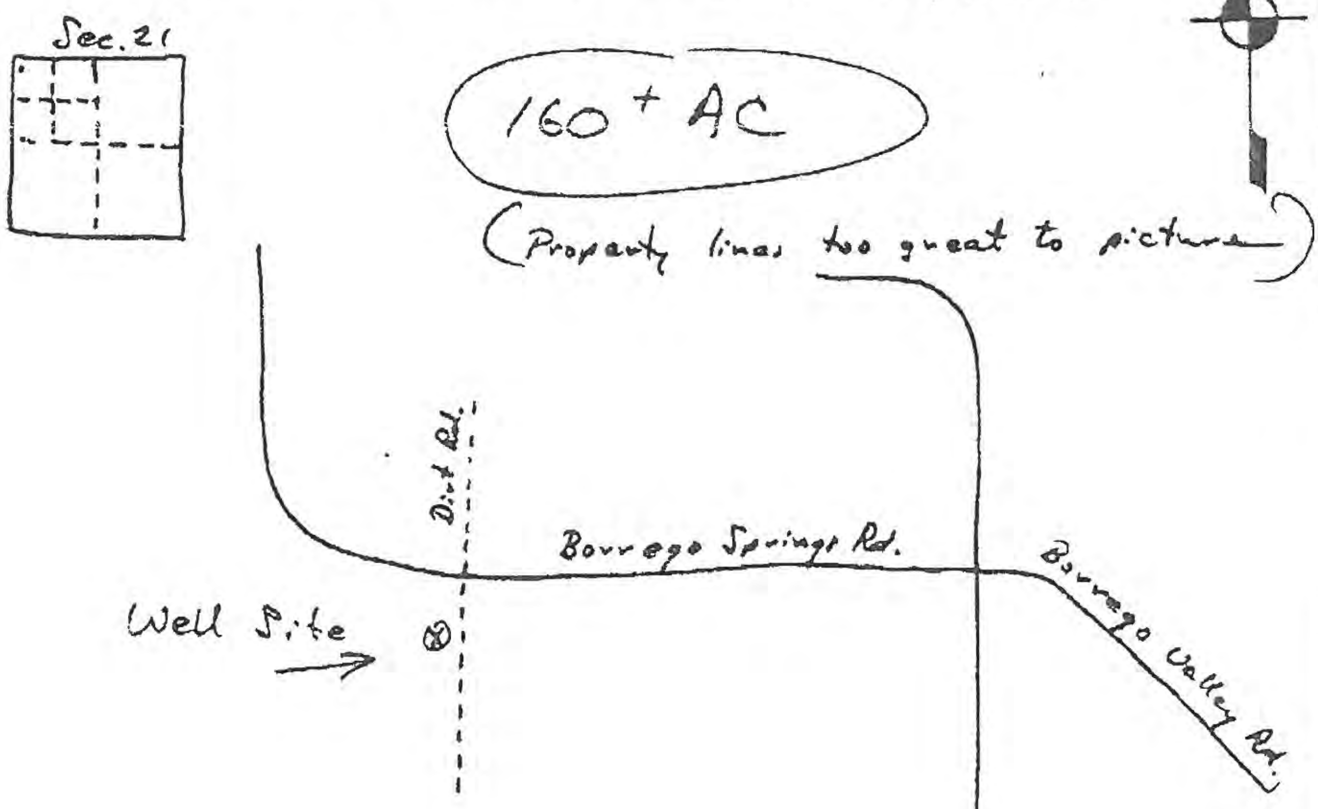
Permit No. ______________

Assessor's Parcel No. 200-130-01

LOCATION

INDICATE BELOW THE EXACT LOCATION OF WELL WITH RESPECT TO THE FOLLOWING ITEMS: PROPERTY LINES, WATER BODIES OR WATER COURSES, DRAINAGE PATTERN, ROADS, EXISTING WELLS, SEWERS AND PRIVATE SEWAGE DISPOSAL SYSTEMS. INCLUDE DIMENSIONS.

Well site appears to be located in the NW 1/4 of the NW 1/4 of Sec. 21, T11S, R6E.



- Well site is approx. 200' south of Borrego Springs Rd. + 50ft west of small dirt road.
- No Buildings are in this area + no Health Hazards Are Present.

Roy G. Anderson

104-2

ORIGINAL
File with DWR

Notice of Intent No.____
Local Permit No. or Date____

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in
No. 126538
State Well No.____
Other Well No.____

(1) OWNER: Name Borrego Springs Water Co.
Address Box B
City Borrego Springs, Calif. Zip 92004

(2) LOCATION OF WELL (See instructions):
County San Diego Owner's Well Number No. 2 (New)
Well address if different from above____
Township T11S Range R6E Section Sec. 7
Distance from cities, roads, railroads, fences, etc. Approx. 2 1/2 mi south west of Christmas Circle on Country Club Rd., Borrego Springs, Calif.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☒
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size #4 x #7
Diameter of bore 24"
Packed from 0 to 380 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	50	26	.322
2	380	14	.250

(8) PERFORATIONS:
Type of perforation or size of screen____

From ft.	To ft.	Slot size
240	325	3/32
355	370	

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval____ft.
Method of sealing Cement Grout

(10) WATER LEVELS:
Depth of first water, if known — ft.
Standing level after well completion 254 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? Rex Anderson
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test 254 ft. At end of test 254 ft
Discharge 350 gal/min after 24 hours Water temperature —
Chemical analysis made? Yes ☒ No ☐ If yes, by whom? Borrego Springs Water Co.
Was electric log made? Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 468 ft. Depth of completed well 380 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	66	Sand
66	73	Fine gravel w/ very little sand
73	86	Sand w/ small gravel
86	141	Sand w/ small gravel & rock
141	154	Sand & Gravel
154	159	Boulders & sand
159	188	Sand & gravel
188	191	Sand & gravel w/ some clay
191	255	Sand & gravel w/ some clay, semi-consolidated
255	270	Boulders & clay
270	290	Sand & gravel in clay
290	294	Boulders & clay
294	320	Sand & clay
320	322	Rocks & clay
322	328	Sand w/ clay, slow drilling
328	337	Sand, clay & gravel
337	338	Sand w/ little clay
338	347	Clay
347	359	Sand, clay & gravel
359	367	Sand & gravel w/ some clay
367	372	Clay & sand, slow drilling
372	418	Sand & clay w/ rock, slow drilling
418	426	Gravel & Rock in clay
426	460	Clay w/ sand & small gravel
460	468	Clay

Work started 3/14 1978 Completed 4/26 1978

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED Rex E. Anderson
(Well Driller)

NAME Rex Anderson Corp.
(Person, firm, or corporation) (Typed or printed)
Address 10303 Channel Rd.
City Lakeside, Calif. Zip 92040
License No. A305739 Date of this report 4/26/78

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

McCalla Bros.

Well Drilling & Pump Sales

MAIN OFFICE:

3132 West 17th Street
Santa Ana, California 92703
Phone: 714-554-4142

BRANCH OFFICES:

13855 Central Avenue
Chino, California 91710
Phone: 714-627-1521

980 Nevada Street
Redlands, California 92373
Phone: 714-793-2913

53-381 Hiway 111
P.O. Box 866
Coachella, California 92236
Phone: 619-398 8867

January 20, 1987

L.R. Burzell
Palm Canyon Estates
1002 Bennie Brea Place
Vista, CA 92084

SUBJECT: 12" Well-Palm Canyon Estates
Borrego Springs *Well 5 BSWC.*

Dear Lin,

Confirming our conversation of 1-15-86, outlined below are details concerning construction of the subject well.

As you are aware the construction of the well proceeded without any unusual problems. The "E" Log was not unusual and the bore samples were as expected.

Outlined here are dates of work as completed:

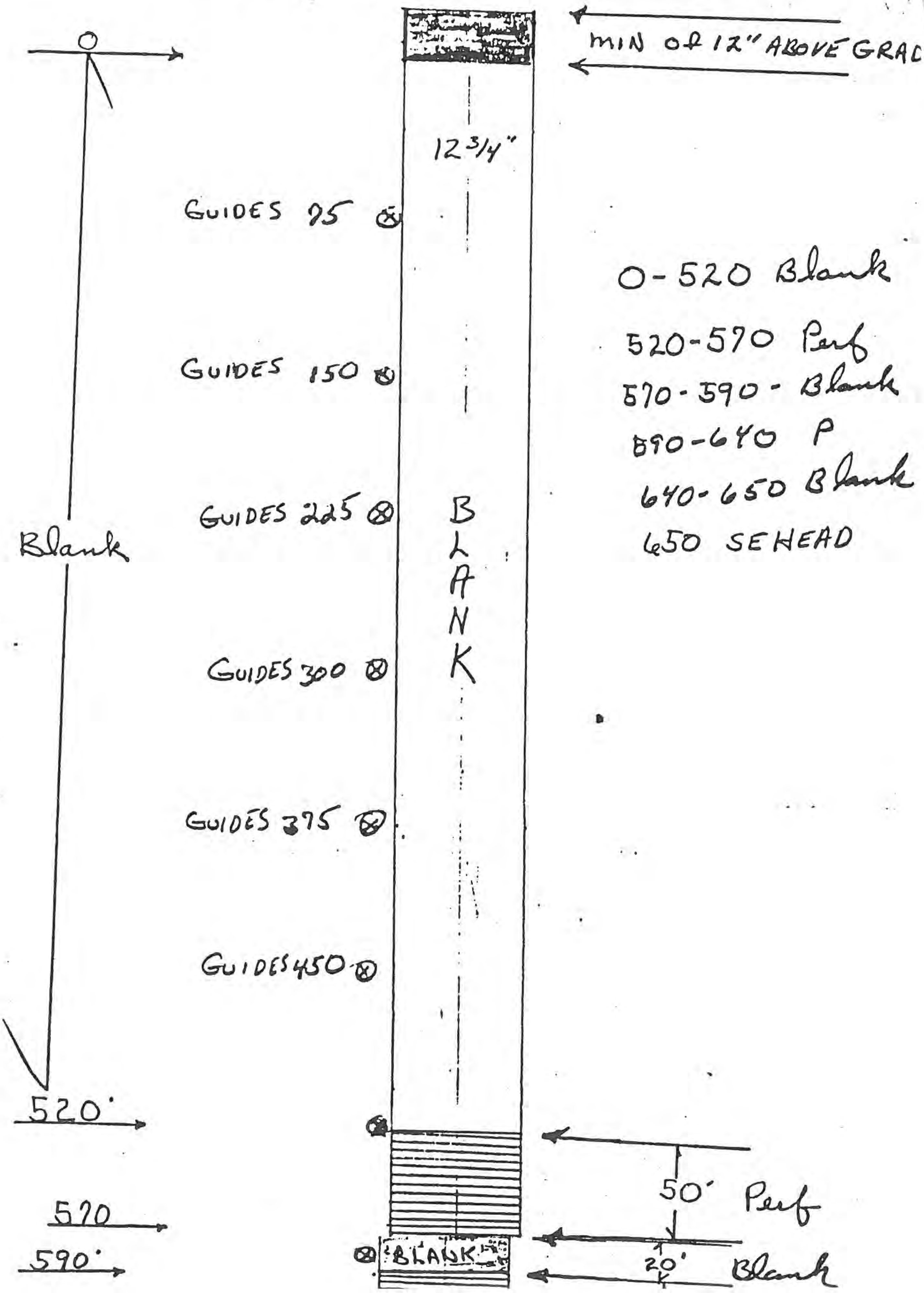
9-10-86	Move In - Set Up
9-16-86	Began Pilot Bore
9-19-86	Ran "E" Log
9-22-86	Began Constructing Conductor Set 50' of 25" Pipe Cemented In Place
9-23-86	Began Reaming 24" Hole
10-04-86	Completed Reaming 24" Bore to 659'
10-04-86	Set Well Casing & Gravel Pack
10-06-86	Air Lift Well To Remove Drill Fluids (7 Hrs)
10-07-86	Air Lift Well To Remove Drill Fluids (11 Hrs)
10-20-86	Install Test Pump
10-22-86	Test Pump Well (6 1/2 Hrs)
10-23-86	Test Pump Well (7 1/2 Hrs)
10-27-86	Install 80' Extension to 330' Setting
10-28-86	Test Pump Well (6 Hrs)
10-29-86	Test Pump Well (7 Hrs)
10-30-86	Test Pump Well (4 Hrs)

10S/6E 33Q

Palm Canyon Estates CC-1327

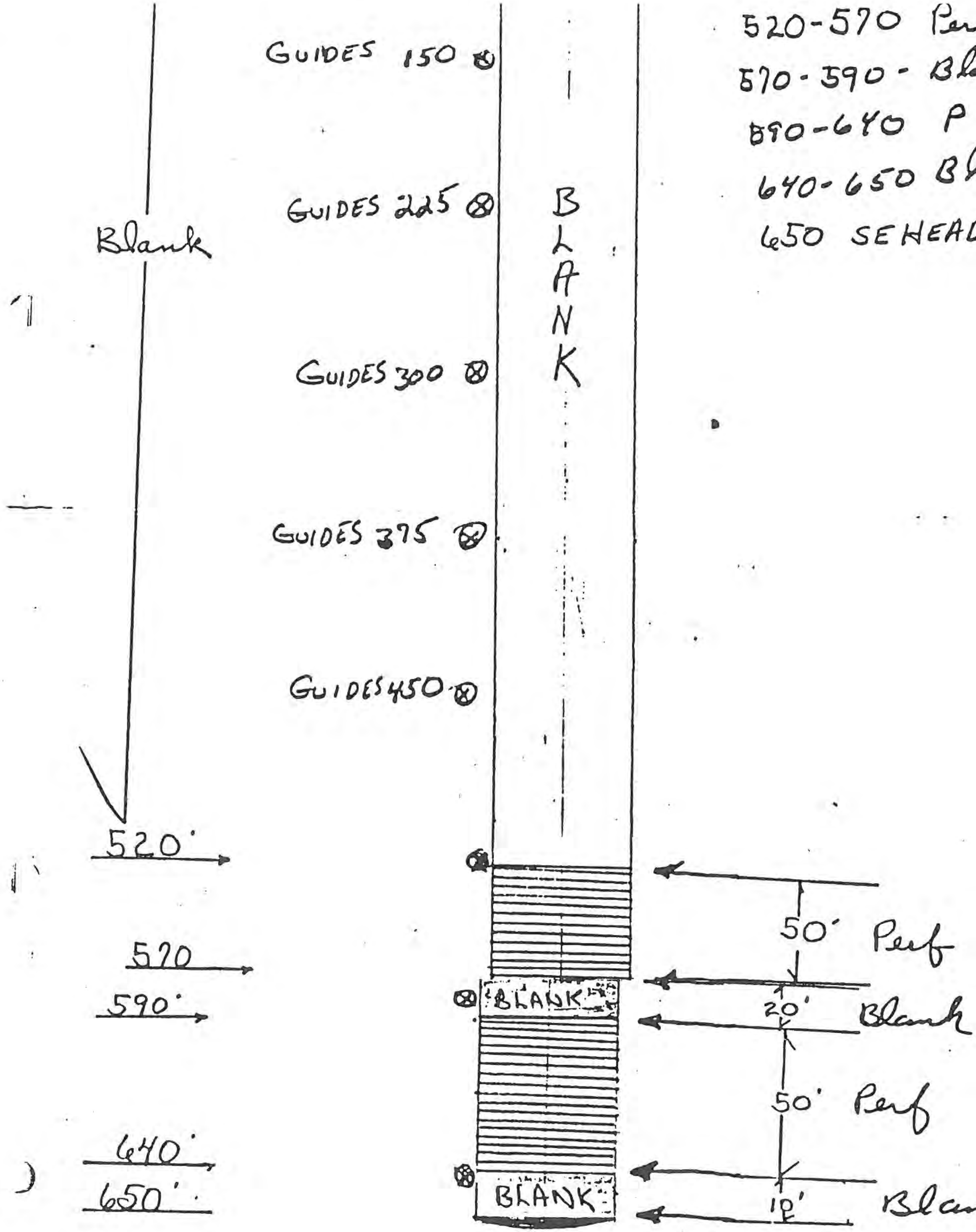
Depth	Material		
1.8	Sand		
6.0	Sand		
26	Sand		
46	Sand		
66	Sand		
86	Sand		
106	Sand		
126		Clay	
146	Sand	Clay	Rock
166	Sand		Rock
186		Gravel	Rock
206	Sand	Clay	Gravel
226	Sand		Gravel
246		Clay	
266		Clay	Gravel
286	Sand		Gravel
306	Sand		
326	Sand	Clay	
346		Clay	
366		Clay	
386		Clay	
406	Sand	Clay	
426	Sand	Clay	
446	Sand	Clay	
466	Sand	Clay	
486	Sand	Clay	
506		Clay	
520			Gravel
526			Gravel
546			Gravel
566		Clay	Gravel
586		Clay	Gravel
606			Gravel
610			Gravel
626			Gravel
646		Clay	Gravel
666		Clay	Gravel
686		Clay	Gravel
Bottom			

Palm Canyon Estates # CC 1321



0-520 Blank
520-570 Perf
570-590 - Blank
590-640 P
640-650 Blank
650 SEHEAD

520-570 Perf
570-590 - Blank
590-640 P
640-650 Blank
650 SEHEAD



BSWCo Well 10

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

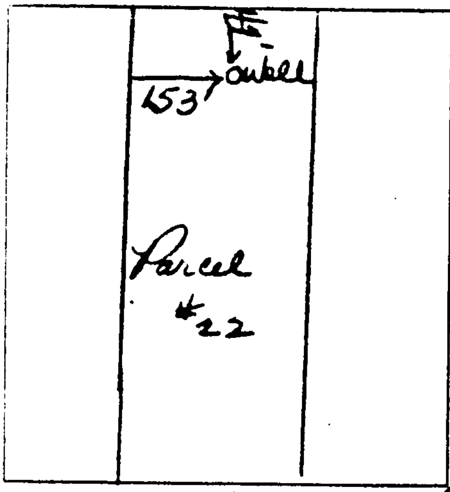
No. 278130

ID4 Well 10
...ment No. ______
Local Permit No. or Date ______

State Well No. ______
Other Well No. ______

(1) OWNER: Name ~~Pete Petersen~~
Address ~~2436 Five Diamonds Rd.~~
City ~~Borrego Springs, Ca. 92004~~ ZIP ______

(2) LOCATION OF WELL (See instructions):
County San Deigo Owner's Well Number ______
Well address if different from above ______
Township 11/S Range 6E Section 18
Distance from cities, roads, railroads, fences, etc. ______



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other ☒
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 12/16 4/16
Diameter of bore 12¼
Packed from 160 to 630 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen Mill cut

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	630	8	.188	420	630	

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 160 ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval ______ ft.
Method of sealing Bentonite slurry

(10) WATER LEVELS:
Depth of first water, if known 385 ft.
Standing level after well completion 385 ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom? ______
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ______ ft. At end of test ______ ft.
Discharge ______ gal/min after ______ hours Water temperature ______
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? ______
Was electric log made Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 630 ft. Completed depth 630 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	50	Coarse med to fine sand & grave
50	120	Med. fine to coarse sand & gravel
120	245	medfine to coarse sand & gravel with small rocks & cobbles
245	440	Boulders
440	470	Fine to coarse sand with thin streaks of brown clay w/lime
470	630	Fine to coarse sand

Work started 5/24/89 19__ Completed 6/21/89 19__

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed Tony G. Mesa
(Well Driller)

NAME Coachella Valley Pump & Supply, Inc.
(Person, firm, or corporation) (Typed or printed)
Address P.O. Drawer QQQ
City Indio, Ca. 92202 ZIP ______
License No. 161541 Date of this report 7/14/89

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. e013685

Owner's Well No. MW-1

Date Work Began 04/27/04 Ended 05/17/04

Local Permit Agency San Diego Dept. of Environmental Health

Permit No. LMON102206 Permit Date 04/27/04

STATE WELL NO./STATION NO.

LATITUDE | LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) XX VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD Direct Rotary FLUID Bentonite

DEPTH FROM SURFACE Ft. to	Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	84	Fine to medium sand
84	104	Fine to course sand
104	164	Fine to medium sand
164	224	Fine to course sand
224	244	Fine to course sand w/clay lenses
244	304	Fine to course sand
304	324	Fine to course sand w/clay lenses
324	334	Fine sand w/brown clay
334	354	Fine to medium sand w/clay lenses
354	404	Fine to medium sand
404	434	Fine to course sand
434	464	Fine to medium sand
464	501	Fine to course sand
501	510	Fine to medium sand w/clay lenses
510	524	Fine to course sand
524	534	Fine to course sand w/clay lenses
534	564	Fine to medium sand
564	574	Fine to course sand
574	584	Fine to medium sand
584	614	Fine to medium sand w/ clay lenses
614	644	Fine to medium sand
644	684	Fine to medium sand w/course sand
684	704	Fine to medium sand w/clay lenses
704	724	Fine to medium sand
724	764	Fine to course sand w/10% clay
764	804	Fine sand
804	820	Fine to medium sand
820	834	Fine to medium sand w/clay lenses

CONTINUED PAGE 2

TOTAL DEPTH OF BORING 1238 (Feet)

TOTAL DEPTH OF COMPLETED WELL 900 (Feet)

WELL OWNER

Name Borrego Water District

Mailing Address P.O. Box 1870

Borrego Springs, CA 92004

CITY STATE ZIP

WELL LOCATION

Address Henderson Canyon Rd. & Borrego Valley Rd.

City Borrego Springs

County San Diego

APN Book 140 Page 290 Parcel 03

Township 10S Range 6E Section 21

Latitude ___ NORTH DEG. MIN. SEC. Longitude ___ WEST DEG. MIN. SEC.

LOCATION SKETCH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. **PLEASE BE ACCURATE & COMPLETE.**

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ___ Industrial

MONITORING X
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER N/A (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 233 (Ft.) & DATE MEASURED 05/18/04

ESTIMATED YIELD * 150 (GPM) & TEST TYPE Airlift

TEST LENGTH 8 (Hrs.) TOTAL DRAWDOWN 418 (Ft.) PL-651'

* *May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to	Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	780	12¼	x				A53B	4.03	.237	
780	800	12¼	x				304SS	4.260	SCH10	
800	890	12¼		x			304SS	4.125	STDWT	.040
890	900	12¼	x				304SS	4.260	SCH10	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to	Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	750	x			10-sack
750	930			x	8 x 16
930	1238		x		Baroid - Hole Plug

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
X Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Rottman Drilling Co.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 46471 N Division, St., Lancaster, CA 93535
CITY STATE ZIP

Signed Larry W. Rottman, President 06/01/04 316599
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Page 2 of 2

Owner's Well No. MW-1

Date Work Began 04/27/04, Ended 05/17/04

Local Permit Agency San Diego Sept. of Environmental Health

Permit No. LMON102206 Permit Date 04/27/04

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. e013685

STATE WELL NO./STATION NO.

LATITUDE | LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD Direct Rotary FLUID Bentonite

DEPTH FROM SURFACE Ft. to	Ft.	DESCRIPTION Describe material, grain size, color, etc.
834	844	Fine to medium sand
844	864	Fine to medium sand w/clay lenses
864	884	Fine to medium sand
884	894	Fine sand and clay
894	904	Fine to medium dand and clay
904	924	Fine sand
924	1004	Fine to medium sand and clay lenses
1004	1034	Fine to medium sand w/blue clay
1034	1054	Fine to medium sand w/brown, black and blue clay lenses
1054	1064	Fine sand
1064	1084	Fine to medium sand
1084	1094	Fine to medium sand w/brown clay lenses
1094	1115	Fine to course sand w/brown and black clay
1115	1130	Fine to medium sand and brown clay
1130	1150	Fine to medium sand
1150	1194	90% Hard clay w/10% sand
1194	1204	90% Hard clay w/10% sand and blue clay lenses
1204	1238	Fine to medium sand w/blue clay and some cementing

TOTAL DEPTH OF BORING 1238 (Feet)

TOTAL DEPTH OF COMPLETED WELL 900 (Feet)

WELL OWNER

Name Borrego Water District

Mailing Address P.O. Box 1870

Borrego Springs, CA 92004

CITY STATE ZIP

WELL LOCATION

Address Henderson Canyon Rd. & Borrego Valley Rd.

City Borrego Springs

County San Diego

APN Book 140 Page 290 Parcel 03

Township 10S Range 6E Section 21

Latitude ___ DEG. MIN. SEC. NORTH Longitude ___ DEG. MIN. SEC. WEST

LOCATION SKETCH

NORTH

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ___ Industrial

MONITORING XX
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER N/A (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 233 (Ft.) & DATE MEASURED 05/18/04

ESTIMATED YIELD * 150 (GPM) & TEST TYPE Airlift

TEST LENGTH 8 (Hrs.) TOTAL DRAWDOWN 418 (Ft.)

* May not be representative of a well's long-term yield.

PL-651'

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Rottman Drilling Co.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

46471 N Division, Lancaster, CA 93535-5906
ADDRESS CITY STATE ZIP

Signed Larry W. Rottman, President 06/01/04 316599
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

ORIGINAL
File with DWR
Page 1 of 1
Owner's Well No. MW-3
Date Work Began 05/17/04, Ended 05/24/04
Local Permit Agency San Diego Dept. Of Env. Health
Permit No. LMON102206 Permit Date 04/27/04

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. e011052

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) XX VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD Direct Rotary FLUID Bentonite

DEPTH FROM SURFACE Ft. to Ft.		DESCRIPTION *Describe material, grain size, color, etc.*
0	14	Fine to course sand
14	24	Fine to course sand w/brown clay lenses
24	44	Fine to course sand
44	74	Fine to course sand w/gravel
74	84	Fine to course sand
84	94	Fine to course sand w/cobble
94	124	Fine to course sand
124	134	Fine to course sand & gravel w/ brown clay lenses
134	144	Silty Brown clay
144	148	50% Silty brown clay & 50% fine to medium sand
148	164	Fine to medium sand
164	170	Fine to course sand w/20% silty brown clay
170	184	Fine to course sand
184	195	Silt and brown clay
195	204	Fine to med sand
204	214	Fine to medium sand w/brown clay lenses
214	224	Fine to medium sand w/brown clay
224	244	Silty brown clay
244	254	Fine to medium sand w/90% red, brown and gray clay
254	314	Gray & red clay w/fine to medium sand lenses
314	324	Fine to medium sand w/clay lenses
324	344	Brown & red clay w/fine to medium sand lenses

TOTAL DEPTH OF BORING 344 (Feet)
TOTAL DEPTH OF COMPLETED WELL 325 (Feet)

WELL OWNER

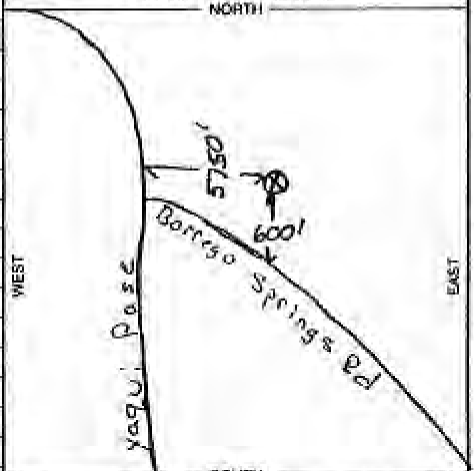
Name Borrego Water District
Mailing Address P.O. Box 1870
Borrego Springs, CA 92004
CITY STATE ZIP

WELL LOCATION

Address 5037 Borrego Springs Rd.
City Borrego Springs
County San Diego
APN Book 200 Page 120 Parcel 49
Township 11S Range 6E Section 23
Latitude ___ NORTH Longitude ___ WEST
DEG. MIN. SEC. DEG. MIN. SEC.

LOCATION SKETCH

NORTH



WEST EAST
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING XX
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER N/A (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 62 (Ft.) & DATE MEASURED 05/19/04
ESTIMATED YIELD * 100 (GPM) & TEST TYPE Airlift
TEST LENGTH 8 (Hrs.) TOTAL DRAWDOWN 253 (Ft.)
** May not be representative of a well's long-term yield.* PL-315'

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	175	12¼	x				A53B	4.03	.237	
175	325	12¼		X			A53B	4.03	.237	.080

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	130	x			10-sack
130	344			xx	6x12

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
X Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Rottman Drilling Co.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

46471 N Division, Lancaster, CA 93535
ADDRESS CITY STATE ZIP

Larry W. Rottman, President
Signed Larry W. Rottman Pres. 06/01/04 316599

TRIPLICATE
Owner's Copy

Page ____ of ____

Owner's Well No. #4

STATE OF CALIFORNIA
WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 1084528

Date Work Began 6-12-06, Ended 8-20-05

Local Permit Agency SAN DIEGO ENVIRONMENTAL HEALTH

Permit No. lmon104065 Permit Date 6-12-06

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE | LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD ________ FLUID ________

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION Describe material, grain size, color, etc.
0	60	sand
60	80	sand layers
80	120	sandy gravels
120	160	sandy clay layers
160	200	clay layers
200	220	gravel/ sand
220	320	sandy clay layers
320	400	sand
400	440	sandy clay layers
440	460	sand layers
460	500	sand clay layers
500	560	sand
560	600	sandy gravel
600	680	clay and sand
680	760	clay layers and gravelsand
760	820	sand clay
820	840	sand rocky
840	880	sand
880	900	sand rocks
900	930	sandy clay

WELL WAS SEALED FROM (#) BOTTOM DEPTH OF 927' WITH BENTONITE SEAL UP TO 390'

TOTAL DEPTH OF BORING 927 (Feet)

TOTAL DEPTH OF COMPLETED WELL 390 (Feet)

WELL OWNER

Name BORREGO WATER DISTRICT

Mailing Address P.O.BOX 1870

BORREGO SPRINGS, CA 92004

CITY STATE ZIP

WELL LOCATION

Address SO. OF PALM CANYON DR. 1704

City BORREGO SPRINGS

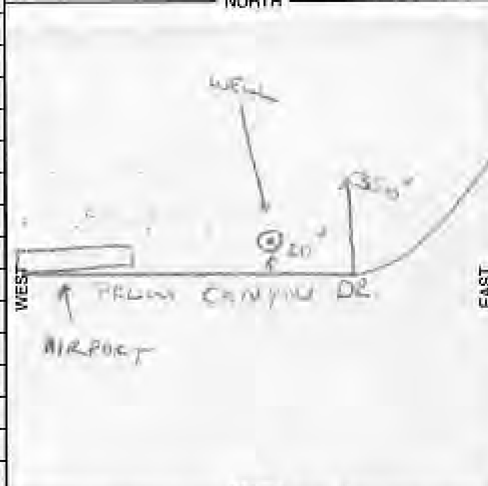
County SAN DIEGO

APN Book ____ Page ____ Parcel (#1)230-3?

Township ____ Range ____ Section ____

Lat ____ N DEG. MIN. SEC. Long ____ W DEG. MIN. SEC.

LOCATION SKETCH



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. ***PLEASE BE ACCURATE & COMPLETE.***

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR
- ___ Deepen
- ___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

USES (✓)

WATER SUPPLY
- ___ Domestic ___ Public
- ___ Irrigation ___ Industrial

MONITORING X

TEST WELL ___

CATHODIC PROTECTION ___

HEAT EXCHANGE ___

DIRECT PUSH ___

INJECTION ___

VAPOR EXTRACTION ___

SPARGING ___

REMEDIATION ___

OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ____ (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 94 (Ft.) & DATE MEASURED 8-4-06

ESTIMATED YIELD * ____ (GPM) & TEST TYPE AIR LIFT

TEST LENGTH 8 (Hrs.) TOTAL DRAWDOWN ____ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	24	16			x		STEEL		.250	
0	85	12	x				STEEL	6	.250	
85	390	12		x			PERF	6	.250	.70

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	80		x		
80	395			x	8x16
395	927		x		

ATTACHMENTS (✓)

- ___ Geologic Log
- ___ Well Construction Diagram
- ___ Geophysical Log(s)
- ___ Soil/Water Chemical Analyses
- ___ Other ________

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME SO CAL PUMP & WELL DRILLING INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

1510 PALMYRITA AVE RIVERSIDE ,CA 92507
ADDRESS CITY STATE ZIP

Signed ________ C-57 LICENSED WATER WELL CONTRACTOR

DATE SIGNED 9 20 06

C-57 LICENSE NUMBER 510836

DWR 188 REV. 05/03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 1084529

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Page ____ of ____
Owner's Well No. 5 A
Date Work Began 6-12-06, Ended 8-25-06
Local Permit Agency SAN DIEGO ENVIRONMENTAL HEALTH
Permit No. LMON104064 Permit Date 6-12-06

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD ROTARY FLUID MUD

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	80	sand , small particles gravel.
80	120	small gravles, clay layers
120	160	sandy clay
160	180	gravels
180	220	gravels, sand
220	240	sand
240	300	sandy clay, gravels
300	380	gravels, sandy clay
380	400	sand, gravels
400	440	sandy clay, gravel
440	460	sandstone, sandy clay
460	480	sandstone, layers of and clay
		THERE HAVE BEEN TWO 4" casings SET INSIDE OF THE CONDUCTOR THE WELL HAS BEEN SEALED FROM THE BOTTOM OF THE WELL @480' WITH BENTONITE UP TO 350'

TOTAL DEPTH OF BORING 480 (Feet)
TOTAL DEPTH OF COMPLETED WELL [redacted] (Feet) 345'

WELL OWNER

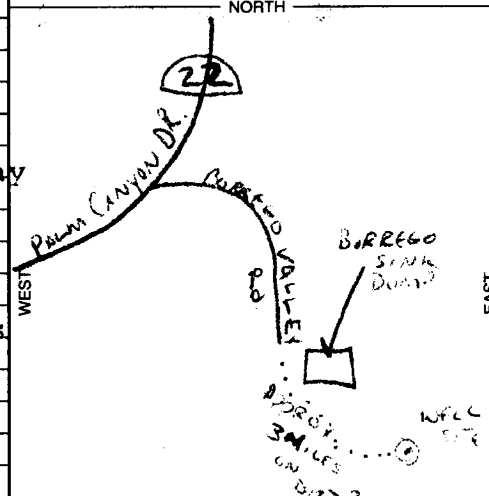
Name BORREGO WATER DISTRICT
Mailing Address P.O. BOX 1870
BORREGO SPRINGS, CA 92004
CITY STATE ZIP

WELL LOCATION

Address END BORREGO VALLEY RD. NEAR SINK
City BORREGO SPRINGS
County SAN DIEGO
APN Book ____ Page ____ Parcel @ 201-050-13
Township ____ Range ____ Section ____
Lat ____ DEG. MIN. SEC. N Long ____ DEG. MIN. SEC. W

LOCATION SKETCH

NORTH



WEST EAST
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. ***PLEASE BE ACCURATE & COMPLETE.***

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (*Describe Procedures and Materials Under "GEOLOGIC LOG"*)

USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING X
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ____ (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 62 (Ft.) & DATE MEASURED 8-2-06
ESTIMATED YIELD * ____ (GPM) & TEST TYPE AIR LIFT
TEST LENGTH 8 (Hrs.) TOTAL DRAWDOWN ____ (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	45	16			x		steel		.250	
0	200	14	x				steel	4	.250	
200	340	14		x			perf	4	.250	.070
340	345	14	x				steel	4	.250	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	35		x		
35	165			x	8x16
165	190		x		
190	350			x	8x16
350	480		x		

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ____

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME SO CAL PUMP & WELL DRILLING INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
1510 PALMYRITA AVE. RIVERISDE,CAS 92507
ADDRESS CITY STATE ZIP
Signed [signature] 8-20-06 510836
C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 05-03
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

TRIPLICATE
Owner's Copy

Page ____ **of** ____

Owner's Well No. 5B

Date Work Began 6-12-06, Ended 8-25-06

Local Permit Agency SAN DIEGO ENVIRONMENTAL HEALTH

Permit No. LMON104064 Permit Date 6-12-06

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 1084530

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE | LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD ________ FLUID ________

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION — Describe material, grain size, color, etc.
0 – 80	SAND , SMALL PARTICLES OF GRAVEL.
80 – 120	small gravels, clay layers
120 – 160	sandy clay
160 – 180	gravels
180 – 220	gravels, sand
220 – 240	sand
240 – 300	sandy clay, gravel
300 – 380	gravels, sandy clay
380 – 400	sand, gravels
400 – 440	sandy clay , gravles
440 – 460	sanstone, sandy clay
460 – 480	sandstone, layers of sand and clay.

THERE HAVE BEEN TWO 4" CASINGS SET INSIDE OF THE CONDUCTOR. THE WELL HAS BEEN SEALED FROM THE BOTTOM OF THE WELL @ 480' with BENTONITE UP TO 350'

TOTAL DEPTH OF BORING 480 (Feet)

TOTAL DEPTH OF COMPLETED WELL 160 (Feet)

WELL OWNER

Name BORREGO WATER DISTRICT

Mailing Address P.O. BOX 1870

borrego springs, ca 92004

CITY STATE ZIP

WELL LOCATION

Address borrego valley rd, NEAR SINK

City BORREGO SPRINGS

County SAN DIEGO

APN Book ____ Page ____ Parcel 201-050-13

Township ____ Range ____ Section ____

Lat ____ DEG. MIN. SEC. N Long ____ DEG. MIN. SEC. W

LOCATION SKETCH

NORTH

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ___ Industrial

MONITORING X
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ____ (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 62 (Ft.) & DATE MEASURED 9-1-06

ESTIMATED YIELD * ____ (GPM) & TEST TYPE AIR LIFT

TEST LENGTH 8 (Hrs.) TOTAL DRAWDOWN ____ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 – 16	16			x		STEEL		.250	
0 – 45	14	x				STEEL	4	.250	
45 – 155	14		x			PERF	4	.250	.070
155 – 160	14	x				STEEL	4	.250	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 – 35		x		
35 – 165			x	8x16
165 – 190		x		
190 – 350			x	8x15
350 – 480		x		

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ________

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME SO CAL PUMP & WELL DRILLING INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

1510 PALMYRITA AVE RIVERSIDE, CA 92507
ADDRESS CITY STATE ZIP

Signed ________ 9-26 510836
C-57 LICENSED WATER/WELL CONTRACTOR DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 05-03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

File Original with DWR

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. e068687

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

Page 1 of 1

Owner's Well No. YP-1

Date Work Began 1/16/08 Ended 2/25/08

Local Permit Agency San Diego County

Permit No. WLWEL18987 Permit Date 1/11/08

WELL OWNER

GEOLOGIC LOG

ORIENTATION (X) x VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD Rotary FLUID ___

DEPTH FROM SURFACE Ft. to Ft.		DESCRIPTION Describe material, grain size, color, etc.
0	6	Sand with gravel
6	20	Sand
20	22	Sand with gravel
22	26	Silty sand
26	30	Silty Sand with Gravel
30	50	Sand with gravel
50	60	Silty Sand
60	70	Sand
70	180	Sand with gravel
180	195	Silty Sand
195	200	Claey Sand
200	215	Sand
215	230	Silty Sand
230	240	Clayey Sand
240	245	Sand
245	260	Silty Sand
260	300	Sand
300	330	Silty Sand
330	335	Sandy clay
335	345	Sand
345	360	Silty Sand
360	365	Sandy clay
365	370	Sand
370	380	Sand with gravel
380	385	Sandy clay
385	420	Sand
420	430	Silty Sand
430	490	Sand
490	500	Silty sand with clay
500	500	Sand

TOTAL DEPTH OF BORING 520 (Feet)

TOTAL DEPTH OF COMPLETED WELL 500 (Feet)

WELL LOCATION

Address 300' South of Anzio Dr & Sarasota Dr.

City Borrego Springs STATE Ca ZIP 92004

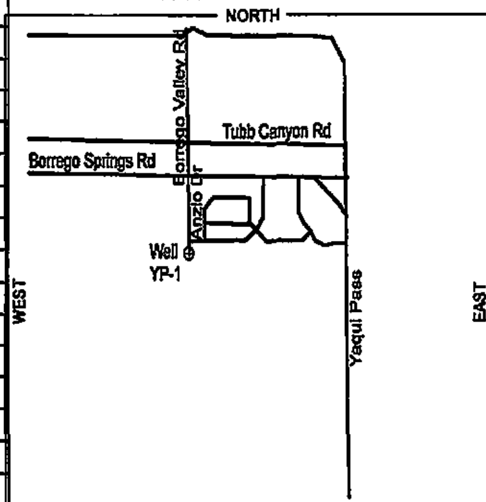
County San Diego County

APN Book 200 Page 030 Parcel 24

Township 11S Range 6E Section 21

Latitude 33 12 21.8 NORTH (DEG. MIN. SEC.) Longitude 116 20 49.64 WEST (DEG. MIN. SEC.)

LOCATION SKETCH



Illustrate or Describe Distance Of Well from Roads Buildings, Fences, Rivers etc and attach map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (X)

x NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (X)

WATER SUPPLY

x Domestic ___ Public

___ Irrigation ___ Industrial

MONITORING ___

TEST WELL ___

CATHODIC PROTECTION ___

HEAT EXCHANGE ___

DIRECT PUSH ___

INJECTION ___

VAPOR EXTRACTION ___

SPARGING ___

REMEDIATION ___

OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 270 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 270 (Ft.) & DATE MEASURED 2/5/08

ESTIMATED YIELD 65 (GPM) & TEST TYPE Pump

TEST LENGTH 6 (Hrs.) TOTAL DRAWDOWN 15 (Ft.)

* *May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	OUTSIDE DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	20	24			x		PVC	16	.250	
0	250	24	x				PVC	8	Class 200	
250	500	24		x			PVC	8		Screen

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (X)	BEN-TONITE (X)	FILL (X)	FILTER PACK (TYPE/SIZE)
50	500				Gravel Pack
0	50				Concrete Grout

ATTACHMENTS (X)

x Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Layne Christensen Company (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 11001 Etiwanda Ave CITY Fontana STATE Ca ZIP 92337

Signed [signature] WELL DRILLER/AUTHORIZED REPRESENTATIVE

DATE SIGNED 2-25-08

C-57 LICENSE NUMBER 510011

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

11S06E21 e068687

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

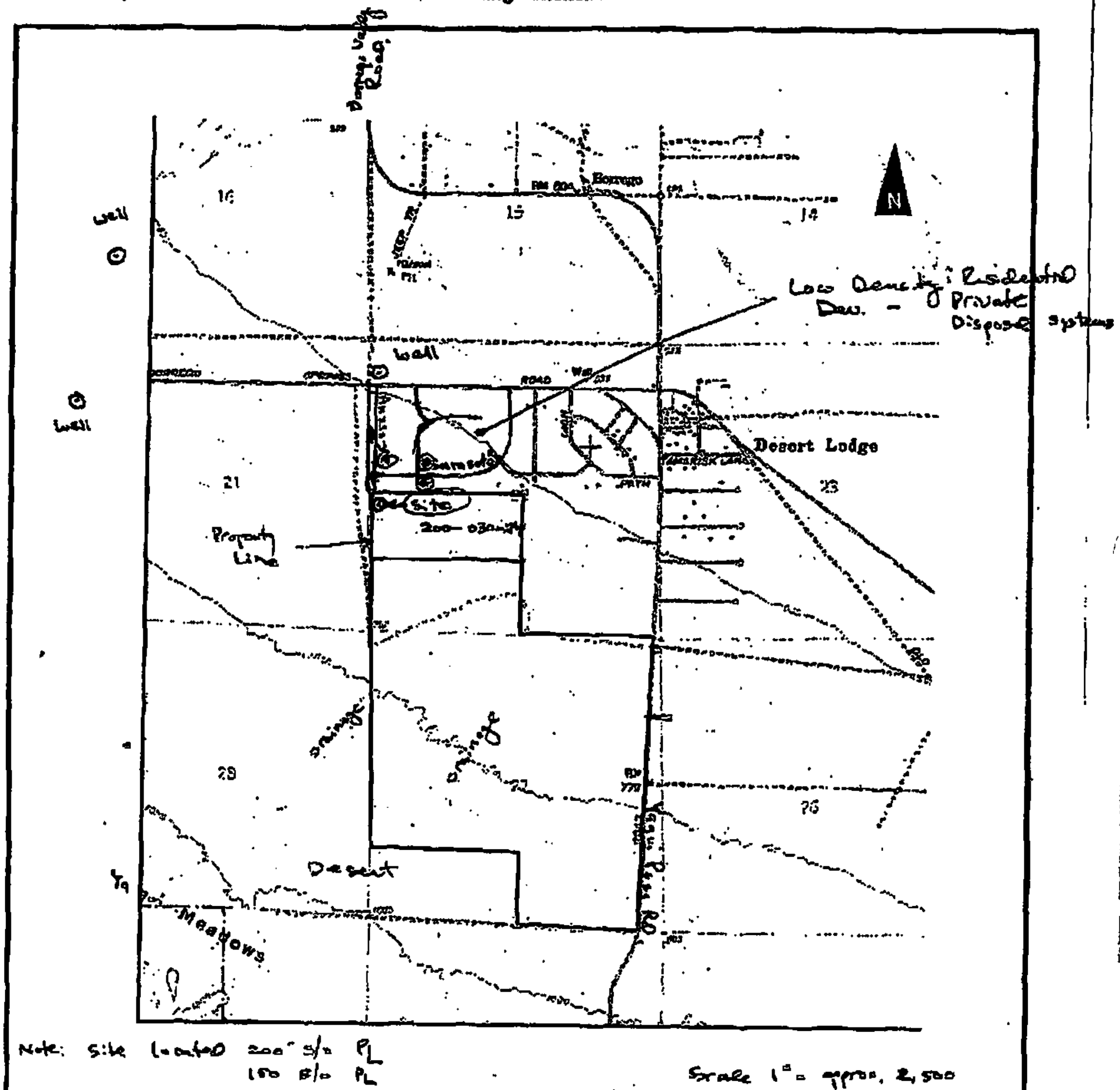
Control #: Lwel 18967

Assessor's Parcel Number: San Diego Co. 200-030-24

33.20614
-116.34715

LOCATION

Indicate below the vicinity and exact location of well with respect to the following items: Property lines, water bodies or water courses, drainage pattern, roads, existing wells, sewers and private sewage disposal systems and other potential contamination sources, including dimensions.



(*) Residences - close
closest ≈ 400' NE

e0068687

PETRA EXPLORATION LOG

Project: Environmental Exploration	Boring No.: YP-1
Location: Yaqui Pass	Date: 1/19/08
Job No.: 434-07 / Drilling Method: Reverse Rotary - Air	Logged By: CC/BV
Drilling Co.: Layne Christiansen	Approved By: BV

Depth to Water: 270 ft. Total Depth of Boring: 500 ft.

Depth (Feet)	Lithology	Material Description	Water	Samples: Blows Per 6 in.	Run	Rec	PID (ppm)	OVA (ppm)	Other Lab Tests
0		Sand with Gravel (SP) Light brown (10YR 6/3); dry; very fine- to coarse-grained sand; fine to medium subangular gravel up to 1/2 inch diameter (20%); poorly sorted.							
2		@ 2 feet: gravel becomes coarser (up to 2 inch diameter).							
5									
6		Sand (SP): Light brown (10YR 7/3); dry; very fine- to very coarse-grained sand; poorly sorted.							
8		@ 8 feet: some fine gravel.							
10									
15		@ 15 feet: gravel up to 1/2 inch diameter (5%).							
17		@ 17 feet: fine to medium grained sand (70%).							
20		Sand with Gravel (SP) Light yellowish-brown (2.5Y 6/4); dry; fine-grained sand; 20% gravel up to 1/2 inch diameter.							
22		Silty Sand (SM) Light yellowish-brown (10YR 6/4); dry; very fine- to fine-grained sand.							
24		@ 24 feet: becomes gray to grayish-brown, 20% medium to coarse grained sand.							
27		Silty Sand with Gravel (SP/SM) Brownish-gray (10YR 6/2); medium- to coarse-grained sand; 30% fine gravel.							
30		Sand with Gravel (SP) Grayish-brown; dry; medium- to coarse-grained sand.							
33		@ 33 feet: gravel up to 1 inch diameter.							
35									
40									
43		@ 43 feet: approximately 2 foot zone of fine to medium grained sands.							
45									
47		@ 47 feet: gravel coarsens up to 1 inch diameter (10%).							

PLATE A-1

e068687

PETRA EXPLORATION LOG

Project: Environmental Exploration	Boring No.: YP-1
Location: Yaqui Pass	Date: 1/19/08
Job No.: 434-07 / Drilling Method: Reverse Rotary - Air	Logged By: CC/BV
Drilling Co.: Layne Christiansen	Approved By: BV

Depth to Water: 270 ft. Total Depth of Boring: 500 ft.

Depth (Feet)	Material Description	Water	Samples: Blows Per 6 in.	Run	Rec	PID (ppm)	OVA (ppm)	Other Lab Tests
50–60	Silty Sand (SM) Grayish-brown (2.5Y 5/2); dry; fine- to medium-grained sand, 15% very coarse-grained sand and very small gravel; few weakly foliated, granitic, subangular to subrounded gravel up to 1 inch diameter.							
60–70	Sand (SP): Dark grayish-brown (10YR 4/2) with some orange staining; very coarse-grained sand and very small gravel; angular gravel composed primarily of quartz and feldspar; well sorted. @ 66 feet: slighlty silty, coarse to very coarse sand.							
70–100	Sand with Gravel (SP) Brown to orangish-brown; coarse-grained sand; fine angular gravel (5 to 10%) up to 1 inch diameter; weakly foliated; composed of granitics (primarily quartz and 2% feldspar). orange-stained, angular granitic gravel. @ 90 feet: gravel content increases to 25% up to 1 inch diameter; granitic, metamorphic, gneissic, quartz gravel, epidote on rock fragment, some granitic gravel, high in mafics.							

ENVIRONMENTAL LOG - V2 434-07.GPJ PETRA.GDT 2/15/08

PLATE A-2

e068687

PETRA **EXPLORATION LOG**

Project: Environmental Exploration	Boring No.: YP-1
Location: Yaqui Pass	Date: 1/19/08
Job No.: 434-07 — Drilling Method: Reverse Rotary - Air	Logged By: CC/BV
Drilling Co.: Layne Christiansen	Approved By: BV

Depth (Feet)	Lithology	Material Description (Depth to Water: 270 ft. Total Depth of Boring: 500 ft.)	Water	Samples: Blows Per 6 in.	Samples: Run	Samples: Rec	Field and Laboratory Tests: PID (ppm)	Field and Laboratory Tests: OVA (ppm)	Field and Laboratory Tests: Other Lab Tests
		Sand with Gravel (SP) Brown (10Y 4/3); medium- to very coarse-grained sand; poorly sorted; angular to sub-angular consisting of 25% quartz, 10% feldspar; less than 10% fines.							
105									
110		@110 feet: light olive to light olive-brown poorly sorted coarse- to very coarse-grained sand and 20% very small gravel, 5-10% gravel up to 1 inch diameter; angular to subangular; foliated rock fragments, laminated chert fragments, oxide staining.							
115									
120		@ 120 feet: increased medium and coarse-grained sand content; few gravel.							
125		@ 125 feet: approximately 5 foot thick zone of dark yellowish-brown well sorted medium-grained sand 10-15% very coarse sand, subangular, quartz 25% feldspar and biotite and few gravel.							
130		@ 130 feet: becomes light olive brown (2-5Y 5/4) well sorted, very coarse sand and very small gravel, angular and subangular gravel; some oxide staining.							
135		@ 137 feet: well sorted medium to coarse grained sand consisting of quartz, feldspar, and flecks of biotite 2.5Y 5/1 olive brown.							
140									
145		@ 145 feet: poorly sorted primarily fine grained sand with few coarse grained sands and fine gravels 2.5Y 5/1 grey.							

PETRA **EXPLORATION LOG**

Project: **Environmental Exploration**		Boring No.:	**YP-1**
Location: **Yaqui Pass**		Date:	**1/19/08**
Job No.: **434-07**	Drilling Method: **Reverse Rotary - Air**	Logged By:	**CC/BV**
Drilling Co.: **Layne Christiansen**		Approved By: **BV**	

Depth (Feet)	Lithology	Material Description (Depth to Water: 270 ft. Total Depth of Boring: 500 ft.)	Water	Samples: Blows Per 6 in.	Samples: Run	Samples: Rec	Field and Laboratory Tests: PID (ppm)	Field and Laboratory Tests: OVA (ppm)	Field and Laboratory Tests: Other Lab Tests
		Sand with Gravel (SP) Brown (10Y 4/3); medium- to very coarse-grained sand; poorly sorted; angular to sub-angular consisting of 25% quartz, 10% feldspar; less than 10% fines. *(Continued)*							
155									
160		@ 160 feet: large concentration of mafic minerals 10-15%, gravel, primarily gray and opaque quartz and mafic. 5Y 4/2 olive gray.							
165		@ 165 feet: becomes coarse to very coarse sand with gravel; dark gray (2.5Y 4/1); wet.							
170		@ 170 feet: few fine gravel to 1/4 inch diameter, angular to subangular gravel, 15% very small gravel.							
175									
180		Silty Sand (SM) Light olive brown (2/5Y 5/3); fine- to coarse-grained sand; few fine gravel; minor clay; subangular; poorly sorted.							
185									
190		@190 feet: increase in fines.							
195		Clayey Sand (SC) Grayish-brown (2.5Y 5/2); medium- to coarse-grained sand and few very small gravel; subangular (quartz, feldspar, biotite flakes).							

PLATE A-4

e068687

PETRA EXPLORATION LOG

Project:	Environmental Exploration	Boring No.:	YP-1
Location:	Yaqui Pass	Date:	1/19/08
Job No.: 434-07	Drilling Method: Reverse Rotary - Air	Logged By:	CC/BV
Drilling Co.:	Layne Christiansen	Approved By: BV	

Depth to Water: 270 ft. Total Depth of Boring: 500 ft.

Depth (Feet)	Lithology	Material Description	Water	Samples: Blows Per 6 in.	Run	Rec	PID (ppm)	OVA (ppm)	Other Lab Tests
		Sand (SP): Dark gray (2.5Y 4/1); medium- to coarse-grained sand, <5% very small gravel; well sorted, subangular, primarily opaque quartz, 10-15% feldspar.							
205									
210		@ 210 feet: becomes poorly sorted; increase in fine sand, minor silt and clay.							
215		Silty Sand (SM) Dark gray (2.5Y 4/1) with some dark oxide staining; fine- to medium-grained sand, 15% coarse-grained sand and very small gravel; fine gravel up to 3/4 inch; poorly sorted; dark brown, weakly foliated granitic gravel.							
220									
225		@ 225 feet: increase in fines (silt and clay).							
230		Clayey Sand (SC) Dark gray (2.5Y 4/1); fine- to coarse-grained sand; poorly sorted; subangular.							
235									
240		Sand (SP): Dark gray (2.5Y 4/1); medium- to coarse-grained sand; some very small gravel (10%); few fines (5%), subangular; primarily opaque and white quartz, 5-15% feldspar.							
245		Silty Sand (SM) Dark gray (2.45Y 4/1); fine- to medium-grained sand; fine gravel (5%); subangular.							

PLATE A-5

e0068687

PETRA **EXPLORATION LOG**

Project: **Environmental Exploration**	Boring No.: **YP-1**
Location: **Yaqui Pass**	Date: **1/19/08**
Job No.: **434-07** Drilling Method: **Reverse Rotary - Air**	Logged By: **CC/BV**
Drilling Co.: **Layne Christiansen**	Approved By: **BV**

Depth to Water: 270 ft. Total Depth of Boring: 500 ft.

Depth (Feet)	Lithology	Material Description	Water	Samples: Blows Per 6 in.	Samples: Run	Samples: Rec	PID (ppm)	OVA (ppm)	Other Lab Tests
		Silty Sand (SM) Dark gray (2.45Y 4/1); fine- to medium-grained sand; fine gravel (5%); subangular. *(Continued)*							
255									
260		Sand (SP): Light olive brown (2.5Y 5/4); coarse-grained sand; minor fine-grained sand and silt; subangular; consists of quartz, feldspar and some biotite flakes.							
265		@ 265 feet: fine- to medium-grained sand.							
270		@ 270 feet: light olive brown (2.5Y 5/4); wet; poorly sorted medium- to coarse grained sand, with few fine-grained sand and silt; subangular quartz; feldspar and biotite.	∇						
275									
280		@ 280 feet: light olive (2.5Y 5/3) medium-grained sand; some very fine to fine-grained sand with minor silt; primarily quartz 15 to 20%, feldspar and biotite; trace gravel to 1/4 inch diameter.							
285									
290		@ 290 feet: sand (SP) grayish-brown; poorly sorted medium to coarse-grained sand; subangular; primarily opaque quartz 20%, feldspar and biotite; epidote on single grain; trace gravel.							
295									

e0068687

PETRA **EXPLORATION LOG**

Project: **Environmental Exploration**	Boring No.: **YP-1**
Location: **Yaqui Pass**	Date: **1/19/08**
Job No.: **434-07** — Drilling Method: **Reverse Rotary - Air**	Logged By: **CC/BV**
Drilling Co.: **Layne Christiansen**	Approved By: **BV**

Depth to Water: 270 ft. Total Depth of Boring: 500 ft.

Depth (Feet)	Lithology	Material Description	Water	Samples: Blows Per 6 in.	Run	Rec	PID (ppm)	OVA (ppm)	Other Lab Tests
		Silty Sand (SM) Olive brown; medium-grained sand; 25% coarse to very coarse grained sand; few fine subangular gravel (5%); quartz and feldspar, larger amounts of biotite.							
305									
310		@ 310 feet: 5% fine gravel to 1/4 inch diameter.							
315									
320		@ 320 feet: olive-brown silty sand (SM) medium-grained sand; few coarse to very coarse grained-sand; primarily quartz 15-20%, feldspar and biotite.							
325									
330		Sandy Clay (CL) Light olive brown (2.5Y 5/4); very fine- to fine-grained sand; minor silt.							
335		Sand (SP) Grayish-brown (2.5Y 5/2); coarse-grained sand to very coarse; subangular gravel (10%); some silt; quartz and feldspar; biotite 10-15%.							
340									
345		Silty Sand (SM) Grayish-brown (2.5Y 5/2); medium- to coarse-grained sand; few very-fine to fine-grained sands; subangular; primarily quartz, 15% feldspar and biotite.							

PLATE A-7

e068687

PETRA **EXPLORATION LOG**

Project: **Environmental Exploration**	Boring No.: **YP-1**
Location: **Yaqui Pass**	Date: **1/19/08**
Job No.: **434-07** / Drilling Method: **Reverse Rotary - Air**	Logged By: **CC/BV**
Drilling Co.: **Layne Christiansen**	Approved By: **BV**

Depth to Water: 270 ft. Total Depth of Boring: 500 ft.

Depth (Feet)	Lithology	Material Description	Water	Samples: Blows Per 6 in.	Run	Rec	PID (ppm)	OVA (ppm)	Other Lab Tests
		Silty Sand (SM) Grayish-brown (2.5Y 5/2); medium- to coarse-grained sand; few very-fine to fine-grained sands; subangular; primarily quartz, 15% feldspar and biotite. *(Continued)*							
355									
360		Sandy Clay (CL) Light olive brown (2.5Y 5/3); medium-grained sand, 5% coarse-grained sand; subangular; primarily quartz, 20% feldspar and biotite.							
365		Sand (SP): Dark gray (2.5Y 4/1); coarse-grained sand; well sorted; quarts feldspar and biotite; possible muscovite.							
370		Sand with Gravel (SP) Dark gray; coarse-grained sand to very coarse-; subangular to subrounded opaque and gray quartz with 30% feldspar and biotite, flakes of muscovite.							
375		@ 375 feet: small gravel 10-25%.							
380		Sandy Clay (CL) Light olive brown (2.5Y 5/3); medium-grained sand, 5% coarse grained sand; subangular; primarily quartz, 20% feldspar and biotite.							
385		Sand (SP): Dark gray (2.5Y 4/1); coarse- to very coarse-grained sand, 20% fine to medium-grained sand, some silt; gravel (5%) up to 1/4 inch diameter; subangular quartz, feldspar and biotite, few mafic grains.							
390									
395									

ENVIRONMENTAL LOG - V2 434-07.GPJ PETRA.GDT 2/15/08

PLATE A-8

E068687

PETRA EXPLORATION LOG

Project:	Environmental Exploration	Boring No.:	YP-1
Location:	Yaqui Pass	Date:	1/19/08
Job No.: 434-07	Drilling Method: Reverse Rotary - Air	Logged By:	CC/BV
Drilling Co.:	Layne Christiansen	Approved By: BV	

Depth (Feet)	Lith-ology	Material Description (Depth to Water: 270 ft. Total Depth of Boring: 500 ft.)	Water	Samples: Blows Per 6 in.	Samples: Run	Samples: Rec	Field and Laboratory Tests: PID (ppm)	Field and Laboratory Tests: OVA (ppm)	Field and Laboratory Tests: Other Lab Tests
405		Sand (SP): Dark gray (2.5Y 4/1); coarse to very coarse-grained sand; 20% fine to medium grained sand, some silt; very small gravel 5%, up to 1/4 inch diameter subangular to subrounded quartz, 15% feldspar and biotite, few mafic grains; few flakes of muscovite; epidote on one grain.							
410		@ 410 feet: medium to coarse-grained sand, 5% small gravel, some silt.							
415									
420		Silty Sand (SM) Olive brown (2.5Y 4/3); fine-grained sand; few small gravel-sized clasts of chert and granite; subangular; trace clay; primarily quarz, 15-20% feldspar and biotite.							
425		@ 425 feet: becomes dark gray.							
430		Sand (SP): Dark gray (2.5Y 4/1); coarse-grained sand with few fine- and medium-grained sand; subangular quartz, feldspar and biotite; trace gravel.							
435									
440		@ 440 feet: becomes predominantly medium- to coarse-grained; 15% very coarse sand ; few gravel up to 1 inch diameter.							
445									

ENVIRONMENTAL LOG - V2 434-07.GPJ PETRA.GDT 2/15/08

PLATE A-9

e068687

PETRA **EXPLORATION LOG**

Project:	Environmental Exploration	Boring No.:	YP-1
Location:	Yaqui Pass	Date:	1/19/08
Job No.: 434-07	Drilling Method: Reverse Rotary - Air	Logged By:	CC/BV
Drilling Co.:	Layne Christiansen	Approved By:	BV

Depth to Water: 270 ft. Total Depth of Boring: 500 ft.

Depth (Feet)	Lithology	Material Description	Water	Samples: Blows Per 6 in.	Run	Rec	PID (ppm)	OVA (ppm)	Other Lab Tests
450–460		Sand (SP): Dark gray (2.5Y 4/1); coarse-grained sand with few fine- and medium-grained sand; subangular quartz, feldspar and biotite; trace gravel. *(Continued)*							
460–480		Sand (SP): Dark gray (5Y 4/1); medium-grained sand with 5-10% coarse-grained sand and small gravel; quartz, 15% feldspar.							
470		@ 470 feet: no small gravel.							
480–490		Sand (SP): Dark gray (2.5Y 4/1); medium- to very coarse-grained sand; very small gravel (<5%); subangular quartz, 15% feldspar, biotite and few muscovite flakes; <5% small granitic gravel subrounded.							
490–500		Silty Sand with Clay (SC/SM) Olive brown (2.5Y 4/3); fine- to medium-grained sand; few small gravel; subangular; quartz 15%, feldspar and biotite.							

Depth scale: 455, 460, 465, 470, 475, 480, 485, 490, 495

ENVIRONMENTAL LOG - V2 434-07.GPJ PETRA.GDT 2/15/08

Petra Geotechnical

E0068687

PETRA **EXPLORATION LOG**

Project:	**Environmental Exploration**	**Boring No.:**	**YP-1**
Location:	**Yaqui Pass**	**Date:**	**1/19/08**
Job No.: 434-07	**Drilling Method:** Reverse Rotary - Air	**Logged By:**	**CC/BV**
Drilling Co.:	**Layne Christiansen**	**Approved By:**	**BV**

Depth (Feet)	Lith-ology	Material Description Depth to Water: 270 ft. Total Depth of Boring: 500 ft.	Water	Samples: Blows Per 6 in.	Samples: Run	Samples: Rec	Field and Laboratory Tests: PID (ppm)	Field and Laboratory Tests: OVA (ppm)	Field and Laboratory Tests: Other Lab Tests
		Sand (SP): Dark gray (2.5Y 4/1); very coarse-grained sand; some medium grained sand and very small gravel; subangular to subrounded; primarily quartz, 20-25% feldspar; few amber quarz grains.							
		Notes Total Depth = 500 feet.							

PLATE A-11

APPENDIX B

2018 Pump Check Data

PUMP CHECK
PUMPING SYSTEMS ANALYSIS • RIVERSIDE CA, SINCE 1958
P.O. Box 5646 Riverside, CA 92517 (951) 684-9801 Fax (951) 653-1950

April 24, 2018

Greg Holloway
Borrego Water District
P.O. Box 1870
Borrego Springs, CA 92004

Dear Greg:

Congratulations! The pump and motor work performed at **ID 1 Well 12** has resulted in a reduction of 163.5 kWh's per acre foot water pumped. Based on the acre feet water pumped last year by ID 1 Well 12, **the annual savings will be 50,750 kWh's.**

This is enough energy saved (kWh's) to power 4.8 average household for one year.
(National average for electricity consumed per household 10,500 kWh's per year. Source: U.S. Department of Energy, Table 1.5 Energy Consumption, Expenditures and Emissions Indicators, 2012, www.energy.gov).

And

Reduce Green House CO2 gases by 46.9 tons annually.
(National average emissions factor for electricity is 1.85 pounds CO2 per kilowatt-hour. Source: Energy Information Administration. Electric Generator Report 2013, Table 8.2, www.eia.doe.gov).

Continued regular pump testing keeps you aware of the water table and pump operating conditions. This also provides current information for pump redesign when necessary. By tracking pump wear and potential saving from pump replacement, you can determine the most cost effective time to replace a pump. Pumping cost reduction is a major benefit of regular pump testing.

Please call me at (951) 684-9801 if you have any questions.

Sincerely,

Jon Lee

Jon Lee

PUMP CHECK

Pumping Systems Analysts

Hydraulic Test Report

Since 1958

(951) 684-9801 • Lic. 799498 • Fax (951) 684-2988

Borrego Water District
5037 Borrego Springs Road

Test Date: 03/16/2018
Pump type: DWT
Plant: ID 1 Well #8

A test was made on this well pump and the following information was obtained.

EQUIPMENT

PUMP:	Byron Jackson	SERIAL:	841L0168
MOTOR:	Newman	SERIAL:	S20046807
H.P.	125	LAT/LON:	33.12.191n116.18.860w
METER:	6578837	REF #:	PC 1222

TEST RESULTS

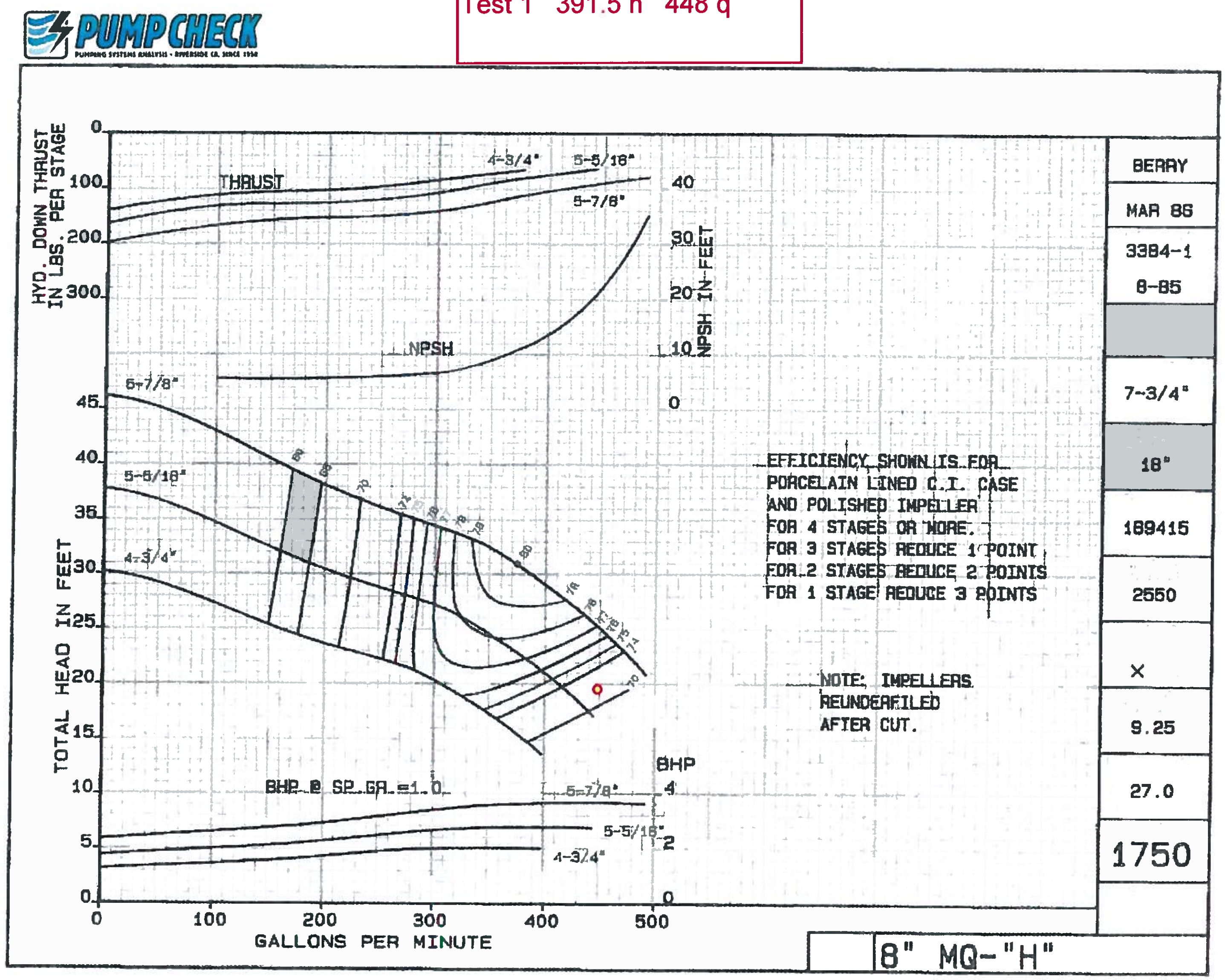
	TEST 1
Discharge, PSI	118.0
Discharge head, feet	272.6
Standing water level, feet	71.2
Drawdown, feet	47.7
Pumping water level, feet	118.9
Total pumping head, feet	391.5
Gallons per minute flow	**448**
Gallons per foot of drawdown	9.4
Acre feet pumped per 24 hours	1.977
KW input to motor	64.7
HP input to motor	86.7
Motor load, % BHP	63.1
Measured speed of pump, RPM	1788
KWH per acre foot	785.2
Overall Plant efficiency in %	**51.0**

Test 1 was with this pump operating to waste as found at the time of the test.

The available water measurement location does not meet recommended industry standards. We recommend 8-10 diameters of straight pipe for the ideal test location.

If you have any questions please contact Jon Lee at (951) 684-9801.

ID 1 Well #8 3/16/2018
Test 1 391.5 h 448 q



PUMP CHECK

Pumping Systems Analysts

Hydraulic Test Report

Since 1958

(951) 684-9801 • Lic. 799498 • Fax (951) 684-2988

Borrego Water District
4201 Borrego Springs Road

Test Date: 03/16/2018
Pump type: DWT
Plant: ID 1 Well #10

A test was made on this well pump and the following information was obtained.

EQUIPMENT

PUMP:	Aurora	SERIAL:	V81-726831
MOTOR:	Newman	SERIAL:	S20066201
H.P.	150	LAT/LON:	33.12.708n116.20.812w
METER:	6695547	REF #:	PC 1186

TEST RESULTS

	TEST 1
Discharge, PSI	133.0
Discharge head, feet	307.2
Standing water level, feet	213.9
Drawdown, feet	11.5
Pumping water level, feet	225.4
Total pumping head, feet	532.6
Gallons per minute flow	**317**
Gallons per foot of drawdown	27.5
Acre feet pumped per 24 hours	1.399
KW input to motor	59.0
HP input to motor	79.1
Motor load, % BHP	48.2
Measured speed of pump, RPM	1787
KWH per acre foot	1011.9
Overall Plant efficiency in %	**53.9**

Test 1 was with this pump operating to waste at the time of the test.

The airline length was calibrated at 352.5'.

The available water measurement location does not meet recommended industry standards. We recommend 8-10 diameters of straight pipe for the ideal test location.

If you have any questions please contact Jon Lee at (951) 684-9801.

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Borrego Water District
3352 Borrego Valley Road

Test Date: 03/16/2018
Pump type: DWT
Plant: ID 1 Well #12

A test was made on this well pump and the following information was obtained.

EQUIPMENT

PUMP:	No Data	SERIAL:	N/A
MOTOR:	Newman	SERIAL:	S21612703
H.P.	200	LAT/LON:	33.13.571n116.20.897w
METER:	6695546	REF #:	PC 1221

TEST RESULTS

	TEST 1	TEST 2
Discharge, PSI	215.0	226.0
Discharge head, feet	496.7	522.1
Standing water level, feet	145.5	
Drawdown, feet	10.4	9.3
Pumping water level, feet	155.9	154.8
Total pumping head, feet	652.6	676.9
Gallons per minute flow	**890**	**844**
Gallons per foot of drawdown	85.5	90.8
Acre feet pumped per 24 hours	3.932	3.732
KW input to motor	152.2	152.0
HP input to motor	203.9	203.7
Motor load, % BHP	93.8	93.7
Measured speed of pump, RPM	1788	
KWH per acre foot	929.1	977.6
Overall Plant efficiency in %	**71.9**	**70.9**

Test 1 was the normal operation of the pump at the time of the test. The other results were obtained by throttling the pump discharge.

The available water measurement location does not meet recommended industry standards. We recommend 8-10 diameters of straight pipe for the ideal test location.

The airline length was calibrated at 303.4'.

If you have any questions please contact Jon Lee at (951) 684-9801.

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Borrego Water District		Test Date:	03/16/2018
951 Rangor Way		Pump type:	DWT
		Plant:	ID 1 Well #16

A test was made on this well pump and the following information was obtained.

EQUIPMENT

PUMP:	Layne & Bowler	SERIAL:	801084
MOTOR:	US	SERIAL:	V047590079-0005-R0007
H.P.	150	LAT/LON:	33.12.993n116.21.744w
METER:	6695579	REF #:	PC 1219

TEST RESULTS

	TEST 1
Discharge, PSI	134.0
Discharge head, feet	309.5
Standing water level, feet	230.9
Drawdown, feet	24.3
Pumping water level, feet	255.2
Total pumping head, feet	564.7
Gallons per minute flow	**848**
Gallons per foot of drawdown	34.9
Acre feet pumped per 24 hours	3.748
KW input to motor	127.9
HP input to motor	171.4
Motor load, % BHP	109.5
Measured speed of pump, RPM	1785
KWH per acre foot	818.9
Overall Plant efficiency in %	**70.6**

Test 1 was with the VFD operating at 60.0 Hz to waste at the time of the test.

The airline length was calibrated at 402.5'.

The available water measurement location does not meet recommended industry standards. We recommend 8-10 diameters of straight pipe for the ideal test location.

If you have any questions please contact Jon Lee at (951) 684-9801.

Borrego Water District
1775 Borrego Springs Road

Test Date: 03/16/2018
Pump type: DWT
Plant: ID 4 Well #4B

A test was made on this well pump and the following information was obtained.

EQUIPMENT

PUMP:	Goulds	SERIAL:	N/A
MOTOR:	US	SERIAL:	Y017664360-0005M0003
H.P.	100	LAT/LON:	33.16.627n116.22.463w
METER:	6561482	REF #:	PC 1180

TEST RESULTS

	TEST 1	TEST 2
Discharge, PSI	148.0	161.0
Discharge head, feet	341.9	371.9
Standing water level, feet	205.4	
Drawdown, feet	63.5	60.1
Pumping water level, feet	268.9	265.5
Total pumping head, feet	610.8	637.4
Gallons per minute flow	**395**	**380**
Gallons per foot of drawdown	6.2	6.3
Acre feet pumped per 24 hours	1.743	1.679
KW input to motor	64.0	63.9
HP input to motor	85.8	85.6
Motor load, % BHP	81.8	81.7
Measured speed of pump, RPM	1788	
KWH per acre foot	881.0	913.5
Overall Plant efficiency in %	**71.0**	**71.4**

Test 1 was the normal operation of the pump at the time of the test. The other results were obtained by throttling the pump discharge.

The airline length was calibrated at 388.5'.

If you have any questions please contact Jon Lee at (951) 684-9801.

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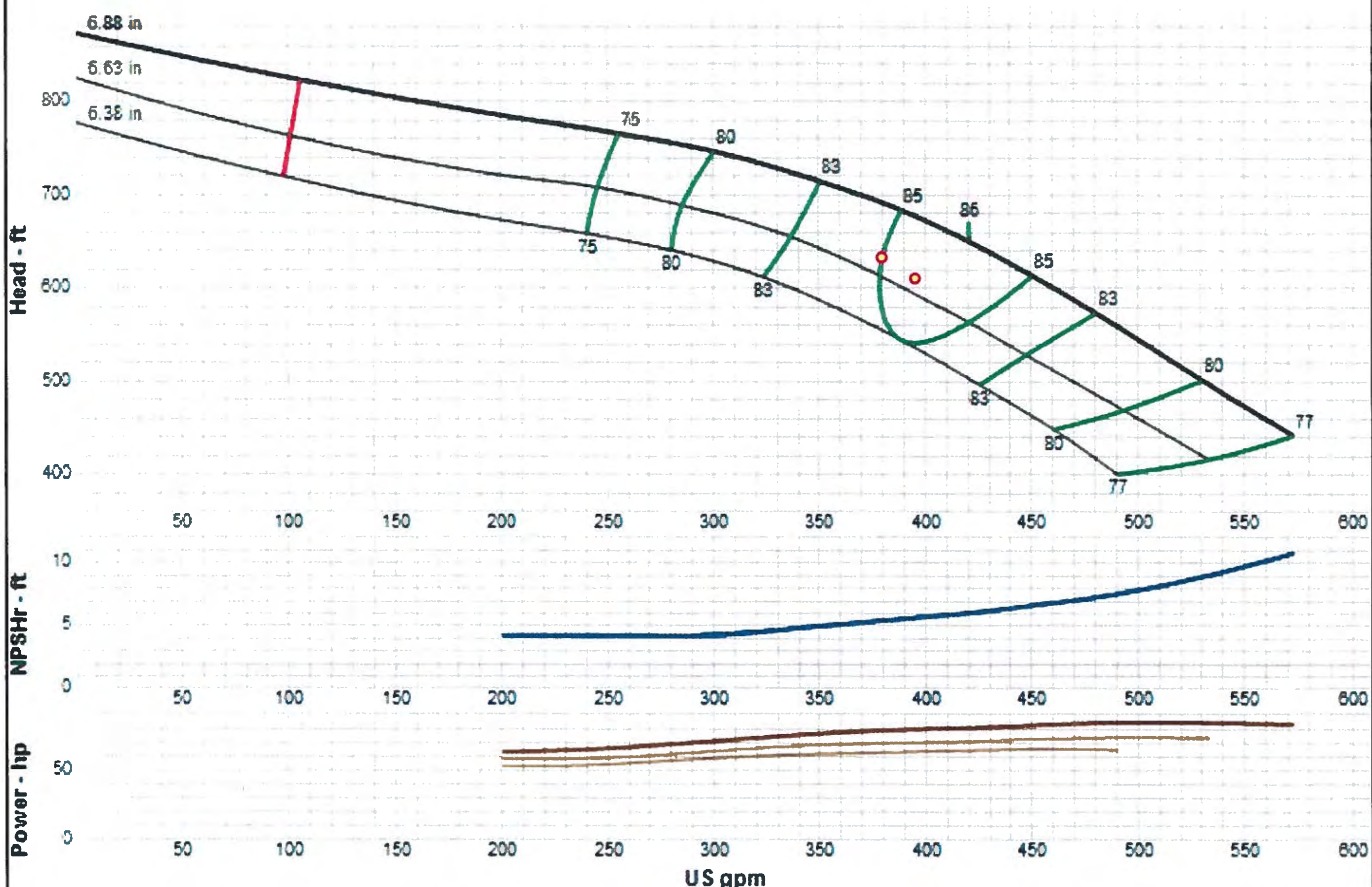
xylem
Let's Solve Water

ID4 Well #4B 3/16/2018
Test 1 610.8 h 395 q
Test 2 637.4 h 380 q

PERFORMANCE CURVE

Quote Number: 9001-170503-053
Product Name: DWT - Deep Well Lineshaft Turbine
Product Id: GWT_DWT

BORREGO WD ID4 WELL 4
HIDDEN VALLEY PUMP SYSTEMS, INC



Sizing Criteria

Series	GWT_DWT	Max Power on Design Curve	83.7 Hp
Size	9RCLC	Max Power on Max Imp Trim	83.7 Hp
Additional Size	9RCLC	Flow at BEP	420 USGPM
Speed	1770	Head at BEP	650 ft
Number of Stages	16	NPSH Required	0 ft
Stages	16 Stages	Specified NPSH Avail.	34 ft
Frequency	60 Hz	NPSHaMargin	2 ft
Impeller Trim	6.88 inch	Min Flow	105 USGPM
Additional Impeller Trim	6.88 inch	Flow on Max Imp Trim @ Max Power	530 USGPM
Impeller Maximum Trim	6.88 in inch		
Specified Flow	420 USGPM	Shut-Off Head	872 ft
Specified Head	0 ft	Shut-Off Disc Pressure	377 psi
Flow at Design	420 USGPM	Fluid Type	Water
Head at Design	872 ft	Temperature	70 F
Head at Design	872 ft	Allowable Sphere Size	0.75 inch
Run-Out Flow	0 USGPM	Exact Bowl Diameter	9.25 inch
Run-Out Head	0 ft	Curve ID	E6409CFPC2
Efficiency at Design	0	Thrust K Factor [lb/ft]	4.9
Best Efficiency	86	Add Thrust K Factor [lb/ft]	4.9
Driver Size	100 Hp	Max Lateral	0.88 inch

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Borrego Water District
2201 Diegueno Road

Test Date: 03/16/2018
Pump type: DWT
Plant: ID 4 Well #11

A test was made on this well pump and the following information was obtained.

EQUIPMENT

PUMP:	Goulds	SERIAL:	N/A
MOTOR:	US	SERIAL:	X07X125R612R4
H.P.	250	LAT/LON:	33.16.047n116.23.004w
METER:	6695581	REF #:	PC 1183

TEST RESULTS

	TEST 1	TEST 2
Discharge, PSI	131.0	140.0
Discharge head, feet	302.6	323.4
Standing water level, feet	223.2	
Drawdown, feet	5.8	4.7
Pumping water level, feet	229.0	227.9
Total pumping head, feet	531.6	551.3
Gallons per minute flow	**920**	**819**
Gallons per foot of drawdown	158.6	174.3
Acre feet pumped per 24 hours	4.065	3.621
KW input to motor	126.7	126.6
HP input to motor	169.8	169.6
Motor load, % BHP	65.3	65.3
Measured speed of pump, RPM	1785	
KWH per acre foot	748.1	839.2
Overall Plant efficiency in %	**72.7**	**67.2**

Test 1 was the normal operation of the pump at the time of the test. The other results were obtained by throttling the pump discharge.

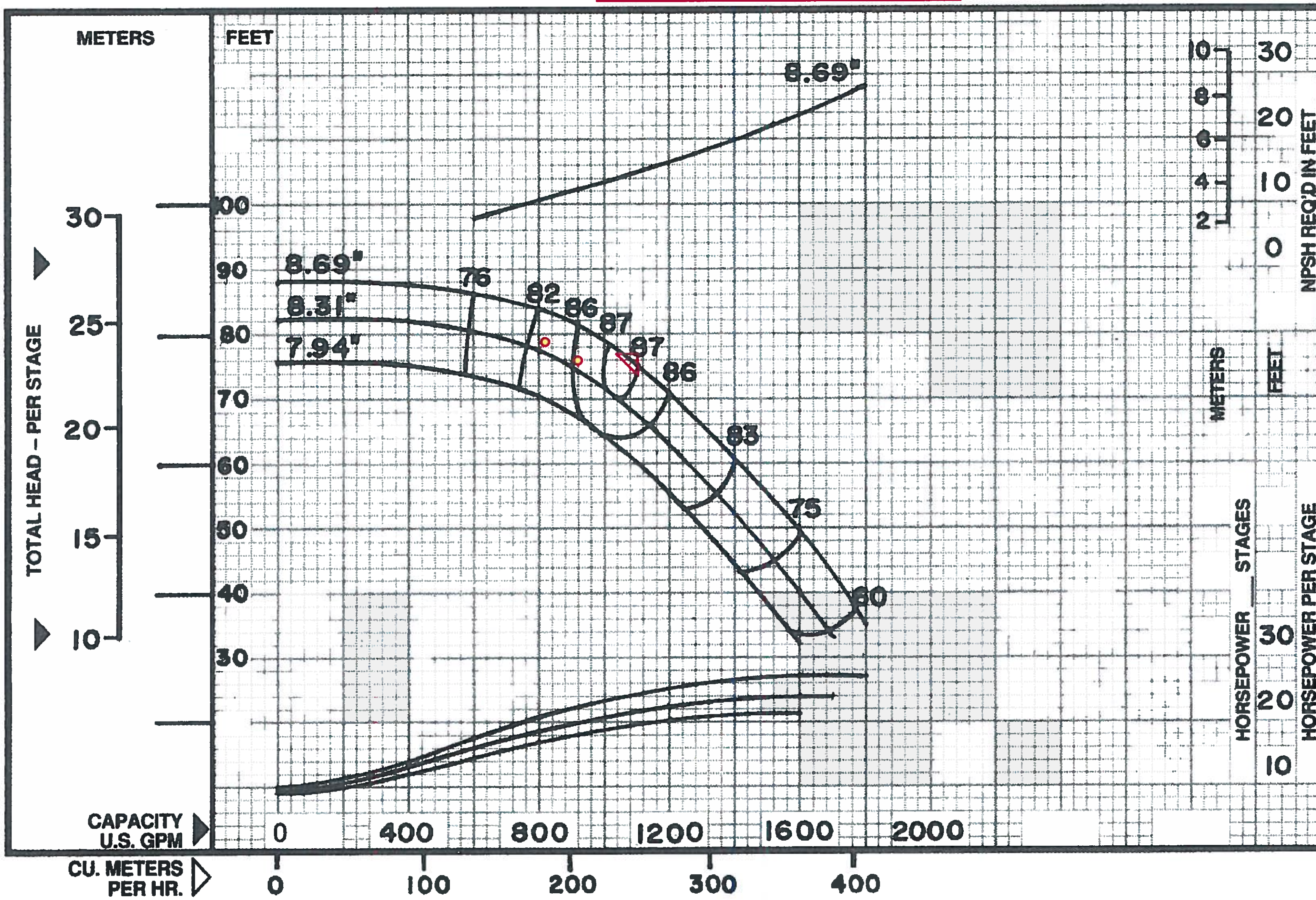
The airline length was calibrated at 283.3'.

The available water measurement location does not meet recommended industry standards. We recommend 8-10 diameters of straight pipe for the ideal test location.

If you have any questions please contact Jon Lee at (951) 684-9801.

ID 4 Well #11 3/16/2018
Test 1 531.6 h 920 q
Test 2 551.3 h 819 q

PUMPCHECK



Curve No.: E6412CCPCO
Model: 12CHC
RPM: 1770
EFFICIENCY CORRECTION
STGS. 1 -3.0
STGS. 2 -2.0
STGS. 3 -0.5
STGS. 4 -0.0
PERF BASED ON STD. MTL'S
Impeller=C03087B
N_S= 2100
K= 5.10 LBS/FT 7.59 KG/M
K (Bal.)=
GOULDS PUMPS TURBINE DIVISION LUBBOCK, TEXAS
Characteristics based upon pumping clear, non-aerated water. Rating point only is guaranteed. Column losses not included.

MODEL
12CHC
DATE
March 1995
SUPERCEDES
NEW

C12CHC

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Borrego Water District
111 Indian Head Ranch Road

Test Date: 03/16/2018
Pump type: SUB
Plant: ID 4 Well #18

A test was made on this well pump and the following information was obtained.

EQUIPMENT

PUMP:	Goulds	SERIAL:	N/A
MOTOR:	Franklin	SERIAL:	16J19-15-16154A
H.P.	40	LAT/LON:	33.18.404n116.23.087w
METER:	6597551	REF #:	PC 1181

TEST RESULTS

	TEST 1	TEST 2
Discharge, PSI	110.0	126.0
Discharge head, feet	254.1	291.1
Standing water level, feet	311.2	
Drawdown, feet	7.6	6.5
Pumping water level, feet	318.8	317.7
Total pumping head, feet	572.9	608.8
Gallons per minute flow	**130**	**109**
Gallons per foot of drawdown	17.1	16.8
Acre feet pumped per 24 hours	0.573	0.482
KW input to motor	27.8	27.6
HP input to motor	37.3	37.0
Motor load, % BHP	82.0	81.4
Measured speed of pump, RPM	n/a	
KWH per acre foot	1164.6	1375.0
Overall Plant efficiency in %	**50.3**	**45.3**

Test 1 was the normal operation of the pump at the time of the test. The other results were obtained by throttling the pump discharge.

If you have any questions please contact Jon Lee at (951) 684-9801.

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Goulds Water Technology

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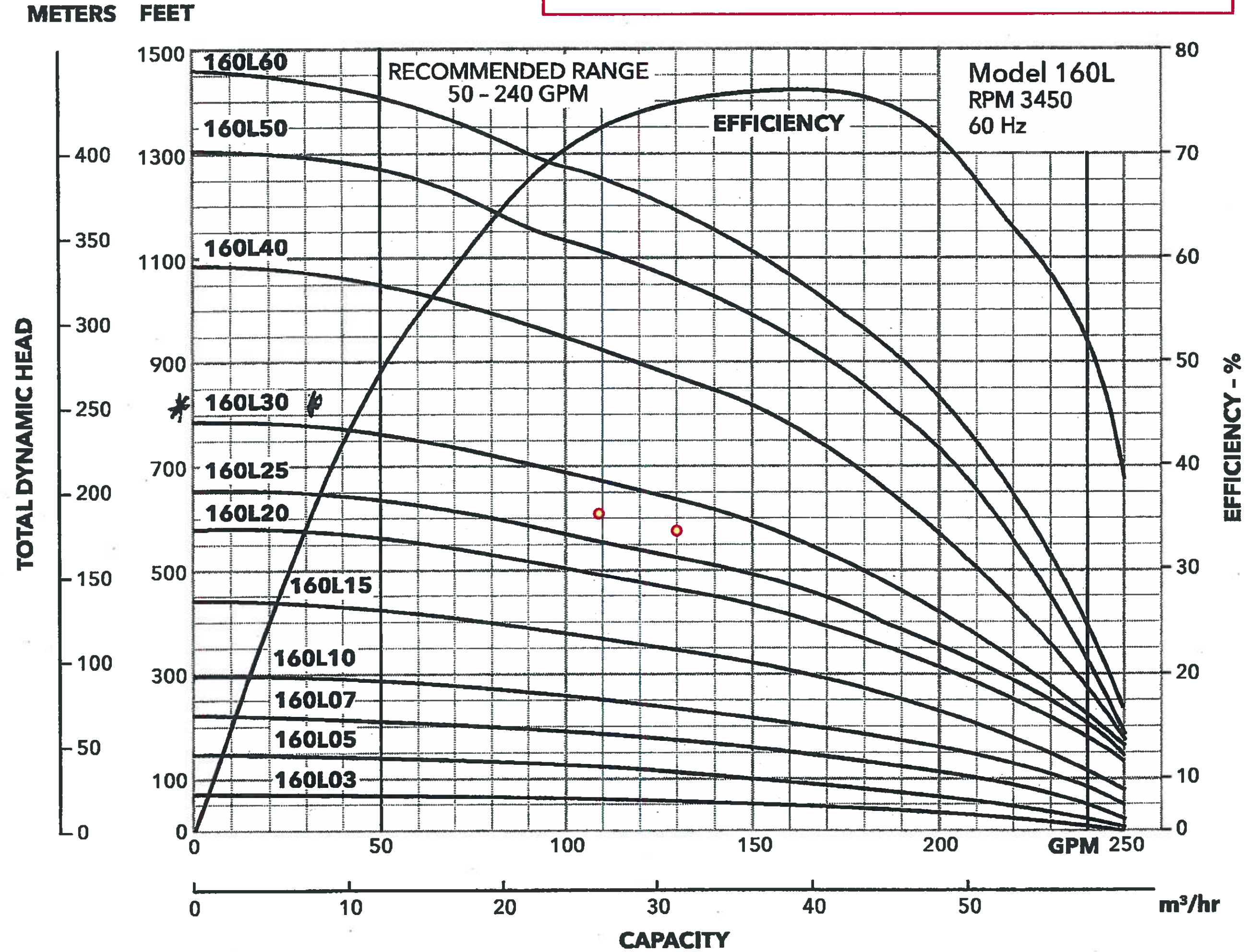
MODEL 160L

ID4 Well #18   3/16/2018
Test 1 572.9 h 130 q
Test 2 608.8 h 109 q



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Borrego Water District
3003 Lofter Drive

Test Date: 03/16/2018
Pump type: DWT
Plant: ID 5 Well #5

A test was made on this well pump and the following information was obtained.

EQUIPMENT

PUMP:	Goulds	SERIAL:	N/A
MOTOR:	US	SERIAL:	C09-6349-M01
H.P.	200	LAT/LON:	34.14.222n116.21.857w
METER:	6697749	REF #:	PC 3557

TEST RESULTS

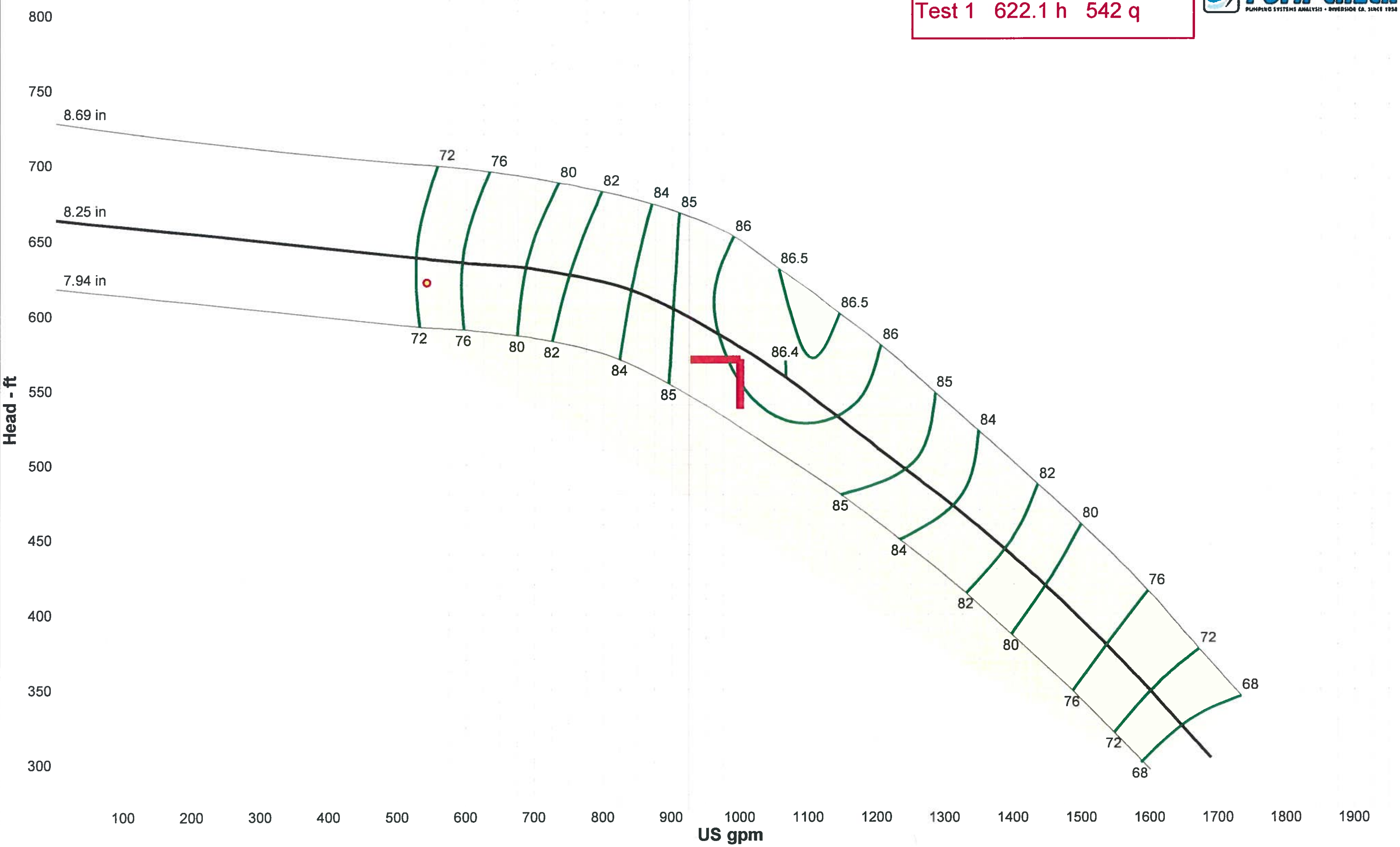
	TEST 1
Discharge, PSI	183.5
Discharge head, feet	423.9
Standing water level, feet	182.1
Drawdown, feet	16.1
Pumping water level, feet	198.2
Total pumping head, feet	622.1
Gallons per minute flow	**542**
Gallons per foot of drawdown	33.7
Acre feet pumped per 24 hours	2.395
KW input to motor	102.4
HP input to motor	137.2
Motor load, % BHP	64.2
Measured speed of pump, RPM	1781
KWH per acre foot	1026.3
Overall Plant efficiency in %	**62.0**

Test 1 was the normal operation of the pump at the time of the test.

The airline length was calibrated at 258.3'.

If you have any questions please contact Jon Lee at (951) 684-9801.

ID 5 Well #5 3/16/2018
Test 1 622.1 h 542 q



Suction Size-8",10" Discharge Sizes-6",8",10". Curves are certified for water at 60°F only. Consult factory for performance with any other fluid.

Company: Borrego Water District
Name: ID 5 Well #5
4/1/2013

Turbine 60 Hz
Catalog: goulds lineshaft .60, Vers 3.36
Lineshaft - 1800
Design Point: 1000 US gpm, 570 ft

Size: 12CHC 8 stage
Speed: 1770 rpm
Dia: 8.25 in
Curve: E6412CCPC4

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Borrego Water District
3816 Borrego Springs Road

Test Date: 03/16/2018
Pump Type: DWT
Plant: Wilcox Well

A test was made on this deep well turbine pump and the following information was obtained.

EQUIPMENT

Pump:	Goulds	Serial:	88583
Engine:	Cummins	Serial:	45848487
HP:	130	Lat/Lon:	33.12.660n116.21.887w
Meter:	Diesel	Ref #:	PC 1218

TEST RESULTS

	TEST 1
Discharge, PSI	94.0
Discharge head, feet	217.1
Standing water level, feet	305.2
Drawdown, feet	5.8
Pumping water level, feet	311.0
Total pumping head, feet	528.1
Gallons per minute flow	**205**
Gallons per foot of drawdown	35.3
Acre feet pumped per 24 hours	0.906
Measured speed of engine, RPM	1810
Measured speed of pump, RPM	1645

Test 1 was the normal operation of the pump at the time of the test.

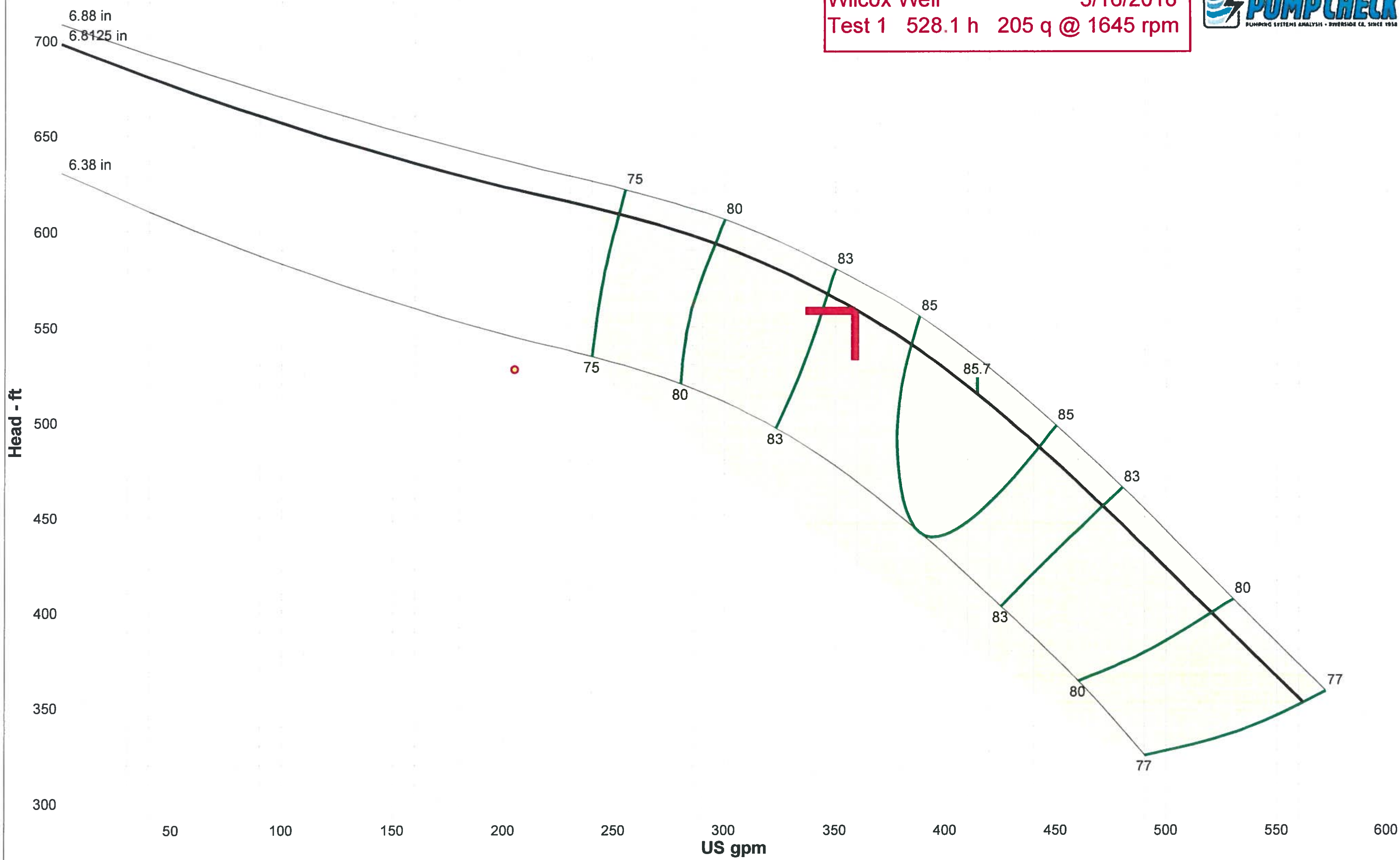
The airline length was calibrated at 397.6'.

The available water measurement location does not meet recommended industry standards. We recommend 8-10 diameters of straight pipe for the ideal test location.

If you have any questions please contact Jon Lee at (951) 684-9801.

P.O. Box 5646, Riverside, California 92517

Wilcox Well 3/16/2018
Test 1 528.1 h 205 q @ 1645 rpm



Suction Size-6" Discharge Sizes-5",6",8". Curves are certified for water at 60°F only. Consult factory for performance with any other fluid.

Company: Borrego Water District Name: Wilcox Well 4/1/2013	Turbine 60 Hz Catalog: goulds lineshaft .60, Vers 3.36 Lineshaft - 1800 Design Point: 359 US gpm, 558 ft	Size: 9RCLC 13 stage Speed: 1770 rpm Dia: 6.8125 in Curve: E6409CFPC2

Appendix J:

<u>Dudek 10/4/2016.</u>

Theoretical Water Demand at Buildout of Present Unbuilt Lots Under County's Current Zoning in Borrego Springs

WORKING DRAFT TECHNICAL MEMORANDUM

To:	Geoff Poole, General Manger
From:	Trey Driscoll, PG, CHG
Subject:	Theoretical Water Demand at Buildout of Present Unbuilt Lots Under County's Current Zoning in Borrego Springs
Date:	October 4, 2016
cc:	Jim Bennett, County of San Diego
Attachment(s):	Figures 1–4, Attachments A and B

EXECUTIVE SUMMARY

The Borrego Valley Groundwater Basin (BVGB) has been determined to be in "overdraft" (Figure 1). Recent studies estimate that water users within the Borrego Valley currently withdraw approximately 19,000 acre-feet per year (AFY) and that the "sustainable yield" of the BVGB is approximately 5,700 AFY based on averaging 66 years of historical annual recharge data.[1] Thus, the current estimated "overdraft" is approximately 13,300 AFY. The withdrawal value of 19,000 AFY is the assumed "baseline" on which the state-required Groundwater Sustainability Plan (GSP) will be established, and the "sustainable yield" value of 5,700 AFY is the maximum assumed water use target at the end of the prescribed 20-year water reduction period.[2]

The theoretical municipal water demand at buildout of present unbuilt lots under the County of San Diego's (County's) current zoning was estimated for comparison to the sustainable yield of the BVGB. The Borrego Water District's (BWD's) 2015 annual groundwater production for domestic supply is 1,645 acre-feet to serve 2,059 connections and a total of 3,103 equivalent dwelling units (EDUs). The current average use per EDU is 0.55 acre-feet per residential unit.

---

1 The overdraft of the BVGB was established by the U.S. Geological Survey (USGS) work conducted in 1982 for San Diego County. Since 1982, the overdraft has more than doubled. See http://www.borregowd.org/uploads/BWD_Report_USGS_1982.pdf. See also, USGS Scientific Investigation Report 2015-5150, *Hydrogeology, Hydrologic Effects of Development, and Simulation of Groundwater Flow in the Borrego Valley, San Diego County, California*, available at https://pubs.er.usgs.gov/publication/sir20155150.

2 This amount does not include any environmental water necessary to maintain the groundwater system, which at present is unknown. The 20-year water reduction period is promulgated in California Water Code Section 10727.2(b)(1).

Under the County's current zoning there are 4,439 vacant and undeveloped parcels that could be converted to residential development and 526 vacant and undeveloped lots that could be converted to commercial, industrial, office space, rural commercial, open space, public agency, or public/semi-public facilities (County of San Diego 2011a). Because an undetermined number of lots do not have legal lot status and because many of the lots are not developable due to environmental and other physical constraints, it was assumed that development of approximately 3,000 residential units would approach maximum buildout of the Borrego Valley. To estimate increased demand for commercial and other user types, it was conservatively assumed that their demand would increase proportionally to their existing percentage of the overall demand as growth occurs in Borrego Springs.

Full General Plan buildout of legal lots given constraints was presumed to add an additional 3,000 residential, 215 commercial, 108 public agency, 207 irrigation, and 179 multiple unit EDUs to the basin for a total of 6,811 EDUs at buildout of the Borrego Valley. A conservative estimate of future water demands was estimated by applying the current residential EDU water demand of 0.55 acre-feet per account. This results in a future estimated municipal water demand of 3,746 acre-feet per year, which is about 66% of the basin sustainable yield of 5,700 acre-feet per year.[3]

POPULATION

The population and number of homes within the Borrego Springs community are rather stable at the present time with slow growth over the past 20 years. Borrego Springs is an attractive community for holiday retreats, seasonal residents or "snowbirds," and retirement because of the dry desert air, quiet surroundings, and slow pace of life. The Anza-Borrego Desert State Park, including the Ocotillo Wells State Vehicular Recreation Area, attracts approximately 500,000 annual tourist visits per year to the community, which helps support the local economy, adding an estimated $40 million per year in revenue from these visits (BBC Research & Consulting 2012). The current population of Borrego Springs is 3,429 based on the 2010 census (U.S. Census 2010). It is noted that fluctuation of transient population of snowbirds and tourists is an important factor that is additive to water demand since up to 2,000 additional winter residents and 500,000 tourists visit Borrego Springs annually. Historical and projected population is

[3] This estimate of the theoretical municipal water demand at buildout of present unbuilt lots under the County's current zoning in Borrego Springs is based on the current residential water use per EDU of 0.55 acre-feet per year, the existing distribution of user types, and an assumed additional 3,000 residential units at buildout. It is recognized that change in the water use per EDU and change in the distribution of user types will vary the actual municipal water demand.

presented in Table 1. Projected population is estimated based on the calculated historical annual growth rate from 1990 to 2010 of 2.64%.

Table 1
Historical and Projected Population

Year	Population[a]
1990	2,244
2000	2,541
2010	3,429
2020[b]	4,450
2030[b]	5,774
2040[b]	7,493
2050[b]	9,724
Estimated Annual Growth Rate[c]	**2.64%**

Notes:
a. Borrego Springs is a census designated place. The population estimates the permanent population. Seasonal population is a large factor in Borrego Springs since the winter population may exceed 10,000.
b. Population Future = Population Current x $(1 + 0.0264)^n$. Where Population Current = 2010 Population (3,429), annual growth rate = 0.0264 and n = 10 years between periods.
c. Annual growth rate = ((Present Value – Past Value)/Past Value)) x100 = Growth Rate/Years (N) = Annual Growth Rate, N = 20.
Source: U.S. Census 2010, 2016.

LAND USE

The land uses in Borrego Valley primarily include residential, agricultural, recreational, and commercial uses. Most of the land is owned by private individuals or corporations. The majority of agricultural lands are located in the northern portion of Borrego Valley. The Anza-Borrego Desert State Park and other parkland cover some of the margins of Borrego Valley and the mountain regions above Borrego Valley. Borrego Springs is completely surrounded and encompassed by state park land, which also includes tribal, private, and national forest land (County of San Diego 2011b).

Current Land Use

Current land use for the BWD service area is listed in Table 2 and shown in Figure 2. The parcel count was determined utilizing geographic information systems (GIS) methodologies, as detailed in Attachment A. The total number of parcels within the BWD service area is 5,931, which equates to a total of approximately 9,246 units (SANDAG 2015). A unit is defined in this memorandum as a parcel or a portion of a parcel that is listed within a land use category as determined by the San Diego Area of Governments (SANDAG).

As of 2016, there are roughly 2,999 existing residential units accounting for 32.42% of the total potential units in the Borrego Valley. Residential land use categories include Mobile Home Park, Multi-Family Residential, Residential Under Construction, Single Family Detached, Single Family Multiple-Units, Single Family Residential, Single Family Residential Without Units, and Spaced Rural Residential.

Table 2
Current Land Use

Current Land Use	Land Use Count	Percent of Total Land Use by Unit
Communications and Utilities	30	0.32%
Elementary School	1	0.01%
Field Crops	6	0.06%
Fire/Police Station	2	0.02%
General Aviation Airport	6	0.06%
Golf Course	883	9.55%
Golf Course Clubhouse	863	9.33%
Government Office/Civic Center	1	0.01%
Hospital – General	1	0.01%
Hotel/Motel (Low-Rise)	8	0.09%
Intensive Agriculture	1	0.01%
Landscape Open Space	23	0.25%
Library	1	0.01%
Light Industry – General	2	0.02%
Mobile Home Park	640	6.92%
Multi-Family Residential	64	0.69%
Office (Low-Rise)	1	0.01%
Open Space Park or Preserve	50	0.54%
Orchard or Vineyard	67	0.72%
Other Public Services	2	0.02%
Other Recreation – High	4	0.04%
Other Retail Trade and Strip	37	0.40%
Park – Active	2	0.02%
Parking Lot – Surface	6	0.06%
Post Office	1	0.01%
Religious Facility	9	0.10%
Residential Recreation	17	0.18%
Residential Under Construction	430	4.65%
Resort	6	0.06%
Road Right of Way	181	1.96%
Senior High School	1	0.01%
Service Station	3	0.03%

Table 2
Current Land Use

Current Land Use	Land Use Count	Percent of Total Land Use by Unit
Single Family Detached	1,109	11.99%
Single Family Multiple-Units	318	3.44%
Single Family Residential	1	0.01%
Single Family Residential Without Units	17	0.18%
Spaced Rural Residential	420	4.54%
Vacant and Undeveloped Land	4,030	43.59%
Warehousing	2	0.02%
Total Units	**9,246**	**100.00%**

Source: SANDAG 2015

General Plan Land Use Designations

The planned land use designations were created through the San Diego County General Plan, as adopted in August 2011. The General Plan land use designations include Village Residential, Semi-Rural Residential, Rural Lands, Specific Plan Area, Office Professional, Neighborhood Commercial, Rural Commercial, Limited, Medium and High Impact Industrial, Village Core Mixed Use, Public/Semi-Public Facilities and Lands, and Open Space Recreation and conservation (County of San Diego 2011a). Figure 3 shows the General Plan land use designations grouped into overall categories. The General Plan land use count was determined using GIS methodologies, as detailed in Attachment A.

The Specific Plan Areas make up 1,052 units with approximately 11.33% of the total General Plan land use units. The smallest portion of the General Plan land use is the Rural Lands, comprising of 395 units with approximately 4.25% of the total units. Semi-Rural Residential land use totals 1,747 for approximately 18.81% of the total units. The largest General Plan land use is the Village Residential land use group, totaling 3,989 units for approximately 42.95% of the total planned land use units. Table 3 provides a summary of the land use units and percentage of each land use type by area.

Table 3
General Plan Land Use

Designation	Land Use Count	Percentage of Land Use by Unit
Borrego Country Club SPA	225	2.42%
Mesquite Trails SPA	15	0.16%
Rams Hill Country Club SPA	812	8.74%
Total Specific Planning Area	*1,052*	*11.33%*

Table 3
General Plan Land Use

Designation	Land Use Count	Percentage of Land Use by Unit
Rural Lands (RL-20)	133	1.43%
Rural Lands (RL-40)	190	2.05%
Rural Lands (RL-80)	72	0.78%
Total Rural Lands	*395*	*4.25%*
Semi-Rural Residential (SR-1)	476	5.12%
Semi-Rural Residential (SR-2)	226	2.43%
Semi-Rural Residential (SR-4)	588	6.33%
Semi-Rural Residential (SR-10)	457	4.92%
Total Semi-Rural Lands	*1,747*	*18.81%*
Village Residential (VR-2)	1,740	18.73%
Village Residential (VR-2.9)	898	9.67%
Village Residential (VR-4.3)	546	5.88%
Village Residential (VR-7.3)	666	7.17%
Village Residential (VR-10.9)	9	0.10%
Village Residential (VR-15)	127	1.37%
Village Residential (VR-24)	3	0.03%
Total Village Residential	*3,989*	*42.95%*
Other Non-Residential Land Uses	2,105	22.66%
Total Units	**9,288**	**100.00%**

Source: County of San Diego 2011c

Specific Plan Areas

There are three Specific Plan Areas in Borrego Springs: Borrego Country Club, Mesquite Trails, and Rams Hill Country Club.

Borrego Country Club Specific Plan

Borrego Country Club Specific Plan (SP-82-03) provides for a gross permitted density of 0.77 dwelling units per acre at the 1,075.6-acre project site (Figure 3). Existing development on the site includes 345 lots, approximately 132 residential structures, two golf courses (one closed), a 100-room hotel, and country club. At current approved buildout of Borrego Country Club, there will be an additional 332 residential units (Martin 1992).

Mesquite Trails Specific Plan

The Mesquite Trails Specific Plan covers a 309.51-acre site with 480 recreational vehicle lots and 28 recreation or open space lots. To date, no development has occurred at the site (Figure 3).

Rams Hill Country Club Specific Plan

Rams Hill Country Club Specific Plan (SP 80-01) provides for a gross permitted density of 0.5 dwelling units per acre at the 3,142-acre project site (Figure 3). Included is a proposed total of 780 dwelling units, a hotel (350 suites), a tennis and retail shop complex, an 18-hole championship golf course, a medical clinic, a future fire station, a wastewater treatment plant, a flood control facility, 1,600 acres of open space, and 880 acres of "future planning areas" (PRC Toups Corporation 1980). Rams Hill Country Club Specific Plans Plan Amendment (SPA 86-006) Log #86-11-01 indicates that, to date, four residential subdivisions have been recorded providing a total of 511 dwelling units. More than 400 lots were purchased by individuals, on which 325 homes have been built. At current approved buildout of Rams Hill there will be an additional 455 residential units and a 350-room hotel.

Property-Specific Requests for General Plan Amendments

Currently there are two property-specific requests for General Plan amendments that would up-zone the properties. Property Specific Request (PSR) DS8 consist of 34 acres located on assessor's parcel number (APN) 141-160-47 adjacent to a larger 135-acre study area (APNs 141-160-48 and 141-370-25) (Figure 4). The existing General Plan allows for 337 dwelling units, and the proposed project requests 756 dwelling units or an increase in 389 dwelling units for both the PSR and study area (Attachment B).

PSR DS24 consists of 168 acres on 2 parcels, APNs 198-320-26 and 198-320-01. The existing General Plan allows for 16 dwelling units, and the proposed project requests 169 dwelling units or an increase in 153 dwelling units (Attachment B). Table 4 lists General Plan existing and proposed land use designations and dwelling units for the PSRs.

Table 4
Property-Specific Requests for General Plan Amendments

Category	Existing General Plan (August 2011)	PSR – Proposed Project	Potential Increase
Estimated Potential Dwelling Units			
PSR Area DS8	67 (VR-2)	145 (VR-4.3)	78
Study Area DS8	270 (VR-2)	581 (VR-4.3)	311
PSR Area DS24	16 (SR-10)	169 (SR-1)	153
		Total	**542**

Source: County of San Diego 2016a, 2016b

Present Unbuilt Lots Under County's Current Zoning

Under the County's current zoning, there are 4,439 vacant and undeveloped parcels that could be converted to residential development and 526 vacant and undeveloped lots that potentially could be converted to commercial, industrial, office space, rural commercial, open space, public agency, or public/semi-public facilities (SANDAG 2015; County of San Diego 2011c). The buildout land count was determined using GIS methodologies, as shown in Attachment A. The legal lot status estimate of 85% from the *Evaluation of Groundwater Conditions in Borrego Valley* was used to develop a more realistic number of buildable lots. Additionally, the County of San Diego indicates that "Having a legally created lot which meets Zoning requirements still may not be buildable due to a number of factors such as floodplain issues, having legal access to roadways, having access to sewer or water, etc. Building permits are granted on a case-by-case basis by the County, and it is not possible to accurately estimate the number of legally buildable parcels in Borrego Valley. However, the significant inventory of existing unbuilt lots could possibly provide up to an additional 3,000+ future residential units without any additional subdivision" (County of San Diego 2011b).

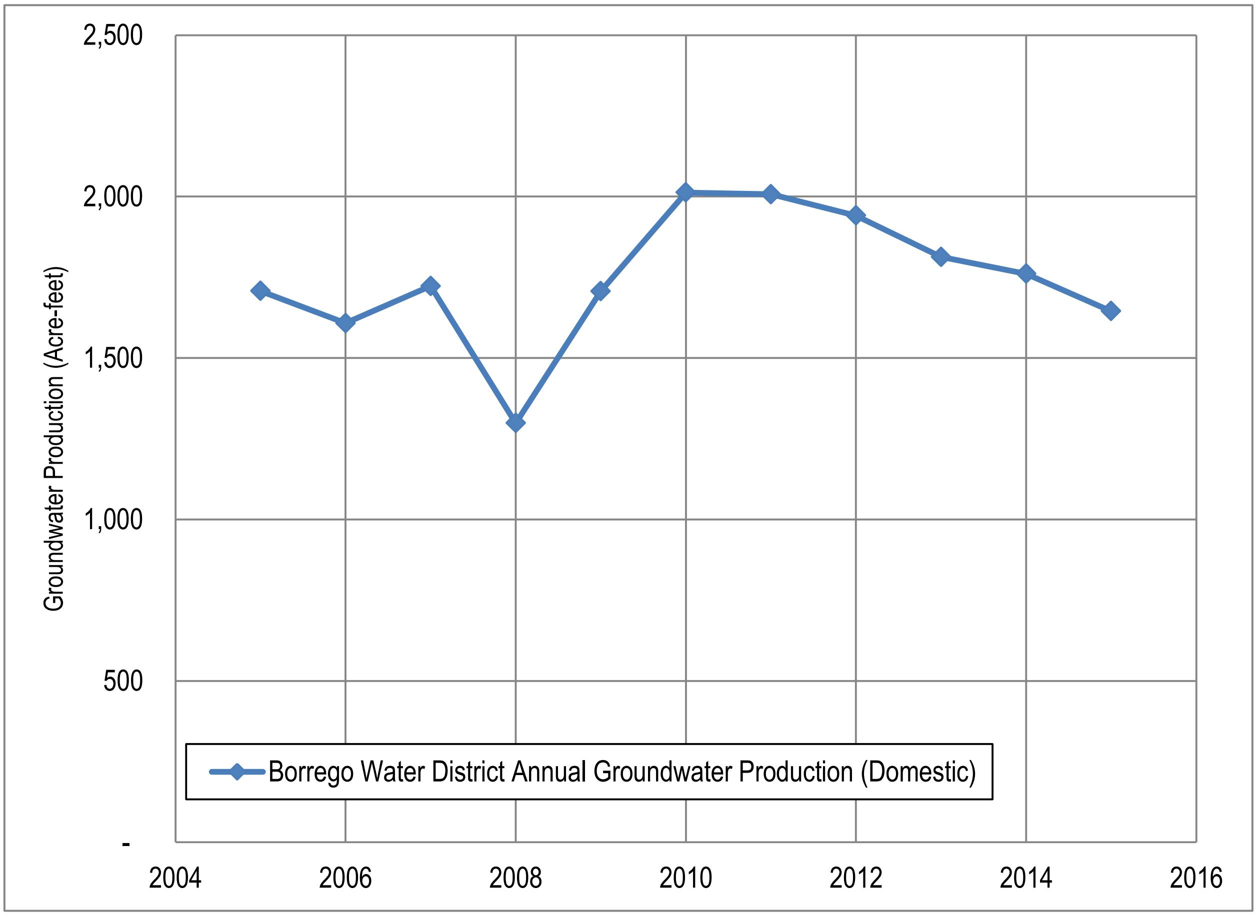
WATER USE

Current and Historical Municipal Water Use

The current annual groundwater production for the BWD is 1,606 acre-feet for the period from May 2015 to May 2016. Annual groundwater production peaked in 2010 at 2,013 acre-feet and has been trending downward over the past 5 years (Exhibit 1). The 2015 annual groundwater production is 1,645 acre-feet, which is an 18% decrease from 2010.[4] The decrease in water demand is attributed to both an increase in water rates and the Governor's Emergency Regulation for Statewide Urban Water Conservation. Additionally, the BWD has been proactive in publicizing the long-term water supply realities of the BVGB and providing conservation measures such as landscape audits to reduce outdoor water use.

4 Annual production excludes groundwater supply for Rams Hill Golf Course.

Exhibit 1
Borrego Water District Annual Groundwater Production 2005–2015



Notes: Municipal production excludes groundwater production and supply for golf courses. In 2009, the BWD began serving the Borrego Springs Park Community Services District (Club Circle and Borrego Springs resorts).
Source: BWD 2016a

Equivalent Dwelling Use Calculations

EDU calculations have been prepared for municipal water use during the 2015 fiscal year. The annual water use per residential account is 0.55 acre-feet with a total of 1,823 residential EDUs. The total EDUs currently served by the BWD, including residential, commercial, public agency, irrigation, and multiple units, is 3,103 (Table 5).

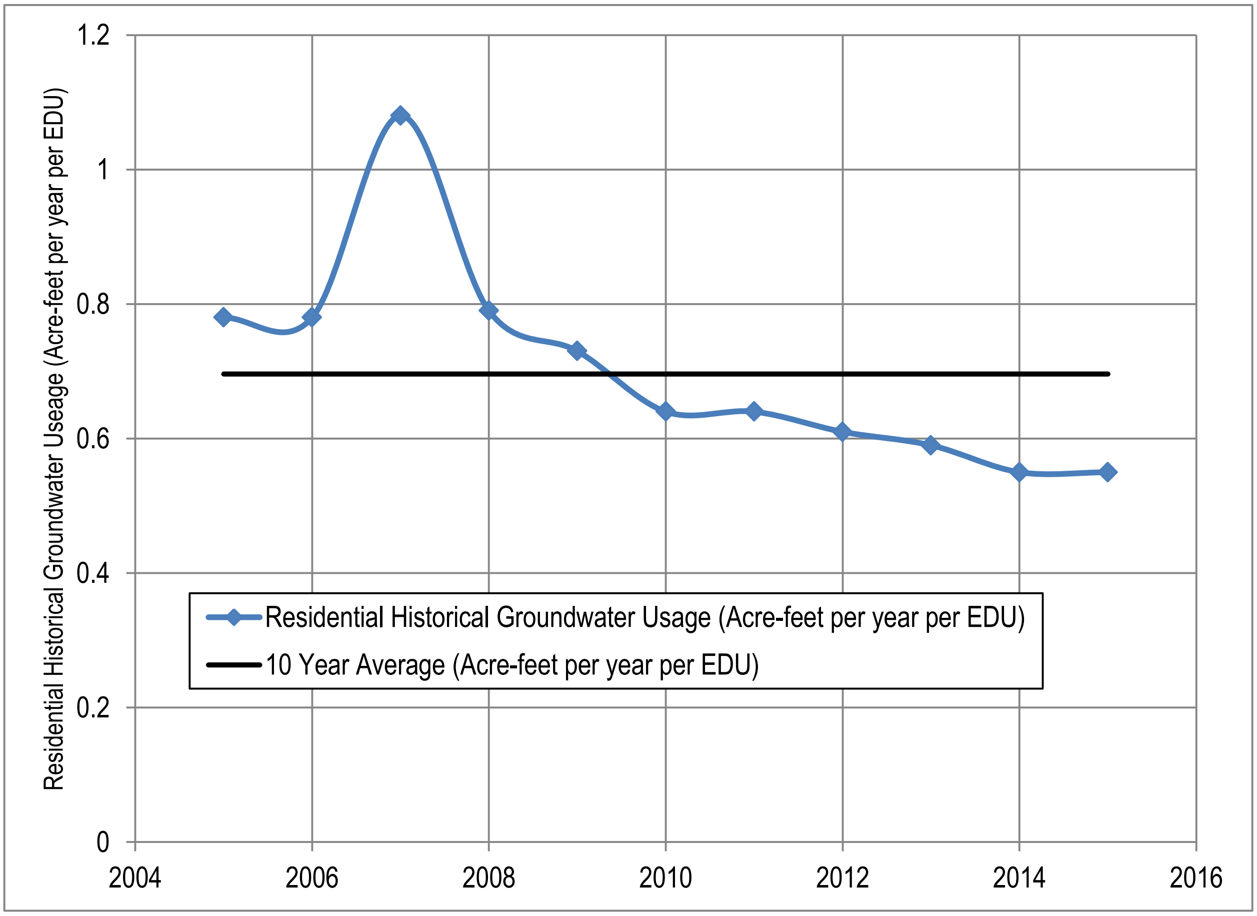
Table 5
Equivalent Dwelling Unit (EDU) Information[a]

User Type	Average Monthly Water Usage (gallons)	Annual Water Usage Per Account (acre-feet)	Number of Users (connections)	Average Monthly Usage per Connection (gallons)	Number of EDUs
Residential	27,226,209	0.55	1,823	14,935	1,823
Commercial	5,801,234	1.96	109		388
Public Agency	2,917,724	3.07	35		195
Irrigation	5,565,535	3.66	56		373
Multiple Units	4,828,026	5.08	35		323
Golf Course	0	0	1		0
				Total EDUs	**3,103[b]**

Notes:
a. Based on customer use by code for fiscal year 2015. BWD did not supply groundwater to Rams Hill Golf Course in fiscal year 2015.
b. Total EDUs rounded to nearest whole number.
Source: BWD 2016b

The historical annual residential water use per EDU has decreased from a high of 1.08 acre-feet in 2007 to 0.55 acre-feet in 2015 (Exhibit 2). The 2015 annual residential water use per EDU is about 21% less than the 10-year average of 0.70 acre-feet per EDU.

Exhibit 2
Historical Annual Residential Groundwater Use per EDU 2005–2015



Source: BWD 2016a

Potential Future Water Demand

Maximum Buildout of Present Unbuilt Lots

The potential future water demand required to serve present unbuilt lots at maximum buildout is calculated to provide a comparison to the sustainable yield value of the BVGB. The current residential water demand of 0.55 acre-feet per EDU was used to conservatively estimate future water demand. Full General Plan buildout of legal lots given constraints was presumed to add an additional 3,000 residential, 215 commercial, 108 public agency, 207 irrigation, and 179 multiple unit EDUs to the basin for a total of 6,811 EDUs based on the existing distribution of land use (Table 6). Applying the current residential water demand of 0.55 acre-feet per account would result in a future municipal water demand of 3,746 acre-feet per year, which is about 66% of the basin sustainable yield of 5,700 acre-feet per year.

Table 6
Annual Water Demand at Existing General Plan Buildout

User Type	Number of Existing EDU	Percentage by User Type	EDU at Buildout	Annual Water Demand at Buildout (Acre-feet)
Residential	1,823	59%	4,823	2,653
Commercial	388	13%	603	332
Public Agency	195	6%	303	167
Irrigation	373	12%	580	319
Multiple Units	323	10%	502	276
Golf Course	0	0%	0	0
Total	**3,102**	**100%**	**6,812**[a]	**3,747**[a]

Notes:
a. EDUs rounded to nearest whole number.

SUSTAINABLE GROUNDWATER MANAGEMENT ACT CONSTRAINTS

This analysis does not directly consider existing recreational (i.e., golf course irrigation), agricultural, and other user water demands. For example, agriculture in the Borrego Valley presently uses approximately 70%, on average, of the 19,000 AFY withdrawals, of which a large percentage of this amount are no longer available under Sustainable Groundwater Management Act (SGMA) requirements. Also, there are currently six golf courses in Borrego Springs—Borrego Springs Resort – Golf Club & Spa (18 holes), Club Circle Resort (par 3 course with 18 holes), de Anza Country Club (18 holes), Rams Hill Golf Club (18 holes), the Springs at Borrego RV Resort and Golf Course (9 holes), and Roadrunner Golf and Country Club (par 3 course with 18 holes)—that irrigate approximately 519 acres with an estimated water demand of 2,852 acre-feet per year, which is about 50% of the basin sustainable yield of 5,700 acre-feet per year (Table 7).

Table 7
Existing Golf Course Water Demand

Course	Type	Water Use (AFY)	Irrigated Area (Acres)	Source
Borrego Springs Resort – Golf Club & Spa	18 holes	589	110	2015 Groundwater Monitoring Report, Borrego Springs CC Permit #SPA9001
Club Circle Resort	Par 3 course with 18 holes	66	28	2015 Groundwater Monitoring Report, Borrego Springs CC Permit #SPA9001
de Anza Country Club	18 holes	773	137	12 months meter reads; Holloway, pers. comm. 2016

Table 7
Existing Golf Course Water Demand

Course	Type	Water Use (AFY)	Irrigated Area (Acres)	Source
Rams Hill Golf Course	18 holes	998	115	Metered 2015 production records
The Springs at Borrego RV Resort and Golf Course	9 holes	175	84	2014 report to County
Roadrunner Golf and Country Club	Par 3 course with 18 holes	252	45	Assumption: 45 irrigated acres @ est. 5.35 AF per acre
	Total	**2,853**	**519**	

Source: BWD 2015; Dudek 2016; Holloway, pers. comm. 2016.

The estimated future municipal water demand (3,746 acre-feet per year) combined with the existing golf course water demand (2,853 acre-feet per year) is 6,598 acre-feet per year, or 116% of the BVGB sustainable yield. This indicates that at buildout of Borrego Springs, the municipal water demand, conservatively assuming the current water use per EDU, combined with existing recreational water demand, will consume all available sustainable supply and that there would be limited to no supply available for agriculture.

Study Findings

- Present County zoning for the BWD's service area may be unsupportable under SGMA constraints. Even with drastic reductions in residential EDU, it is uncertain that municipal demand can be met, given current competition with agriculture, recreation, and other water users of the basin, including potential environmental water necessary to maintain the groundwater system.
- Existing County General Plan assumptions need to be reevaluated given physical water constraints under SGMA.
- Any up-zoning in the BWD's service area would necessarily require as preconditions significant down-zoning of existing properties given physical constrains of available groundwater supply to meet municipal demand at buildout of Borrego Springs. Otherwise, an up-zoning without first meeting these preconditions would create a significant contingent liability for the BWD and its ratepayers as well as potentially difficult litigation risk due to the District's cost to purchase water and potential inability to provide potable water to the up-zoned property due to SGMA constraints. In other words, upfront mitigation for new development is required to offset the condition of overdraft in the BVGB.

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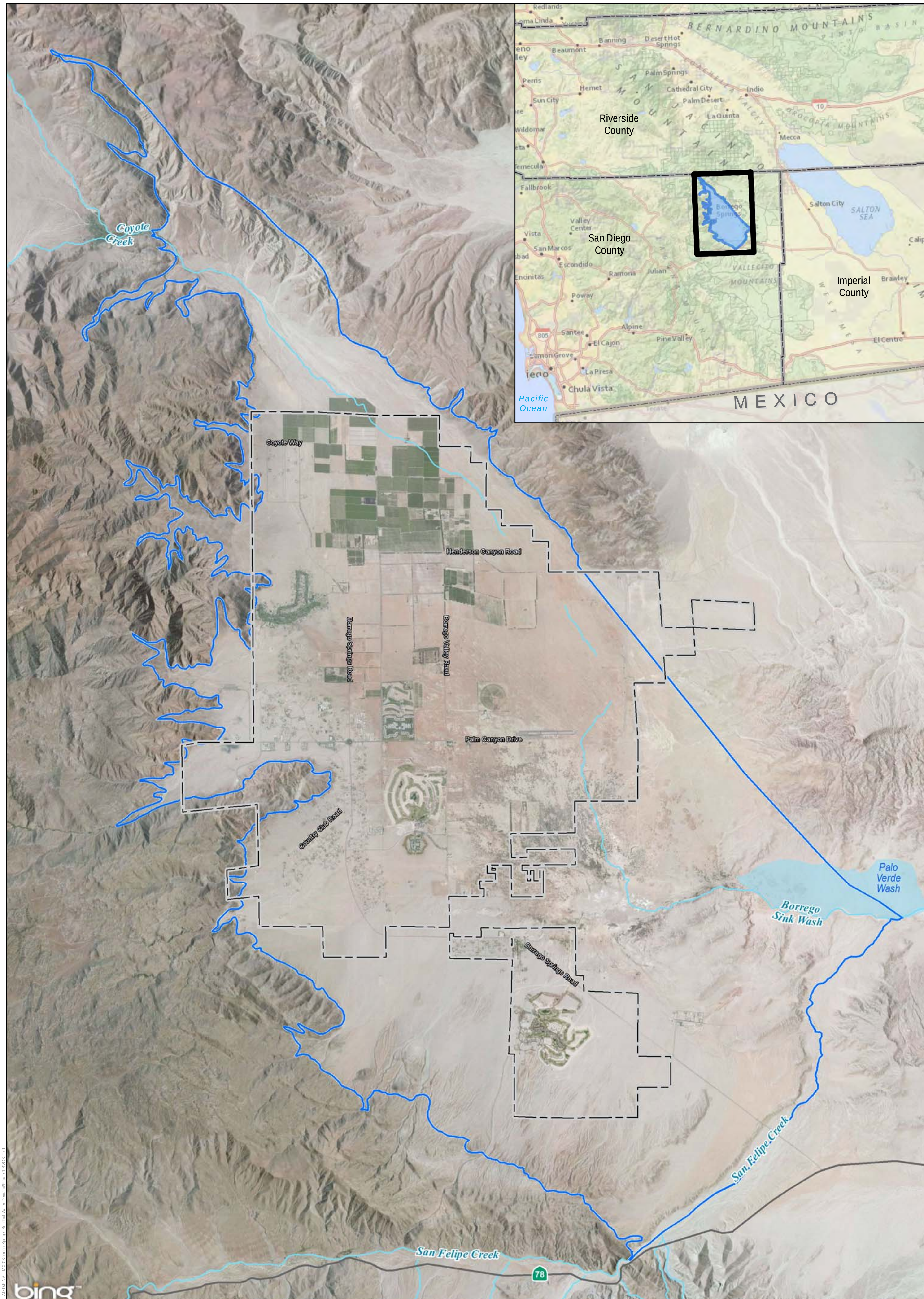


Borrego Water District Service Area
Borrego Valley Groundwater Basin
Major Stream Channels
Wash/Sink
State Highway

0 0.5 1 Miles

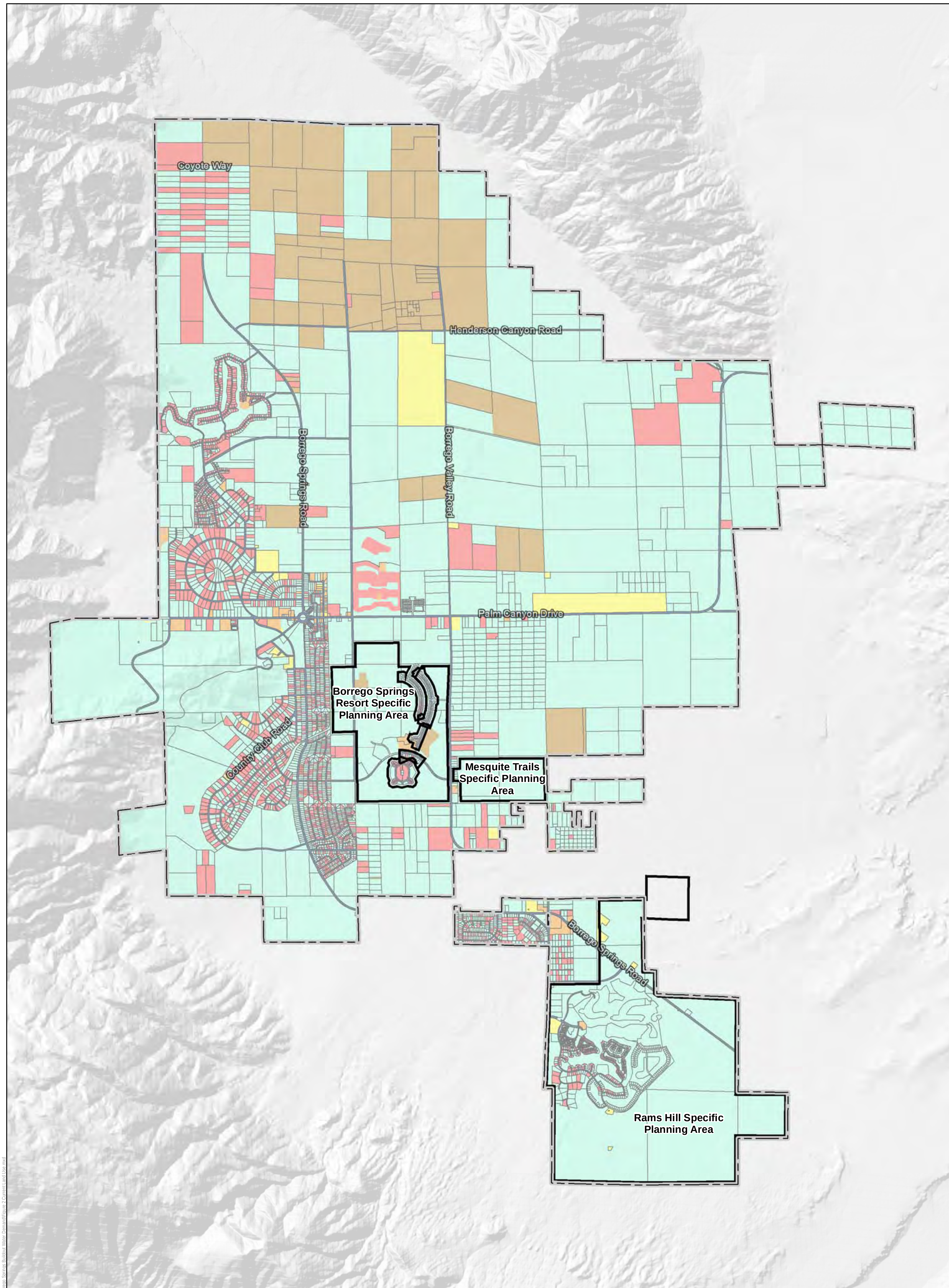
DUDEK

SOURCE: SanGIS

FIGURE 1
Borrego Valley Groundwater Basin

Theoretical Water Demand at Buildout of Present Unbuilt Lots Under County's Current Zoning in Borrego Springs

DRAFT October 4, 2016



Borrego Water District Service Area
Specific Planning Areas
Parcel Boundary

Current Land Use
Land Use Groups
Agriculture
Commercial or Industrial
Government or Other Public Institutions
Park, Open Space or Recreation
Residential
Roadway or Parking Lot

0 2,500 5,000 Feet

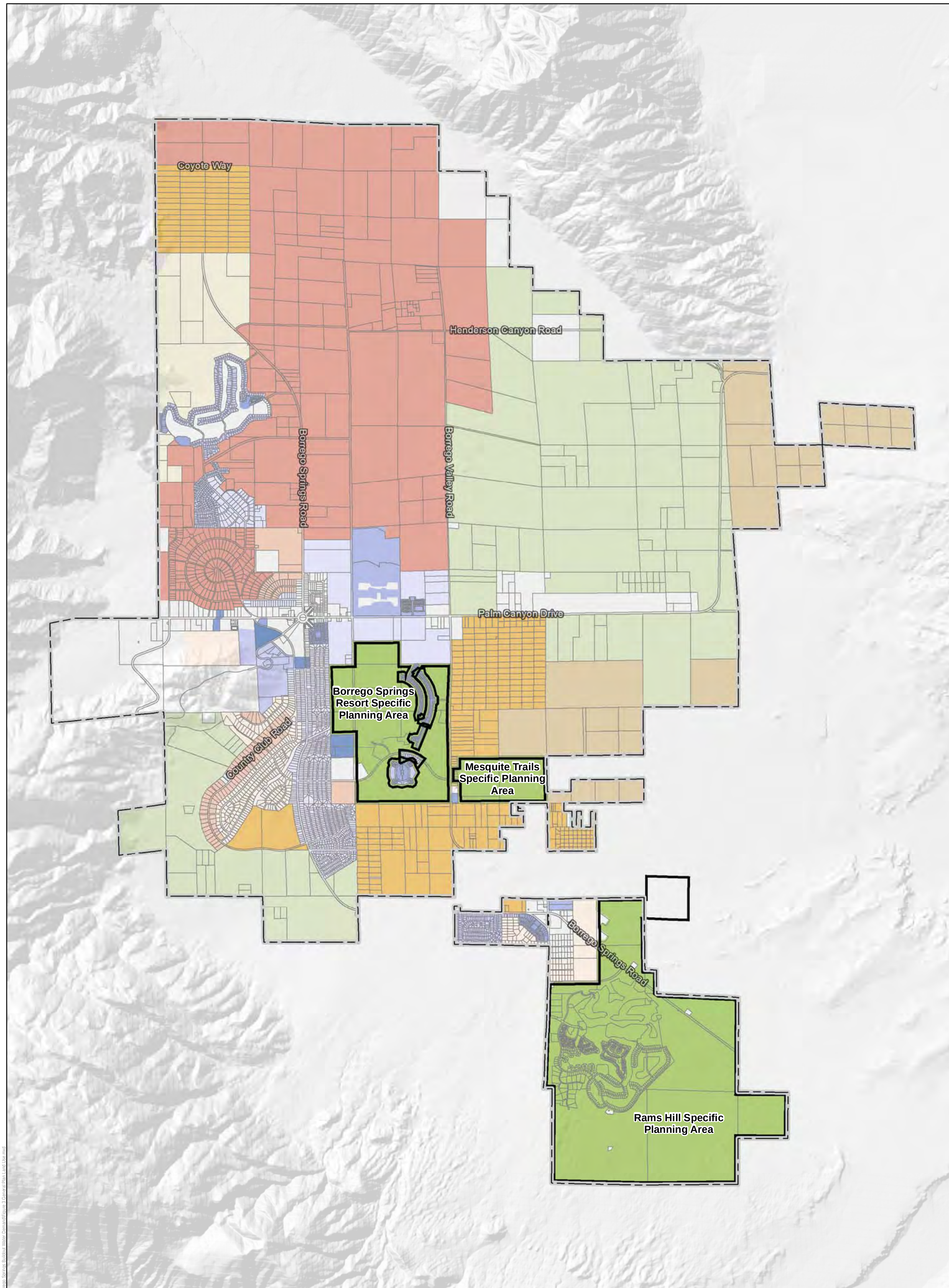
DUDEK

SOURCE: SANDAG; SanGIS

FIGURE 2
Current Land Use

Theoretical Water Demand at Buildout of Present Unbuilt Lots Under County's Current Zoning in Borrego Springs

DRAFT October 4, 2016



Borrego Water District Service Area
Specific Planning Areas
Parcel Boundary

0 2,500 5,000 Feet

General Plan Land Use

Specific Planning Area
- SPECIFIC PLAN AREA

Rural Residential
- RURAL LANDS (RL-20)
- RURAL LANDS (RL-40)
- RURAL LANDS (RL-80)

Semi-Rural Residential
- SEMI-RURAL RESIDENTIAL (SR-1)
- SEMI-RURAL RESIDENTIAL (SR-2)
- SEMI-RURAL RESIDENTIAL (SR-4)
- SEMI-RURAL RESIDENTIAL (SR-10)

Village Residential
- VILLAGE RESIDENTIAL (VR-2)
- VILLAGE RESIDENTIAL (VR-2.9)
- VILLAGE RESIDENTIAL (VR-4.3)
- VILLAGE RESIDENTIAL (VR-7.3)
- VILLAGE RESIDENTIAL (VR-10.9)
- VILLAGE RESIDENTIAL (VR-15)
- VILLAGE RESIDENTIAL (VR-24)

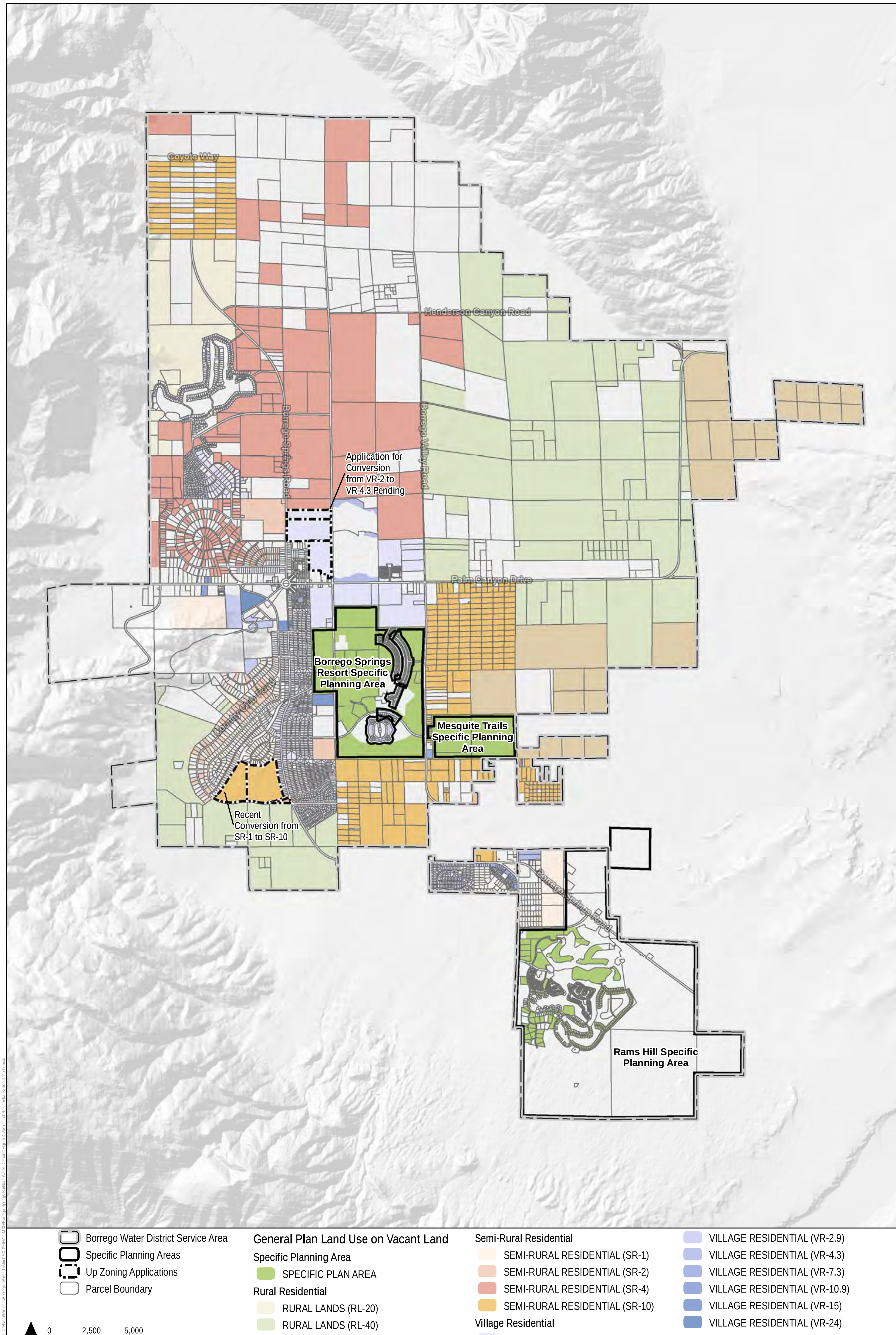
DUDEK

SOURCE: SANDAG; SanGIS

FIGURE 3
General Plan Land Use

Theoretical Water Demand at Buildout of Present Unbuilt Lots Under County's Current Zoning in Borrego Springs

DRAFT October 4, 2016



DUDEK

SOURCE: SANDAG; SanGIS

FIGURE 4
General Plan Designations on Vacant and Undeveloped Land

Theoretical Water Demand at Buildout of Present Unbuilt Lots Under County's Current Zoning in Borrego Springs

DRAFT October 4, 2016

ATTACHMENT A

GIS Methodologies

ATTACHMENT A
GIS Methodologies

CURRENT LAND USE WITHIN THE BWD GIS WORK FLOW

Current Land Use

Draft – September 2, 2016

1. **Downloaded Current shapefiles from SanGIS.**
   a. Current Land Use: Z:\Hydro\Projects\Borrego_Water_District\DATA\DATA_RCVD\SanGIS_20160701\LANDUSE_CURRENT
2. **Clipped downloaded data to the BWD boundary.**
   a. Example File Name: LU_Current_BWD_clip
3. **Selected parcels from the 2016 SanGIS parcel shapefile within the BWD service area using the Select by Location tool. All parcels were selected using the spatial selection method for the target layer features of "have their centroid in the source layer feature".**
   a. Z:\Hydro\Projects\Borrego_Water_District\DATA\GDB\Reference_Data.gdb\Parcels_within_BWD
4. **Used the Union geoprocessing tool to merge the current land use and parcels within the BWD layers.**
   a. Z:\Hydro\Projects\Borrego_Water_District\DATA\GDB\Working.gdb\LU_Current_BWD_clip_Parcels_union
5. **Created a summary table with the LANDUSE column to generate the table of total number of land use units.**

Four land use units were removed due to no value.

GENERAL PLAN LAND USE WITHIN THE BWD GIS WORK FLOW

General Plan Land Use

Draft – September 15, 2016

1. **Downloaded Current shapefiles from SanGIS.**
   a. General Plan Land Use: Z:\Hydro\Projects\Borrego_Water_District\DATA\DATA_RCVD\SanGIS_GeneralPlan_20160713\General_Plan_Update_Recommended_Project_(August_2011)\General_Plan_Update_Recommended_Project_(August_2011).shp
2. **Clipped downloaded data to the BWD boundary.**
   a. Example File Name: LU_Current_BWD_clip
3. **Selected parcels from the 2016 SanGIS parcel shapefile within the BWD service area using the Select by Location tool. All parcels were selected using the spatial selection method for the target layer features of "have their centroid in the source layer feature".**
   a. Z:\Hydro\Projects\Borrego_Water_District\DATA\GDB\Reference_Data.gdb\Parcels_within_BWD
4. **Used the Union geoprocessing tool to merge the General Plan land use and parcels within the BWD layers.**
   a. Z:\Hydro\Projects\Borrego_Water_District\DATA\GDB\Working.gdb\GP_Update_RecommProject_BWD_clip_Parcels_union
5. **Created a summary table with the DESCRIPTIO column to generate the table of total number of land use units.**
   a. Three land use units were removed due to no value.

VACANT LOT TO RESIDENTIAL BUILDOUT GIS ANALYSIS PROCESS

Current Land Use vs. General Plan Update Recommended Project (August 2011)

Draft – September 2, 2016

1. **Downloaded Current and General Plan Update Recommended Project (August 2011) shapefiles from SanGIS**
   a. Current Land Use: Z:\Hydro\Projects\Borrego_Water_District\DATA\DATA_RCVD\SanGIS_20160701\LANDUSE_CURRENT
   b. General Plan Update Recommended Project (August 2011): Z:\Hydro\Projects\Borrego_Water_District\DATA\DATA_RCVD\SanGIS_GeneralPlan_20160713\General_Plan_Update_Recommended_Project_(August_2011)
2. **Clipped downloaded data to the BWD boundary.**
   a. Example File Name: LU_Current_BWD_clip
3. **Intersected the current and General Plan Update Recommended Project (August 2011) clipped layers and the parcels**
   a. Z:\Hydro\Projects\Borrego_Water_District\DATA\GDB\Working.gdb\GP_Update_LU_Current_Parcels_intersect
4. **Selected all the features with an attribute of Vacant and Undeveloped Land in the current land use category from the intersected layer.**
5. **Exported all the selected features to a new layer.**
   a. Z:\Hydro\Projects\Borrego_Water_District\DATA\GDB\Borrego_Water_District_MASTER.gdb\BuildOut_Analysis_GP_Update_LU_Current_Parcels
6. **The following GP attributes were queried out for the Vacant Lot Residential Buildout figure:**
   a. GENERAL COMMERCIAL
   b. HIGH IMPACT INDUSTRIAL
   c. LIMITED IMPACT INDUSTRIAL
   d. MEDIUM IMPACT INDUSTRIAL
   e. OFFICE PROFESSIONAL
   f. OPEN SPACE (RECREATION)

g. PUBLIC AGENCY LANDS

h. PUBLIC/SEMI-PUBLIC FACILITIES

i. RURAL COMMERCIAL

ATTACHMENT B

Property Specific Plan Requests for General Plan Amendment

Context

The DS8 Analysis Area includes one PSR request parcel of approximately 34 acres and two study area parcels totaling approximately 135 acres. The entire Analysis Area is within the Village Regional Category, and the southern end of the study area is less than a half mile from Christmas Circle, which is a focal point of the community and the center of the Village Core. The Analysis Area is bordered on the west and east by two County-maintained Mobility Element roads. On the west, Borrego Springs Road is classified as a 2.2E Light Collector, which is a 2-lane classification. On the east, Di Giorgio Road is a 2.2D Light Collector, which is also a 2-lane classification, but has a wider right-of-way to accommodate improvement options, such as turn lanes. Existing water lines are found under each of these roads, and the northern two parcels have existing meter service, while the southernmost study area parcel does not. There are no sewer lines currently available to the site, but the southernmost study area parcel is within the sewer service area for the Borrego Water District, and the other study area parcel and PSR parcel are within the sewer service sphere of influence.

The eastern half of the PSR parcel contains a palm grove/nursery. The western half of the PSR parcel is vacant, with no apparent land uses and little vegetative cover. The western half of the northern study area parcel has similar characteristics. The eastern half of the northern study area parcel and most of the southern study area parcel contain Desert saltbush scrub vegetation, which is considered a sensitive vegetation community. There are no steep slopes or wetlands on the properties. The properties are completely within the 100-year floodplain and most of the Analysis Area is within a fan terminus alluvial wash, which is defined as the flow path where the bottom of an alluvial fan intersects with the edge of another alluvial fan.

Reflecting the location within the Village Regional Category, a mix of uses can be found in close proximity to the site. Restaurants, retail, and small-scale grocery and convenience stores can be found along the nearby Palm Canyon Drive corridor. Additional commercial uses and public/semi-public uses are found in the area between the site and the Palm Canyon Drive corridor, including the Borrego Springs Fire Protection District (BSFPD) fire station. The Roadrunner Club golf resort and residential community is across Di Giorgio Road to the east. Across Borrego Springs Road to the west are the Boys and Girls Club and Borrego Springs High School. Beyond those properties to the west, the area north of Palm Canyon drive is more sparsely populated, in comparison to the Roadrunner club, with areas of VR-2, SR-2 and SR-4 designations that include many vacant lots.

Comparison of Land Use Maps

Category	Existing General Plan (August 2011)	PSR - Proposed Project (June 2012)	Staff Recommendation
Estimated Potential Dwelling Units			
PSR Area	67 (VR-2)	145 (VR-4.3)	NOT DETERMINED
Study Area	270 (VR-2)	581 (VR-4.3)	NOT DETERMINED

Zoning (Note: the zoning under 'PSR – Proposed Project' details zoning that would be necessary for consistency with the PSR proposed Land Use designations and does not necessarily reflect the staff recommendation.)			
Proposed Zoning Use Regulation	RS (Residential Single)/RMH (Residential Mobile Home)	RS/RMH	NOT DETERMINED
Proposed Zoning Minimum Lot Size (acres)	6,000	6,000	NOT DETERMINED

Community Input – PSR Proposed Land Use Map	
Support	NOT DETERMINED
Opposed	NOT DETERMINED

General Plan Conformance

Review of General Plan Policies Applicable to General Plan Amendments/Rezones without an associated development project.

Policy		EIR Proposed Project: Policy Review
LU-1.1	**Assigning Land Use Designations.** Assign land use designations on the Land Use Map in accordance with the Community Development Model (CDM) and boundaries established by the Regional Categories Map.	The proposal associated with the DS8 Analysis Area would involve a change from VR-2 to VR-4.3. As such, no change in the Village Regional Category is necessary; however, an increase in density necessitates consideration of the aspects of the CDM. The Borrego Springs CPA has some unique characteristics, in terms of application of Village designations and high densities. Considering groundwater limitations and the location of the Community Planning Area (CPA), far from job centers, the Land Use Map developed during the General Plan Update reflected pre-existing development patterns for the most part. The application of Village densities in areas without pre-existing density or parcelization was limited to a few areas around the Village Core, including the DS8 area. The VR-4.3 designation is applied to the Roadrunner Club property, which is adjacent to the DS8 Analysis Area, on the east. This designation generally reflects the existing residential density of condos and timeshares on that site. Adjacent to the DS8 area on the west is an area of SR-2 properties, including a group of roughly 1-acre lots near Palm Canyon Drive and an undeveloped area around the high school and Boys and Girls Club sites. Farther west, is an area of SR-4 that is parcelized with roughly 2-4 acre lots. To the north of the DS8 site is a large area of SR-4 properties, which include current and former agricultural lands. The CDM also considers the proximity to job centers, the transportation network, and available infrastructure and services. The closest job centers are in eastern and northern San Diego County, and in Riverside County, however some residents are employed in agriculture and other local businesses. The CPA also includes retirement communities and vacation homes. There is a good network of County-maintained roads in the area of DS8, which is bordered on the west and east by 2-lane Mobility Element roads. The southern portion of the Analysis Area is only approximately 200 feet from the Borrego Springs FPD station on Stirrup Road, and a response time of less than 5 minutes is likely achievable. The County Departments of General Services and Parks and Recreation are currently in the planning process for a new library and community park (estimated construction completion in 2018), both of which will be located a half mile away from the Analysis Area, just southeast of Christmas Circle behind 'The Mall' shopping center. Borrego Water District (BWD) water lines are found under each of the adjacent public roads, and the northern two parcels have existing meter service, while the southernmost study area parcel does not. Sewer lines are not currently available to the Analysis Area parcels, but the southern study area parcel is within the BWD sewer service area and the other two parcels in the Analysis Area are in the BWD sewer service sphere of influence. The use of groundwater in the community will have an impact on review of potential water service in relation to proposed density increases. See analysis information for Policies LU-1.9 and LU-

	Policy	EIR Proposed Project: Policy Review
		2.4 for further information.
LU-1.2	**Leapfrog Development.** Prohibit leapfrog development which is inconsistent with the Community Development Model. Leapfrog Development restrictions do not apply to new villages that are designed to be consistent with the Community Development Model, that provide necessary services and facilities, and that are designed to meet the LEED-Neighborhood Development Certification or an equivalent. For purposes of this policy, leapfrog development is defined as Village densities located away from established Villages or outside established water and sewer service boundaries. [*See applicable community plan for possible relevant policies*.]	**Not Applicable** This policy is not applicable because the DS8 Analysis Area is already in a Village Regional Category, with a Village Land Use designation (VR-2).
LU-1.3	**Development Patterns.** Designate land use designations in patterns to create or enhance communities and preserve surrounding rural lands.	The General Plan Regional Village area includes commercial and residential designations that range from VR-24 to VR-2. The existing mapping pattern generally reflects existing parcelization. The area east of the DS8 analysis area and further removed from the village center is designated as VR-4.3. The VR-4.3 designation is applied to the Roadrunner Club property, which is adjacent to the DS8 Analysis Area, on the east. This designation generally reflects the existing residential density of condos and timeshares on that site. On the east side of the Roadrunner Club property, the VR-4.3 is extended another 30 acres to the east, to reflect existing parcelization. The other residential properties in this area are designated VR-2.
LU-1.4	**Village Expansion.** Permit new Village Regional Category designated land uses only where contiguous with an existing or planned Village and where all of the following criteria are met: ▪ Potential Village development would be compatible with environmental conditions and constraints, such as topography and flooding ▪ Potential Village development would be accommodated by the General Plan road network ▪ Public facilities and services can support the expansion without a reduction of services to other County residents ▪ The expansion is consistent with community character, the scale, and the orderly and contiguous growth of a Village area	**Not Applicable** This policy is not applicable because the DS8 Analysis Area is already in a Village Regional Category, with a Village Land Use designation (VR-2).
LU-1.5	**Relationship of County Land Use Designations with Adjoining Jurisdictions.** Prohibit the use of established or planned land use patterns in nearby or adjacent jurisdictions as the primary precedent or justification for adjusting land use designations of unincorporated County lands. Coordinate with adjacent cities to ensure that land use designations are consistent with existing and planned infrastructure capacities and capabilities.	There are no adjoining jurisdictions. The DS8 Analysis Area is approximately 16 miles from the border with Imperial County, 11 miles from the border with Riverside County, 7 miles from the Los Coyotes Reservation, and the Borrego CPA is mostly surrounded by state park lands.

	Policy	EIR Proposed Project: Policy Review
LU-1.9	**Achievement of Planned Densities.** Recognizing that the General Plan was created with the concept that subdivisions will be able to achieve densities shown on the Land Use Map, planned densities are intended to be achieved through the subdivision process except in cases where regulations or site specific characteristics render such densities infeasible.	The greatest obstacle for increased residential development in the CPA is reliance on groundwater. Per the requirements of the Sustainable Groundwater Management Act (SGMA), a Groundwater Sustainability Plan will soon be prepared for the Borrego Valley, in order to ensure long term groundwater sustainability. For additional information on how groundwater sustainability regulations impact GPA proposals for density increases, see the review of Policy LU-2.4 in this report. The ability to achieve the potential density of 726 dwelling units is further strained by the difficulties associated with meeting the requirements of the California Building Code for this floodplain area of alluvial flood hazards. New multi-family residential structures (with the exception of one and two family houses and townhomes) would require a comprehensive flood protection solution for the alluvial fan area, prior to grading and construction. The Analysis Area is mostly within a fan terminus alluvial wash. This is defined as the flow path where the bottom of an alluvial fan intersects with the edge of another alluvial fan. These areas can concentrate flows during flash floods. The County's Flood Damage Prevention Ordinance requires that projects in fan terminus alluvial washes be designed so that any obstruction to flow would not cause a cumulative increase in the base flood depth of more than 0.5 feet. A detailed hydraulic model will be required to acceptably demonstrate satisfaction of this requirement. Archaeological/cultural resource survey/study results could limit the area available for development. Sensitive vegetation coverage on the site is found in the eastern portion of the northern study area parcel and much of the southern study area parcel, consisting of Desert saltbush scrub. It is likely that sewer service would be required in order to reach the VR-4.3 density potential in the Analysis Area because the anticipated lot size would be between 6,000 to 10,000 square-feet. These lot areas would be too small to accommodate typical septic systems, and additional septic restrictions in the CPA are possible, with the development of the Groundwater Sustainability Plan. Though sewer lines are not currently available to the Analysis Area, the southern study area parcel is within the designated sewer service area for the BWD and the PSR parcel and northern study area parcel are within the sewer service sphere of influence. Therefore, the extension of sewer service to this area is possible. See the review of Policy LU-6.11 for information on fire protection services in relation to density feasibility.
LU-2.3	**Development Densities and Lot Sizes.** Assign densities and minimum lot sizes in a manner that is compatible with the character of each	The Borrego Springs CPA has some unique characteristics, in terms of application of Village designations and high densities. Considering groundwater limitations and the location of the CPA,

	Policy	EIR Proposed Project: Policy Review
	unincorporated community.	the Land Use Map developed during the General Plan Update reflected pre-existing development patterns for the most part. The application of Village densities in areas without pre-existing density or parcelization was limited to a few areas around the Village Core, including the DS8 area. The DS8 proposal to go from VR-2 to VR-4.3 would allow up to 726 dwelling units within the Analysis Area, so consideration of surrounding development patterns and General Plan designations/densities is important. For additional information on the current mapping pattern in this area, see the review of Policy LU-1.1 in this report.
LU-2.4	**Relationship of Land Uses to Community Character**. Ensure that the land uses and densities within any Regional Category or land use designation depicted on the Land Use Map reflect the unique issues, character, and development objectives for a community plan area, in addition to the General Plan Guiding Principles.	A unique issue in the CPA is the use of groundwater. Preliminary data indicate that the CPA will have to reduce groundwater use as part of implementation of a Groundwater Sustainability Plan. Though related to the groundwater issue, existing vacant lots are also a unique issue. Based on analysis prepared for the General Plan Update Groundwater Study, estimates show that there were approximately 3,700 existing, private, unbuilt parcels in the Borrego Valley in 2007. Of those, it was estimated that approximately 3,200 had legal lot status. Issue LU-2.2 of the Community Plan calls for consideration of how existing vacant lots impact housing demand and investment in the community. Another issue in the community that affects development in the DS8 Analysis Area is that of current flood control regulations in this area of alluvial floodplains. See the review of Policies LU-1.9 and S-9.2 for further information. Policy LU-1.1.1 of the Community Plan calls for ensuring that remaining undisturbed desert native habitat lands throughout the CPA are conserved to the greatest extent possible. Goal LU-2.1 seeks to focus development on previously disturbed lands. Much of the southern and eastern ends of the study area contain Desert saltbush scrub. This is considered a sensitive vegetation community, which requires mitigation at a 2:1 ratio. However, a multi-family development within the Analysis Area could achieve the VR-4.3 density potential, while preserving much of the native vegetation through clustering. With the current floodplain restrictions associated with multi-family development, the more clustered approach would require a comprehensive alluvial fan-wide flood protection solution. See Policy LU-1.9 and S-9.2 reviews for additional information.
LU-2.5	**Greenbelts to Define Communities.** Identify and maintain greenbelts between communities to reinforce the identity of individual communities.	The General Plan Glossary defines Greenbelts as a largely undeveloped area surrounding more urbanized areas, consisting of agricultural lands, open space, conservation areas, passive parks, or very low density rural residential lands. The DS8 Analysis Area is within a Village Regional Category and not within a low density buffer area.
LU-3.1	**Diversity of Residential Designations and Building Types.** Maintain a mixture of residential land use designations and development regulations that accommodate various building types and styles.	The DS8 proposal would not impact variations in building types and styles, as changes to the zoning use regulations or zoning building types are not proposed.
LU-5.1	**Reduction of Vehicle Trips within Communities.**	The DS8 proposal does not involve changes to the zoning use

	Policy	EIR Proposed Project: Policy Review
	Incorporate a mixture of uses within Villages and Rural Villages and plan residential densities at a level that support multi-modal transportation, including walking, bicycling, and the use of public transit, when appropriate.	regulations, so it would not impact a mixture of uses within this Rural Village. Extensive development of vacant and underdeveloped parcels would be necessary within the Village, in order to realize a Village population density conducive to a more vibrant pedestrian and bicycling atmosphere, but development of the Analysis Area at the proposed density would support multi-modal transportation.
LU-6.2	Reducing Development Pressures. Assign lowest-density or lowest-intensity land use designations to areas with sensitive natural resources.	While the PSR parcel contains a palm grove/nursery in the eastern half and almost no vegetative cover in the western half, much of the study area contains native vegetation. The eastern portion of the northern study area parcel and most of the southern study area parcel contain Desert saltbush scrub. This vegetation community is scattered in the northern study area parcel and gets thicker in the southern study area parcel. Desert saltbush scrub is considered a sensitive vegetation community. Policy LU-1.1.1 of the Community Plan seeks to ensure that desert native habitat lands within the CPA are preserved to the greatest extent possible. Policy LU-2.1.1 has a similar purpose (discourages development on native desert habitat lands), but it notes the policy applies outside the Village Core.
LU-6.11	Protection from Wildfires and Unmitigable Hazards. Assign land uses and densities in a manner that minimizes development in extreme, very high and high hazard fire areas or other unmitigable hazardous areas.	The DS8 Analysis Area is within a 'moderate' fire hazard severity zone, which would not preclude the proposed VR-4.3 designation. Per the Borrego Springs FPD, any development on the site would require participation in the newly formed Community Facilities District, which covers all of Borrego Springs for improved fire protection facilities and services. The study area parcels are only approximately 200 feet from the Borrego Springs FPD fire station on Stirrup Road, so a subdivision project here could likely meet the 5-minute fire response travel time required for all projects under the Village Land Use designations. As mentioned previously, the site is bordered on the west and east by County-maintained Mobility Element roads (Borrego Springs Road and Di Giorgio Road). Due to the lack of steep slope, rock outcroppings, or other prohibitive landscape features, it's possible that emergency access could be provided in compliance with the maximum dead end road length standard of 800 feet, for the proposed designation. Archaeological/cultural and biological resource study/survey results could potentially limit the area available for development, depending on whether on-site open space easements are required for these resources.
LU-7.1	Agricultural Land Development. Protect agricultural lands with lower-density land use designations that support continued agricultural operations.	Most of the Analysis Area contains prime agricultural soils and the eastern portion of the PSR parcel contains an existing palm grove/nursery. The area of the palm grove/nursery is classified as prime farmland per the State of California's Farmland Mapping and Monitoring Program (FMMP). Based on a review of aerial photos, there is no evidence of agricultural operations for the last 20 years in the Analysis Area, beyond the palm grove area. However, it is possible that additional agricultural uses have occurred.

	Policy	EIR Proposed Project: Policy Review
		The existing VR-2 designation does not support agricultural operations. In discussing Village Land Use designations for agricultural areas, the General Plan FEIR notes, "Although agriculture has become increasingly more viable on smaller lot sizes within the unincorporated County, there becomes a point when an individual lot size is considered to be too small for a viable agricultural operation to persist. For the purposes of this analysis, and as a conservative estimate, areas allowing one dwelling unit per acre (du/acre) would be considered too small to support a viable agricultural operation. Therefore, any parcels smaller than one du/acre have been calculated to result in a 100 percent conversion of agricultural resources to non-agricultural uses for the purpose of this analysis." The County's Guidelines for Determining Significance – Agricultural Resources discusses the prevalence of residential uses coinciding with small agricultural operations in a number of unincorporated communities where the lots are typically 2 acres or larger. The Guidelines go on to note, "Occupants of higher density residential uses are more likely to be disturbed by noise, dust, pesticides or other nuisances…" The proposal to change the designation to VR-4.3 would not constitute a change that would be attributable to negatively impacting the protection of agricultural operations, as both the existing and proposed designations would facilitate lot sizes considered too small and densities too high, for continued agricultural operations. Issue LU-2.4 of the Community Plan recognizes that agricultural uses severely constrain future growth due to the overdraft problem, and the corresponding Goal (LU-2.4) calls for some conversion of agricultural uses to less consumptive uses.
LU-8.1	Density Relationship to Groundwater Sustainability. Require land use densities in groundwater dependent areas to be consistent with the long-term sustainability of groundwater supplies, except in the Borrego Valley.	Not Applicable Though sustainable groundwater use and implications of the SGMA are noted in other policy reviews as important issues facing the community, the current language of this policy makes it not applicable to Borrego Springs.
LU-9.2	Density Relationship to Environmental Setting. Assign Village land use designations in a manner consistent with community character, and environmental constraints. In general, areas that contain more steep slopes or other environmental constraints should receive lower density designations. [*See applicable community plan for possible relevant policies*.]	This policy requires careful consideration of proposed changes from a non-Village Land Use designation to a Village Land Use designation. The Analysis Area is already within the Village Regional Category, with a Village Land Use designation of VR-2. See the review of Policies LU-2.3 and LU-2.4 for potential community character issues and Community Plan references, associated with the proposed change from VR-2 to VR-4.3.
LU-9.5	Village Uses. Encourage development of distinct areas within communities offering residents places to live, work, and shop, and neighborhoods that integrate a mix of uses and housing types.	The DS8 proposal would not impact allowed uses or variations in building types and styles, as changes to the zoning use regulations or zoning building types are not proposed.
LU-9.6	Town Center Uses. Locate commercial, office, civic, and higher-density residential land uses in the Town Centers of Villages or Rural Villages at transportation nodes. Exceptions to this pattern may be allowed for established industrial districts	As noted in the General Plan, a transportation node is intended to be the intersection of two high volume Mobility Element roadways, along with a transit stop. Transit service is very limited in Borrego Springs due to its remote location and lack of sufficient demand. There is a bus stop at nearby Christmas

	Policy	EIR Proposed Project: Policy Review
	and secondary commercial districts or corridors.	Circle and Palm Canyon drive, but routes between Borrego Springs and El Cajon only run on Thursdays and Fridays. The southern portion of the Analysis Area is within a half mile of the Christmas Circle and Palm Canyon Drive area, which serves as the Town Center of the Village. This area includes most of the commercial, office, civic and higher-density land uses.
LU-9.9	Residential Development Pattern. Plan and support an efficient residential development pattern that enhances established neighborhoods or creates new neighborhoods in identified growth areas.	An increase in density within the DS8 analysis area would result in higher density residential development within the Village Regional Category of the General Plan. Estimates show that there are approximately 3,700 vacant undeveloped private lots in the CPA. Many of these vacant lots can be found in the vicinity of the DS8 Analysis Area. Just west of the Analysis Area, between the high school and the Palm Canyon Drive commercial corridor, there is a large area of existing parcelization (approximately ¾-acre to 4-acre lots) with a large number of the lots currently vacant. For the most part, the VR-2, SR-2 and SR-4 designations in this area are reflective of existing parcelization. There is a similar situation just south of the Analysis Area, in the VR-2, SR-1, and SR-2 areas just south of the Town Center. These areas have an existing system of County-maintained roads for fire access and water line infrastructure that would support the build-out of these vacant lots. New water and sewer infrastructure improvements, in addition to fire access roads would be required to reach the proposed VR-4.3 density potential in the Analysis Area.
LU-10.3	Village Boundaries. Use Semi-Rural and Rural land use designations to define the boundaries of Villages and Rural Land Use designations to serve as buffers between communities.	The DS8 proposal would not require changing the existing Village Regional Category. The Analysis Area is on the northern edge of the Village Regional Category in the CPA.
LU-10.4	Commercial and Industrial Development. Limit the establishment of commercial and industrial uses in Semi-Rural and Rural areas that are outside of Villages (including Rural Villages) to minimize vehicle trips and environmental impacts.	Not Applicable This policy is not applicable because the DS8 proposal would not involve changes to the zoning use regulations and the Analysis Area is within the Village.
LU-11.1	Location and Connectivity. Locate commercial, office, and industrial development in Village areas with high connectivity and accessibility from surrounding residential neighborhoods, whenever feasible.	Not Applicable This policy is not applicable because the DS8 proposal would not involve changes to the zoning use regulations and the Analysis Area is within the Village.
LU-11.10	Integrity of Medium and High Impact Industrial Uses. Protect designated Medium and High Impact Industrial areas from encroachment of incompatible land uses, such as residences, schools, or other uses that are sensitive to industrial impacts. The intent of this policy is to retain the ability to utilize industrially designated locations by reducing future development conflicts.	Not Applicable This policy is not applicable because there are no properties designated for Medium or High Impact Industrial use within 1.5 miles of the Analysis Area.
COS-10.2	Protection of State-Classified or Designated Lands. Discourage development or the establishment of other incompatible land uses on or adjacent to areas classified or designated by the	The DS8 Analysis Area does not contain any MRZ-2 or MRZ-3 areas.

	Policy	EIR Proposed Project: Policy Review
	State of California as having important mineral resources (MRZ-2), as well as potential mineral lands identified by other government agencies. The potential for the extraction of substantial mineral resources from lands classified by the State of California as areas that contain mineral resources (MRZ-3) shall be considered by the County in making land use decisions.	
COS-12.1	Hillside and Ridgeline Development Density. Protect undeveloped ridgelines and steep hillsides by maintaining semi-rural or rural designations on these areas.	The DS8 Analysis Area does not contain any ridgelines or steep hillsides.
COS-14.1	Land Use Development Form. Require that development be located and designed to reduce vehicular trips (and associated air pollution) by utilizing compact regional and community-level development patterns while maintaining community character.	Considering the DS8 Analysis Area is less than a half mile from the Town Center and the variety of commercial and civic services available along (and in the vicinity of) the Palm Canyon Drive corridor, development of the site at the proposed VR-4.3 density could be considered in line with a relatively compact community-level development pattern. As discussed in detail in the review of Policies LU-2.3, LU-2.4 and LU-9.9, there are many vacant lots within the same proximity to the Village Core/Town Center. These include the areas of VR-2, SR-1, SR-2 and SR-4 designations just north and south of the Palm Canyon Drive corridor, which already have the public road network and network of water lines to support the build out of those areas.
S-1.1	Minimize Exposure to Hazards. Minimize the population exposed to hazards by assigning land use designations and density allowances that reflect site-specific constraints and hazards.	As noted in the analysis for Policy LU-6.11 (Protection from Wildfires and Unmitigable Hazards), the DS8 Analysis Area is within a 'moderate' fire hazard severity zone. Village designations are appropriate in this zone, particularly in Rural Villages. The study area parcels are only approximately 200 feet from the Borrego Springs FPD fire station on Stirrup Road, so a subdivision project here could likely meet the 5-minute fire response travel time required for all projects under the Village Land Use designations. Current California Building Code requirements will impact future development at the site. New multi-family residential structures (with the exception of one and two family houses and townhomes) would require a comprehensive flood protection solution for the whole alluvial fan area, prior to grading and construction. See the review of Policies LU-1.9 and S-9.2 for further information on flood hazards and regulations.
S-6.4	Fire Protection Services for Development. Require that development demonstrate that fire services can be provided that meets the minimum travel times identified in Table S-1 (Travel Time Standards).	The Analysis Area would likely be able to meet the 5-minute emergency response travel time required for development at the VR-4.3 density. The southern portion of the study area is only approximately 200 feet from the Borrego Springs FPD fire station on Stirrup Road

	Policy	EIR Proposed Project: Policy Review
S-9.2	Development in Floodplains. Limit development in designated floodplains to decrease the potential for property damage and loss of life from flooding and to avoid the need for engineered channels, channel improvements, and other flood control facilities. Require development to conform to federal flood proofing standards and siting criteria to prevent flow obstruction.	The entire Analysis Area is within the 100-year floodplain, which is the case for much of the Village and the northern portion of the CPA. The large floodplain with no associated floodway is the result of the alluvial fan pattern of drainage from the nearby mountains. New multi-family residential structures (with the exception of one and two family houses and townhomes) would require a comprehensive flood protection solution for the whole alluvial fan area, prior to grading and construction. The Analysis Area is mostly within a fan terminus alluvial wash. This is defined as the flow path where the bottom of an alluvial fan intersects with the edge of another alluvial fan. These areas can concentrate flows and become particularly hazardous during flash floods. The County's Flood Damage Prevention Ordinance requires that projects in fan terminus alluvial washes be designed so that any obstruction to flow would not cause a cumulative increase in the base flood depth of more than 0.5 feet. A detailed hydraulic model would be required to acceptably demonstrate satisfaction of this requirement.
S-9.4	Development in Villages within the Floodplain Fringe. Allow new uses and development within the floodplain fringe (land within the floodplain outside of the floodway) only when environmental impacts and hazards are mitigated. This policy does not apply to floodplains with unmapped floodways. Require land available outside the floodplain to be fully utilized before locating development within a floodplain. Development within a floodplain may be denied if it will cause significant adverse environmental impacts or is prohibited in the community plan. Channelization of floodplains is allowed within villages only when specifically addressed in community plans.	Not Applicable This policy is not applicable because, as it notes, the policy does not apply to floodplains with unmapped floodways (which is the case on this site).
S-9.5	Development in Semi-Rural and Rural Lands within the Floodplain Fringe. Prohibit development in the floodplain fringe when located on Semi-Rural and Rural Lands to maintain the capacity of the floodplain, unless specifically allowed in a community plan. For parcels located entirely within a floodplain or without sufficient space for a building pad outside the floodplain, development is limited to a single family home on an existing lot or those uses that do not compromise the environmental attributes of the floodplain or require further channelization.	Not Applicable This policy is not applicable because, as it notes, the policy only applies to Semi-Rural and Rural Lands areas (Regional Categories). The DS8 Analysis Area is entirely within the Village Regional Category, and that is not proposed to change.
S-9.6	Development in Dam Inundation Areas. Prohibit development in dam inundation areas that may interfere with the County's emergency response and evacuation plans.	Not Applicable This policy is not applicable because the DS8 Analysis Area is not within a dam inundation area.
S-10.1	Land Uses within Floodways. Limit new or expanded uses in floodways to agricultural, recreational, and other such low-intensity uses and those that do not result in any increase in flood	Not Applicable This policy is not applicable because the DS8 Analysis Area is not within a floodway.

Policy		EIR Proposed Project: Policy Review
	levels during the occurrence of the base flood discharge, do not include habitable structures, and do not substantially harm, and fully offset, the environmental values of the floodway area. This policy does not apply to minor renovation projects, improvements required to remedy an existing flooding problem, legal sand or gravel mining activities, or public infrastructure.	

Desert (Borrego Springs) DS24

Property Specific Request (PSR)

SR-10 to SR-1

Requested by: Chris Brown

STAFF RECOMMENDATION: NOT DETERMINED

PSR Description

Property Owner:
Borrego Country Club Estates LLC

Size:
169 acres; 2 parcels

Location/Description:
Approximately 2 miles south of Palm Canyon Drive, at the intersection of Borrego Springs Road and Country Club Road; outside the County Water Authority boundary

Estimated total increase in potential dwelling units (based on proposed map): 153

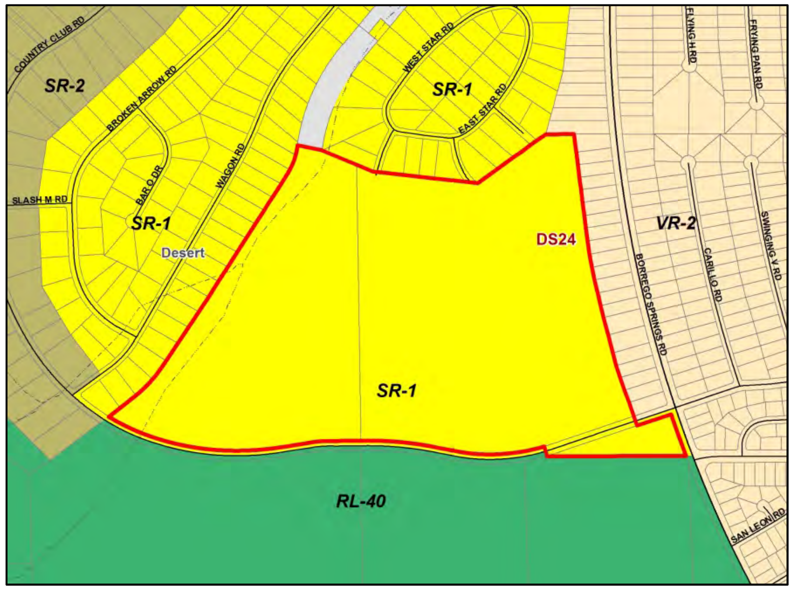
Fire Service Travel Time *(GP Policy S-6.4)*:
5 to 10 minutes

Prevalence of Constraints (See following page):
● – high; ◒ – partially; ○ - none

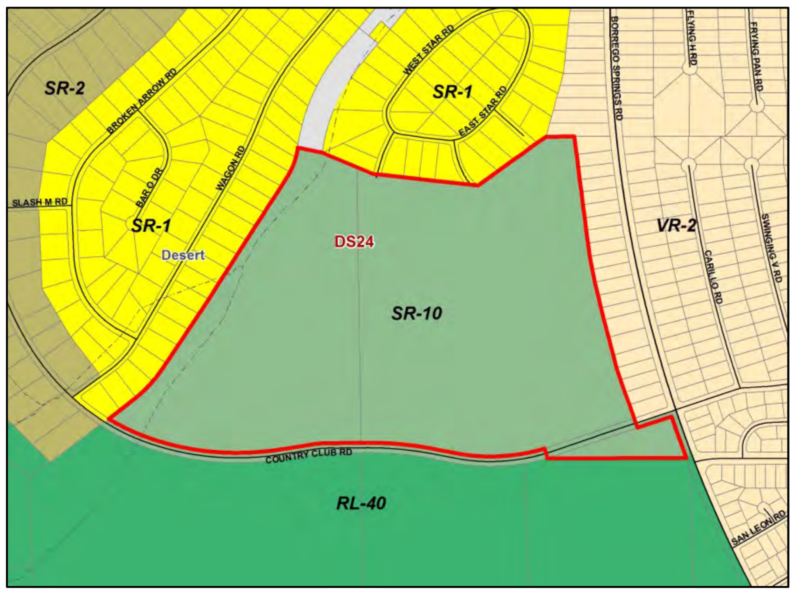
- ○ Steep Slope (Greater than 25%) *almost none*
- ● Floodplain
- ○ Wetlands
- ● Sensitive Habitat
- ○ Agricultural Lands
- ◒ Fire Hazard Severity Zones

Staff Recommendation and Summary Rationale
See General Plan Conformance Findings starting on page 5 for additional discussion of the rationale.

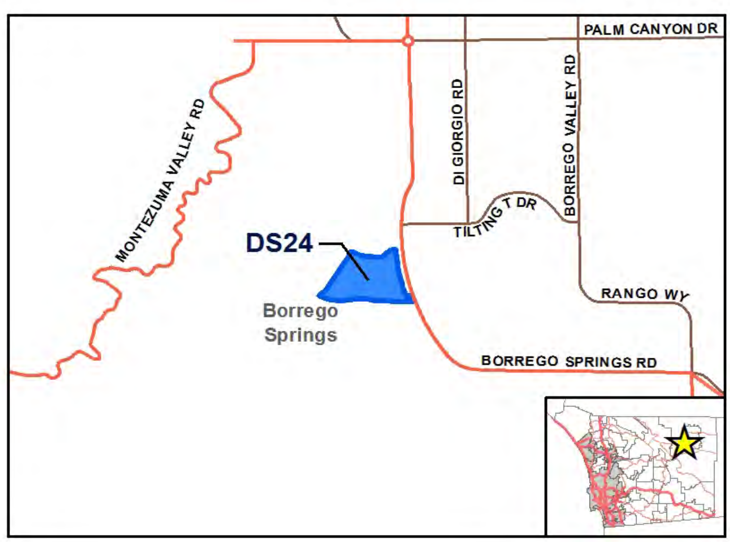
NOT DETERMINED



Proposed General Plan Designations



Existing General Plan Designations



Vicinity Map

Aerial and Site Photos

Aerial

Facing south from the central portion of the property

Facing northwest from the central portion of property

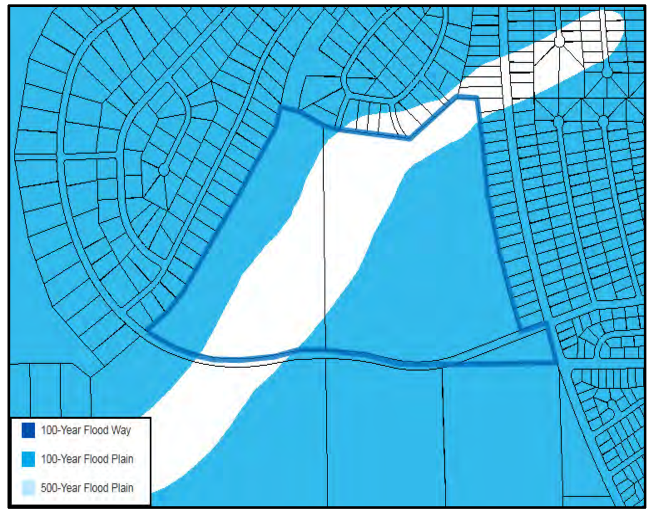
Facing northeast at site, from Montezuma Valley Road (southern border of DS24 is the curving dirt road in the upper right corner of the picture)

From the northwestern portion of the property, facing north along drainage that runs along the western portion

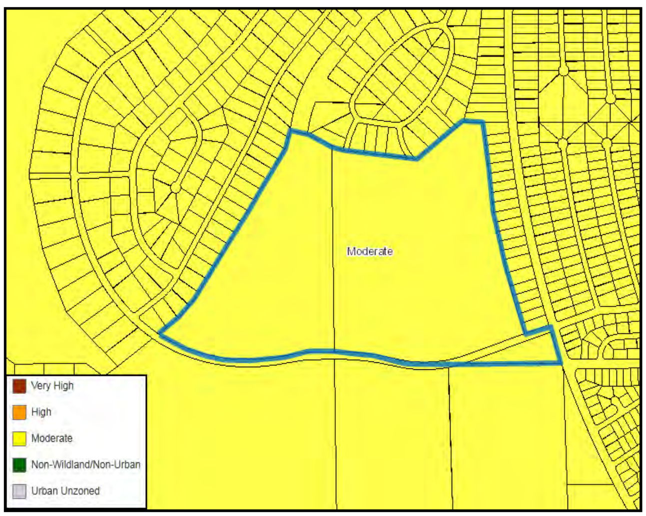
From the northern portion of the property, facing south

Constraints

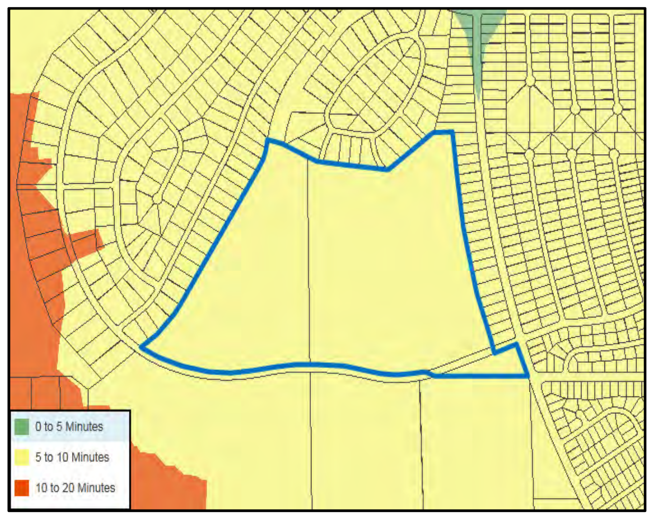
Vegetation (Sonoran Creosote bush scrub; including extensive Ocotillos)



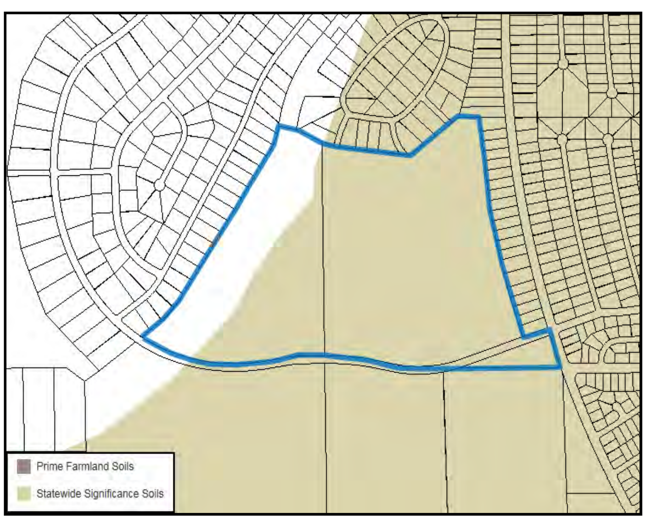
Floodplain



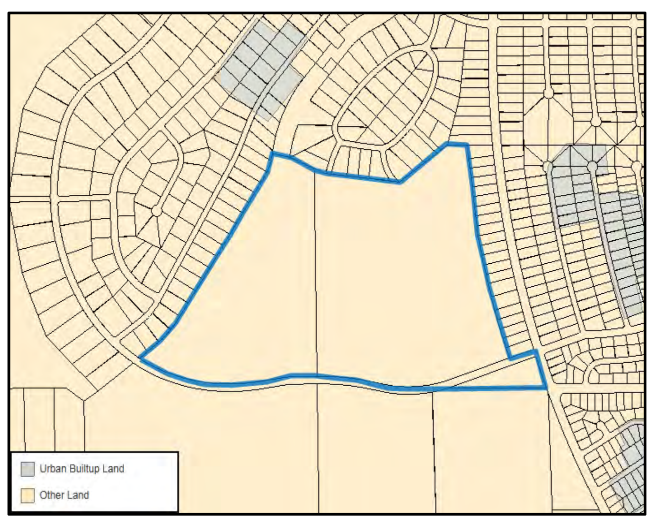
Fire Hazard Severity Zones



Emergency Response Travel Time



Prime Agricultural Soils



Farmland Mapping and Monitoring Program

Context

The subject site includes two parcels totaling approximately 169 acres, located in the western portion of the Borrego Springs Community Planning Area (CPA). The western parcel is approximately 65 acres and the eastern parcel is approximately 104 acres. The subject site is approximately two miles south of Palm Canyon Drive and 1.5 miles east of Montezuma Valley Road (S22), which is a County Scenic Highway. The eastern parcel extends to the intersection of Borrego Springs Road (S3) and Country Club Road. The site is visible from Borrego Springs Road, a primary route into the village core of Borrego Springs from SR-78 to the south.

The subject site is situated on the edge of alluvial fans, formed from the drainages of nearby Loki Canyon, Tubb Canyon, Culp Canyon, and Dry Canyon, all to the west. The Culp Canyon ephemeral drainage is found in the low lying area along the western perimeter of the site (picture on page 2). The entire site is within the FEMA floodplain, with the exception of a slightly higher elevation area running diagonally across the site, which has been categorized as a sand dune, stabilized by native vegetation. The vegetation of the site is categorized as Sonoran Creosote bush scrub. This classification includes Ocotillos (Fouquieria splendens) and the site contains concentrations of Ocotillos.

There are mapped subdivisions to the north, east and west of the subject site. The subdivisions include lot sizes that range from half acre to one acre, for the most part. Approximately 80% of the adjacent subdivided lots to the north, east and west are vacant. Areas to the south are mostly undeveloped and located in the General Plan Rural Lands Regional Category.

Comparison of Land Use Maps

Category	Existing General Plan (August 2011)	PSR - Proposed Project (June 2012)	Staff Recommendation
Estimated Potential Dwelling Units			
PSR Area	16 (SR-10)	169 (SR-1)	NOT DETERMINED

Zoning (Note: the zoning under 'PSR – Proposed Project' details zoning that would be necessary for consistency with the PSR proposed Land Use designations and does not necessarily reflect the staff recommendation.)			
Proposed Zoning Use Regulation	S92	RS	NOT DETERMINED
Proposed Zoning Minimum Lot Size (acres)	1	1	NOT DETERMINED

Community Input – PSR Proposed Land Use Map	
Support	NOT DETERMINED
Opposed	NOT DETERMINED

General Plan Conformance

Review of General Plan Policies Applicable to General Plan Amendments/Rezones without an associated development project.

Policy		EIR Proposed Project: Policy Review
LU-1.1	**Assigning Land Use Designations.** Assign land use designations on the Land Use Map in accordance with the Community Development Model (CDM) and boundaries established by the Regional Categories Map.	The CDM as referenced in the General Plan uses the model of a central core (referred to as a 'Village' or 'Rural Village') surrounded a Semi-Rural area of lower density residential, small-scale agriculture, and other lower intensity uses. The outer mapping layer is the Rural Lands; typically comprised of very low density residential, open space, agriculture, and other uses associated with rural areas. A key component of the CDM is to focus growth near existing and planned infrastructure, services and jobs. There are areas of SR-1 (1 unit per acre, slope dependent), SR-2 (1 unit per 2 acres, slope dependent), and VR-2 (2 units per acre) to the north, east and west, extending from the DS24 site north to the village core. The designations of these areas coincide with the typical parcel sizes, with many (roughly) half acre lots in the VR-2 area, 1-acre lots in the SR-1 area and 2-acre lots in the SR-2 area. While these designations are reflective of parcelization, many of the existing lots remain vacant. A larger area to the south and west is designated RL-40, with mostly large lots and preserved desert habitat. This RL-40 area serves as a low density/greenbelt buffer between the Semi-Rural residential area and the undeveloped areas of Anza Borrego Desert State Park (ABDSP) to the south and west of this area. Changing the Semi-Rural Regional Category would not be required for the proposed Land Use designation change to SR-10. Available services and infrastructure are also considered in the CDM. The infrastructure currently available to the DS24 site is fairly typical of the lower densities in the Semi-Rural category, outside of the County Water Authority. The properties do not currently have water or sewer service, nor do they have access to water or sewer lines. The site is not within the sewer service area for the Borrego Water District, though it is within their sewer service sphere of influence. The closest sewer line is approximately three miles east of the site, along Yaqui Pass Road. The Borrego Water District has noted that connection to sewer will likely be necessary for a subdivision at the site. The southeastern portion of the site is adjacent to Borrego Springs Road, which is a General Plan Mobility Element road with a 2.2D Light Collector classification. Based on Average Daily Trip (ADT) estimates prepared for the General Plan Update, the proposed density increase would not be anticipated to push this road into a failing level of service upon build out. While it would be feasible to provide the necessary fire access, the Borrego Springs Fire Protection District (in comments on this GPA) anticipates that a new fire station could be required in order for a subdivision in the PSR area to meet the emergency

	Policy	EIR Proposed Project: Policy Review
		response travel time required for the SR-1 designation (see Policy S-6.4 review). However, based on the previous review of the Tentative Map 5487 application (now in 'idle' status) on the project site, it's possible that the provision of wider access roads could lead to a conclusion of an approximate 5-minute travel time, which would be required for development at the SR-1 density. See additional discussion of fire protection considerations in the review of applicable policies LU-6.11, S-1.1, and S-6.4.
LU-1.2	**Leapfrog Development.** Prohibit leapfrog development which is inconsistent with the Community Development Model. Leapfrog Development restrictions do not apply to new villages that are designed to be consistent with the Community Development Model, that provide necessary services and facilities, and that are designed to meet the LEED-Neighborhood Development Certification or an equivalent. For purposes of this policy, leapfrog development is defined as Village densities located away from established Villages or outside established water and sewer service boundaries. [See applicable community plan for possible relevant policies.]	**Not Applicable** This policy is not applicable because there are no Village designations proposed with DS24.
LU-1.3	**Development Patterns.** Designate land use designations in patterns to create or enhance communities and preserve surrounding rural lands.	The proposed SR-1 designation could be viewed as an extension of the current land use mapping pattern based on the adjacent SR-1 properties to the west and the VR-2 properties to the east; however, the DS24 site is not currently parcelized like these areas of mostly ½ acre to 2 acre lots, and there is a prevalence of vacant lots in these adjacent areas. Issue LU-2.2 of the Community Plan calls for GPAs to consider the number of existing vacant lots in the community. Goal LU-2.3 and Policy LU-2.3.1 seek to preserve uses and densities in older residential neighborhoods by prohibiting (unless required for health and safety) alteration of uses or increases in densities existing at the time of the General Plan Update adoption in a number of neighborhoods, including the area of DS24, referred to as Country Club Estates. The areas of SR-2, SR-1, and VR-2 that are near the DS24 site (between the site and the village core) are not close to reaching the build out density, based on the current Land Use Map. As such, it could be determined that increasing density at the site will not enhance the community.
LU-1.4	**Village Expansion.** Permit new Village Regional Category designated land uses only where contiguous with an existing or planned Village and where all of the following criteria are met: ▪ Potential Village development would be compatible with environmental conditions and constraints, such as topography and flooding ▪ Potential Village development would be accommodated by the General Plan road network ▪ Public facilities and services can support the expansion without a reduction of services to	**Not Applicable** This policy is not applicable because there are no Village designations proposed with DS24.

	Policy	EIR Proposed Project: Policy Review
	other County residents ▪ The expansion is consistent with community character, the scale, and the orderly and contiguous growth of a Village area	
LU-1.5	**Relationship of County Land Use Designations with Adjoining Jurisdictions.** Prohibit the use of established or planned land use patterns in nearby or adjacent jurisdictions as the primary precedent or justification for adjusting land use designations of unincorporated County lands. Coordinate with adjacent cities to ensure that land use designations are consistent with existing and planned infrastructure capacities and capabilities.	There are no adjoining jurisdictions. The DS24 area is approximately 16 miles from the border with Imperial County, 14 miles from the border with Riverside County, 7 miles from the Los Coyotes Reservation, and the Borrego CPA is mostly surrounded by state park lands.
LU-1.9	**Achievement of Planned Densities.** Recognizing that the General Plan was created with the concept that subdivisions will be able to achieve densities shown on the Land Use Map, planned densities are intended to be achieved through the subdivision process except in cases where regulations or site specific characteristics render such densities infeasible.	The specific site characteristics that would have the greatest impact on the achievement of the proposed Land Use Map density at this site are the floodplain, California Species of Special Concern and groundwater. The site is mostly within the 100-year floodplain and the potential for particularly hazardous flooding is apparent, due to the confluence of west to east drainage flows associated with the alluvial fans of Dry Canyon, Tubb Canyon, Culp Canyon, and Loki Canyon. The Hydrology/Drainage Study for the Tentative Map 5487 application on the site called for improvements to an existing off-site diversion dike and additional diversion structures (to deal with the confluence of drainages from Tubb, Culp, and Loki Canyons), with these existing and proposed features located on private property with no existing flood control easements. The project proposed the formation of a 'Geological Hazard Abatement District' in order to construct regional flood control facilities. County staff noted that such a district must be formed prior to the approval of a Tentative Map. The project plans noted a boundary adjustment was required in order to obtain necessary land from the nearby property to the south (APN 198-320-35) for the connection of Country Club Road and other improvements. Focused surveys were to be completed for two California Species of Special Concern, the Burrowing owl and the Flat-tailed horned lizard. If surveys were to detect evidence of the presence of these species, additional requirements would be placed on the project that could limit the available area that would be required to reach the density potential. The greatest obstacle for increased residential development in the CPA is the reliance on groundwater. Per the requirements of the Sustainable Groundwater Management Act (SGMA), a Groundwater Sustainability Plan will soon be prepared for the Borrego Valley, in order to ensure long term groundwater sustainability. For additional information on how groundwater sustainability regulations impact GPA proposals for density increases, see the review of Policy LU-2.4 in this report.

	Policy	EIR Proposed Project: Policy Review
LU-2.3	Development Densities and Lot Sizes. Assign densities and minimum lot sizes in a manner that is compatible with the character of each unincorporated community.	The densities surrounding the DS24 site were developed with consideration of existing parcelization. There are only a few parcels in the VR-2, SR-1, and SR-2 areas near the DS24 site that have any additional subdivision potential. Issue LU-2.2 of the Community Plan calls for GPAs to consider the number of existing vacant lots in the community. The areas of SR-2, SR-1, and VR-2 that are near the DS24 site (between the site and the village core) include a large number of vacant lots. The Borrego Springs Community Plan also includes issue and policy references to the community character impacts of increased development on undisturbed desert vegetation, as opposed to fallowed agricultural lands and other previously cleared parcels. Page 8 of the Community Plan under *d. Existing Land Uses and Community Character* notes, "There is significant development pressure for housing and commercial development projects that are not consistent with our community character. Of special concern are those proposed plans that do not take the fragile ecosystem into account, or are sited on botanically-rich, native desert vegetation and which would significantly impact dark skies, scenic and vegetative elements of the community character." For additional Community Plan references related to this issue, see the review of Policies LU-2.4 and LU-6.2 in this report.
LU-2.4	Relationship of Land Uses to Community Character. Ensure that the land uses and densities within any Regional Category or Land Use Designation depicted on the Land Use Map reflect the unique issues, character, and development objectives for a Community Plan area, in addition to the General Plan Guiding Principles.	An issue facing the CPA is the use of groundwater and new regulations based on the SGMA. Preliminary estimates indicate that the CPA may have to function within a groundwater use limit of roughly 5,600 acre-feet per year. The current use of groundwater is estimated to be approximately 19,000 acre feet per year within the CPA. Preservation of undisturbed desert habitat (like the subject site) in the CPA is a top priority of the Community Plan. Policy LU-1.1.1 calls for ensuring that remaining undisturbed desert native habitat lands throughout the CPA are conserved to the greatest extent possible. Goal LU-2.1 seeks to focus development on previously disturbed lands. Following recommendations of the community during the General Plan Update, areas that were not extensively parcelized were assigned lower densities. The preservation of native desert vegetation sites also addresses air quality and erosion issues. High winds in the valley are fairly common, and air quality and erosion issues are exacerbated in areas with little vegetation cover to keep the sands in place.
LU-2.5	Greenbelts to Define Communities. Identify and maintain greenbelts between communities to reinforce the identity of individual communities.	The General Plan Glossary defines Greenbelts as a largely undeveloped area surrounding more urbanized areas, consisting of agricultural lands, open space, conservation areas, passive parks, or very low density rural residential lands. The DS24 site is located in a transition area from the Semi-Rural neighborhood south of the Village Core, to the Rural Lands properties that serve as the buffer from the state park lands to the west and south in this area. The current SR-10 designation requires a Conservation Subdivision which necessitates 75% avoidance of sensitive resources. With the current 1-acre zoning minimum lot

	Policy	EIR Proposed Project: Policy Review
		size, development associated with achieving the SR-10 density potential could be achieved while avoiding disturbance on the majority of the site and consolidating the footprint in the area near the existing homes to the north. The proposed SR-1 designation would not require a Conservation Subdivision.
LU-3.1	Diversity of Residential Designations and Building Types. Maintain a mixture of residential land use designations and development regulations that accommodate various building types and styles.	The proposal would not have a substantial impact on the current mixture of residential Land Use designations and building types in the CPA. With the proposal to change the designation to SR-1, a zoning change to RS (Residential Single) is proposed for consistency. The RS zoning and zoning development designators would match the area of SR-1 adjacent to the DS24 site. The site is currently zoned S92. The Building Type (C) would not require a change for consistency.
LU-5.1	Reduction of Vehicle Trips within Communities. Incorporate a mixture of uses within Villages and Rural Villages and plan residential densities at a level that support multi-modal transportation, including walking, bicycling, and the use of public transit, when appropriate.	Not Applicable This policy is not applicable because the PSR area is not within a Village, and the proposal does not include a change to Village designations or the Village Regional Category.
LU-6.2	Reducing Development Pressures. Assign lowest-density or lowest-intensity land use designations to areas with sensitive natural resources.	The vegetation of the site is categorized as Sonoran Creosote bush scrub. This classification includes Ocotillos (Fouquieria splendens) and the site contains a concentration of Ocotillos. Policy LU-1.1.1 calls for ensuring that remaining undisturbed desert native habitat lands throughout the CPA are conserved to the greatest extent possible. Goal LU-2.1 seeks to focus development on previously disturbed lands. The DS24 site provides potential habitat for some sensitive species. During the County's review of the TM5487 application, the site was identified as having the potential to host two California Species of Special Concern: the Flat-tailed horned lizard and the Burrowing owl. The site is also near Recovery Region 7 (South San Ysidro Mountains) for the Peninsular Bighorn Sheep, as noted in the Recovery Plan, prepared by the U.S. Fish & Wildlife Service in 2000. This species can be found on east-facing, lower-elevation slopes (typically below 4,600 feet), so there is a good possibility this species could visit the site from the nearby east-facing slopes for foraging and for a seasonal water source. The site is situated on the edge of alluvial fans, formed from the drainages of nearby Loki Canyon, Tubb Canyon, Culp Canyon, and Dry Canyon, all to the west. Additional flood flow diversion structures could impact the biodiversity of this area, which is dependent on seasonal flows from these alluvial fans. The current SR-10 designation on the site requires a Conservation Subdivision approach. This process requires 75% avoidance of sensitive resources, and allows for a clustered approach. Community Plan Policy LU-1.2.1 requires maximizing the use of clustering to preserve natural habitats and Policy COS-1.2.5 calls for preserving existing wildlife and vegetation corridors throughout neighborhoods.

	Policy	EIR Proposed Project: Policy Review
LU-6.11	Protection from Wildfires and Unmitigable Hazards. Assign land uses and densities in a manner that minimizes development in extreme, very high and high hazard fire areas or other unmitigable hazardous areas.	The DS24 site is within a 'moderate' fire hazard severity zone, which would not preclude the proposed SR-1 designation. Per the Borrego Springs FPD, any development on the site could require participation in the newly formed Community Facilities District, which covers all of Borrego Springs for improved fire protection facilities and services. Potential access points could be provided via adjacent County-maintained roads, including Borrego Springs Road (a General Plan Mobility Element Road), Country Club Road (though the portion adjacent to the DS24 site on the south is not County-maintained), Lightning Road, and Lapped Circle Drive. Per GIS data, the emergency response travel time for the site is 5-10 minutes. That is a longer response time than what would be required on a development project under the proposed SR-1 designation (see GP Policy S-6.4). However, during a review of the TM5487 application at the site, the Borrego Springs FPD noted an estimated response time of 7 minutes, but if the applicant were to adhere to the FPD request of 32' wide internal access roads, they noted an approximate 5-minute response time could be confirmed.
LU-7.1	Agricultural Land Development. Protect agricultural lands with lower-density land use designations that support continued agricultural operations.	Though prime agricultural soils are found on a portion of the DS24 site, the site does not contain Prime Farmland, Unique Farmland, or Farmland of Statewide/Local Importance. Review of aerial photos shows that no farming has occurred on the project site for the last 20 years.
LU-8.1	Density Relationship to Groundwater Sustainability. Require land use densities in groundwater dependent areas to be consistent with the long-term sustainability of groundwater supplies, except in the Borrego Valley.	Not Applicable Though sustainable groundwater use and implications of the SGMA are noted in other policy reviews as important issues facing the community, the current language of this policy makes it not applicable to Borrego Springs. See the review of Policies LU-1.9 and LU-2.4 in this report for discussion of the groundwater sustainability issue in Borrego Springs, as it relates to achieving the proposed density potential and issues facing the community.
LU-9.2	Density Relationship to Environmental Setting. Assign Village land use designations in a manner consistent with community character, and environmental constraints. In general, areas that contain more steep slopes or other environmental constraints should receive lower density designations. [See applicable community plan for possible relevant policies.]	Not Applicable This policy is not applicable because there are no Village designations proposed with DS24.
LU-9.5	Village Uses. Encourage development of distinct areas within communities offering residents places to live, work, and shop, and neighborhoods that integrate a mix of uses and housing types.	Not Applicable This policy is not applicable because there are no Village designations proposed with DS24.
LU-9.6	Town Center Uses. Locate commercial, office, civic, and higher-density residential land uses in the Town Centers of Villages or Rural Villages at transportation nodes. Exceptions to this pattern may be allowed for established industrial districts and secondary commercial districts or corridors.	Not Applicable This policy is not applicable because there are no Village designations proposed with DS24.
LU-9.9	Residential Development Pattern. Plan and support an efficient residential development pattern	The proposed SR-1 designation could establish a new neighborhood within the CPA; however, the new neighborhood

	Policy	EIR Proposed Project: Policy Review
	that enhances established neighborhoods or creates new neighborhoods in identified growth areas.	could detract from the existing neighborhoods surrounding the site due to the number of nearby vacant lots. Estimates show that there are approximately 3,700 vacant undeveloped private lots in the CPA. The SR-2, SR-1 and VR-2 areas to the north, west and east of the DS24 site have a system of County-maintained roads resembling that of a built-out residential neighborhood. In addition to the road network, most of the lots in these areas have access to existing BWD water lines (not the case with the DS24 site). A number of issues, goals, and policies presented in the Community Plan seek to direct any growth to areas that have already been cleared of native desert vegetation, particularly fallowed agricultural lands. For additional discussion of land use mapping patterns, see the review of Policies LU-1.1, LU-1.3, and LU-2.4.
LU-10.3	Village Boundaries. Use Semi-Rural and Rural land use designations to define the boundaries of Villages and Rural Land Use designations to serve as buffers between communities.	The DS24 proposal is consistent with this policy because a Semi-Rural Land Use designation is proposed, which would not require changing the existing Regional Category of Semi-Rural.
LU-10.4	Commercial and Industrial Development. Limit the establishment of commercial and industrial uses in Semi-Rural and Rural areas that are outside of Villages (including Rural Villages) to minimize vehicle trips and environmental impacts.	The proposed changes associated with DS24 would not involve new allowances for by-right commercial and industrial uses.
LU-11.1	Location and Connectivity. Locate commercial, office, and industrial development in Village areas with high connectivity and accessibility from surrounding residential neighborhoods, whenever feasible.	The proposed changes associated with DS24 would not involve new allowances for by-right commercial and industrial uses.
LU-11.10	Integrity of Medium and High Impact Industrial Uses. Protect designated Medium and High Impact Industrial areas from encroachment of incompatible land uses, such as residences, schools, or other uses that are sensitive to industrial impacts. The intent of this policy is to retain the ability to utilize industrially designated locations by reducing future development conflicts.	Not Applicable This policy is not applicable because there are no properties designated for Medium or High Impact Industrial use within 3 miles of the DS24 area.
COS-10.2	Protection of State-Classified or Designated Lands. Discourage development or the establishment of other incompatible land uses on or adjacent to areas classified or designated by the State of California as having important mineral resources (MRZ-2), as well as potential mineral lands identified by other government agencies. The potential for the extraction of substantial mineral resources from lands classified by the State of California as areas that contain mineral resources (MRZ-3) shall be considered by the County in making land use decisions.	The DS24 site does not contain MRZ-2 or MRZ-3 areas.

	Policy	EIR Proposed Project: Policy Review
COS-12.1	Hillside and Ridgeline Development Density. Protect undeveloped ridgelines and steep hillsides by maintaining semi-rural or rural designations on these areas.	A Semi-Rural designation is proposed for DS24, and according to a slope analysis prepared for a recent project at the site, less than ¼ acre of the site contains slopes greater than 25%.
COS-14.1	Land Use Development Form. Require that development be located and designed to reduce vehicular trips (and associated air pollution) by utilizing compact regional and community-level development patterns while maintaining community character.	Considering the DS24 site is just approximately 1.5 miles from the Village Core, development of the site at an SR-1 density could be considered in line with a relatively compact community-level development pattern, though additional roads and road connections would be required to develop at that density. As discussed in detail in the conformance analysis for Policies LU-2.3, LU-2.4 and LU-9.9, the CPA has many undeveloped vacant parcels between the DS24 site and the Village Core. For the most part, the vacant parcels in these areas of SR-2, SR-1, and VR-2 already have the necessary road network and water lines to facilitate development of these parcels. Following a compact pattern of development, these parcels would be built out, prior to adding additional density.
S-1.1	Minimize Exposure to Hazards. Minimize the population exposed to hazards by assigning land use designations and density allowances that reflect site specific constraints and hazards.	The DS24 site is within a 'moderate' fire hazard severity zone. Additional information about fire protection can be found in the discussion for Policy LU-6.11. The site is mostly within the 100-year floodplain and the potential for particularly hazardous flooding is apparent, due to the confluence of west to east drainage flows associated with the alluvial fans of Dry Canyon, Tubb Canyon, Culp Canyon, and Loki Canyon. For additional information about floodplain issues, please see the discussions for Policies LU-1.9 and S-9.2.
S-6.4	Fire Protection Services for Development. Require that new development demonstrate that fire services can be provided that meets the minimum travel times identified in Table S-1 (Travel Time Standards).	According to County GIS data, new development associated with the proposed SR-1 designation would not be able to meet the 5-minute fire protection response travel time standard required for development at the SR-1 density, per Table S-1 associated with this policy. As the policy places this requirement on new development (i.e. Subdivision stage and not stand-alone GPA stage), this current travel time information does not preclude approval of an SR-1 density for the DS24 site when evaluated in combination with other available fire protection service information. See the review of Policies LU-1.9, LU-6.11, and S-1.1 in this report for additional discussion of fire protection.
S-9.2	Development in Floodplains. Limit development in designated floodplains to decrease the potential for property damage and loss of life from flooding and to avoid the need for engineered channels, channel improvements, and other flood control facilities. Require development to conform to federal flood proofing standards and siting criteria to prevent flow obstruction.	As noted previously, most of the DS24 site is within the 100-year floodplain. The potential for particularly hazardous flooding is apparent, due to the confluence of west to east drainage flows associated with the alluvial fans of Dry Canyon, Tubb Canyon, Culp Canyon, and Loki Canyon. A Hydrology/Drainage Study for the TM5487 application on the site called for improvements to an existing off-site diversion dike and additional diversion structures (to deal with the confluence of drainages from Tubb, Culp, and Loki Canyons), with these existing and proposed features located on private property with no existing flood control easements. The project proposed the formation of a 'Geological Hazard Abatement District' in order to construct regional flood control facilities. County staff noted that such a district must be formed prior to the approval of a Tentative Map.

	Policy	EIR Proposed Project: Policy Review
S-9.4	Development in Villages within the Floodplain Fringe. Allow new uses and development within the floodplain fringe (land within the floodplain outside of the floodway) only when environmental impacts and hazards are mitigated. This policy does not apply to floodplains with unmapped floodways. Require land available outside the floodplain to be fully utilized before locating development within a floodplain. Development within a floodplain may be denied if it will cause significant adverse environmental impacts or is prohibited in the community plan. Channelization of floodplains is allowed within villages only when specifically addressed in community plans.	Not Applicable This policy is not applicable because, as it notes, the policy does not apply to floodplains with unmapped floodways (which is the case on this site).
S-9.5	Development in Semi-Rural and Rural Lands within the Floodplain Fringe. Prohibit development in the floodplain fringe when located on Semi-Rural and Rural Lands to maintain the capacity of the floodplain, unless specifically allowed in a community plan. For parcels located entirely within a floodplain or without sufficient space for a building pad outside the floodplain, development is limited to a single family home on an existing lot or those uses that do not compromise the environmental attributes of the floodplain or require further channelization.	Not Applicable The floodplain fringe is defined (including in the General Plan Glossary) as the portion of the floodplain outside the limits of the floodway. Policy S-9.4 associated with the floodplain fringe notes that the policy does not apply to floodplains with unmapped floodways. That is the case on this site and there is no floodway throughout the alluvial floodplain covering a large portion of the Borrego Valley.
S-9.6	Development in Dam Inundation Areas. Prohibit development in dam inundation areas that may interfere with the County's emergency response and evacuation plans.	Not Applicable This policy is not applicable because the subject area is not within a dam inundation area.
S-10.1	Land Uses within Floodways. Limit new or expanded uses in floodways to agricultural, recreational, and other such low-intensity uses and those that do not result in any increase in flood levels during the occurrence of the base flood discharge, do not include habitable structures, and do not substantially harm, and fully offset, the environmental values of the floodway area. This policy does not apply to minor renovation projects, improvements required to remedy an existing flooding problem, legal sand or gravel mining activities, or public infrastructure.	Not Applicable This policy is not applicable because the subject area is not within a floodway.

Appendix K:
IMPLAN Files

2016 IMPLAN dataset for ZIP code 92004 adjusted to 2018 U.S. Census Occupational Categories for Borrego Springs

Hotels, motels, accomodations		Employment	10%	
499	Hotels and motels, including casino hotels	138.89	13.89	
500	Other accommodations	18.50	1.85	
Restaurants				
501	Full-service restaurants	80.14	8.01	
502	Limited-service restaurants	6.57	0.66	
Recreation, amusement				
496	Other amusement and recreation industries	163.49	16.35	
	Total	250.19	25.02	
Farming & Ranching		Employment	25%	75%
1	Oilseed farming	0.00	0.0004	0.0012
2	Grain farming	0.01	0.0016	0.0049
3	Vegetable and melon farming	4.92	1.2311	3.6932
4	Fruit farming	81.27	20.3174	60.9520
5	Tree nut farming	1.20	0.2996	0.8989
	Total	87.40	21.85	65.55
Education		Employment	10%	
532	* Employment and payroll of state govt, education	27.18	2.72	
534	* Employment and payroll of local govt, education	101.01	10.10	
School & education services				
472	Elementary and secondary schools	2.28	0.23	
474	Other educational services	5.53	0.55	
	Total	136.00		