SDAC IMPACT/VULNERABILITY ANALYSIS
(TASK 2 REPORT)

- **Baseline Water Use**
- **Water Supply Impact/SDAC Vulnerability/ SGMA Impacts**

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SDAC IMPACT/VULNERABILITY ANALYSIS
(TASK 2 REPORTS)

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1. INTRODUCTION

Starting January 1, 2020, California State Law requires the implementation of a Groundwater Sustainability Plan[1] (GSP) to reduce groundwater use by the Borrego Springs Community by approximately 75% over a maximum 20-year period. The community water supply is entirely reliant on local pumping- as explained in the GSP there are currently no feasible sources of imported water. It has long been recognized that the depleting groundwater 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 per 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**). Because it is a Severely Disadvantaged Community (SDAC[4]) and located within an Economically Distressed Area (EDA[5]) the community is particularly susceptible and vulnerable to the changes that will occur as a result of severe water use reductions under SGMA. An extensive public outreach effort was made by LeSar Development Consultants (LDC) in 2018 to obtain local data specific to water reduction and potential cost impacts as further described in this Report and summarized in **Appendix A** (LDC, 2019). The survey results provide great insights regarding potential SDAC community impacts and what will be necessary for the community to successfully adapt.

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 B**):

- <u>Baseline Water Use</u>
  (**Section 2, Summary in Section 4**)
- <u>Water Supply Impact, SDAC Vulnerability, and SGMA Impacts Analysis</u>
  (**Section 3, Summary in Section 4**)

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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 3) Low population density.

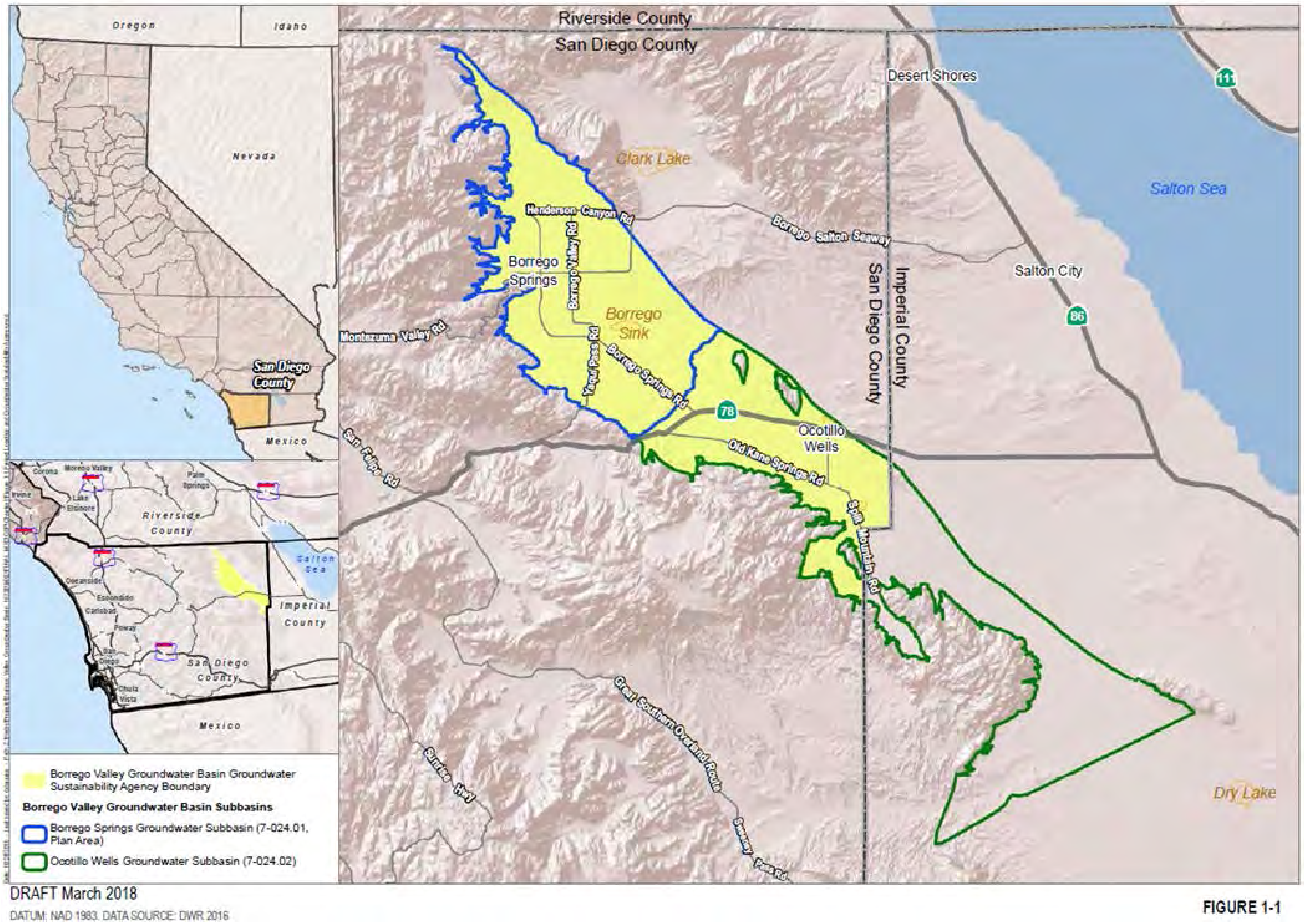


Figure 1. Site Location (From Draft GSP, Figure 1-1)

Analyses included in this Report build upon work done by others. Community-specific information was gathered and analyzed by LDC as previously noted. Their work expanded on stakeholder engagement conducted by the GSA. A Draft GSP completed by Dudek Associates for the Groundwater Sustainability Agency is currently available for review and includes much of the available water supply information cited in this Report.

The Draft GSP describes a series of projects and management actions (PMAs) that include water trading, agricultural land fallowing, and water conservation to facilitate groundwater pumping reductions. Groundwater use can be described in terms of three sectors. Most of the current pumping is controlled by independent well operators to provide water for agricultural and recreational (golf course) irrigation. The Borrego Water District provides water to most of the residents and businesses yet only represents approximately 10 percent of current water demand. Additional details follow in **Section 2**.

In general, given the existing distribution of water uses, changes in water consumption practices will result in the substantial reduction of irrigation-dependent agriculture and golf course turf demands over the 20-year GSP compliance period. These reductions have direct impacts on the SDAC population of Borrego Springs as these water-dependent businesses (i.e. farming and golf course communities) that support employment will be significantly affected.

The Borrego Water District provides drinking water to nearly all of the SDA Community of Borrego Springs. Safe drinking water is fully accessible; however, water affordability and reduced availability is of significant concern. The cost of the PMAs necessary to maintain water supply as well as SGMA administration costs[6] will impact BWD operational costs. An overall assessment of SGMA-related impacts is reviewed in **Section 3**.

[6] The Draft GSP summarizes the SGMA administrative costs in sections 1.3.3 and 5.1. As noted in Section 1.3.3 "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."

2.0 BASELINE WATER USE AND FUTURE REDUCTION SCENARIOS

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 sustainable yield as developed by the US Geological Society 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. However, 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 1** provides a hypothetical example of a potential water transfer outcome.

Table 1. 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 1** 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 1** 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[7]. As noted in **Table 1** the current use 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.

- In some instances, the golf communities include vacant parcels and additional residential and commercial development included in their overall business operation and community structure. The golf courses are a key component to 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**) 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[8]. 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 "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,

[7] 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.

[8] 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

given current competition with agriculture, recreation, and other water users of the basin, including potential environmental water necessary to maintain the groundwater system."

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, given the projected pumping costs associated with SGMA compliance. Therefore, future water transfers are assumed to occur from the agricultural sector to the other residentially-driven water uses.

2.1 Water Use Reduction Rates

SGMA mandates that sustainable pumping conditions be attained over a 20-year GSP compliance period that begins January 1, 2020. While current pumping will need to be reduced by approximately 75% to meet the 5,700 AFY target, SGMA does not explicitly dictate how the reductions will be made or the rate schedule used to reach the target. The Draft GSP proposes a reduction schedule where a constant annual reduction of ~812 AFY is planned (Draft GSP, Table 3-6). This results in additional overdraft of 72,000 AF (Draft GSP, page 3-12) and also means that the amount of water use reduction relative to pumping will increase over time. In other words, the reduction of ~812 AFY becomes increasingly larger over time - for example compare the relative reduction of 812 AFY when pumping is at 20,000 AFY versus 10,000 AFY.

Alternative pumping rate reduction scenarios and associated trade-offs are analyzed in **Appendix D**. The purpose of this Report is to examine pumping rate reduction schedules relative to that proposed in the Draft GSP. Please note that the BPA used in the analysis included in Appendix D is based on a value that has since been changed- the overall conclusions remain unchanged. As stated in the Appendix the choice of the reduction rate schedule necessary to achieve the target pumping rate can affect the following:

- The magnitude of overdraft and additional long-term groundwater level decline in the Subbasin will vary depending on the reduction rate schedule. A reduction rate schedule that minimizes overdraft will also minimize groundwater level decline and the potential that undesirable results will occur as defined under SGMA and further explained in the GSP.

- The choice of rate schedule can accelerate or delay the effects associated with decreased pumping. Making significant reductions earlier in the compliance period results in a more meaningful aquifer system response, which is necessary to support timely adaptive management. The longer the reductions are delayed the higher the risk that adaptive management will not be as effective, potentially require unanticipated additional pumping restrictions, or become more expensive to implement.

- Year-to-year pumping rate reductions are directly determined by the reduction rate schedule. Ideally the year-to-year changes are made gradually to allow the community to adapt to less water use. However, when reductions are deferred toward the end the compliance period the percentage change in pumping rate from year-to-year can rapidly increase and be much greater than 10%.

- A long-term average recharge rate determined by the USGS Groundwater Model[9] was used to develop the target pumping rate of 5,700 AFY. Being an average, the recharge rate will be lower than average 50% of the time. Failure of the reduction rate schedule to accommodate below average recharge rates by January 2040, the end of the SGMA compliance period could trigger State intervention should the GSP fail to attain a sustainable groundwater condition. The GSP describes an adaptive management strategy based on the observed aquifer response that will occur as pumping is reduced. A lower target pumping rate could also be used to increase the probability of compliance.

The choice of reduction rate schedule carries with it associated impacts and trade-offs that need to be considered in the broader context of the GSP. Multiple water supply management options are available to the Borrego Water District and other stakeholders that can reduce reliance on pumping rate reductions to mitigate chronic overdraft and attain long-term sustainability under SGMA.

Once the reductions are underway and impacts (both positive and negative) begin to be realized, the actual pumping rate reductions will become known and the implications of the projected reduction rates can be reviewed to assess GSP progress.

[9] [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

3.0 WATER SUPPLY IMPACT, SDAC VULNERABILITY, AND SGMA IMPACTS ANALYSIS

The purpose of this section is 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 period. Structural changes in the Borrego Springs community that are assumed to occur are posed in this analysis in terms of the businesses that make up each of the water use sectors.

The focus of this section in on vulnerability and impacts. A key point to consider is that the GSP implementation period is 20 years and the community will have this time to adapt. Much of this adaptation will occur as a result of a change in the types of businesses and future job opportunities that will exist in Borrego Springs. Conceptually the community has the capacity to prosper by understanding and adapting to these reasonably predictable changes. A separate economic analysis has been prepared by ENSI under Task 3 of the Proposition 1 grant that builds on this Section.

3.1 Community Characteristics Overview

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 and economic 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)[10] include:

Population[11]: 3,676 Fulltime; Estimated to approximately double during Winter
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[12]. LDC (2019, p8; [**Appendix A**]) provides a clear picture of the distribution of income within the SDA Community. "In the Borrego Municipal User Survey results, 49% of those who responded to questions about income indicated they have an annual income of $36,000 or less (Appendix G). This is in line with 2016 Census estimates indicating that 51% of households had an income of $35,000 or less[13].

[10] Census demographic data updated July 1, 2018 by ESRI Demographics.
[11] Population estimates for Borrego Springs vary among sources- here the ESRI estimate is different than that indicated by US Census. The seasonal nature of the population adds to the overall uncertainty.
[12] State Income Limits for 2016, Department of Housing and Community Development, Division of Housing Policy Development, May 24, 2016.
[13] U.S. Census. (2016). Selected Economic Characteristics, 2012-2016 American Community Survey 5-Year Estimates. Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF

The Borrego Municipal User Survey results also displayed stark income differences between Spanish survey households and English survey households: 80% of Spanish survey households earned less than $36,000 annually, while English survey households were a bit more distributed among income levels (Figure 7 [in Appendix A]). The most recent Census estimates for MHI based on race/ethnicity is from 2014, in which MHI for White households was $39,138, while MHI for Hispanic households was $19,375.[14]" LDC (2019, p6) notes that "Hispanic/Latinx residents make up roughly 20% of the total population in Borrego, while White residents, both Hispanic and Non-Hispanic, make up 87% of the total population (Figure 3)[15]."

Community-specific data have been obtained that emphasize the seasonal nature of the Borrego Springs community and economy. Among the key points included in the Borrego Spring Community Characteristics Report (LDC, 2019) include:

- "According to the U.S. Census Bureau, Borrego Springs' estimated full-time population in 2016 was 2,328, an over 30% decrease from the 2010 Census (3,429).[16] However, based on the seasonality of the area, it is estimated that part-time residents inflate the population by almost two-fold[17]."

- "The average tenure for households reported in the Borrego Municipal User Survey was 9.8 months per year, with about 30% of households reporting they are part-time residents (less than 9 months per year)."

- "There are approximately 2,667 total housing units in Borrego Springs, with a seasonal housing vacancy rate of around 40%. Over 1,000 units are estimated to be for seasonal, recreational, or occasional use."

- "[A] majority of business in Borrego Springs is seasonal, with the high season being from October to May, although the village is still active during the summer months."

[14] U.S. Census. (2014). Median Income in the Past 12 Months, American Community Survey 5-Year Estimates.
[15] U.S. Census. (2016). Place of Birth by Nativity and Citizenship Status, 2012-2016 American Community Survey 5-Year Estimates.
[16] U.S. Census. (2016). ACS Demographics and Housing Estimates, 2012-2016 American Community Survey 5-Year Estimates. Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_DP05; U.S. Census (2010). Profile of General Population and Housing Characteristics, 2010. Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_DP_DPDP1
[17] San Diego County. (2011). Borrego Springs Community Plan.

Tourism, a highly seasonal activity, is one of the main economic drivers for the community with an estimated 650,000 to 1,000,000 annual visitors to Anza-Borrego Desert State Park[18]. Tourism supports lodging, food service and retail establishments. Winter-time attractions aside from the State Park include golfing and related country club activities. Due to seasonally pleasant weather Borrego Springs' population roughly doubles during the winter. The area experiences extreme heat during the summer months so the primary economic activity, tourism, is limited to an approximately five- to six-month period when businesses can make a profit.

This analysis recognizes that much of the local Borrego economy is hospitality based and primarily relies on seasonal visitors and tourism. As described in the Borrego Springs Community Characteristics Report (LDC, 2019; **Appendix A**):

> "The main economic driver in Borrego Springs is tourism, largely from State Park visitation. It is estimated that the 900 square-mile Anza-Borrego Desert State Park (ABDSP) attracts between 650,000 and 1,000,000 visitors to the region annually.[19] Recent California State Park Statistical Reports from 2013-2016 put the official numbers between 350,000 to 550,000. In FY2015-2016, there were approximately 403,000 visitors to ABDSP, accounting for $620,169 in total park revenue; meanwhile, Anza-Borrego's 2015-2016 Total Budgetary Expenses added up to over $3.7 million.[20] The beginning of FY2018-2019 has been difficult for ABSDP, as it faces a severe staffing shortage, similar to many California state parks. There are presently only four rangers on duty compared to eight to 10 plus two supervising rangers in the past.[21]
>
> While ABDSP is the largest draw to the Borrego Springs area, visitors are often interested in other activities such as biking, hiking, golfing, stargazing, or visiting the Borrego Art Institute and local galleries. The surrounding businesses in Borrego, such as restaurants, retail stores, and lodging properties, also support this tourism economy. There are 10 lodging options for visitors to Borrego Springs, with additional communities and resorts offering traditional house rentals or RV parking. In addition, there are currently 167 listings on Airbnb for the greater Borrego Springs area. The Transient Occupancy Tax (TOT) collected in Borrego in the 2016 calendar year was around $413,000, compared to more than $700,000 in 2017, which was likely related to the wildflower "super bloom."[22]
>
> In March 2018, the Borrego Village Association launched a year-long visitor survey to get a better understanding of who visits the region and why, and what their visitor experiences

[18] Tourism Development and Marketing Plan Borrego Springs, California. Prepared by CB&D, dated 10/18/2001. http://www.borregospringschamber.com/BSCSG/BorregoSprings_CP_2001-10-18.pdf

[19] San Diego County. (2011). Borrego Springs Community Plan.

[20] California State Parks. (2016). State Park Statistical Report 2015-2016 Fiscal Year. Retrieved from: http://www.parks.ca.gov/?page_id=23308

[21] J. Harry Jones. (2018). "Only 4 rangers patrolling 1,000-square-mile Anza Borrego desert." The San Diego Union-Tribune. Retrieved from: http://www.sandiegouniontribune.com/communities/north-county/sd-no-park-staffing-20180531-story.html

[22] San Diego County. (2018). Transient Occupancy Tax Reports. https://data.sandiegocounty.gov/Government/Transient-Occupancy-Tax-Reports/bqne-86gf/data

are like. The survey will provide the Borrego Village Association and the greater community insight into how to sustainably foster tourism and economic growth in the region. As of May 18, 2018, they had received a total of 91 completed surveys. Preliminary trends showed the primary reason for a visit was the State Park (56%) and a majority of visitors surveyed were adults 60 years or older (64%). The average visitor reported spending about $123 per day.

It is also important to note that a majority of business in Borrego Springs is seasonal, with the high season being from October to May, although the village is still active during the summer months. Since 2009, the Borrego Springs Village Association has been working on a variety of community initiatives to make Borrego's Central Business District more accessible and pedestrian-friendly through design enhancements and traffic-calming.

While there are no other industries quite as significant in Borrego Springs, there are over 4,000[23] acres of land dedicated to agriculture in the Borrego Valley, which belong to a handful of citrus growers.[24] According to the Census, "Agriculture, Forest, Fishing, Hunting" made up 6.8% of jobs in Borrego's local economy in 2015, and employed approximately 22% of Borrego residents 16 years and older.[25]"

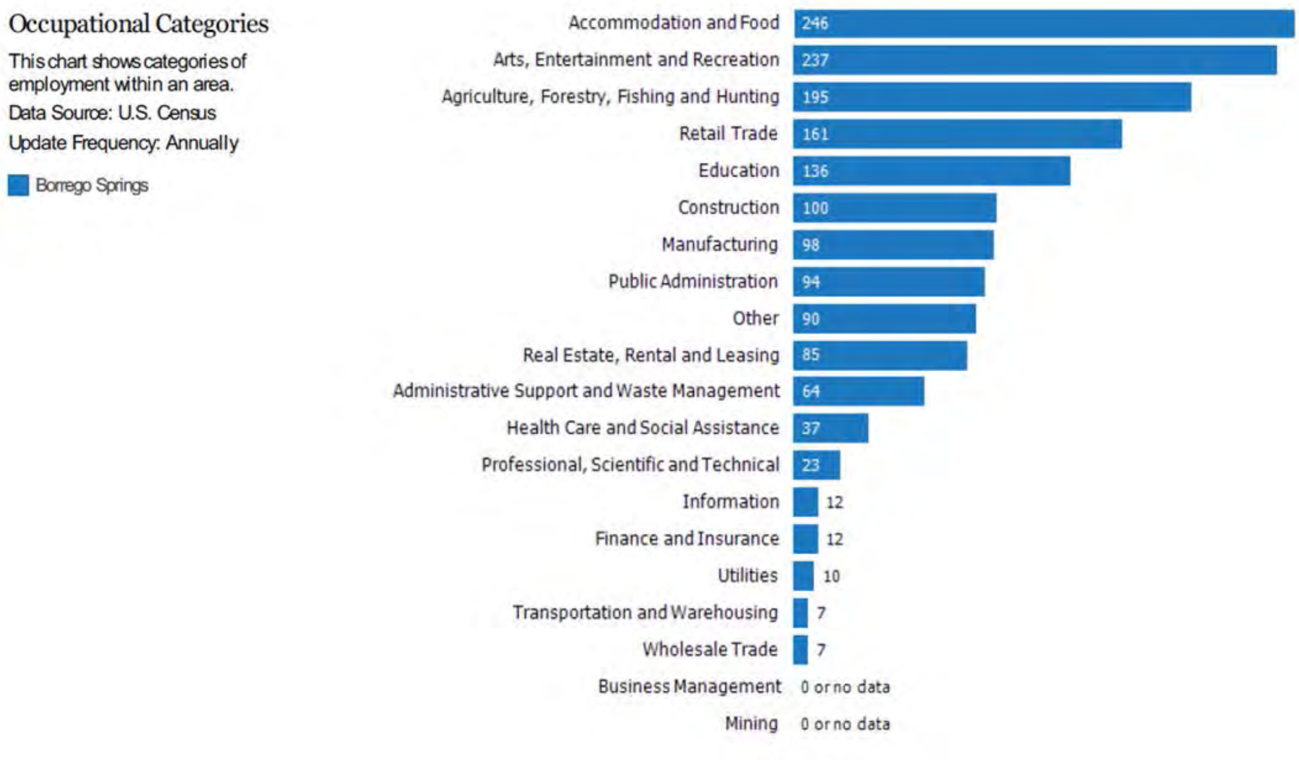
3.1.1 Employment-based Analysis

Employment, by occupation categories, is used in this Report to assess how the community will change and adapt in response to the decreased availability of water. **Figure 3** depicts the occupational categories and number of jobs represented by each. A total of 1,614 jobs are represented.

Most of the occupations listed in **Figure 3** represent multiple water use sectors (i.e. they can be included in either Agricultural, Recreational/Golf, and Municipal). The agricultural sector is represented by the third category entitled 'agriculture, forestry, fishing, and hunting'. Of primary concern is how the implementation of SGMA will impact available jobs as the most severe impacts of SGMA will be associated with the reduction of irrigation-dependent agriculture and golf courses.

[23] A range of agricultural acreage values have been used. The GSP (page 3-24) provides an updated value of 2,624 developed for the GSA in 2018.
[24] San Diego County. (2011). Borrego Springs Community Plan.
[25] U.S. Census (2016)

Figure 3: Occupational Categories (Total =1,614)



Source: Sandicor, 2018

3.1.2 Societal Structure based on Demographics and Employment

The societal structure of the Borrego Springs Community reflects the seasonal, retirement-oriented population and related businesses. For example, there are six golf course communities in Borrego Springs that support rural resort dwellers and retirees. Of note is that 18% of the current baseline pumping allocation (BPA) is used for golf course (recreational) irrigation versus 10% for BWD's residential and commercial service. For reference agricultural irrigation demand represents 72% of the BPA water demand (**Table 1**).

Much of the Borrego Springs Economy is supported by "outside money" such as revenue derived from tourism, retirement income, and various forms of direct and direct government assistance. The municipal customer survey results, further detailed in the Borrego Springs Community Characteristics Report (**Appendix A**), clearly show that the economy and associated demographics are based on tourism and related hospitality business.

Table 2. BWD Municipal User Survey Responses (Question 5)

Employment	Number	Percent
Retired/Retirado	279	47%
Other/Otro*	99	17%
Hotel	47	8%
Golf	36	6%
Landscaping/Jardinero	35	6%
Food Service/Servicio Alimenticio o Restauran	25	4%
Medical/Medica	22	4%
Recreation/Recreo	21	4%
Retail/Tienda o al por Menor 2.0% 12	19	3%
Agriculture/Agricultura	10	2%
Total	593	100%
* 'other': Law, Self-Employed, State Park, Education, Construction		

Notes:
1. 32% of the Survey Replies were in Spanish.
2. A relatively small proportion of the Spanish Responders (18 of the 279 [6%]) reported being retired.

The Community Characteristics Report provides additional insight, especially when examining the portion of the community likely to have school aged children:

- "The median age of residents in Borrego Springs is 53.8 years, with almost 60% of the population aged 55-years or older and 31% of the population aged 65 or older."

  "With such a large population in retirement, income for many Borrego households comes from retirement, Social Security, or other sources of fixed income. In 2016, there were 1,050 individual Social Security beneficiaries in the 92004 ZIP code – 850 of the total were retired, and 895 were aged 65 or older. The Census estimates 45.2% of households receive Social Security income at an average of $18,201 per year, and 30.3% of households have retirement income at an average of $19,371 per year."

- "Approximately 38.4% of households are comprised of only a single householder, 42.8% are comprised of two persons, and 18.8% of households are comprised of three or more individuals. Based on the Borrego Municipal User Survey, household size averaged 2.8 persons, with retired households averaging 1.9 and nonretired households averaging 3.6 persons. Respondents who completed surveys in Spanish had a larger average household size of 4.4 persons compared to English survey respondents, who averaged a household size of 2.0 persons."

- "The characteristics of younger residents display a stark contrast to the overall population's racial and ethnic makeup and language background. Eighty-four percent of students in the Borrego Springs Unified School District (BSUSD) are Hispanic/Latinx and 44% of students are English Language Learners (ELL). In Borrego Springs as a whole, it is estimated that 15% of residents ages 5 and older are non-English speakers (down from 29.01% in 2011), and that approximately 30% of the total population speaks Spanish at home. It is estimated that by 2050, the San Diego County Desert Community Planning Area (Desert CPA) where Borrego is located will be over 60% Hispanic/Latinx."

- "The Borrego Springs Unified School District includes a public elementary, middle, and high school, and oversight of three charter schools that have campuses in Borrego Springs. Hispanic/Latinx students make up 84% of the BSUSD student population. Ninety-two percent of BSUSD students are considered "socioeconomically disadvantaged," meaning neither of the student's parents have a high school diploma or the student is eligible for the National School Lunch Program."

3.1.3 Community Facilities and Infrastructure

Of high concern is the potential for SGMA-mandated water use reduction to destabilize the Borrego Springs community by impacting the viability of local community facilities and infrastructure.

Borrego Springs, as described by LDC (**Appendix C**, page 4) is "[A] Census Designated Place (CDP) is a geographic term for a settled concentration of population that is identifiable by name, but is not a legally incorporated place, e.g., it does not have traditionally elected officials to serve municipal functions like a city would have. Its boundaries are defined by local officials in partnership with the Census Bureau and they are updated every 10 years for the Census." It is geographically isolated and located in an Economically Distressed Area (EDA[26]). Further " Borrego Springs is located within a Medically Underserved Area (MUA) in San Diego County, as defined by the federal Health Resources and Services Administration. A MUA is an area with too few primary care providers, high poverty rates, a higher older adult population, and/or a high infant mortality rate.[27] There is only one medical clinic that provides comprehensive healthcare for residents in the Borrego Valley, and it does not provide emergency services."

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

[26] Per LDC (2019, page 4) An Economically Distressed Area is defined as a geographic area with a population of 20,000 or less
"with an annual median household income (MHI) that is less than 85%of the [California] statewide MHI, and with at least one of the following conditions as determined by the [Department of Water Resources]: 1) financial hardship, 2) unemployment rate at least 2% higher than the statewide average, 3) low population density."5

[27] County of San Diego Health & Human Services Agency. (2013). San Diego County Atlas of Medically Underserved Areas/Populations,
Health Professional Shortage Areas, & Registered Nurse Shortage Areas. Retrieved from: https://www.sandiegocounty.gov/content/dam/sdc/hhsa/programs/phs/documents/CHS-HealthcareShortageAtlas_2013.pdf

been developed by the community. Per the 2014 Borrego Springs Community Plan[28] "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, Soroptomists, American Legion, multiple local churches, and the
Anza Borrego Desert Natural Heritage Association (ABDNHA).

3.2 SDAC Vulnerability and Potential SGMA Impacts

Community outreach by LDC (**Appendix C**) has provided a clear picture of the SDAC concerns and vulnerabilities relative to water. The SDA Community is not a homogeneous group and is comprised of low-income sub-populations. Of note are two sub-populations- households with school age children and retirees. As noted by LDC "almost 60% of the population aged 55-years or older and 31% of the population aged 65 or older[29]." "Hispanic/Latinx residents make up roughly 20% of the total population in Borrego, while White residents, both Hispanic and Non-Hispanic, make up 87% of the total population[30] (Figure 3 [in **Appendix C**])".

Review of the community response, in part summarized in Table 3, support the following concerns and associated vulnerability identified by the SDAC related to the impact of SGMA-mandated water use reductions.

[28] County of San Diego General Plan, Borrego Springs Community. As amended June 18, 2014 (GPA 12-007)
[29] U.S Census. (2016). Age and Sex, 2012-2016 American Community Survey 5-Year Estimates. Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_S0101.
[30] U.S. Census. (2016). Place of Birth by Nativity and Citizenship Status, 2012-2016 American Community Survey 5-Year Estimates.

Table 3: Municipal User Survey Comment Themes

Open Comment Theme	Number	pct
High Rates/Rising Rates/Cost Burdens	31	37%
[Criticism of] Golf/Agriculture Water Use	15	18%
Fixed Income/Retirement/Senior Citizens	9	11%
Conservation	8	10%
Jobs/Local Economy	8	10%
Borrego's Quality of Life/Hopes to Stay	5	6%
Relocation	5	6%
Water Quality	3	4%
Total	84	100%
Privacy/Security Related to Survey	11	

<u>Water affordability (BWD Rate impacts)</u>
"Borrego Municipal User Survey results reveal that 53% of respondents were able or willing to pay up to $25 more per month for dependable, potable water from the Borrego Water District. Twelve percent were able or willing to pay up to $50 per month, while 10% indicated that they were unable or willing to pay anything more per month. Results did not vary significantly between income levels or between English and Spanish surveys. Many survey respondents indicated that they are frustrated with rising rates and other rising costs of living. Several mentioned how any change in monthly costs can be extremely burdensome for those with a fixed income, including many seniors. Thirty-one survey responses included comments related to high or rising rates and cost burdens, while an additional nine responses included concerns related to fixed incomes, seniors, and retirement." (LDC, 2019; p22).

<u>Jobs/Local Economy</u>
Review of employment data (**Figure 3** and **Table 2**) supports that water use reduction will have varying effect depending on the water use sector. The three sectors include:

Agricultural (72% of BPA water use)
Locally agricultural jobs represent a minority of the employment opportunities in Borrego Springs. **Table 2** shows 2% of responders are employed in agriculture. Figure 3 includes a broad category of "agriculture, forestry, fishing, and hunting" that comprise 12% (195 of 1614).

Recreational (18% of BPA water use)
The golf course communities employ and involve a wide range of occupations as they combine real estate, hospitality, and recreational businesses. They support local tourism as well as being a focus for retirement living. Among the applicable occupations included in **Table 2** include Golf, Landscaping, Food Service, and Recreation.

Municipal (10% of BPA water use)
The Borrego Water District provides potable water to most of the residents and commercial businesses. As a result, BWD water rates have wide-ranging effect on the community both in terms of cost of living and business operation costs.

SGMA has a direct impact on the availability of water for future residential and commercial development. BWD will need to obtain additional water through water trading. As illustrated by **Table 1,** reallocation of water from agricultural and potentially from recreational/golf use will be required for BWD to provide additional water for undeveloped land within their service area. T

Outmigration: "hopes to stay/ relocation"
Uncertainty regarding the future of Borrego Springs may lead some to consider leaving the community. The Municipal User Survey asked how many would be able or willing to pay more for dependable water, by income and price increase. 17% of the lowest income (22 of 134 responses for those at less than $36,000/year) indicated they would not be able or willing to pay more for water. Thus, it is possible that some individuals in this portion of the population will choose to leave the area.

Infrastructure Impacts "Quality of Life"
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 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 for outmigration to cause significant impacts to Borrego Springs.

Outmigration of younger families 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 bussed 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 School 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[31] and threaten the viability of the School District.

3.3 Potential Mitigations
The Borrego Springs community has the potential to adapt to water use reductions over the next 20 years. The primary impact will be the loss of water for irrigation as it represents 90% of the BPA (see **Table 1,** combining the agricultural and recreational/golf water use sectors). As noted in section 2, SGMA does not mandate how the water reductions are to occur. The Draft GSP outlines multiple projects and management actions (PMAs) that can be used to achieve long-term sustainability.

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

Water affordability for Borrego SDAC residents will be principally determined by BWD water rates, which are driven by BWD costs to supply potable water to municipal users. Among the potential mitigations include:

Maintain Low Rates for Baseline Water Use

BWD currently has a tiered rate that can allow for lower rates for basic, non-irrigation, water service. Among the considerations for maintaining low rates for basic water service include recent Human Right to Water legislation and the recently-completed survey data that clearly show the sensitivity of those with low incomes to water rates. California has established a target of 55 gallons of water for residential users per day per capita under California Water Code Section 10608.20. This equates to approximately 5,000 gallons per month per person, which may be a low standard for residential users in a desert environment that rely on evaporative cooling in the hot summer months.

Explore Additional Assistance for the State of California

Borrego Springs' SDAC status potentially allows for a higher priority for State assistance. The potential for SGMA-related impacts such as outmigration of low income ratepayers could be mitigated through programs that provide direct or indirect assistance. Several programs exist in the State. Some are for individuals directly from funding sources. Others are based on programs that the utility can participate. Some programs are specific to local jurisdictions, therefore some investigation into the qualifying criteria would need to be undertaken.

Municipal business customers may be able eligible for the New Market Tax Credits program[32]. Per their website "Historically, low-income communities experience a lack of investment, as evidenced by vacant commercial properties, outdated manufacturing facilities, and inadequate access to education and healthcare service providers. The New Market Tax Credit Program (NMTC Program) aims to break this cycle of disinvestment by attracting the private investment necessary to reinvigorate struggling local economies.

The NMTC Program attracts private capital into low-income communities by permitting individual and corporate investors to receive a tax credit against their federal income tax in exchange for making equity investments in specialized financial intermediaries called Community Development Entities (CDE[33]s). The credit totals 39 percent of the original investment amount and is claimed over a period of seven years."

This program has the potential to mitigate some of the depressive effects on the local economy.

[32] https://www.cdfifund.gov/programs-training/Programs/new-markets-tax-credit/Pages/default.aspx

[33] "A Community Development Entity (CDE) is a domestic corporation or partnership that is an intermediary vehicle for the provision of loans, investments, or financial counseling in low-income communities. Certification as a CDE allows organizations to participate either directly or indirectly in the New Markets Tax Credit Program." See https://www.cdfifund.gov/programs-training/certification/cde/Pages/default.aspx

Job Replacement

Agricultural jobs will be lost. However, on a positive note, the primary economic driver, tourism, is not highly dependent on irrigation and expansion of the tourism industry clearly has the potential to offset agricultural job losses.

All of these mitigations contribute to maintaining a stable community structure. Of high concern is the potential for the loss of family-aged population and associated potential negative impact on the viability of the public school system.

4.0 SUMMARY

The Severely Disadvantaged Community (SDAC) of Borrego Springs is facing an approximately 75% reduction in water use under SGMA by 2040. The community water supply is entirely reliant on local pumping, as explained in the GSP there are currently no feasible sources of imported water, and the aquifer system is in a state of critical overdraft.

4.1 Baseline Water Use

The Borrego Water District (BWD) provides water to the SDA Community so access to high quality drinking water is not of concern provided the BWD remains viable.

Baseline water uses, as further detailed in the GSP, can be generally categorized in term of three water use sectors and quantified by their baseline pumping allocations (BPAs) being used as the starting basis for water use reductions. These include

- Agricultural (72% of BPA)
- Recreational/Golf Irrigation (18% of BPA)
- Municipal/BWD Service Area (10% of BPA)

Of these water uses, 90% of the BPA is associated with irrigation water and only 10% pertains to potable municipal drinking water delivered by BWD.

SGMA does not mandate how the ~75% reduction in water use will be attained, or how quickly the reductions have to be made over the 20-year compliance period. Instead the SGMA sustainability indicators are addressed by a series of projects and management actions (PMAs) are described in the GSP that will be subject to minimum threshold criteria. Additional overdraft will occur over the compliance period and ongoing monitoring will be conducted to assess the progress of water use reductions. A key element to the water use reduction is a water trading program that will enable the transfer of water among water users and use sectors. As described in **Section 2**, water trading is likely necessary to sustain the BWD's long-term water needs and those of the recreational/golf community. The implications associated with various rate reduction schedules are also discussed in **Section 2**.

4.2 Water Supply Impact/SDAC Vulnerability/ SGMA Impacts

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**)

Community outreach efforts (LDC, 2019; **Appendix C**) 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 E 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 C** for details).

- 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.

5.0 ACKNOWLEDGEMENTS

This work was funded by the Borrego Water District as part of a California Proposition 1 Grant that was obtained by the County of San Diego on the behalf of the Groundwater Sustainability Agency. The GSA, established October 2016, is comprised of the County of San Diego and the Borrego Water District. The Project Title for the Grant is *San Diego County GSP Development*, referenced as Grant Agreement No. 4600012839.

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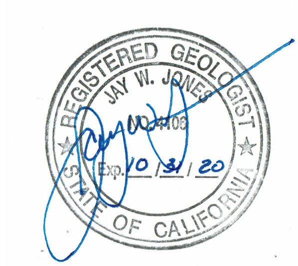

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This work was done under Task 2 of the Proposition 1 Grant Agreement and follows from the work done by LeSar Development Consultants (LDC) completed under Task 1 of the Grant Agreement. Task 1 is described as *SDAC Engagement*, and intended to "Establish 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". Their report is included as **Appendix C**.

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 Corporation, Dudek, Geosyntec Consultants, and Raftelis Financial Consultants.

Appendix A:

Borrego Springs Community Characteristics Report
by LeSar Development Corporation
received 1/30/2019

Borrego Spring 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

Borrego Springs Community Characteristics Report

Table of Contents

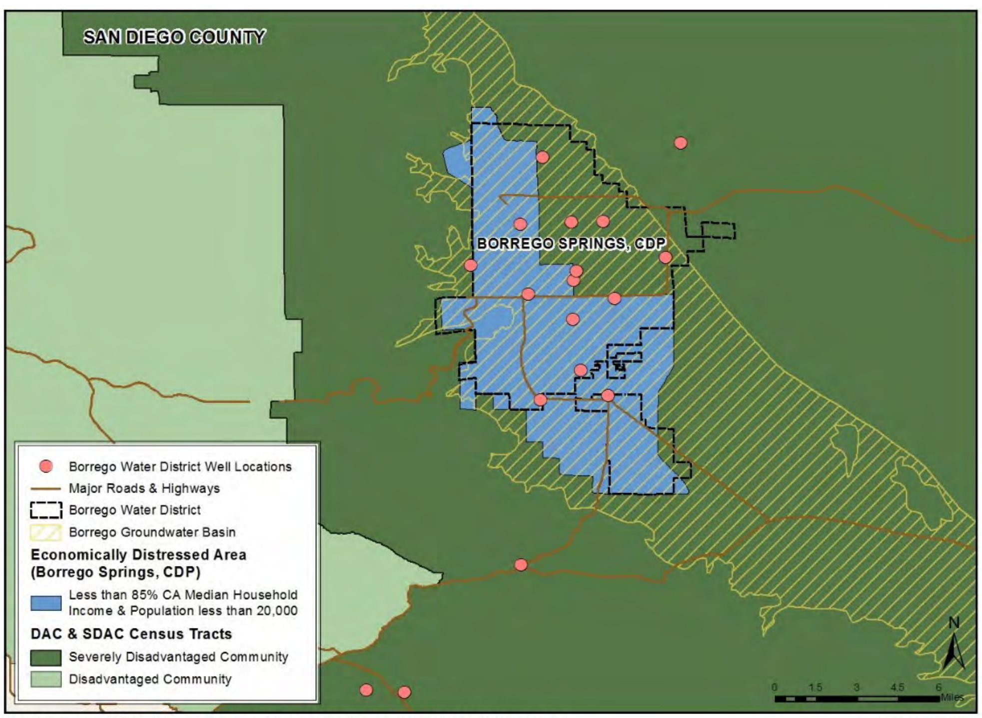
Introduction

The Borrego Water District (BWD) serves nearly 2,200 customers, including residential customers as well as commercial, agricultural, golf course, and State Park customers that employ residents of the community and surrounding area. The Borrego Springs community is entirely reliant on the groundwater obtained from the sedimentary Borrego Valley Groundwater Basin. The northernmost area of the basin is presently in critical overdraft, which occurs when 1) the average annual amount of extracted groundwater exceeds the long-term average annual supply and 2) continued extraction at those rates would likely incur significant impacts to water quality, availability, the local economy, and the environment.[1]

The Groundwater Sustainability Plan (GSP), developed by the Borrego Water District (BWD) and County of San Diego, seeks to reduce groundwater usage by 75% in the next 20 years to reach sustainability. Groundwater quality is deteriorating as groundwater levels drop, and it is possible that water treatment will be necessary to provide potable water in some areas. Fallowing of agricultural operations may also create a significant financial burden upon BWD if costs are incurred to transfer water and water rights from agricultural to municipal uses. Additionally, reaching the 75% reduction will affect local agriculture and other water-dependent commercial activities that provide local employment and support the tax base for the local government.

In this report, data on area demographics, the local economy, and the area water supply will provide a basic landscape to assist BWD and the County with further decision-making for effective water use reduction strategies that maximize the availability of potable drinking water.

Figure 1. Borrego Water District Project and Service Area



Data Sources: California Department of Water Resources (DWR), SanGIS/SANDAG
Date: 10/18/2017

Terminology

[1] Sustainable Groundwater Management Act (SGMA). https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management

Below is a list of terms and their definitions that will be used within this report.

Census Designated Place

A Census Designated Place (CDP) is a geographic term for a settled concentration of population that is identifiable by name, but is not a legally incorporated place, e.g., it does not have traditionally elected officials to serve municipal functions like a city would have. Its boundaries are defined by local officials in partnership with the Census Bureau and they are updated every 10 years for the Census.

When discussing statistical and geographic information throughout this report, “Borrego Springs” will refer to the Census Designated Place (CDP) of Borrego Springs, as defined by the U.S. Census. This is generally synonymous with what residents and visitors know as the village of Borrego Springs. Based on the level of data available for certain statistics, this report will also refer to larger geographic areas that encompass Borrego Springs. These include the following:

- The area census tract (06073021000)
- San Diego County Desert Community Planning Area (Desert CPA)
- San Diego Health and Human Services Agency (HHSA) North Inland Region
- ZIP code 92004 within San Diego County and extending to the east into Imperial County
- San Diego North Economic Development Council Inland North County

The geographic level of measurement for each indicator presented will vary due to the most recent, most reliable, and most appropriate data available at the time of this report.

Census Tract

A census tract is a geographic subdivision of a county for statistical purposes. Borrego Springs lies within Census Tract 06073021000 or is identified by its three-digit abbreviation, Census Tract 210.[2]

Disadvantaged Community (DAC)

A Disadvantaged Community is a community with a median household income (MHI) of less than 80% of the California statewide MHI, as defined by the Proposition 84 Integrated Regional Water Management (IRWM) Guidelines.[3]

Severely Disadvantaged Community (SDAC)

A Severely Disadvantaged Community is defined as a community with a median household income (MHI) of less than 60% of the California statewide MHI.[4]

Economically Distressed Area (EDA)

An Economically Distressed Area is defined as a geographic area with a population of 20,000 or less “with an annual median household income (MHI) that is less than 85%of the [California] statewide MHI, and with at least one of the following conditions as determined by the [Department of Water

[2] U.S. Census Bureau. *Geographic Terms and Concepts – Census Tract.* Retrieved from: https://www.census.gov/geo/reference/gtc/gtc_ct.html
[3] California Department of Water Resources. (2016). Retrieved from: https://gis.water.ca.gov/app/dacs/
[4] Ibid.

Resources]: 1) financial hardship, 2) unemployment rate at least 2%higher than the statewide average, 3) low population density."[5]

Borrego Municipal User Survey

The Borrego Water District conducted a survey of municipal water user households to gather information about the community related to future water use reduction strategies. A total of 367 Borrego Municipal User surveys were collected out of2,200 total distributed surveys. This translates to a 16.7% response rate. Forty-four surveys were completed online via Survey Monkey, while 323 paper surveys were mailed in or collected by BWD and local promotoras.[6].

Throughout this report, relevant data analysis and results from the survey will be shared in an aggregated (combined) form. This data source gives additional insight into Borrego's community characteristics and can be used in combination with other data sources to create a fuller representation of Borrego Springs.

The survey results and data analysis are displayed in Appendix G.

Area Demographics

Population

According to the U.S. Census Bureau, Borrego Springs' estimated full-time population in 2016 was 2,328, an over 30%decrease from the 2010 Census (3,429).[7] However, based on the seasonality of the area, it is estimated that part-time residents inflate the population by almost two-fold.[8] The average tenure for households reported in the Borrego Municipal User Survey was 9.8 months per year, with about 30% of households reporting they are part-time residents (less than 9 months per year).

The median age of residents in Borrego Springs is 53.8 years, with almost 60% of the population aged 55-years or older and 31% of the population aged 65 or older.[9] Approximately 38.4% of households are comprised of only a single householder, 42.8% are comprised of two persons, and 18.8% of households are comprised of three or more individuals.[10] Based on the Borrego Municipal User Survey, household size averaged 2.8 persons, with retired households averaging 1.9 and non-retired households averaging 3.6 persons. Respondents who completed surveys in Spanish had a larger average household size of 4.4 persons compared to English survey respondents, who averaged a household size of 2.0 persons.

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[5] California Department of Water Resources. (2018). https://water.ca.gov/-/media/DWR-Website/Web-Pages/Work-With-Us/Grants-And-Loans/IRWM-Grants/Files/Mapping-Tools/EDA-Instructions_FINAL_REVISED_11-01-2018.pdf?la=en&hash=D8DB91DF2E504512454A6FDA45E0D9555FF24011

[6] A "promotora" is a Spanish term for "community health worker." They usually receive specialized training to promote health education and access. With the deep ties they create in Spanish-speaking communities, they can carry out a variety of outreach and education. For more information: https://www.cdc.gov/minorityhealth/promotores/index.html

[7] U.S. Census. (2016). *ACS Demographics and Housing Estimates, 2012-2016 American Community Survey 5-Year Estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_DP05; U.S. Census (2010). *Profile of General Population and Housing Characteristics, 2010*. Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_DP_DPDP1

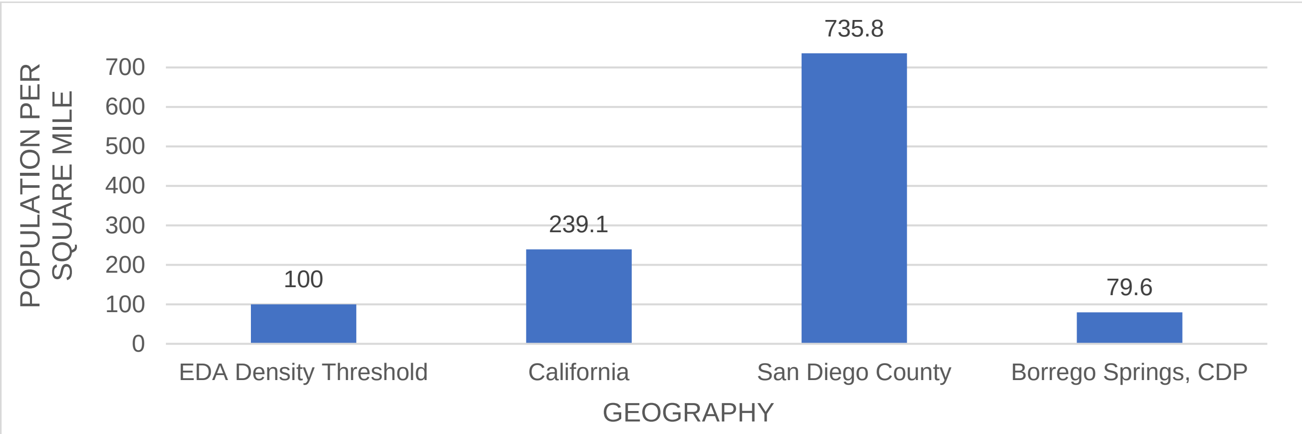
[8] San Diego County. (2011). *Borrego Springs Community Plan.*

[9] U.S Census. (2016). *Age and Sex, 2012-2016 American Community Survey 5-Year Estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_S0101

[10] U.S. Census. (2016). *Occupancy Characteristics, 2012-2016 American Community Survey 5-Year Estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_S2501

Given Borrego's remote location and the course of its development, the current population density for Borrego Springs is quite low at approximately 54 people per square mile. It was previously 79.6 people per square mile in 2010.[11] This low density, coupled with the area's $34,046 MHI (Figure 2), classifies Borrego Springs as an Economically Distressed Area (EDA) according to Proposition 1 Sustainable Groundwater Planning Grant guidelines.[12]

Figure 2. Density per Square Mile, 2010
EDA Eligibility

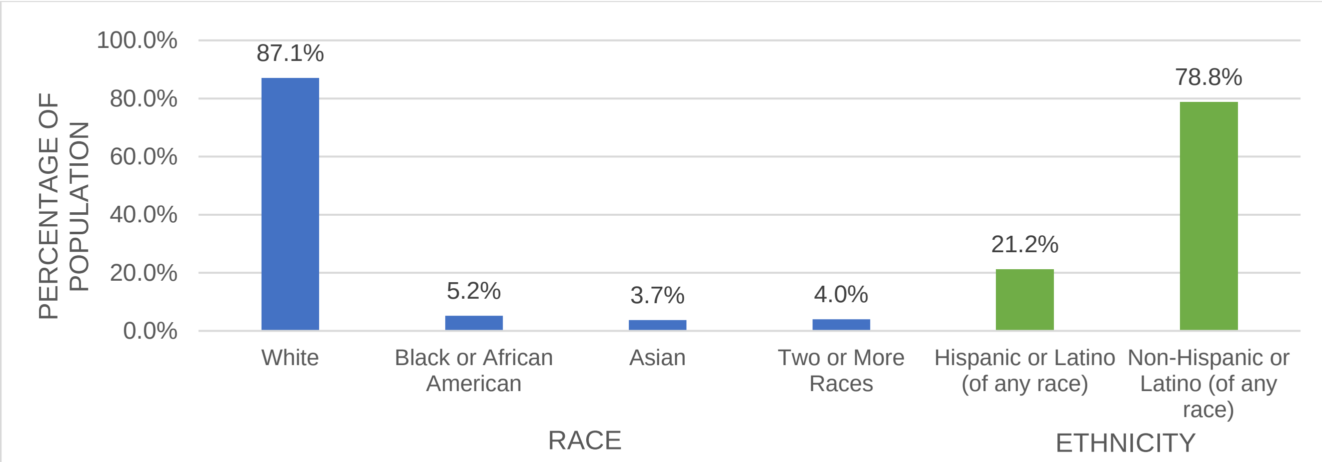


Hispanic/Latinx residents make up roughly 20% of the total population in Borrego, while White residents, both Hispanic and Non-Hispanic, make up 87% of the total population (Figure 3).[13] Approximately 20% of the population in Borrego Springs is estimated to be foreign born – this includes all "naturalized U.S. citizens, lawful permanent residents (immigrants), temporary migrants (such as students), humanitarian migrants (such as refugees), and persons illegally present in the United States."[14] Of those foreign born, approximately 85% were born in Latin America.[15]

The characteristics of younger residents display a stark contrast to the overall population's racial and ethnic makeup and language background. Eighty-four percent of students in the Borrego Springs Unified School District (BSUSD) are Hispanic/Latinx and 44% of students are English Language Learners (ELL).[16] In Borrego Springs as a whole, it is estimated that 15% of residents ages 5 and older are non-English speakers (down from 29.01% in 2011), and that approximately 30% of the total population speaks Spanish at home.[17] It is estimated that by 2050, the San Diego County Desert Community Planning Area (Desert CPA) where Borrego is located will be over 60% Hispanic/Latinx.[18]

[11] U.S. Census. (2016). *ACS Demographics and Housing Estimates, 2012-2016 American Community Survey 5-Year Estimates*.
[12] CA Department of Water Resources. (2016). *DAC Mapping Tool.*
[13] U.S. Census. (2016). *Place of Birth by Nativity and Citizenship Status, 2012-2016 American Community Survey 5-Year Estimates*. Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B05002
[14] U.S. Census. (2016). *Place of Birth by Nativity and Citizenship Status, 2012-2016 American Community Survey 5-Year Estimates*.
[15] Ibid.
[16] National Center for Education Statistics. (2018). *District Details.* Retrieved from: https://nces.ed.gov/ccd/districtsearch/district_detail.asp?Search=2&details=1&ID2=0605700&DistrictID=0605700
[17] U.S. Census. (2016). *Nativity by Language Spoken at Home by Ability to Speak English for the Population 5 Years and Over, 2012-2016 American Community Survey 5-Year Estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B16005
[18] San Diego Association of Governments (SANDAG). (2013). Series 13 Regional Growth Forecast: Desert Community Plan Area, County of San Diego. Retrieved from: http://datasurfer.sandag.org

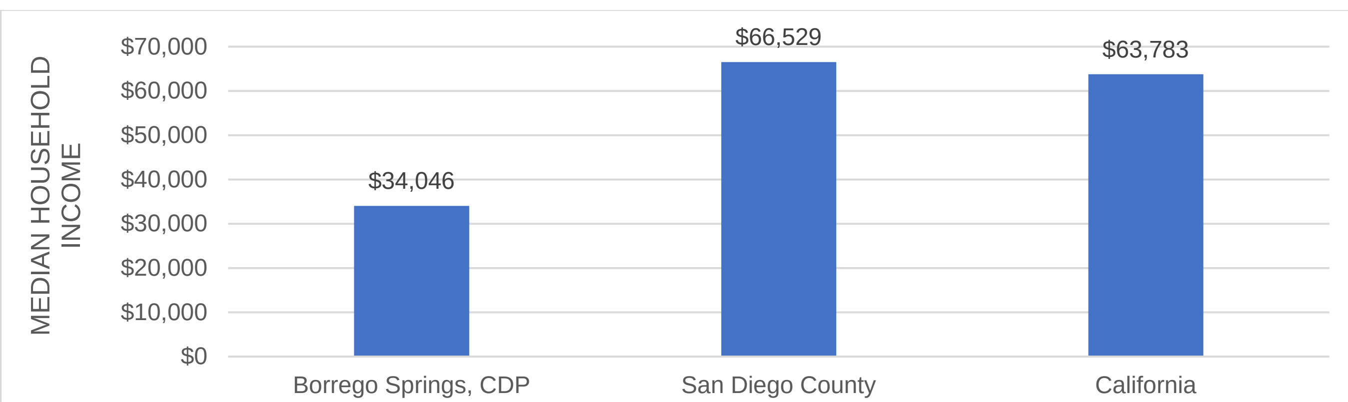
Figure 3. Race and Ethnicity, 2016



Income and Poverty

As noted previously, the MHI in Borrego Springs in 2016 was $34,046. This is almost 50% less than the San Diego County MHI of $66,529 and the California MHI of $63,783 (Figure 4).[19] This qualifies Borrego as a Severely Disadvantaged Community (SDAC) as well as an Economically Distressed Area (EDA) under Proposition 1 Sustainable Groundwater Planning Grant Program guidelines.[20] The Median Family Income (a household with two or more persons) is significantly higher at $48,346.[21] The Per Capita Income for Borrego Springs, the average income earned per person 15 years or older in a given area, sits much lower at approximately $21,035.[22] Figure 5 displays the distribution of annual household income according to the Census, while median earnings by education level follow in Figure 6.

Figure 4. Median Household Income, 2016
SDAC and EDA Eligibility



[19] U.S. Census. (2016). *Median Income in the Past 12 Months, 2012-2016 American Community Survey 5-year estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_S1903
[20] CA Department of Water Resources. (2016). *DAC Mapping Tool.*
[21] U.S. Census. (2016). *Income in the Past 12 Months, 2012-2016 American Community Survey 5-Year Estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_S1901
[22] U.S. Census (2016). *Per Capita Income in the Past 12 Months, 2012-2016 American Community Survey 5-Year Estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B19301

Figure 5. Annual Household Income, 2016

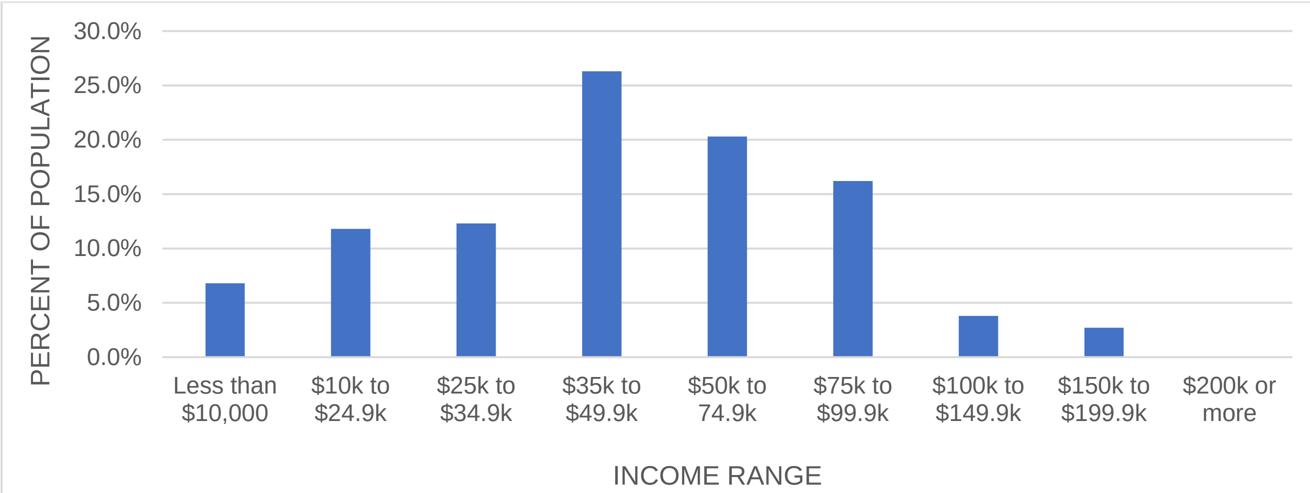
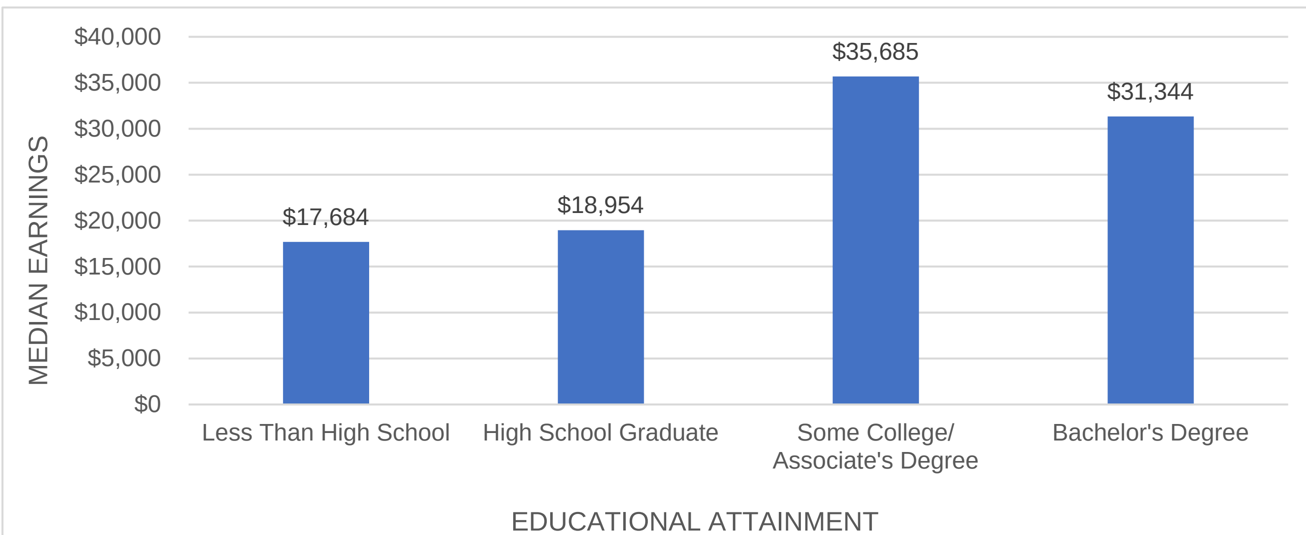


Figure 6. Median Household Income by Educational Attainment, 2016

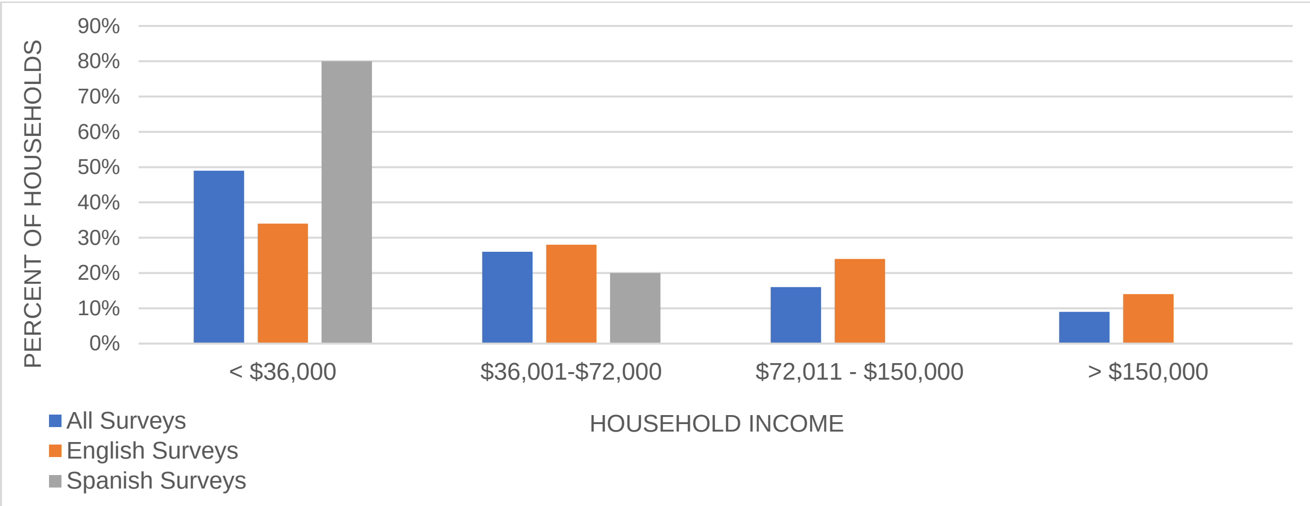


In the Borrego Municipal User Survey results, 49% of those who responded to questions about income indicated they have an annual income of $36,000 or less (Appendix G). This is in line with 2016 Census estimates indicating that 51% of households had an income of $35,000 or less.[23]

The Borrego Municipal User Survey results also displayed stark income differences between Spanish survey households and English survey households: 80% of Spanish survey households earned less than $36,000 annually, while English survey households were a bit more distributed among income levels (Figure 7). The most recent Census estimates for MHI based on race/ethnicity is from 2014, in which MHI for White households was $39,138, while MHI for Hispanic households was $19,375.[24]

[23] U.S. Census. (2016). *Selected Economic Characteristics, 2012-2016 American Community Survey 5-Year Estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF
[24] U.S. Census. (2014). *Median Income in the Past 12 Months, American Community Survey 5-Year Estimates.*

Figure 7. Annual Household Income,
Borrego Municipal User Survey 2018



It is estimated that 11.5% of residents live below the federal poverty line, the threshold for 2016 being an income of $24,3000 for a four-member household.[25] Some subpopulations face higher rates of poverty, including 15.9% of families with children under the age of 18 and 33.6% of female-headed households.[26] Though children under 18 make up only 16% of the total population of Borrego, 60% of youth live in a household that receives food stamps/SNAP, cash assistance, or Social Security Income.[27] Additionally, 71% of children in the Borrego Springs Unified School District (BSUSD) qualified for free lunch, while another 17% qualified for reduced-price lunch in the 2015-2016 school year under the National School Lunch Program.[28]

With such a large population in retirement, income for many Borrego households comes from retirement, Social Security, or other sources of fixed income. In 2016, there were 1,050 individual Social Security beneficiaries in the 92004 ZIP code – 850 of the total were retired, and 895 were aged 65 or older.[29] The Census estimates 45.2% of households receive Social Security income at an average of $18,201 per year, and 30.3% of households have retirement income at an average of $19,371 per year.[30]

Education

The Borrego Springs Unified School District includes a public elementary, middle, and high school, and oversight of three charter schools that have campuses in Borrego Springs. Hispanic/Latinx students make up 84% of the BSUSD student population. Ninety-two percent of BSUSD students are

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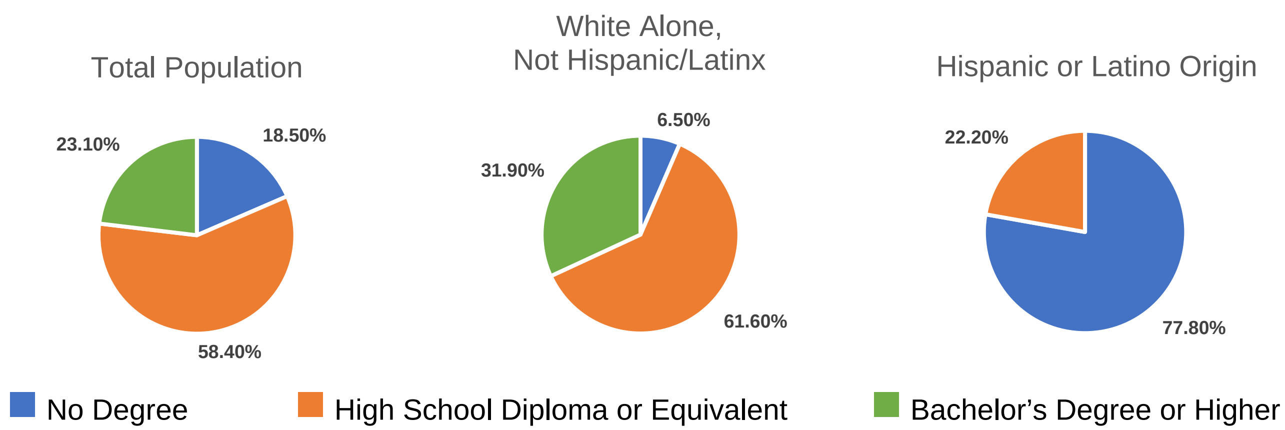
[25] U.S. Census. (2016). *Percent of families and people whose income in the past 12 months is below the poverty level, 2012-2016 American Community Survey 5-Year Estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_DP03
[26] Ibid.
[27] U.S. Census. (2016). *Receipt of Supplemental Security Income (SSI), Cash Public Assistance Income, of Food Stamps/SNAP, 2012-2016 American Community Survey 5-Year Estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B09010
[28] National Center for Education Statistics. (2016). *Enrollment Characteristics (2015-2016 school year).* https://nces.ed.gov/ccd/schoolsearch/school_detail.asp?Search=1&SchoolID=060570000517&ID=060570000517
[29] OASDI Social Security Administration. (2016). *Number of beneficiaries with benefits in current-payment status and total monthly benefits, by field office and ZIP Code.* Retrieved from: https://www.ssa.gov/policy/docs/statcomps/oasdi_zip/2015/ca.html
[30] U.S. Census. (2016). *Selected Economic Characteristics, 2012-2016 American Community Survey 5-Year Estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_DP03

considered “socioeconomically disadvantaged,” meaning neither of the student’s parents have a high school diploma or the student is eligible for the National School Lunch Program.[31]

With regard to educational attainment, 80% of Borrego residents aged 18 and older have at least a high school diploma or equivalent, while approximately 25% of Borrego residents aged 25 years or older have a bachelor’s degree or higher. White, Non-Hispanic residents 18 years and older have a higher overall educational attainment than Hispanic/Latinx residents – 93.5% have at least a high school diploma or equivalent and 31.9% have obtained a bachelor’s degree or higher. Only 22.2% of Non-White Hispanic/Latino residents have attained a high school diploma or equivalent, while estimates indicate that 0% attained a bachelor’s degree or higher (Figure 8).[32]

Figure 8. Educational Attainment by Race/Ethnicity, Borrego Springs 2016



Housing

There are approximately 2,667 total housing units in Borrego Springs, with a seasonal housing vacancy rate of around 40%.[33] Over 1,000 units are estimated to be for seasonal, recreational, or occasional use. Borrego is largely made up of single-family homes (62.5%), the majority detached, while 24.6% of homes in the area are mobile homes. Duplexes and multifamily units make up the final 12.9% of the housing stock.[34] According to the Borrego Springs Community Plan, over 1,500 homes and condominiums were in the development pipeline in Borrego in 2011.[35] Most of the projects were put on hold due to groundwater supply discussions, while some have had development resume, such as the Rams Hill Golf Course redevelopment.

The larger San Diego County Desert Community Planning Area (Desert CPA), which includes the Ocotillo Wells area and expands south encompassing the Anza Borrego State Park, adds an additional 1,000 housing units to the sub-region’s total, totaling approximately 3,500-3,700. The San

[31] California School Dashboard. (2018). *Borrego Springs Unified – San Diego County.* Retrieved from: https://www.caschooldashboard.org/#/search?search=Borrego&year=3&page=1; California Department of Education. (2017). *Glossary – 3-Year Average Academic Performance Index Report.* Retrieved from: https://www.cde.ca.gov/ta/ac/ap/glossary14b.asp
[32] U.S. Census. (2016). *Educational Attainment, 2012-2016 American Community Survey 5-Year Estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_S1501
[33] U.S. Census. (2016). *Selected Housing Characteristics, 2012-2016 American Community Survey 5-Year Estimates.*; U.S. Census. (2016). *Vacant housing units, 2012-2016 American Community Survey 5-Year Estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B25004
[34] U.S. Census. (2016). *Selected Housing Characteristics, 2012-2016 American Community Survey 5-Year Estimates.*
[35] San Diego County. (2011). *Borrego Springs Community Plan.* Retrieved from: https://www.sandiegocounty.gov/pds/docs/CP/Borrego_Springs_CP.pdf

Diego Association of Governments (SANDAG) estimates that more than 10,000 additional acres will be developed as Low-Density Single Family or Single Family by 2050, which would increase the total housing units in the Desert CPA by over 1,500.[36]

According to Esri's 2017 Housing Affordability Index (HAI), ZIP code 92004 scored a 92 on a scale from 1 (least affordable) to 251+ (most affordable). The HAI "measures the financial ability of a typical household to purchase an existing home in an area."[37] An HAI of 100 signifies that an area has, on average, sufficient household income to qualify for a loan on a home worth the median home price. While the Borrego area falls just below that measure, it is still estimated that 40.7% of current homeowners in Borrego Springs are cost-burdened, i.e., households for whom monthly housing costs are 30% or more of their household income.[38] This metric is notable, as there is an estimated homeownership rate of 76% in Borrego Springs.[39]

Additionally, the Census estimates that about 76% of renters in Borrego Springs are cost-burdened, and 30.6% of renters are severely cost-burdened.[40] This means almost a third of rental households face monthly housing costs that are 50% or more of their total household income. This generally affects lower-income households, as approximately 95% of renter households making below $50,000 are cost burdened.[41] In this case, there is a divide between homeownership and rental housing for White/Non-Hispanic and Hispanic households. According to the Census, about 68% of Hispanic residents rent a home or apartment compared to 28% of White residents, indicating a disproportionate cost burden on Hispanic residents.[42] The Municipal Users Survey found 94% of English survey households owned their home while only 13% of Spanish survey households owned theirs. The Survey responses also yielded a 76% homeownership rate overall, which is in line with Census estimates.

Though sparsely populated, Borrego Springs still has unmet housing and infrastructure needs. The Borrego Springs Community Plan highlights a shortage of senior and low-to-moderate-income housing in the community, including assisted living and nursing homes. It also details the lack of pedestrian and bicycle connectivity to housing within the Village Core. Assuming the community remains a destination for older retirees, strategic planning around affordable housing for those on fixed or low incomes, as well as local accessibility and active transportation, is imperative.

Public Health

Borrego Springs is located within a Medically Underserved Area (MUA) in San Diego County, as defined by the federal Health Resources and Services Administration. An MUA is an area with too few primary care providers, high poverty rates, a higher older adult population, and/or a high infant mortality rate.[43] There is only one medical clinic that provides comprehensive healthcare for residents in the Borrego Valley, and it does not provide emergency services.

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[36] SANDAG. (2013). *Series 13 Regional Growth Forecast: Desert Community Plan Area, County of San Diego*.
[37] Esri Housing Affordability Index (2017). *Housing Affordability by ZIP Code, 92004*. Retrieved from: https://www.arcgis.com/home/item.html?id=4ed20164f914429b951486adcbc2b8e8
[38] U.S. Census. (2017). *Selected Housing Characteristics, 2012-2016 American Community Survey 5-Year Estimates*; PolicyMap. (2016). *Percent of all homeowners who are burdened by housing costs.* Retrieved from: https://policymap.com
[39] U.S. Census. (2017). *Tenure: Occupied Housing Units, 2012-2016 American Community Survey 5-Year Estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B25003
[40] U.S. Census. (2017). *Selected Housing Characteristics, 2012-2016 American Community Survey 5-Year Estimates.*
[41] U.S. Census. (2016). *Estimated percent of all renters with incomes less than $50,000 who are burdened by housing costs between 2012-2016.* Retrieved from https://policymap.com
[42] U.S. Census. (2016). *Tenure (Hispanic or Latino Householder), 2012-2016 American Community Survey 5-Year Estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B25003I
[43] County of San Diego Health & Human Services Agency. (2013). *San Diego County Atlas of Medically Underserved Areas/Populations, Health Professional Shortage Areas, & Registered Nurse Shortage Areas.* Retrieved from: https://www.sandiegocounty.gov/content/dam/sdc/hhsa/programs/phs/documents/CHS-HealthcareShortageAtlas_2013.pdf

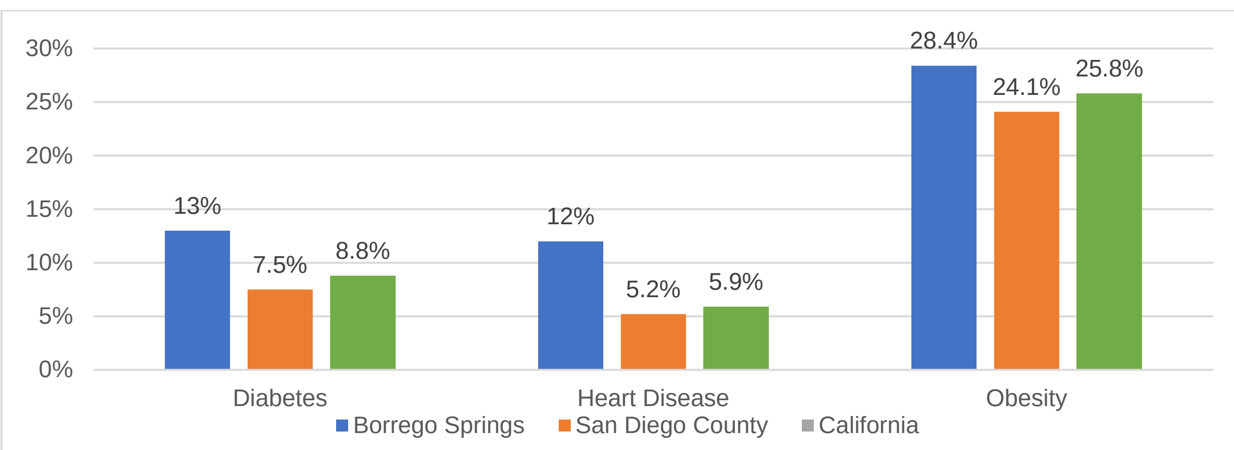
Borrego's location within the desert of San Diego County poses increased risk for heat-related illnesses. There is also a significant number of sub-populations with greater heat-related risk factors: those 65 years or older, those who are medically underserved and/or low-income, as well as those who are occupationally or recreationally active outdoors.[44] However, since 2014, thanks to the development of one of the largest utility microgrids in the United States, Borrego Springs and the surrounding northeast area of the county are less likely to have extended power outages that risk residents being without air conditioning.[45] In addition to heat risks, the census tract is also ranked higher than 75% of other state tracts for the number and type of groundwater threats that exist in the area due to contamination.[46]

The census tract is also designated as "Low-Income, Low Access at 10 miles" to groceries by the USDA.[47] A census tract is designated Low-Income if the poverty rate is 20% or higher, or if the MHI in the census tract is 80% less than the state or metropolitan area. A census tract is designated Low Access if at least 33% of the population lives farther than 1 mile from the nearest grocery store in an urban area, or farther than 10 miles in a rural area.

About 12% of both children (1-17) and adults (18+) in the 92004 ZIP code in 2014 had ever been diagnosed with asthma. This is slightly lower than the state rate of 14% and the San Diego County rate of 16% (1-17 years) and 14% (18+ years).[48] However, changes in climate or land use could affect these rates, as the neighboring Salton Sea area has seen a spike in asthma issues due to drought and receding water.[49] Regarding other chronic diseases, Borrego Springs is generally at or below county and state rates with the exception of rates for diabetes, obesity, and heart disease (Figure 9).

Figure 9. Rate of Disease by Geography

2014 California Health Interview Survey[50]



[44] County of San Diego Health & Human Services Agency. (2012). Health Vulnerability Atlas, San Diego County, 2012. Retrieved from: https://www.sandiegocounty.gov/content/dam/sdc/hhsa/programs/phs/documents/CHS-HeatAtlas2012.pdf

[45] San Diego Gas and Electric. (2018). *The Borrego Springs Microgrid is a Glimpse into the Future.* Retrieved from: https://www.sdge.com/more-information/environment/smart-grid/borrego-springs-microgrid

[46] California Office of Environmental Health Hazard Assessment. (2017). *CalEnviroScreen 3.0, Groundwater Threats.* Retrieved from: https://oehha.ca.gov/calenviroscreen/indicator/groundwater-threats

[47] United States Department of Agriculture, Economic Research Service. (2015). *Low Income & Low Access Layers 2015.* Retrieved from: https://www.ers.usda.gov/data-products/food-access-research-atlas

[48] UCLA Center for Health Policy Research, California Health Interview Survey (2014). *Ever diagnosed with Asthma (1-17); Ever diagnosed with Asthma (18+)*. Retrieved from: askchisne.ucla.edu

[49] Desert Sun (2017). Salton Sea communities "no longer a good place to live" for those with respiratory issues. Retrieved from: https://www.desertsun.com/story/salton-sea/2017/10/25/salton-sea-communities-no-longer-good-place-live-those-respiratory-issues/769970001/

[50] UCLA Center for Health Policy Research, California Health Interview Survey (2014). *Ever diagnosed with diabetes (18+), Ever diagnosed with heart disease (18+), Obese (BMI ≥ 30) (18+).* Retrieved from: askchisne.ucla.edu

Economic Landscape

Industry and Economy

The main economic driver in Borrego Springs is tourism, largely from State Park visitation. It is estimated that the 900 square-mile Anza-Borrego Desert State Park (ABDSP) attracts between 650,000 and 1,000,000 visitors to the region annually.[51] Recent California State Park Statistical Reports from 2013-2016 put the official numbers between 350,000 to 550,000. In FY2015-2016, there were approximately 403,000 visitors to ABDSP, accounting for $620,169 in total park revenue; meanwhile, Anza-Borrego's 2015-2016 Total Budgetary Expenses added up to over $3.7 million.[52] The beginning of FY2018-2019 has been difficult for ABSDP, as it faces a severe staffing shortage, similar to many California state parks. There are presently only four rangers on duty compared to eight to 10 plus two supervising rangers in the past.[53]

While ABDSP is the largest draw to the Borrego Springs area, visitors are often interested in other activities such as biking, hiking, golfing, stargazing, or visiting the Borrego Art Institute and local galleries. The surrounding businesses in Borrego, such as restaurants, retail stores, and lodging properties, also support this tourism economy. There are 10 lodging options for visitors to Borrego Springs, with additional communities and resorts offering traditional house rentals or RV parking. In addition, there are currently 167 listings on Airbnb for the greater Borrego Springs area. The Transient Occupancy Tax (TOT) collected in Borrego in the 2016 calendar year was around $413,000, compared to more than $700,000 in 2017, which was likely related to the wildflower "super bloom."[54]

In March 2018, the Borrego Village Association launched a year-long visitor survey to get a better understanding of who visits the region and why, and what their visitor experiences are like. The survey will provide the Borrego Village Association and the greater community insight into how to sustainably foster tourism and economic growth in the region. As of May 18, 2018, they had received a total of 91 completed surveys. Preliminary trends showed the primary reason for a visit was the State Park (56%) and a majority of visitors surveyed were adults 60 years or older (64%). The average visitor reported spending about $123 per day.

It is also important to note that a majority of business in Borrego Springs is seasonal, with the high season being from October to May, although the village is still active during the summer months. Since 2009, the Borrego Springs Village Association has been working on a variety of community initiatives to make Borrego's Central Business District more accessible and pedestrian-friendly through design enhancements and traffic-calming.

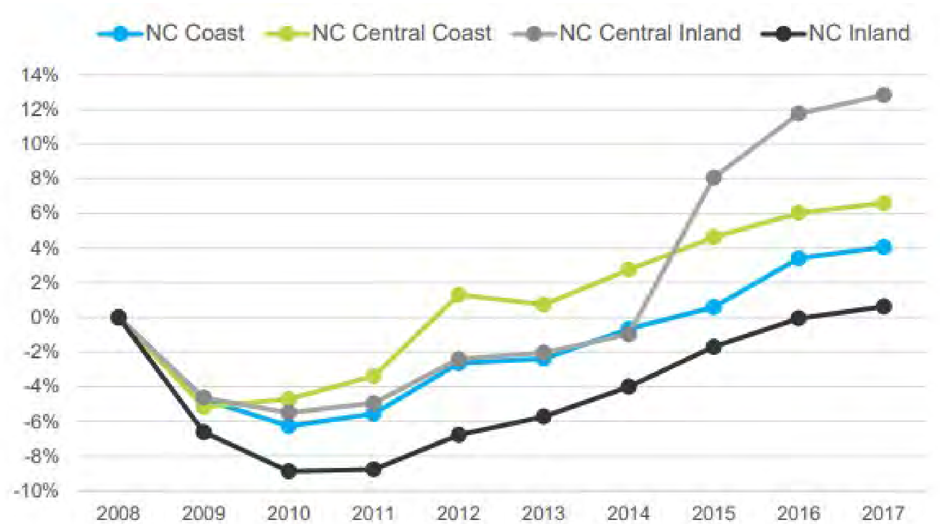
While there are no other industries quite as significant in Borrego Springs, there are over 4,000 acres of land dedicated to agriculture in the Borrego Valley, which belong to a handful of citrus growers.[55] According to the Census, "Agriculture, Forest, Fishing, Hunting" made up 6.8% of jobs in Borrego's local economy in 2015, and employed approximately 22% of Borrego residents 16 years and older.[56]

[51] San Diego County. (2011). *Borrego Springs Community Plan.*
[52] California State Parks. (2016). *State Park Statistical Report 2015-2016 Fiscal Year.* Retrieved from: http://www.parks.ca.gov/?page_id=23308
[53] J. Harry Jones. (2018). "Only 4 rangers patrolling 1,000-square-mile Anza Borrego desert." *The San Diego Union-Tribune.* Retrieved from: http://www.sandiegouniontribune.com/communities/north-county/sd-no-park-staffing-20180531-story.html
[54] San Diego County. (2018). *Transient Occupancy Tax Reports.* https://data.sandiegocounty.gov/Government/Transient-Occupancy-Tax-Reports/bqne-86gf/data
[55] San Diego County. (2011). *Borrego Springs Community Plan.*
[56] U.S. Census. (2016). *Industry by Sex for the Civilian Employed Population 16 Years and Over, 2012-2016 American Community Survey 5-Year Estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_S2403

Employment & Workforce

There are an estimated 1,000 residents (around 50% of residents aged 16 years or older) in the labor force in Borrego Springs.[57] According to the San Diego North Economic Development Council, two sub-regions, the Northern Coast and Inland North County (where Borrego is located) have lower than average educational attainment and lower than average wages (Figure 10). These sub-regions also have the slowest employment growth of those in the North County over the last 10 years – Inland North County has grown its employment by only 0.6%.[58] A result of this disparate growth, SDNEDC also estimates an increased housing cost burden. They suggest targeted workforce development to connect residents in less dynamic regions to high-skill, high-growth career pathways to distribute opportunity more evenly across the North County.

Figure 10. Overall Change in Employment by Sub-Region, 2008-2017



Employment and unemployment status of the local labor force does not include retired workers, students, active duty military, stay-at-home parents, those completing unpaid volunteer work, etc. Still, almost 20% of the civilian labor force in Borrego Springs is unemployed, compared to 7.8% of the population in San Diego County and 7.4% of the population nationally.[59] The larger census tract has an estimated unemployment rate of 31.22%. According to the CalEnviroScreen 3.0 unemployment indicator, this unemployment rate within the census tract is higher than 99% of the rest of the state.[60]

However, this higher rate could also be inflated due to a factor other than a lack of job opportunity in the area, like the informal or underground sector of the local economy. The informal sector is defined as a part of the economy that is unregulated, unrecorded, and/or untaxed by the government. Common examples of informal employment include paid domestic workers, day laborers, or other

[57] U.S. Census. (2016). *Employment Status, 2012-2016 American Community Survey 5-Year Estimates.* Retrieved From: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_S2301
[58] San Diego North Economic Development Council (SDNEDC). (2018). *2018 San Diego North County Indicators.* Retrieved from: https://www.sdnedc.org/wp-content/uploads/2018/04/2018-NC-Prospects-Report-final.pdf
[59] U.S. Census. (2016). *Employment Status, 2012-2016 American Community Survey 5-Year Estimates.*
[60] California Environmental Protection Agency. (2016). *CalEnviroScreen 3.0: Unemployment.* Retrieved from: https://oehha.ca.gov/calenviroscreen/indicator/unemployment

types of employees.[61] The Census estimates that there were 147 self-employed workers (in non-incorporated businesses) and unpaid family workers in Borrego Springs in 2016.[62]

The Census estimates that more than 40% of people in the labor force in Borrego Springs (CDP) are employed in natural resources, construction, and maintenance occupations.[63] Approximately 22.2% of that workforce is employed within the Agriculture, Forestry, Fishing and Hunting, And Mining industry category, while another 20.1% are employed in the Construction industry.[64] The next most populous industry category is Educational Services, Health Care, and Social Assistance at 12.7%. However, Agriculture as an industry only accounted for 6.8% of jobs within Borrego Springs in 2015, and Construction only 2.1%.[65] On the other hand, Educational Services made up 41.5% of jobs, and Accommodation and Food Services made up 18% of jobs. This suggests an inflow of outside workers and outflow of residents in certain industries. Figure 11 displays this estimated inflow and outflow of workers in 2015. Figure 12 displays the density and distribution of jobs in 2015 within Borrego Springs CDP, with most jobs concentrated around the central commercial area.[66] This central area of the village provides much of the support for the tourism economy and hosts many of the local businesses serving the community.

Borrego Springs' 2015 Work Area Profile displayed the following workforce characteristics: [67]

- 37.7% of workers earned $1,250 per month or less; 33.1% earned $1,251 to $3,333 per month; 29.2% earned more than $3,333 per month
- 37.5% of workers were Hispanic/Latinx
- 60.3% of the workforce was made up of women

Findings from the Borrego Municipal User Survey questions asked respondents for the occupations of all household members. Results show about 50% of respondents and their household members are retired. Eighteen percent of respondents indicated that they or members of their household were employed in "Other" occupations, including law, education, construction, and self-employment. Eight percent of respondents and their household members were employed at hotels, 6% at golf courses, and 4% in food service supporting the tourism economy. Medical, recreation, retail, and agriculture sectors all employed 4% of individuals or less.

[61] Martha A. Chen. (2012). *WIEGO Working Paper No. 1: The Informal Economy: Definitions, Theories and Policies.* http://www.wiego.org/sites/wiego.org/files/publications/files/Chen_WIEGO_WP1.pdf
[62] U.S. Census. (2016). *Industry by Occupation for the Civilian Employed Population, 2012-2016 American Community Survey 5-Year Estimates.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_C24050
[63] Ibid.
[64] U.S. Census. (2016). *Selected Economic Characteristics 2012-2016, American Community Survey 5-year estimates.*
[65] U.S. Census, Center for Economic Studies. (2015). *Longitudinal Employer-Household Dynamics OnTheMap.* Retrieved from: https://onthemap.ces.census.gov
[66] Ibid.
[67] Ibid.

Figure 11. Inflow/Outflow Counts of All Jobs in Borrego Springs CDP, 2015

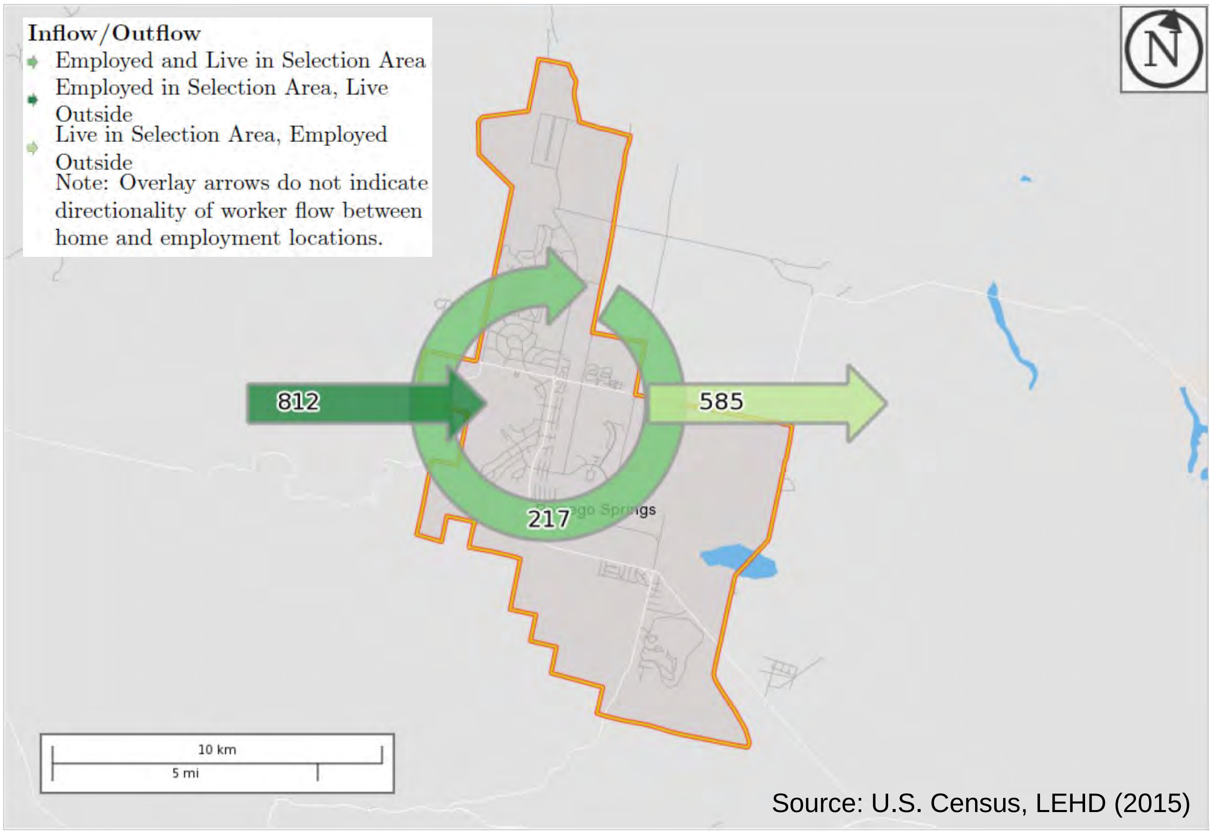
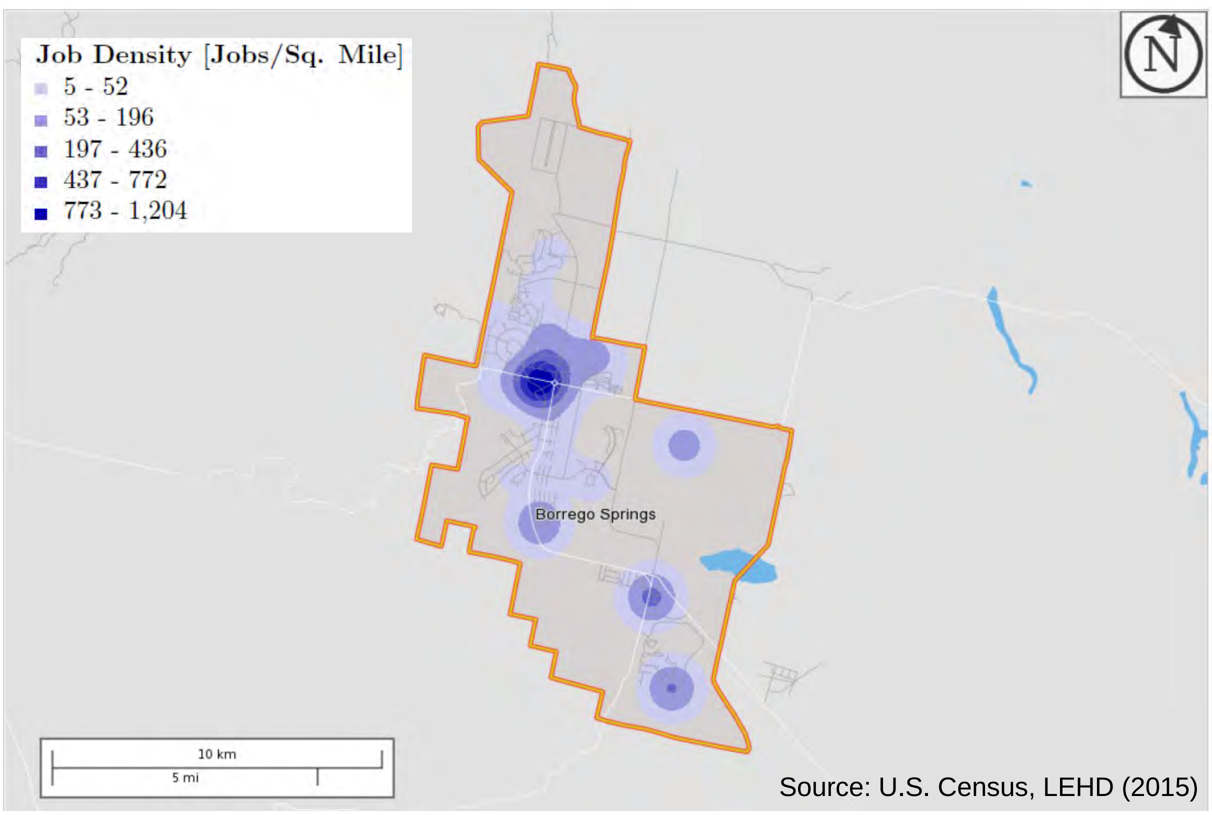


Figure 12. Density of All Jobs in Borrego Springs CDP, 2015



Land Use and Real Estate

Borrego Springs spans 42.5 square miles, with most land zoned as Rural Lands, some Semi-Rural Residential, and a sprinkling of General Commercial and Rural Commercial (Appendix A).[68] There are also a few industrially-zoned land uses related to jobs-based businesses. The larger Borrego Valley comprises 110 square miles and is defined by its open desert lands and mountains that surround Borrego Springs.

In *Scientific Investigations Report 2015-5150*, a report of the United States Geological Survey (USGS), estimated the percent of overall land use in 2009 in the Borrego Valley Groundwater Basin (Appendix E). Approximately 72.5% of land was native vegetation, generally desert-type vegetation, while 5.6% of land was phreatophytic vegetation, e.g., plant communities with deep roots that depend on groundwater, like mesquite. 11.1% of land was dedicated to residential or developed land, 3.6% of land was dedicated to citrus farming, 3% dedicated to golf courses, 2.1% was fallowed agricultural land or dedicated to livestock, 1.2% was dedicated to potato farming, while 0.9% was dedicated to dates, palms, or other nursery types.

Figure 13 displays Planned Land Use based on the SANDAG Series 13 Regional Growth Forecast, a report that provides an overview of the regional demographic, economic, and housing trends expected over the next four decades. This displays the planned permitted land use/zoning categories that have been set for the unincorporated area. This can be compared to the map of Developable Land (Figure 14), which displays parcels that are available for development and their planned land uses. As the map exhibits, most of the land is undeveloped.

[68] San Diego County. (2017). *General Plan Land Use Map (Borrego Springs)*. Retrieved from: https://www.sandiegocounty.gov/pds/docs/GP/4-Borrego_Springs.pdf

Figure 13. Planned Land Use
SANDAG Series 13 Regional Growth Forecast

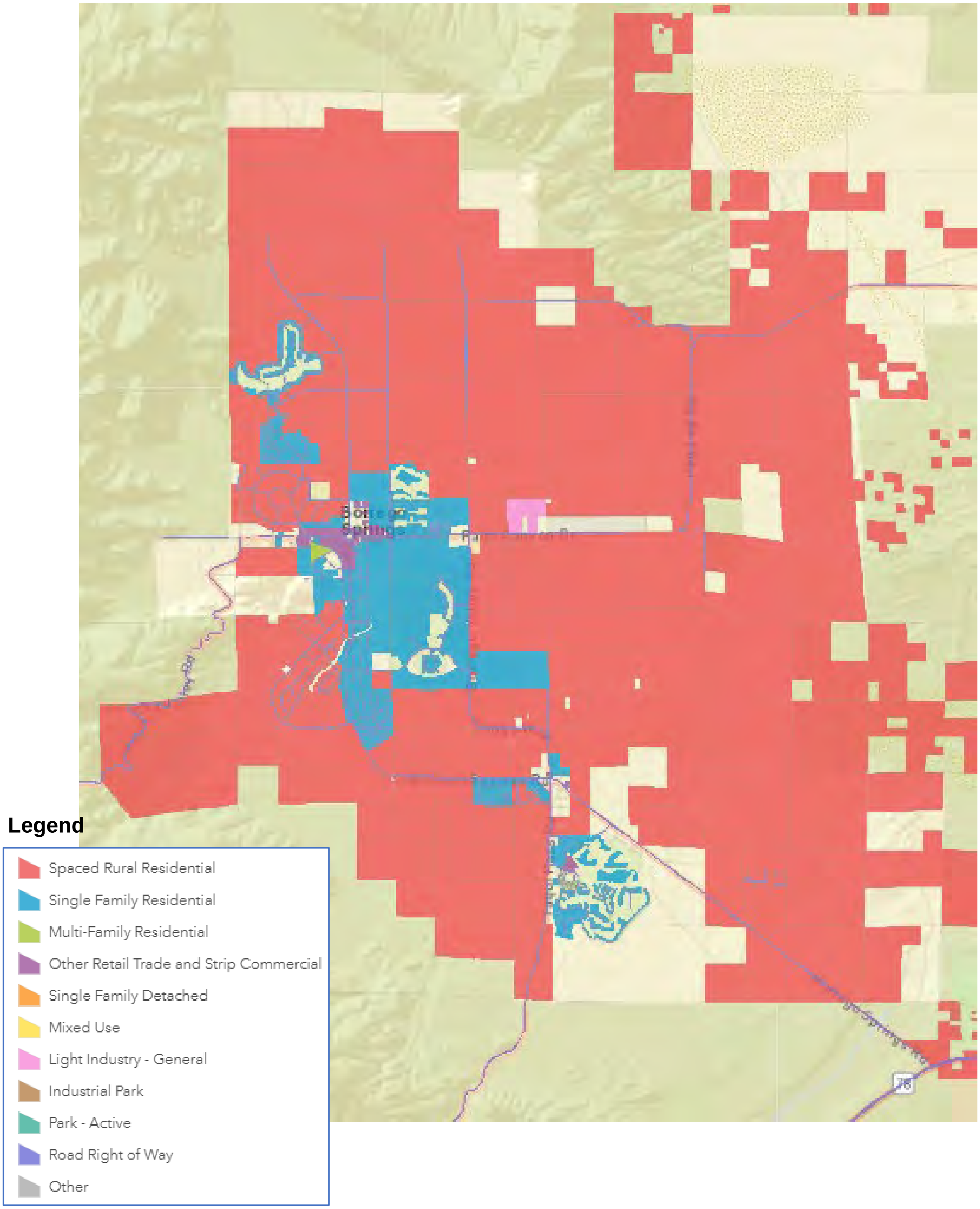
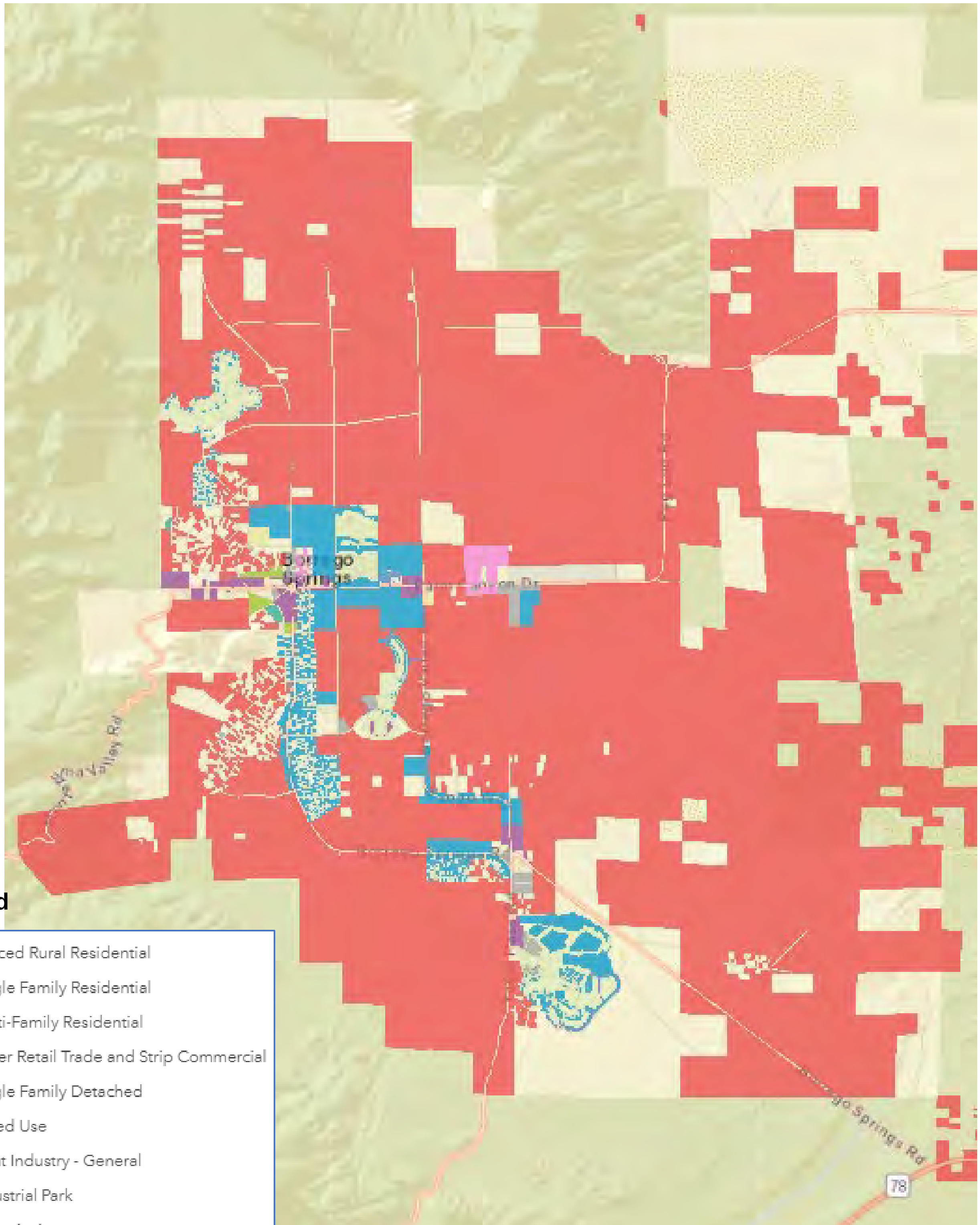


Figure 14. Land Available for Development
SANDAG Series 13 Regional Growth Forecast



Legend

- Spaced Rural Residential
- Single Family Residential
- Multi-Family Residential
- Other Retail Trade and Strip Commercial
- Single Family Detached
- Mixed Use
- Light Industry - General
- Industrial Park
- Park - Active
- Road Right of Way
- Other

Borrego's rural residences and planned living communities surrounded by desert lands and mountains define the area's character. Though a small and sparsely populated village, well-established neighborhoods began to be developed in the 1950s. Almost 70% of the total housing units in Borrego Springs were built between 1960 and 1989.[69] Neighborhoods in the northwest area include De Anza Country Club, Sun Gold, Verbena, and Indian Head Ranch. Sun and Shadows neighborhood, and Springs at Borrego and Roadrunner are located more central to the town, while Deep Well and Montesoro (Rams Hill) are located at the southeastern corner. Country Club, Borrego Springs Golf Club, and Ocotillo Heights communities are located south of Palm Canyon Drive and west of Borrego Valley Road. Borrego's residential developments and communities are spatially scattered and generally not near the central commercial district, which requires residents to rely on cars for mobility purposes.

The real estate market in Borrego, like most places throughout the country, was hard hit during the Great Recession, but has since been relatively revived. The three leading real estate websites, Redfin, Trulia, and Zillow, all give a real estate market overview of Borrego Springs and the surrounding area. Below are the data points that each provide regarding the value of real estate in Borrego.

Redfin (June-July 2018)	
Average Sale Price	$258,000
Average Days on Market	132
Trulia (March-June 2018)	
Median Sales Price	$209,000
Median Listing Price (92004 zip code)	$212,250
Zillow (June 2018)	
Median Home Value (92004 zip code)	$214,600
Median Listing Price (92004 zip code)	$247,000

Redfin lists the average sale price of homes in Borrego Springs at $258,000 during the months of June and July 2018, which includes sales of vacant residential land. This is a 31.4% increase since 2017.[70] Trulia lists the median sales price of homes in Borrego Springs at $209,000 from March to June 2018.[71] Zillow estimates the median value of homes in the 92004 zip code at $214,600, an increase of 11.6% from the same time in 2017.[72] The estimated median annual real estate taxes paid in 2016 (the most current U.S. Census estimate) was $1,426.[73]

As of July 19, 2018, there were 77 homes listed for sale in Borrego Springs on Redfin, 92 homes listed for sale on Trulia, and 94 homes listed for sale on Zillow. Additionally, there were 141 listings for vacant land for sale in Borrego Springs on Zillow, 151 listings on Trulia, and 111 listings on Redfin. These likely all include cross-listings.

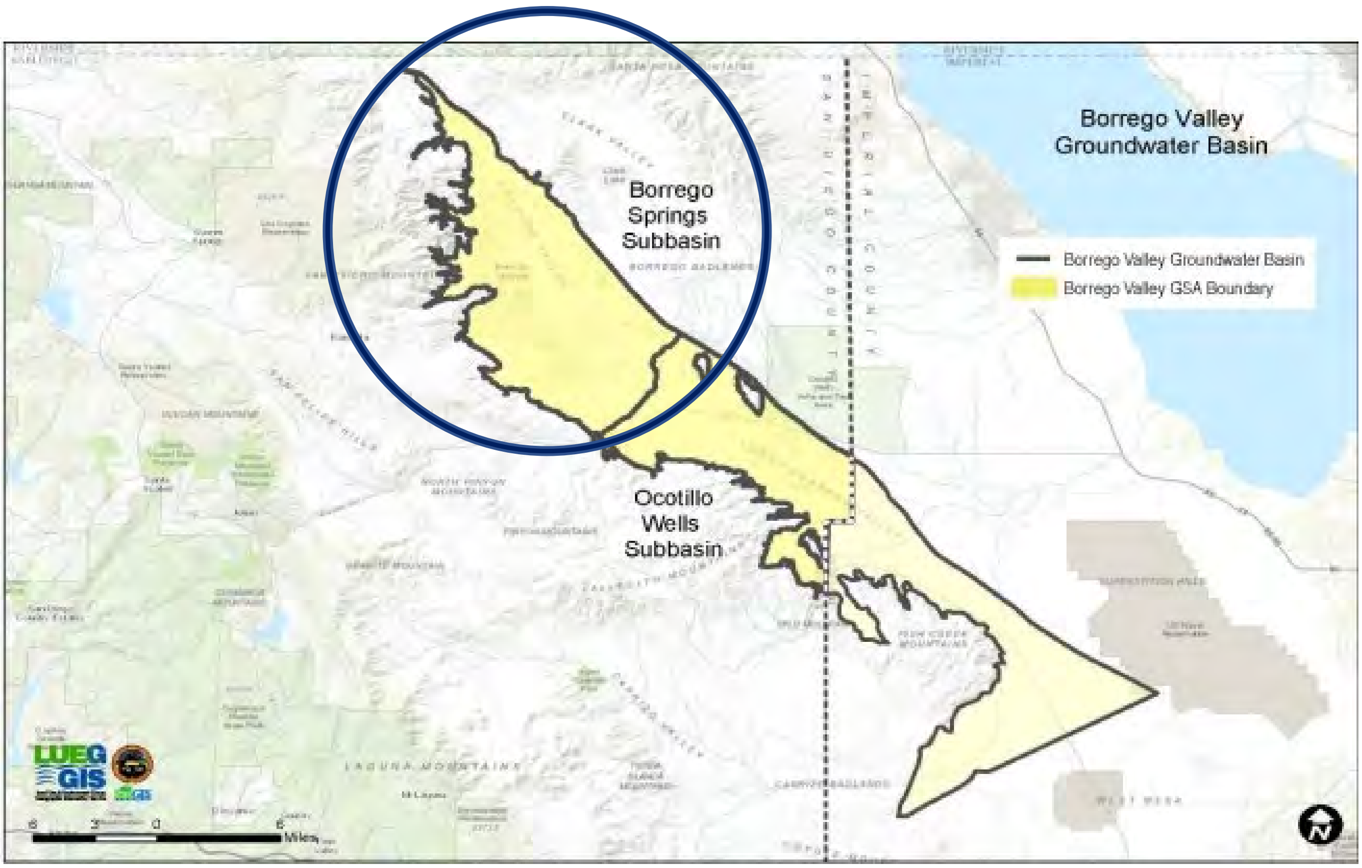
[69] U.S. Census. (2016). *Selected Housing Characteristics, 2012-2016 American Community Survey 5-Year Estimates.*
[70] Redfin. (2018). *Borrego Springs Home Values.* Retrieved from: https://www.redfin.com/city/21573/CA/Borrego-Springs/home-values
[71] Trulia. (2018). *Real Estate Data for Borrego Springs*. Retrieved from: https://www.trulia.com/real_estate/Borrego_Springs-California/
[72] Zillow. (2018). *Borrego Springs Home Prices & Values*. Retrieved from: https://www.zillow.com/borrego-springs-ca/home-values/
[73] U.S. Census. (2016). *Estimated typical (median) annual real estate taxes paid between 2012-2016.* Retrieved from: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B25103

Groundwater

Groundwater Loss

The Borrego Valley Groundwater Basin (BVGB) is located in northeast San Diego County and western Imperial County and is the sole water supply source for the Borrego Water District. It is divided into two subbasins: Borrego Springs Groundwater Subbasin and the Ocotillo Wells Groundwater Subbasin. The Borrego Springs Subbasin (Figure 15) is currently in critical overdraft. It is estimated that water users within the Subbasin withdraw water at a rate of 19,000 acre-feet per year (AFY), while a sustainable rate of withdrawal is approximately 5,700 AFY. This 13,300 AFY discrepancy will require an approximately 75% reduction in groundwater use by the year 2040 to balance long-term extraction and recharge of the Subbasin.[74]

Figure 15. Borrego Valley Groundwater Basin and Subbasins



Groundwater recharge, more simply defined as replenished water supply of the basin, comes from both natural and human sources; however, runoff from the San Ysidro and Santa Rosa Mountains into nearby streams is the key source of recharge. The overdraft of the basin is due to over-extraction – pumping more water out of the aquifer than is replenished. Because of the limited recharge, and because groundwater is the only source of water supply for all municipal, recreational, and agricultural needs, the only realistic solution to the issue is to limit extraction to a sustainable level that avoids groundwater depletion.

[74] Dudek. (2017). *Technical Memorandum: Borrego Springs Subbasin Groundwater Quality Risk Assessment.*

Groundwater Quality

There are both man-made and natural sources that affect the quality of groundwater in the Borrego Valley. These could include pesticides and fertilizers used in irrigation of agricultural landscapes, household septic tank systems that dispose of wastewater, or the rock and mineral composition of aquifers (especially shallow ones) that can contribute to concentrations of dangerous chemicals.

Aquifers are made up of large bodies of water-bearing or porous rock underground that transmit groundwater to wells or springs.[75] In simpler terms, aquifers could be considered underground reservoirs. There are three main aquifers in the BVGB denoted as upper, middle, and lower, which consist of a variety of gravel, sand, silt, and clay deposits.[76] Wells can be drilled into aquifers to tap into the water table underground. But as more water is extracted, and aquifer levels drop, wells need to be drilled even deeper to access available groundwater. This poses a risk to groundwater levels and quality in the BVGB.

The Borrego Water District is the public water system that serves Borrego Springs and is regulated for water quality by the State Water Resources Control Board's Division of Drinking Water (DDW). California regulations require that drinking water not exceed certain Maximum Contaminant Levels (MCLs) for specific substances. The *Scientific Investigation Report 2015-5150*, previously mentioned, evaluated groundwater quality data in both subbasins. As part of the study, they found that total dissolved solids (TDS)[77] and nitrate from individual well samples sometimes far exceeded CA-MCLs. They also found that concentrations of TDS and sulfate continued to increase even though groundwater levels are decreasing. These higher concentrations were generally found in the shallow upper aquifer and northern part of the valley where the agricultural land is located (See Appendix E, Pages 66-67 for nitrate concentrations and TDS concentrations by aquifer in the Borrego Valley).

Groundwater Affordability

A 2016 report by Raftelis Financial Consultants for the Borrego Water District (Appendix D) examined the current and future affordability of water rates assuming basin sustainability goals are met by 2040. It is estimated that the Borrego Water District does not have enough municipal water to serve current customers under the existing withdrawal levels and future reductions, and therefore may be required to acquire irrigated farmland to fallow. This might mean water rates for municipal users will increase significantly, although adjusted rates for lower income households would be considered.

Over time, increasing water rates would increase financial hardship for lower-income households, including those with low-wage jobs as well as senior households on fixed incomes. Ideally, households would not spend more than 2% of their annual income on essential water use, but households at the poverty level or below, and at the 20th percentile of income, already spend between 3.2 and 3.8% of their income on essential water needs (Appendix D).

Borrego Municipal User Survey results reveal that 53% of respondents were able or willing to pay up to $25 more per month for dependable, potable water from the Borrego Water District. Twelve percent were able or willing to pay up to $50 per month, while 10% indicated that they were unable or willing to pay anything more per month. Results did not vary significantly between income levels or between

[75] United States Geological Survey. (2018). *Aquifers and Groundwater.* Retrieved from: https://water.usgs.gov/edu/earthgwaquifer.html
[76] United States Geological Survey. (2018). *Aquifers and Groundwater.* Retrieved from: https://water.usgs.gov/edu/earthgwaquifer.html
[76] United States Geological Survey. (2015). *Scientific Investigations Report 2015-5150: Hydrogeology, Hydrologic Effects of Development, and Simulation of Groundwater Flow in the Borrego Valley, San Diego County, California.* Retrieved from: https://pubs.usgs.gov/sir/2015/5150/sir20155150.pdf
[77] Total dissolved solids (TDS) is a term used to describe inorganic salts and organic matter present in water, including calcium, magnesium, sodium, chloride, sulfate, and many more. They originate from both natural and man-made sources. Source: World Health Organization. (2016). Retrieved from: http://www.who.int/water_sanitation_health/water-quality/guidelines/chemicals/tds/en/

English and Spanish surveys. Many survey respondents indicated that they are frustrated with rising rates and other rising costs of living. Several mentioned how any change in monthly costs can be extremely burdensome for those with a fixed income, including many seniors. Thirty-one survey responses included comments related to high or rising rates and cost burdens, while an additional nine responses included concerns related to fixed incomes, seniors, and retirement. Moving forward toward 2040, the Borrego Water District and San Diego County will have to consider all the information presented related to the local population and economy to choose the most effective and least disruptive water use reduction strategies.

Appendices

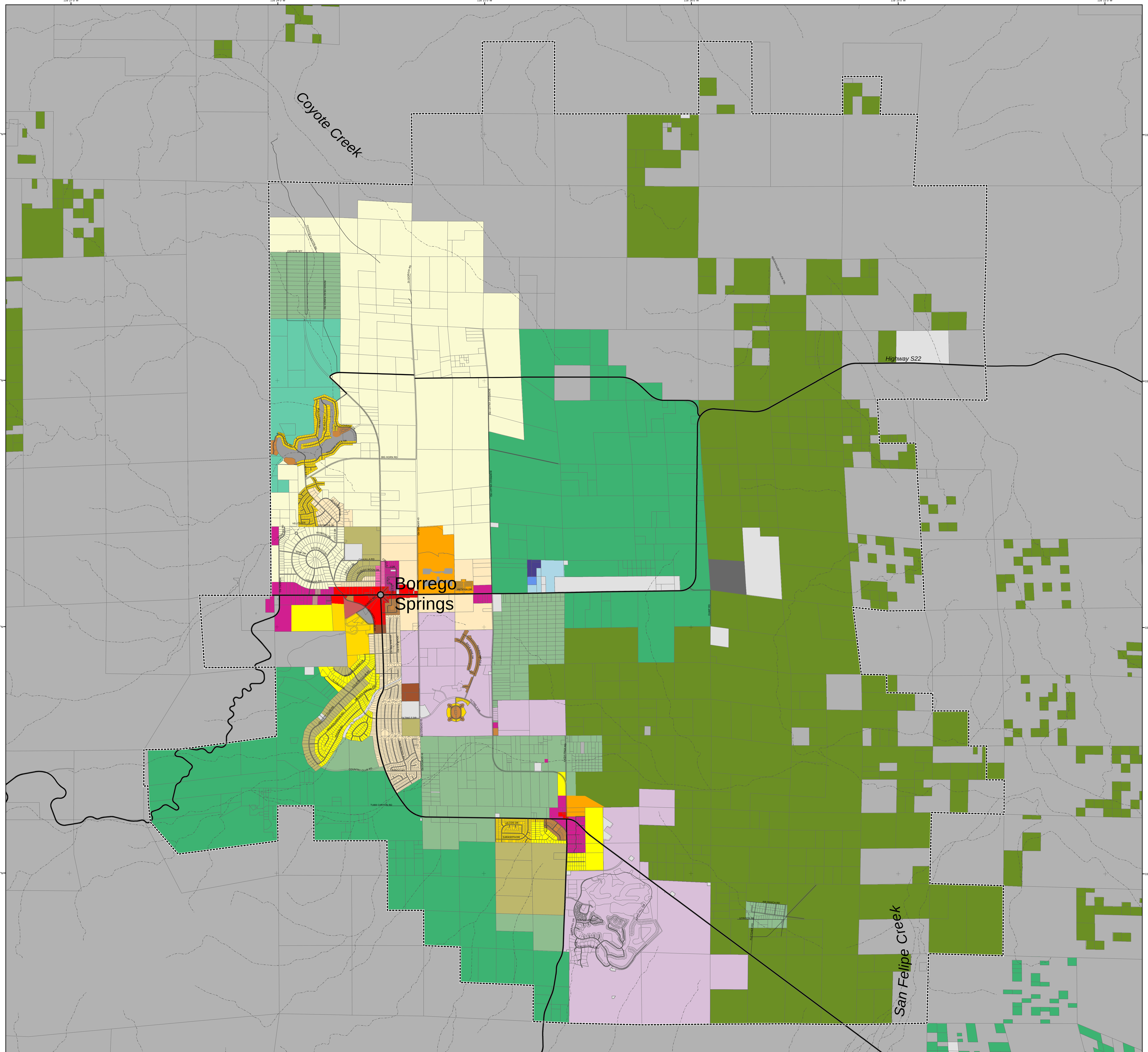
A. Borrego Springs General Plan Land Use/Zoning Map
B. SANDAG Series 13 Regional Growth Forecast
C. SDNEDC North County Prospects Report
D. Borrego Water District – Water Rate Affordability Assessment
E. United States Geological Survey Scientific Investigations Report 2015-5150
F. Borrego Springs Subbasin Groundwater Quality Risk Assessment
G. Borrego Municipal User Survey Results

Appendix A.

Borrego Springs General Plan Land Use/Zoning Map

Borrego Springs

Subregional Group Area



General Plan Land Use Designations[1,2]

- Village Residential (VR-30)
- Village Residential (VR-24)
- Village Residential (VR-20)
- Village Residential (VR-15)
- Village Residential (VR-10.9)
- Village Residential (VR-7.3)
- Village Residential (VR-4.3)
- Village Residential (VR-2.9)
- Village Residential (VR-2)
- Semi-Rural Residential (SR-.5)
- Semi-Rural Residential (SR-1)
- Semi-Rural Residential (SR-2)
- Semi-Rural Residential (SR-4)
- Semi-Rural Residential (SR-10)
- Rural Lands (RL-20)
- Rural Lands (RL-40)
- Rural Lands (RL-80)
- Specific Plan Area[4]
- Office Professional[3]
- Neighborhood Commercial[3]
- General Commercial[3]
- Rural Commercial[3]
- Limited Impact Industrial[3]
- Medium Impact Industrial[3]
- High Impact Industrial[3]
- Village Core Mixed Use
- Public/Semi-Public Facilities[3]
- Public/Semi-Public Lands (Solid Waste Facility)
- Public Agency Lands
- Tribal Lands
- Open Space (Recreation)
- Open Space (Conservation)
- County Water Authority Boundary
- Planning Area Boundary

NOTES:

1: The type and intensity of development depicted on the map must be implemented in accordance with General Plan goals and policies and other County regulations which may further affect the type and intensity of use.

2: Land Use Element, Table LU-1 indicates the applicable Regional Category for each designation.

3: Maximum development intensity for non-residential designations is provided in Land Use Element, Table LU-1.

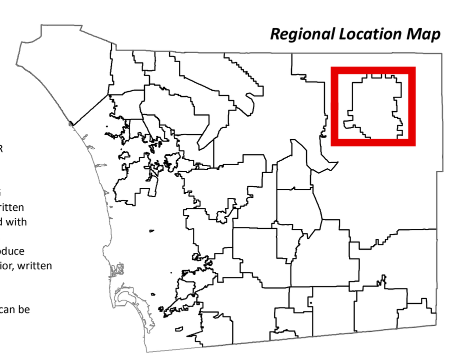
4: Refer to Community Plan for general land uses and intensities allowed in Specific Plan area (SPA).

Map Prepared By:

LUEG GIS

Land Use & Environment Group Geographic Information Service

Coordinates: NAD83 Feet



Source: County of San Diego, SanGIS, SANDAG

Document Path: S:\land_use\gpupdate_maps\official_maps\mxd\new_general_plan_atlas.mxd

20

ACRES

0 2,700 5,400 10,800

Feet

Map Date: 1/6/2017

Appendix B.

SANDAG Series 13 Regional Growth Forecast

SERIES 13 REGIONAL GROWTH FORECAST

Desert Community Plan Area
County of San Diego

POPULATION AND HOUSING

	2012	2020	2035	2050	2012 to 2050 Change* Numeric	Percent
Total Population	4,865	5,187	6,242	7,322	2,457	51%
Household Population	4,856	5,184	6,235	7,312	2,456	51%
Group Quarters Population	9	3	7	10	1	11%
Civilian	9	3	7	10	1	11%
Military	0	0	0	0	0	0%
Total Housing Units	3,565	3,726	4,118	5,117	1,552	44%
Single Family	2,506	2,667	3,002	4,001	1,495	60%
Multiple Family	252	252	309	309	57	23%
Mobile Homes	807	807	807	807	0	0%
Occupied Housing Units	2,232	2,305	2,763	3,249	1,017	46%
Single Family	1,507	1,567	1,993	2,491	984	65%
Multiple Family	213	223	258	257	44	21%
Mobile Homes	512	515	512	501	-11	-2%
Vacancy Rate	37.4%	38.1%	32.9%	36.5%	-0.9	-2%
Single Family	39.9%	41.2%	33.6%	37.7%	-2.2	-6%
Multiple Family	15.5%	11.5%	16.5%	16.8%	1.3	8%
Mobile Homes	36.6%	36.2%	36.6%	37.9%	1.3	4%
Persons per Household	2.18	2.25	2.26	2.25	0.1	3%

HOUSEHOLD INCOME (real 2010 dollars, adjusted for inflation)

Income Forecast Under Review

This forecast was accepted by the SANDAG Board of Directors in October 2013 for distribution and use in planning and other studies. This forecast represents one possibility for future growth in the San Diego region. It is intended to represent a likely prediction of future growth, but it is not intended to be a prescription for growth. The Series 13 Regional Growth Forecast represents a combination of economic and demographic projections, existing land use plans and policies, as well as potential land use plan changes that may occur in the region between 2030 and 2050. In general, growth between 2012 and 2030 is based on adopted land use plans and policies, and growth between 2030 and 2050 includes alternatives that may, in some cases, reach beyond existing adopted plans.

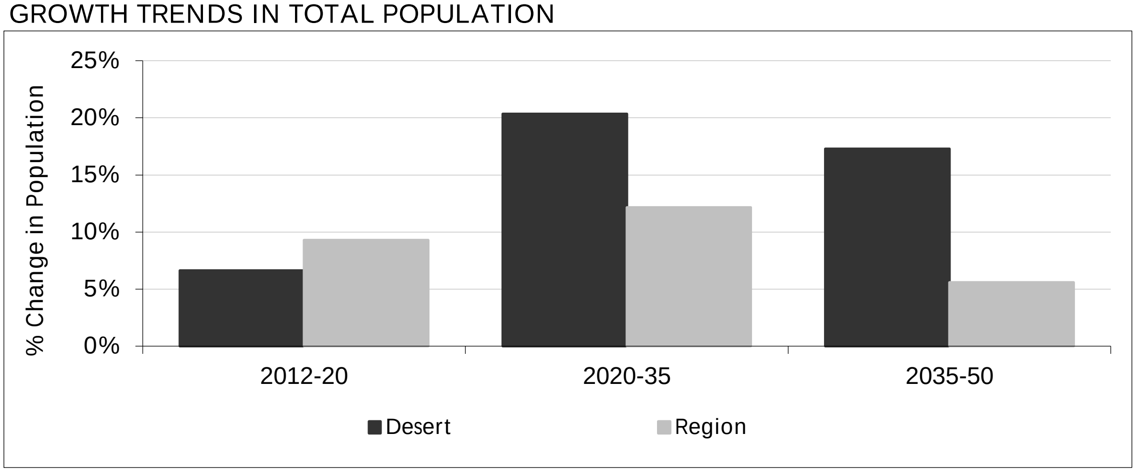
POPULATION BY AGE

	2012	2020	2035	2050	2012 to 2050 Change* Numeric	Percent
Total Population	4,865	5,187	6,242	7,322	2,457	51%
Under 5	217	253	307	348	131	60%
5 to 9	252	273	342	404	152	60%
10 to 14	250	249	309	382	132	53%
15 to 17	162	149	178	224	62	38%
18 to 19	113	103	119	149	36	32%
20 to 24	214	228	238	306	92	43%
25 to 29	188	224	252	304	116	62%
30 to 34	154	157	202	241	87	56%
35 to 39	153	163	225	239	86	56%
40 to 44	184	171	254	269	85	46%
45 to 49	262	239	304	356	94	36%
50 to 54	305	275	326	412	107	35%
55 to 59	380	378	357	526	146	38%
60 to 61	188	196	139	173	-15	-8%
62 to 64	274	289	222	287	13	5%
65 to 69	444	524	511	599	155	35%
70 to 74	375	546	622	567	192	51%
75 to 79	308	363	605	526	218	71%
80 to 84	241	205	385	363	122	51%
85 and over	201	202	345	647	446	222%
Median Age	54.6	56.4	55.9	55.3	0.7	1%

POPULATION BY RACE AND ETHNICITY

	2012	2020	2035	2050	2012 to 2050 Change* Numeric	Percent
Total Population	4,865	5,187	6,242	7,322	2,457	51%
Hispanic	1,891	2,291	3,353	4,562	2,671	141%
Non-Hispanic	2,974	2,896	2,889	2,760	-214	-7%
White	2,803	2,716	2,660	2,464	-339	-12%
Black	34	46	74	111	77	226%
American Indian	48	34	14	5	-43	-90%
Asian	32	39	61	81	49	153%
Hawaiian / Pacific Islander	4	4	7	8	4	100%
Other	3	2	2	3	0	0%
Two or More Races	50	55	71	88	38	76%

GROWTH TRENDS IN TOTAL POPULATION



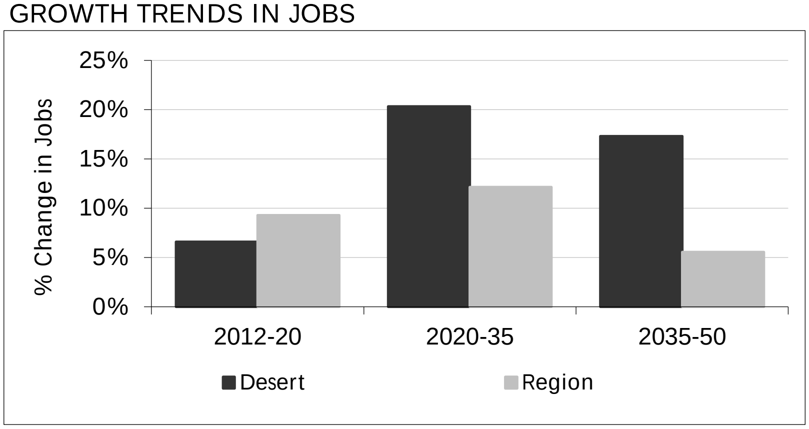
EMPLOYMENT

	2012	2020	2035	2050	2012 to 2050 Change* Numeric	Percent
Jobs	1,018	1,177	1,395	1,856	838	82%
Civilian Jobs	1,018	1,177	1,395	1,856	838	82%
Military Jobs	0	0	0	0	0	0%

LAND USE[1]

	2012	2020	2035	2050	2012 to 2050 Change* Numeric	Percent
Total Acres	599,120	599,120	599,120	599,120	0	0%
Developed Acres	16,427	20,770	22,664	27,496	11,070	67%
Low Density Single Family	4,932	8,402	10,066	14,274	9,342	189%
Single Family	357	437	663	1,293	936	262%
Multiple Family	5	5	8	8	3	66%
Mobile Homes	170	170	169	167	-4	-2%
Other Residential	0	0	0	0	0	0%
Mixed Use	0	0	0	0	0	0%
Industrial	442	443	446	450	8	2%
Commercial/Services	1,506	2,299	2,310	2,327	821	55%
Office	0	0	1	2	2	--
Schools	44	44	44	44	0	0%
Roads and Freeways	2,236	2,236	2,236	2,236	0	0%
Agricultural and Extractive[2]	1,718	1,718	1,706	1,685	-33	-2%
Parks and Military Use	5,017	5,017	5,016	5,011	-5	0%
Vacant Developable Acres	68,113	63,769	61,875	57,043	-11,070	-16%
Low Density Single Family	63,506	60,036	58,372	54,164	-9,342	-15%
Single Family	2,998	2,918	2,703	2,094	-903	-30%
Multiple Family	26	26	23	23	-3	-12%
Mixed Use	0	0	0	0	0	0%
Industrial	121	119	116	112	-9	-7%
Commercial/Services	1,221	430	422	410	-811	-66%
Office	19	19	18	18	-1	-7%
Schools	0	0	0	0	0	0%
Parks and Other	179	179	179	179	0	0%
Future Roads and Freeways	42	42	42	42	0	0%
Constrained Acres	514,581	514,581	514,581	514,581	0	0%
Employment Density[3]	0.5	0.4	0.5	0.7	0.1	29%
Residential Density[4]	0.7	0.4	0.4	0.3	-0.3	-50%

GROWTH TRENDS IN JOBS



Notes:

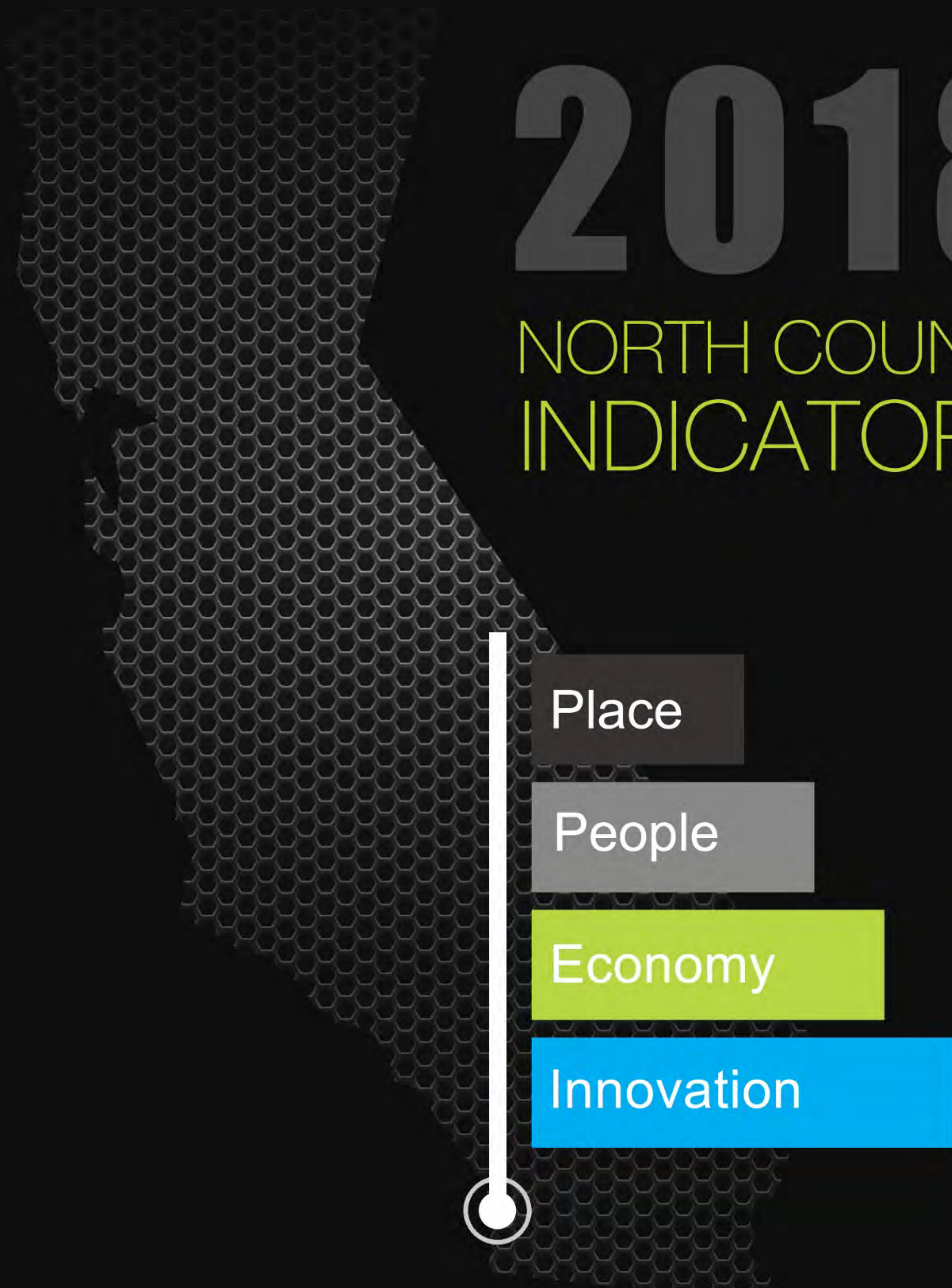
1 - Figures may not add to total due to independent rounding.
2 - This is not a forecast of agricultural land, because the 2050 Regional Growth Forecast does not account for land that may become agricultural in the future. Also, some types of development that occur on agricultural land, such as low density single family residential, may allow for the continuation of existing agricultural use.
3 - Civilian jobs per developed employment acre (industrial, retail, office, schools, and half of mixed use acres).
4 - Total housing units per developed

Appendix C.

SDNEDC North County Prospects Report

2018

NORTH COUNTY INDICATORS



SAN DIEGO NORTH Economic Development Council

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Tri-City Medical Center
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[bw] RESEARCH PARTNERSHIP

Acknowledgments

The San Diego North Economic Development Council would like to thank:

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California State University at San Marcos for graciously hosting the 2018 San Diego North County Economic Summit; and,

The investors of the San Diego North Economic Development Council for their leadership in making San Diego's North County a more prosperous region.

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Executive Summary

Introduction to 2018 North County Indicators

North County Indicators (formerly North County Prospects) is designed to provide a quantitative assessment of the North County economy while identifying issues and evidence to support a more informed discussion about where the region should be headed moving forward.

As an economic region, San Diego's North County (North County) has over 1.2 million residents and just over 513,000 jobs. The region **has a larger population than eight states in the Country**, including Vermont, South Dakota, and Montana, along with **greater employment than eight states** including Alaska, Wyoming, and North Dakota. North County hosts several innovative, export-oriented industry clusters, including Biotechnology and Biomedical devices; Defense, Aerospace, and Communications Manufacturing; Sports and Active Lifestyle; and, Information and Communication Technologies (ICT). The region is also a net exporter of talent, providing highly-skilled workers to employers in neighboring communities.

State of North County

In 2017, North County's economy continues to grow, adding over 6,000 jobs in the region over the last 12 months, while the regional unemployment rate dropped below three percent. From a proportional job growth perspective, North County experienced increased employment (2016 to 2017) faster than California (1.2 percent growth vs. 1.0 percent growth) or the United States (1.2 percent growth vs. 0.7 percent growth). Within North County over the same time period, the North Coast added the most new jobs—roughly 2,300—of the four sub-regions, while North Central Inland grew at the fastest rate (1.8 percent). From a job quality perspective, the region added a balanced mix of Tier 1 (1.1 percent growth), Tier 2 (1.3 percent growth), and Tier 3 (1.3 percent growth) occupations.

North County's industry clusters remain a critical asset in the region's economic health and vitality. The five specialized industry clusters that have seen strong growth and have a high concentration in North County include Defense, Aerospace, and Communications Manufacturing; Life Sciences; Craft Beer and Related Beverages; Sports and Active Lifestyle; and, Visitor Attractions and Accommodations. From 2016 to 2017, four of these five clusters have grown faster than the regional average—between two and five percent—with only Sports and Active Lifestyle experiencing a slight decline in employment.

What We Learned in 2017

North County has an increasingly tight labor market. The region's unemployment rate continues to decline, from a high of 10 percent in 2010 to just under three percent at the end of December 2017; this is well below the Federal Reserve's lowest estimate for the long-run normal level of unemployment (4.5 percent).[1] At the same time, North County businesses have grown each year from 2010 to 2018, resulting in 23,400 new positions for jobseekers. The combination of sustained job growth with a declining number of active jobseekers is likely hampering economic growth for the region's businesses. The need for regional employers to search farther for qualified talent not only impacts their ability to grow, but also impacts commute times and traffic congestion within the region.

North County's high-wage, high-growth industry clusters continue to drive economic vitality in the region. Biotechnology and Biomedical Devices; Building and Design; and, Defense, Aerospace, and Transportation Manufacturing all support annual average wages of between $80,000 and $127,000. Altogether, these clusters have created 18,000 new jobs since 2010, and they are more concentrated in North County compared to the national average. Of North County's five *specialized* industry clusters, Defense, Aerospace, and Communications Manufacturing as well as Craft Beer and Beverages have seen the fastest growth since 2010. All five specialized clusters export most of their sales to markets outside the region.

Entrepreneurialism is on the rebound while innovation activity has slowed in North County. Startup activity—measured as the proportion of entrepreneurs and startup firms in the region—is slowly increasing following a period of decline through about 2013. More individuals are starting businesses due to market opportunities while at the same time, startup firms have been growing faster since 2014, indicating that there are enough resources and revenue to support such expansion. Yet innovation, as measured by patent output, has been on the decline since 2014. Following a steady increase averaging about 10 percent a year since 2010, patent activity declined by 23 percent over the last four years.

Opportunity is not evenly distributed across North County's sub-regions. Overall, the region has a highly educated workforce and high household incomes compared to state and countywide averages. The Central Coast and Central Inland have higher-than-average concentrations of households earning $150,000 a year or more as well as above average concentrations of individuals with a bachelor's degree or higher. In contrast, the Northern Coast and Inland North County not only have lower educational attainment and lower wages, but these regions have also had the slowest employment growth of the four sub-regions in North County over the last ten years. One result of this disparate growth is that residents in these two sub-regions are significantly more likely to allocate a greater portion of household income to housing costs.

[1] Source: https://www.federalreserve.gov/faqs/economy_14424.htm

North County continues to be a net exporter of high-skilled talent for Tier 1 occupations, meaning the region could be losing workers needed to meet local employer demand. North County is a net exporter of individuals in the management, business, sciences, and arts occupations and a net importer of service and production occupations. Given the high growth occurring in highly-skilled industries such as Biotechnology, Defense, Building and Design, and Healthcare, these workers are increasingly valuable to retain for regional businesses.

Public transportation use has declined while workers are faced with increasing commute times. The region's high housing costs prompt workers to seek more affordable housing outside of North County. This results in increased commute times, traffic, and wear on the region's roads and infrastructure. There was a three-point decline in the proportion of workers that reported using public transportation (2015 to 2016); these individuals shifted entirely to driving alone instead of carpooling, walking, or biking. In 2016, 86 percent of North County workers drove to work alone. The proportion of individuals spending 30 minutes or more to get to work increased by one point between 2015 and 2016.

Questions, Considerations & Opportunities for North County

1

Compete for Talent. How can North County attract and retain the talent that drives innovation, entrepreneurialism, and higher-value-added economic activity? North County is becoming a hub for high-quality jobs and is already known for its high quality of life, both of which are key to attracting workers to the region. The region needs to identify strategies to attract and retain talent that can support and grow North County's key industry clusters, including younger (22 to 39 years old) more educated workers.

2

Enhance Industry Cluster Ecosystems. What can North County do to support its specialized industry clusters? North County's specialized industry clusters represent competitive advantages for the region as well as the fuel for economic growth and prosperity. But North County generally has fewer organizations and "conveners" when compared to areas like Sorrento Valley, downtown San Diego, or Silicon Valley. Networking that gives way to collaboration is rare, and most industry associations hold the majority of their events south of SR 56. Entities like the California State University at San Marcos and San Diego Sports Innovators are exceptions to this rule but need more support and more replication for North County's cluster ecosystem to thrive.

3

Develop a Regional Innovation Center. Can North County continue to fuel creative innovation? Research, development, and innovation are key to attracting businesses, investments, and workers. The region is well-poised for innovative activity, with a highly educated workforce and specially-concentrated industry clusters like Life Sciences and Defense and Aerospace Manufacturing that can serve both regional and global marketplaces. While the recent decline in patent output may be attributable to the region's tight labor market—businesses might be spending more time and resources on talent recruitment and retention as opposed to innovation—other metrics indicate that the region has strong startup and entrepreneurship activity. Innovation centers, like the Los Angeles Cleantech Incubator, support local entrepreneurs to bring new products and services to the market while exposing students and the region to evolving industry opportunities.

4

Work Towards Economic Opportunity for All. How can North County expand economic opportunity to residents across the Coast and Inland? Targeted workforce development programs can connect residents in less dynamic economic areas to training and skill development opportunities in high-skill, sustainable career pathways. These programs could also capitalize on untapped talent in the Northern Inland and Coastal sub-regions. Such training and educational programs should be built around occupational categories that would help meet employer demand in less volatile occupational pathways and support the region's specialized industry clusters that typically offer higher wages.

5

Support New Commuting Behavior. What can North County do to address traffic and congestion while maintaining economic growth? Declining use of public transportation coupled with the increase in workers driving to work alone calls for the support and development of other, more efficient modes of transportation such as biking, carpooling, walking, and public transit. Decreasing commute times could also positively affect the quality of life and productivity in North County.

6

Find Solutions to the Housing Crisis. How will North County respond to the growing costs associated with the housing shortage? Housing costs and limited supply not only impact residents, but also regional businesses and their ability to attract and retain talent. Based on recent feedback from North County employers, the costs associated with inadequate housing supply are growing, and the housing crisis will likely play a more central role in the region's immediate economic horizon.

7

Foster Economic Opportunity and Protect North County's Quality of Life. Ultimately, regional economic development strategies should look to support healthy economic activity while protecting and/or improving North County's quality of life—for its residents, businesses, and workers. New business districts, research institutions, innovation centers, and housing in or near transportation hubs could all play a role in supporting the future of North County's high quality of life.

The North County Region

For this report, the North County (NC) region is divided into four sub-regions:

NC Coast	NC Central Coast	NC Inland	NC Central Inland
Carlsbad, Oceanside, Vista, and Camp Pendleton	Encinitas, Del Mar, and Solana Beach	San Marcos, Escondido, Fallbrook, Palomar Mountain, and Borrego Springs	Poway, Ramona, and Julian

For zip code breakdowns of sub-regions, please see Appendix B.

Economy

North County's job growth has been strong, with the region's businesses adding 55,350 new jobs since 2010; this is a growth rate of just over 10 percent. Perhaps more importantly, North County's higher-paying Tier 1 Occupations[2] have grown at a faster rate than total job growth. The region is home to clusters of specialized high-growth, high-wage industries including Defense, Aerospace, and Communications Manufacturing; Life Sciences; Sports and Active Lifestyle; Visitor Attractions and Accommodations; and, Craft Beer and Beverages. In 2017, these businesses employed a total of 61,600 workers and grew collectively by roughly 21 percent over eight years.

Job growth in North County is slower than the county-, state-, and nationwide averages; this could be related to the availability of talent, as North County has the lowest unemployment rate compared to South and East County as well as the statewide average. Together, these data indicate a need to look at how current and future labor shortages might affect the region in the future. As businesses continue to create more jobs while unemployment declines, there will be fewer individuals actively seeking work and employers may begin to face difficulties to firm growth and expansion.

[2] For a definition of Tier 1 Occupations, please see section 1.4.

Economy

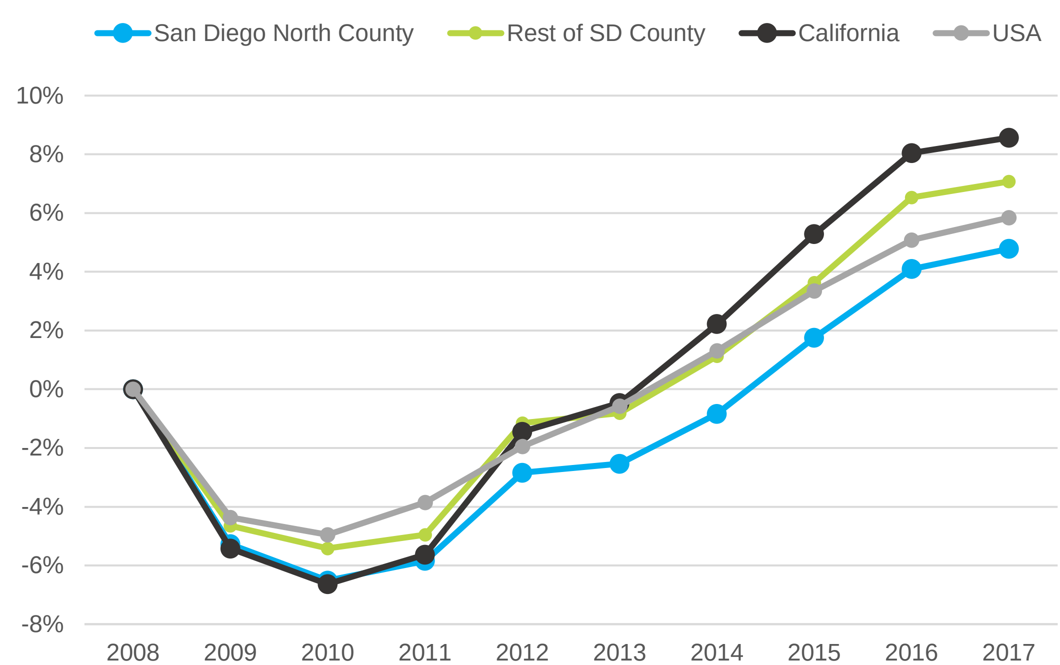
Overall Employment

As of 2017, North County supports a total of 513,447 workers—a growth rate of almost five percent over the last decade. The region's businesses have added just over 23,400 jobs since 2008. Between 2016 and 2017 alone, North County businesses created an additional 3,360 jobs across the region. However, the region is growing slower compared to the rest of the county (seven percent), state (nine percent), and nation (six percent) (Figure 1).

WHY DOES THIS MATTER?

Overall employment is a broadly-discussed general indicator of economic health for any region. In North County, businesses are working to help support the region's population by creating more jobs each year. Regional job growth has remained strong since 2010, continuing to climb over the last eight years following the considerable drop in employment between 2008 and 2010 due to the recession.

Figure 1: Overall Change in Employment by Region, 2008 – 2017[3]



[3] Source: EMSI 2018 q.1 QCEW and Non-QCEW Employees.

Economy

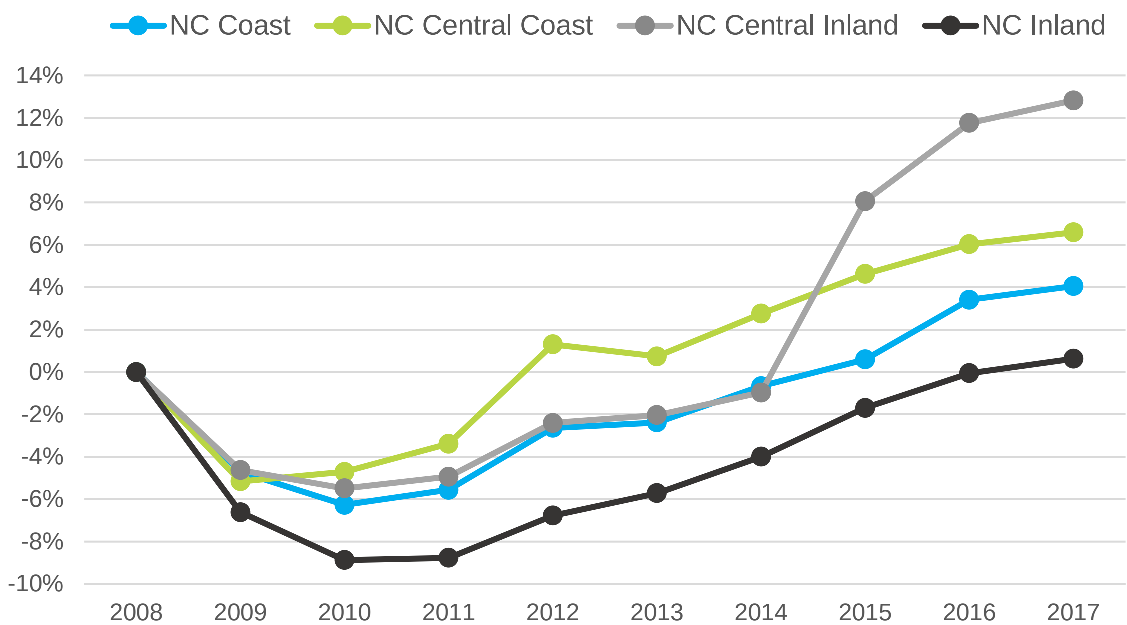
Employment by Area

Within North County, employment growth has varied considerably over the last 10 years. Central Inland North County has seen the highest job growth, particularly over the last four years. Since 2008, the region has grown employment by 12.8 percent. This is followed by the Central Coast with 6.6 percent growth, the (Northern) Coast with 4.1 percent growth and Inland North County with about 0.6 percent growth. In 2017, the Inland region finally grew beyond its employment total during the 2008 recession. This occurred for the Coast and Central Inland in 2015 and for the Central Coast in 2012 (Figure 2).

WHY DOES THIS MATTER?

As the sub-regions within North County change employment over time, it impacts not only the region's economic vitality, but it will impact commute times, development patterns, and ultimately the region's quality of life. The differences in sub-regional employment growth also reflect the diverse industry profile that have varied responses to the evolving economic environment.

Figure 2: Overall Change in Employment by Sub-Region, 2008 – 2017[4]



[4] Source: EMSI 2018 q.1 QCEW and Non-QCEW Employees.

Economy

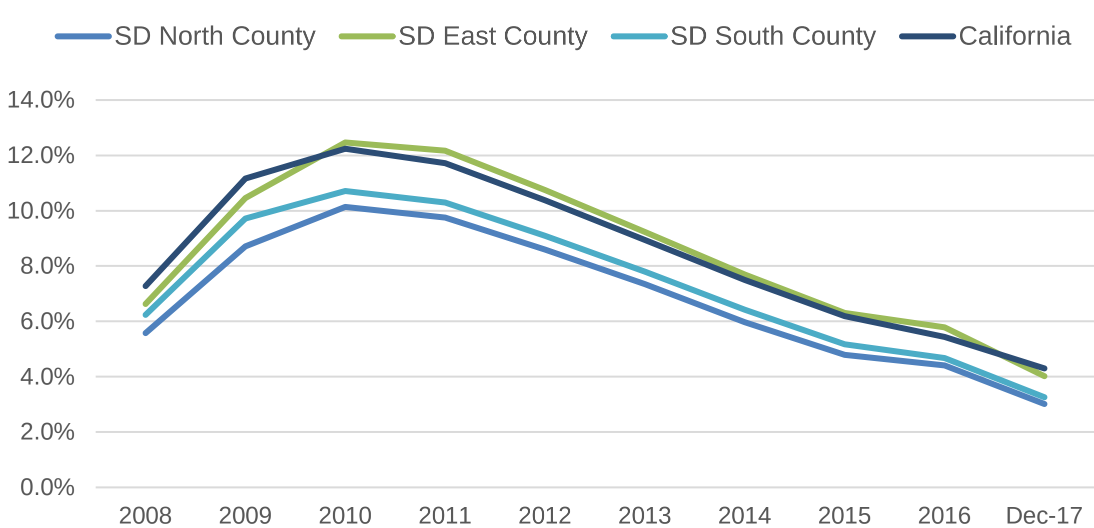
Overall Unemployment

The region's unemployment rate continues to decrease, resting now at about three percent as of December 2017. In fact, the unemployment rate declined by a whole percentage point over the course of 2017 alone—between January through December—and remains lower than the statewide average of 4.3 percent. Compared to the rest of San Diego, North County has had historically lower unemployment. In December 2017, South and East County had unemployment rates of three and four percent, respectively. As with job growth, the unemployment rate is used as another measure of a region's economic health. Low unemployment is typically an indicator of a "tight" labor market in which there are more jobs than there are workers. Since North County's employment total continues to climb as unemployment declines, the region could face talent shortages in the future (Figure 3).

WHY DOES THIS MATTER?

Unemployment metrics provide a valuable indication of the availability or lack of availability of workers, talent, or human capital within a given region. According to the Federal Reserve, the normal or natural rate of unemployment that is sustainable over time is between 4.3 and 5.0 percent.[5] North County's unemployment rate is more than a full percentage point below the natural rate of unemployment, indicating a shortage of available workers for employers to choose from.

Figure 3: Historic Unemployment Rate, 2008 – Dec 2017[6]



[5] Source: https://www.federalreserve.gov/faqs/economy_14424.htm

[6] Source: Employment Development Department (EDD). All years are annual averages, except for 2017, which is preliminary data for December 2017. North, East, and South County data is based on the sum of cities that fall into each of those regions.

Another measure of economic health, the civilian labor force participation rate, looks at the total number of civilians actively employed in the labor force compared to total individuals eligible to participate in the labor force (population 16 years of age or older). The civilian labor force participation rates for North County's four sub-regions are as follows: 57.9 percent for the Coast, 65.8 percent for Central Coast, 63.6 percent for Central Inland, and 60.3 percent for Inland North County. This means that roughly three in five employable adults across the region are currently working or looking for work. Central Coast and Central Inland both are above average in their labor-force participation rate, while the Coast and Inland sub-regions are below average. The current state- and nationwide average is 63 percent.[7]

WHY DOES THIS MATTER?

Labor force participation rates can provide information on two economic phenomena. First, they provide information on the demographic profile of a given area and the proportion of older residents who are less likely to work because they are retired. Secondly, labor force participation rates provide information on the ratio of residents who are actively engaged in work or looking for work in a region and those who are not. Labor force participation rates can also be impacted by those individuals who are going back to school or who are in the military, which is particularly relevant for the Coast sub-region.

[7] Source: American Community Survey, 2016. The civilian labor force excludes military personnel.

Economy

North County's Industry Clusters

Michael Porter, Harvard economist and pioneer of industry cluster research, defined the cluster as a geographic concentration of interconnected companies and institutions working in a common industry. This definition has been expanded over the years to account for employers with shared technologies, supply chains, services, or customers whose competition or collaboration create opportunities for new business creation, increased regional wealth, and new employment.[8]

Export-Oriented vs. Population-Serving Clusters

Not all industry clusters have the same impact on North County's workforce and the regional economy. Export-oriented clusters that draw revenue from markets outside the region result in a multiplier effect that generates additional employment within the region. This is an important consideration for economic and workforce developers looking at training and education programs that will have the highest return on investment for the county. These export-oriented clusters are also likely to drive innovation as they typically face competitive global markets.

For this report, both standardized and specialized industry clusters are presented. The standardized industry clusters include 18 nationally-comparable clusters that have the benefit of examining industry and occupational trends in the nation, across states, and other regional economies. The specialized industry clusters identify five North County-specific clusters that were defined based on the economic strengths of the region; data for these clusters highlights what is happening with the region's key economic drivers. Since there is some overlap readers are advised to keep in mind which kind of cluster the analysis is referencing.

[8] Source: Porter, Michael. *Clusters and the New Economics of Competition*. Harvard Business Review, 1998.

Some of the benefits of identifying and studying regional industry clusters include:

1. **Engaging with employers that are central to countywide economic growth.** Regional markets may be less connected to the overall labor market trend. A focus on industry clusters provides insight into how local employers collaborate to drive the county's economic growth.

2. **Providing valuable information to current workers and job-seekers looking to develop new skills and career pathways.** Workforce development focused on key areas of growth will capitalize on the region's job opportunities, guide individuals to sectors with strong employer demand, and grow the local economy.

3. **Designing programs that best support the current and projected regional workforce demand.** Industry cluster analysis hones in on regional employer demand to create valuable workforce development programs.

4. **Ensuring that job-seekers can transition into employment with sustainable wages and strong career opportunities.** Most industry clusters are targeted towards high-quality employment within the county.

Economy

North County's Standardized Industry Clusters

There are 18 standard industry clusters and they are organized based on their location quotient, or level of regional concentration compared to the national average. Location quotients are used to identify what is unique to a region compared to the national economy and can indicate areas of competitive advantage.

The following are North County's most concentrated standard clusters:

Information and Communications Technologies is a diverse group of technology industries that focus on the development and production of new products and services in telecommunications and information technology. Some of the sectors in this cluster include telecommunications carriers, software publishers, cybersecurity developers and computer and electronic product manufacturing. Some high-employment firms located in North County for this industry cluster include Viasat, Sony Electronics, Datron World Communications, and Palomar Medical Center.

Biotechnology and Biomedical Devices is a particularly important cluster for North County. It is the research, development, and production of medical equipment and pharmaceuticals. Some high-employment firms located in North County for this industry cluster include DJO Finance, Signet Armorlite, Cardinal Health, Thermo Fisher Scientific, and Breg Incorporated.

Defense, Aerospace, and Transportation Manufacturing is the fastest growing standardized industry cluster in North County. It includes companies involved in the manufacturing and wholesale of motor vehicles and vehicle parts, aircrafts and aircraft parts, military vehicles and ammunition, boats and ships, and explosives, small arms, and ammunition. Some high-employment firms located in North County for this industry cluster include Northrop Grumman, Cohu Semiconductor Equipment, Magnaflow Permance Exhaust, Rockwell Collins, and Nortek Security and Control.

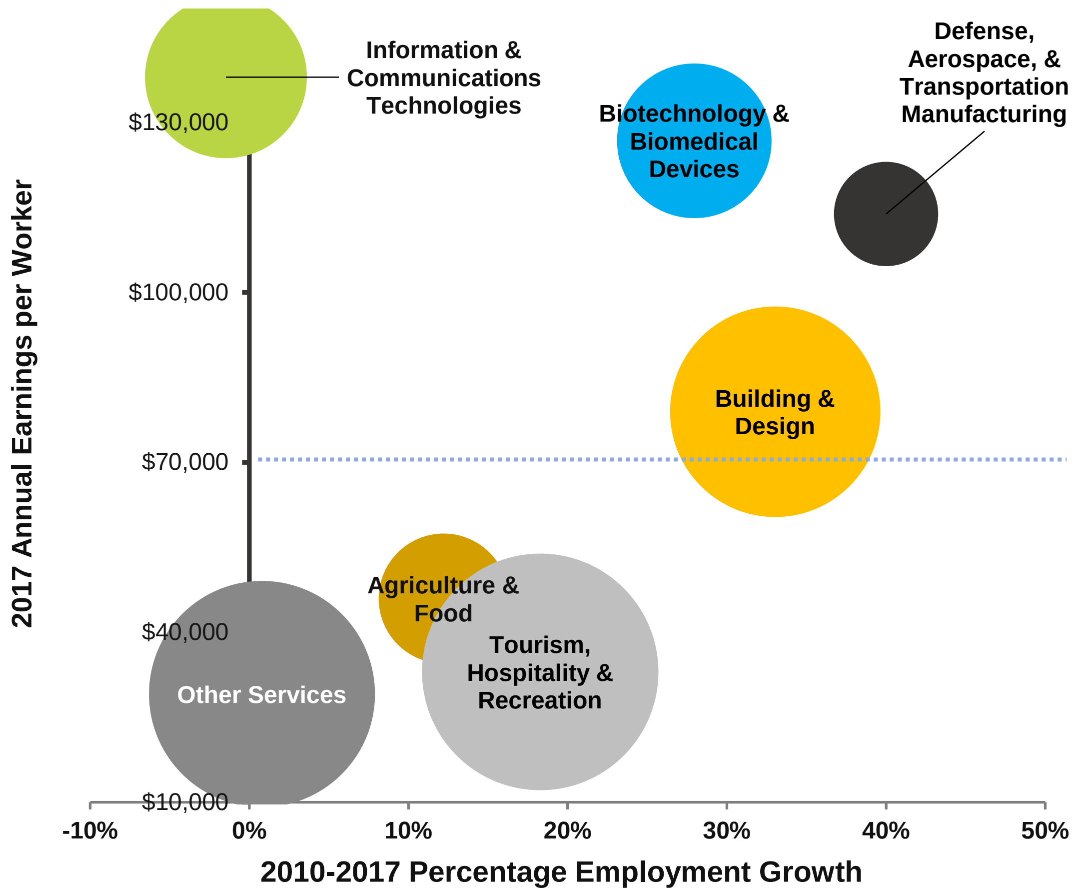
Building and Design involves the design and building of residential and non-residential buildings as well as the interior design of buildings. This industry is actively involved in energy efficiency, building retrofits, and the use of sustainable building materials. Some high-employment firms located in North County for this industry cluster include Oceanside Glass Tile, Balfour Beatty Construction, and Jeld-Wen Windows and Doors.

Tourism, Hospitality, and Recreation is one of the larger industry clusters in North County with over 60,000 jobs. This industry cluster is a mix of agriculture, food production, and service industries that draw tourists into the region. The cluster includes breweries, amusement services, gambling, and recreation industries. Some high-employment firms located in North County for this industry cluster include Legoland California, Harrah's Resort Southern California, Welk Resorts Group, Valley View Casino and Hotel, Pala Casino Spa and Resort, and Omni La Costa Resort and Spa.

High-wage, high-growth clusters such as Biotechnology and Biomedical Devices, Defense, Aerospace and Transportation Manufacturing, and Building and Design are more concentrated in North County compared to the national average. In fact, Biotechnology is about 2.8 times more concentrated compared to the national average. All three of these clusters provide an average annual wage roughly between $79,000 and $127,000 and have grown by 30 to 40 percent since 2010. Collectively, these three clusters have created almost 18,000 new jobs in North County over the last eight years.

While Information and Communication Technologies is also highly concentrated with an annual average wage of roughly $138,000, this cluster has seen negative growth, shedding roughly 300 jobs since 2010. The remaining clusters are only slightly more concentrated than the national average—about 1.01 to 1.07 times—and provide average annual wages between $29,000 and $46,000. Tourism and Hospitality and Agriculture and Food have grown by 18 and 12 percent respectively since 2010, totaling an additional 8,300 jobs for the region (Figure 4).

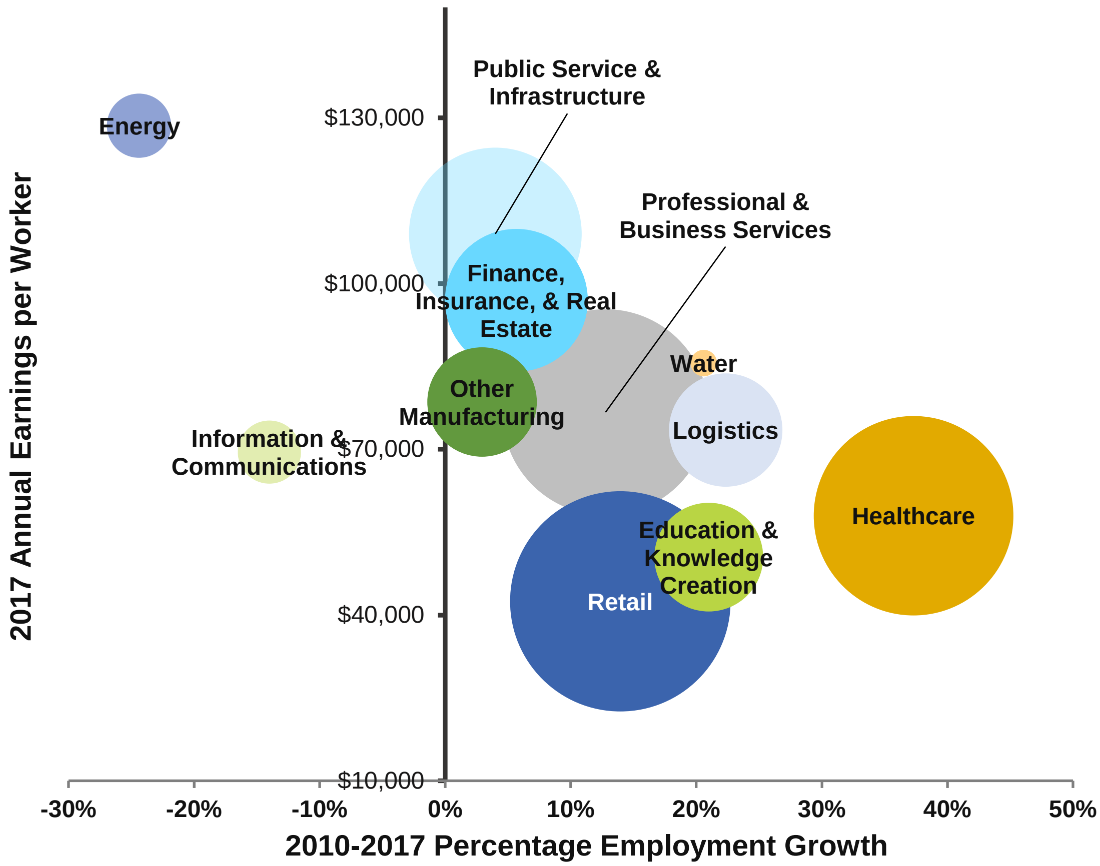
Figure 4: Standard Industry Clusters – High Concentration[9]



The remaining 11 standard industry clusters are all less concentrated in North County compared to the national average. Nevertheless, these clusters account for most of the jobs in the region and provide average annual wages between roughly $42,500 and $129,000. Out of these less-concentrated clusters, Healthcare is the fastest growing industry; this cluster currently employs 44,000 workers and has created almost 12,000 jobs since 2010 for a growth rate of roughly 37 percent. Another important employer for the North County region is the Retail industry cluster. As of 2017, these businesses supported 53,400 workers. The largest industry cluster in North County, Retail, also continues to grow; between 2010 and 2017, the sector created 6,500 new jobs, a growth rate of 14 percent (Figure 5).

[9] Source: EMSI 2018 q.1 QCEW and Non-QCEW employees. In the bubble chart, the x-axis denotes employment growth over time between 2010 and 2017, the y-axis indicates average annual earnings in 2017, and the size of the bubble denotes the relative size of each industry cluster in terms of jobs.

Figure 5: Standard Industry Clusters – Low Concentration[10]



[10] Source: EMSI 2018 q.1 QCEW and Non-QCEW employees. In the bubble chart, the x-axis denotes employment growth over time between 2010 and 2017, the y-axis indicates average annual earnings in 2017, and the size of the bubble denotes the relative size of each industry cluster in terms of jobs.

Economy

North County's Specialized Industry Clusters

The benefit of examining *standardized industry clusters* is that they provide for national, statewide, or other regional comparisons. However, it is also useful to examine a somewhat different construction to understand particular features of a region's economy. *Specialized industry clusters* are defined as those which are fast growing, exceptionally concentrated, and pay high wages in North County. Furthermore, these clusters are typically export-oriented or traded, meaning that they sell their products or services to a market beyond North County residents. These specialized industry clusters are described below.

Sports and Active Lifestyle includes those firms that develop and manufacture sports and related equipment and apparel, as well as those firms that sell and distribute related sports and recreational products and services.

Visitor Attractions and Accommodations include museums, historical sites, amusement parks, gambling industries, and traveler accommodations.

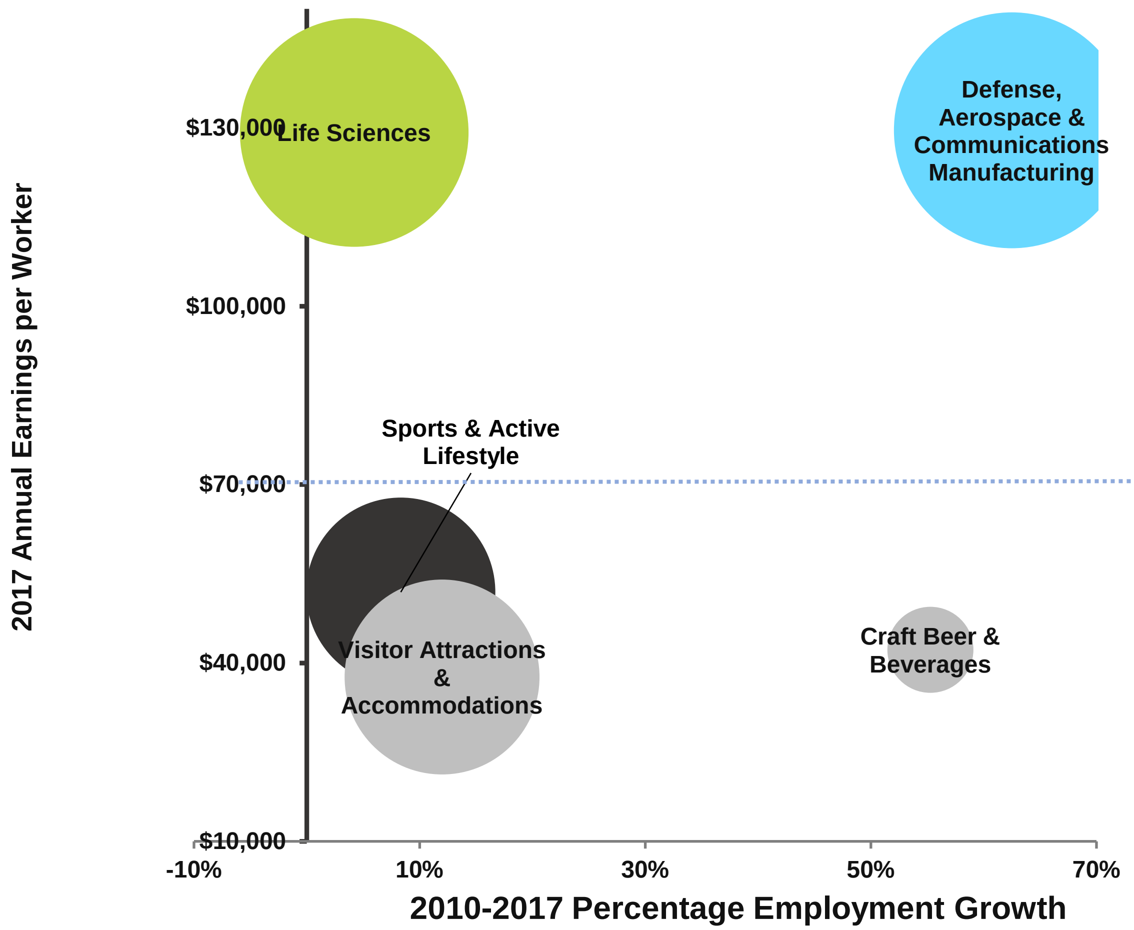
Life Sciences include the research, design, and production of medical devices and biological technologies as well as the manufacturing of medicinal and diagnostic substances.

Craft Beer and Beverages includes beverage manufacturing, beer, wine, and distilled alcoholic beverages wholesalers, beer, wine, and liquor stores, and drinking places.

Defense, Aerospace, and Communications Manufacturing (DACM) includes the manufacturing of metal and chemical products, communications equipment, audio and video equipment, navigational and control instruments, and aerospace products and parts.

North County's five specialized industry clusters together employ 61,600 workers across the region. Each cluster has experienced strong growth since 2010, altogether generating an additional 10,600 jobs for North County residents. These clusters provide an average annual wage that is at least $38,000 and up to $130,000. The largest cluster—Defense, Aerospace, and Communications Manufacturing—is also the most highly concentrated, at 3.85 times the national average, and has exhibited the greatest growth at 63 percent since 2010. These firms also provided the highest average annual wage—about $129,600 per year (Figure 6).

Figure 6: North County's Specialized Industry Clusters[11]



[11] Source: EMSI 2018 q.1 QCEW and Non-QCEW employees.

Table 1: Industry Cluster Employment, Earnings, and Out-of-Region Sales (2016)[12]

Industry Cluster	Employment	Average Wage Per Worker	% Exported Sales
Sports and Active Lifestyle	11,378	$51,912	72%
Life Sciences	16,629	$129,211	76%
Craft Beer & Beverages	2,354	$42,213	50%
Visitor Attractions & Accommodations	13,534	$37,640	66%
Defense, Aerospace, & Communications Manufacturing	17,706	$129,579	81%

[12] Source: EMSI 2018 q.1 QCEW and Non-QCEW employees.

Economy

Quality of Employment

Unemployment, labor force participation, and job growth are general indicators of economic health. However, the reality is that not all jobs are equal in terms of skill requirements and compensation levels. A study by David Autor examined changes to the nation's occupational profile and provided an in-depth examination of the quality and quantity of jobs that employers have demanded over the last 30 years. In his analysis, Autor developed an occupational segmentation that BW Research has also used in regional occupational analyses.[13]

The following three-tier occupational structure is largely based on median wages and has been used by other researchers to better understand the changing dynamics of occupational employment. Most occupations can be delineated into one of the following three occupational tiers:

Tier 1 Occupations

include managers, professional positions (lawyers, accountants, physicians), and high-skill technical occupations (scientists, programmers, engineers). These are typically higher-paying occupations. In North County, the **median wage for a Tier 1 worker is $90,700 a year**.

Tier 2 Occupations

include sales positions, teachers, librarians, office and administrative positions, as well as manufacturing, operations, and production occupations. These can be considered middle-skill, middle-wage position. In North County, the **median wage for a Tier 2 worker is $46,000 a year**.

Tier 3 Occupations

include protective services, food service and retail, building and grounds keeping, and personal care positions. These are typically lower-paying occupations. In North County, the **median wage for a Tier 3 worker is $24,400 a year**.

[13] Autor, David. *The Polarization of Job Opportunities in the U.S. Labor Market*. MIT Department of Economics, April 2010.

Since 2008, both high-skill and low-skill employment growth has outpaced mid-skill, mid-wage, or Tier 2, employment opportunities. Both Tier 1 and Tier 3 jobs have grown by over nine percent over the last decade, while Tier 2 jobs have grown at a rate of 2.8 percent (Figure 7). In fact, the region's Tier 2 employment growth is lower than the statewide average of 5.9 percent (Figure 8). In general, Tier 2 employment still accounts for the largest chunk of workers, at about 35 percent of total jobs, followed by Tier 3 which is 29 percent, and Tier 1 jobs which are 23 percent of total jobs in the North County.[14] It is worth noting that the region's major losses in Tier 2 employment were in part related to construction-related occupations such as carpenters (six percent decline between 2008 and 2017), construction laborers (five percent decline), and construction and maintenance painters (three percent decline); together, these occupations account for roughly 10,400 jobs in North County as of 2017. Other construction-related occupational groups that lost employment at a high rate include brick- and block masons (38 percent decline), painting, coating, and decorating workers (28 percent), and upholsterers (19 percent decline); however, these occupations all employ less than 200 workers each.

This trend has been exhibited at both the state and national level and for many other regions. Concentrated employment growth in both the high- and low-end of the wage and skillset scale is creating a polarized field of employment opportunity, resulting in increasing wage inequality and the decline of middle-class jobs. Though widespread automation and offshore labor market integration accelerated this trend, the recent economic recession has largely contributed to a diminishing Tier 2 workforce. Since 2010, Tier 2 employment has somewhat recovered, but there is growing concern that as technology and the global labor market evolve, middle-skill, middle-wage jobs could be hit again.

WHY DOES THIS MATTER?

This may be the most important employment indicator for a region's long-term economic sustainability. High-quality, high-paying jobs in a region not only have a large employment multiplier effect, but also provide more opportunities for developing a local workforce that can sustainably live, work, and play within a high-cost region like North County.

[14] It should be noted that these percentages will not sum to 100 since not all occupations can be delineated into one of the three tiers.

Figure 7: Percent Change in Occupational Tier Employment, North County, 2008 – 2017[15]

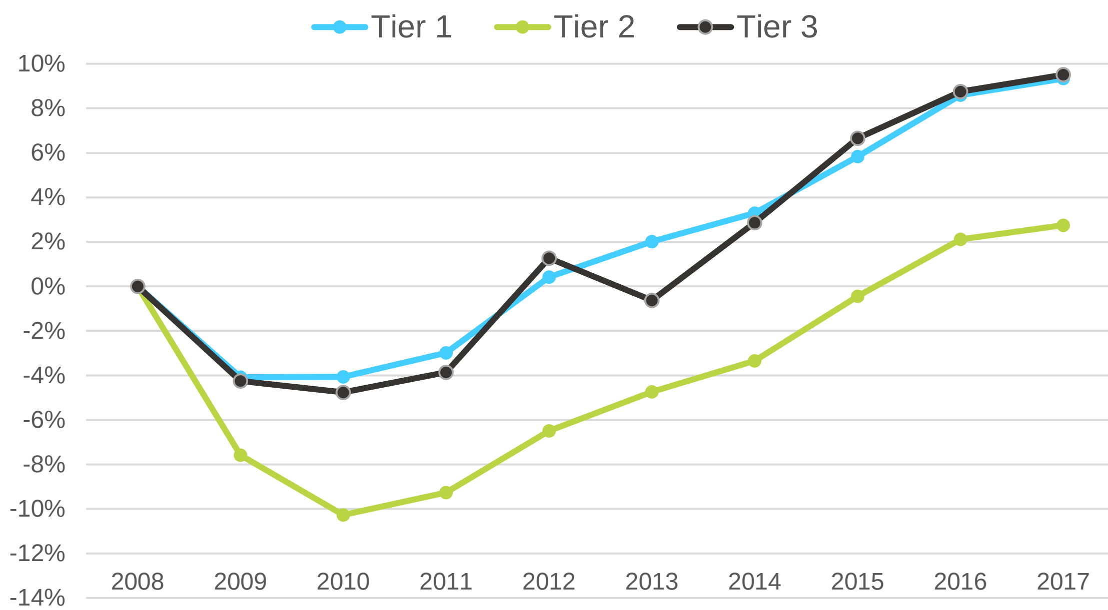
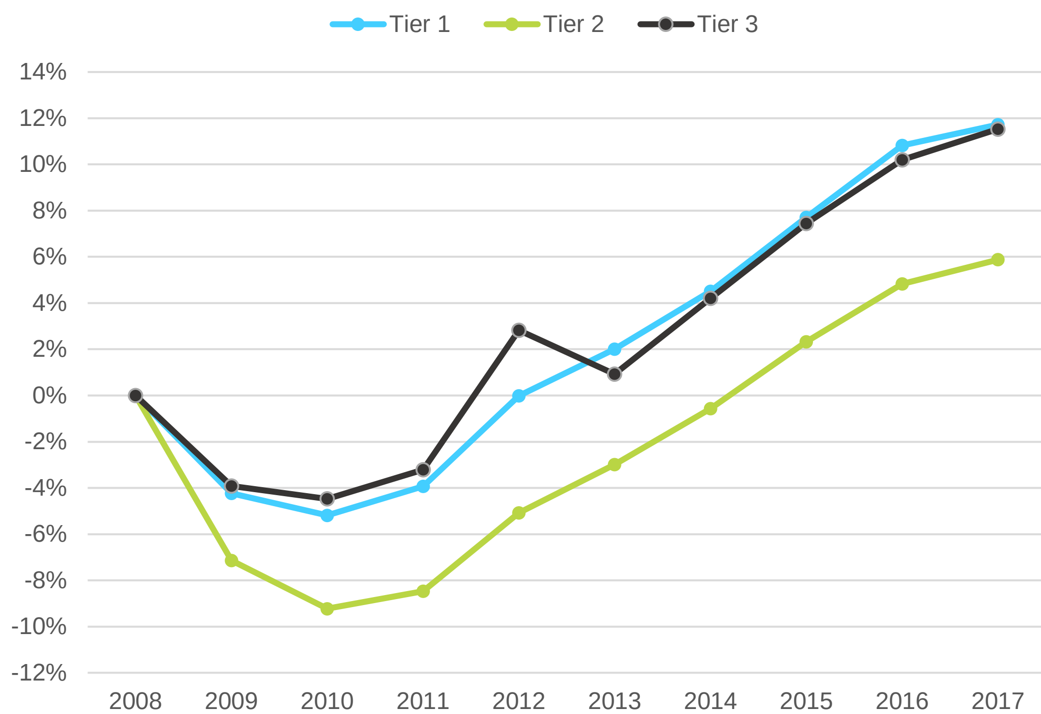


Table 2: Occupational Tier Proportions by Region, 2017[16]

	North County	San Diego County	California	United States
Tier 1	26.2%	27.4%	27.1%	24.4%
Tier 2	40.5%	39.5%	40.8%	42.9%
Tier 3	33.3%	33.1%	32.2%	32.7%

[15] Source: EMSI 2018 q.1 QCEW and Non-QCEW employees.
[16] Source: EMSI 2018 q.1 QCEW and Non-QCEW employees. It should be noted that these percentages are based upon the approximately 90 percent of occupations that are classified into one of the three tiers.

Figure 8: Percent Change in Occupational Tier Employment, California, 2008-2017[17]



[17] Source: EMSI 2018 q.1 QCEW and Non-QCEW employees.

Innovation

Innovation—the generation of new products, ideas, or processes—is critical to maintaining a healthy and competitive local economy. The research, development, and ultimately commercialization of new technologies lead to increased efficiency, productivity, and profitability. Capitalizing on a region's innovative strengths ensures that the region continues to remain economically competitive, attracting new businesses, investments, and workers while tapping into new markets both in-region and globally.

With its concentrated activity in innovation-related activities such as Life Sciences and Defense, Aerospace, and Communications, North County inventors have contributed to steady patent output over the last decade. Comparatively, North County sits between South County and the City of San Diego and East county in terms of growth and output in patent activity. Not surprisingly, San Diego City has seen consistently high growth in patent activity over the last decade.

Innovation

Patents

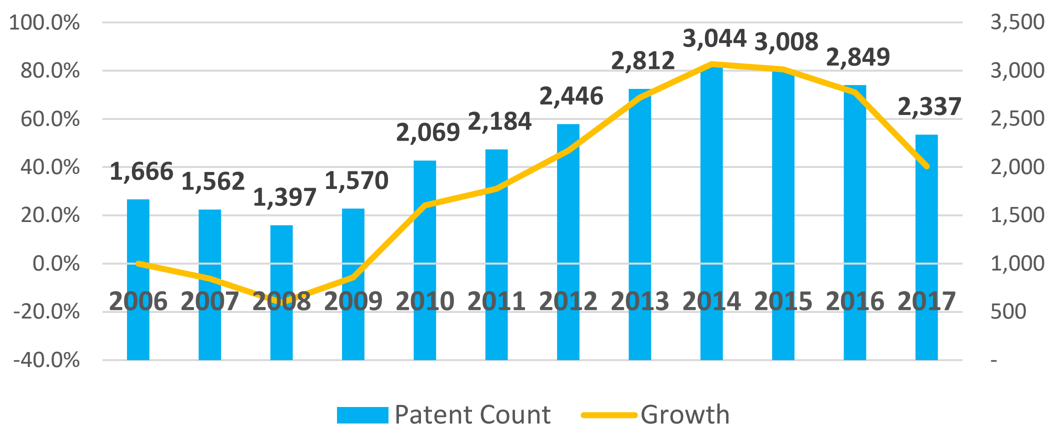
Patent activity has traditionally been used to measure a region's inventive activity—to what extent are North County's residents creatively contributing new ideas to both local and global markets. Between 2006 and 2017, North County's resident inventors have filed for almost 27,000 patents across a number of areas including transportation, textiles, construction, engineering, physics, and electricity. However, following a continuous upward trend from 2008 through 2014, patent production has since declined by about 23 percent (
Figure 9). It's possible that given the region's labor shortages, employers are spending more time and resources focused on talent attraction and retention. With a tight labor market, businesses have fewer resources for innovation-related endeavors.

By contrast, the City of San Diego has seen a steady increase in patent output over the last decade. The City produced just almost 50,000 total patents between 2006 and 2017 for an overall growth rate of 150 percent (Figure 10). East and South County San Diego, on the other hand, have seen the least patent activity over the same time period. Patent output across these two regions has also been more volatile compared to North County and San Diego City (Figure 11 and Figure 12).

WHY DOES THIS MATTER?

Patent activity is one way of measuring how much research and development activity in a region is being commercialized into potential products or services. It also provides some longer-term direction of overall development activity in a given region.

Figure 9: Patents by Inventors from North County, 2006 – 2017[18]



[18] Source: USPTO PatentsView Data Query. Search was done within the inventor database using inventor last known location by city. Inventors from the following 11 cities and communities are included: Carlsbad, Del Mar, Encinitas, Escondido, Fallbrook, Oceanside, Poway, Ramona, San Marcos, Solana Beach, and Vista.

Figure 10. Patents by Inventors from City of San Diego, 2006-2017[19]

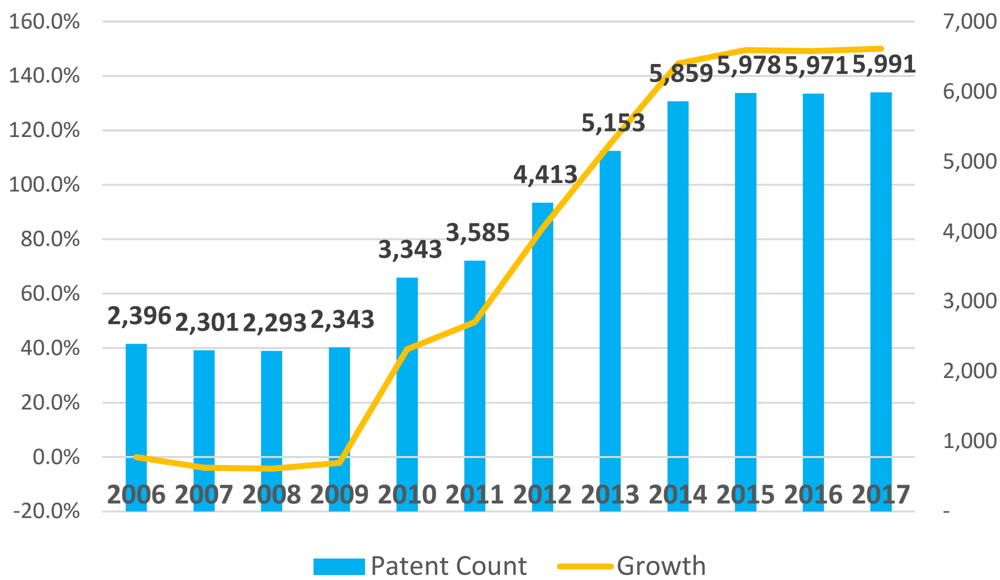
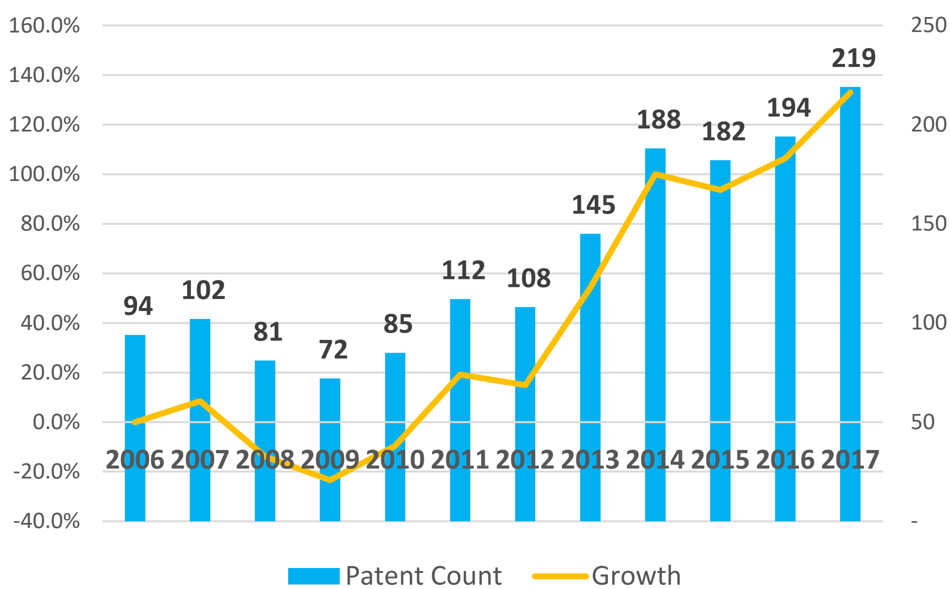


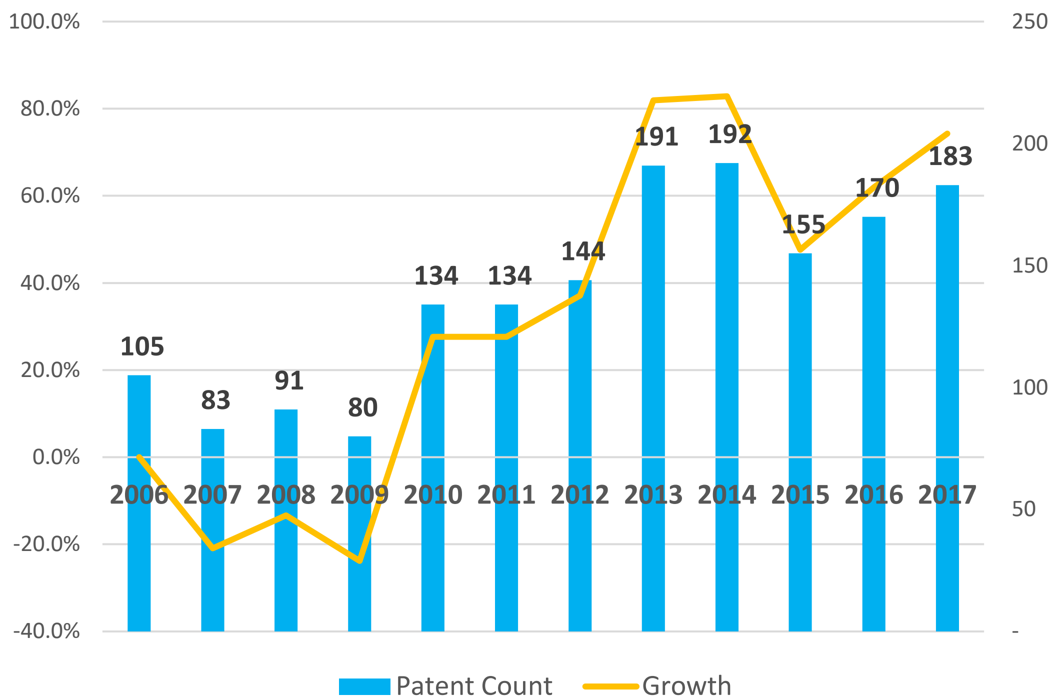
Figure 11. Patents by Inventors from South County, 2006-2017[20]



[19] Source: USPTO PatentsView Data Query. Search was done within the inventor database using inventor last known location by city. Inventors from City of San Diego are included.

[20] Source: USPTO PatentsView Data Query. Search was done within the inventor database using inventor last known location by city. Inventors from the following cities are included: Bonita, Chula Vista, Coronado, Imperial Beach, and National City.

Figure 12. Patents by Inventors from East County, 2006-2017[21]



[21] Source: USPTO PatentsView Data Query. Search was done within the inventor database using inventor last known location by city. Inventors from the following cities are included: Casa de Oro, El Cajon, La Mesa, Lakeside, Lemon Grove, and Spring Valley.

Innovation

Entrepreneurialism and New Business Growth

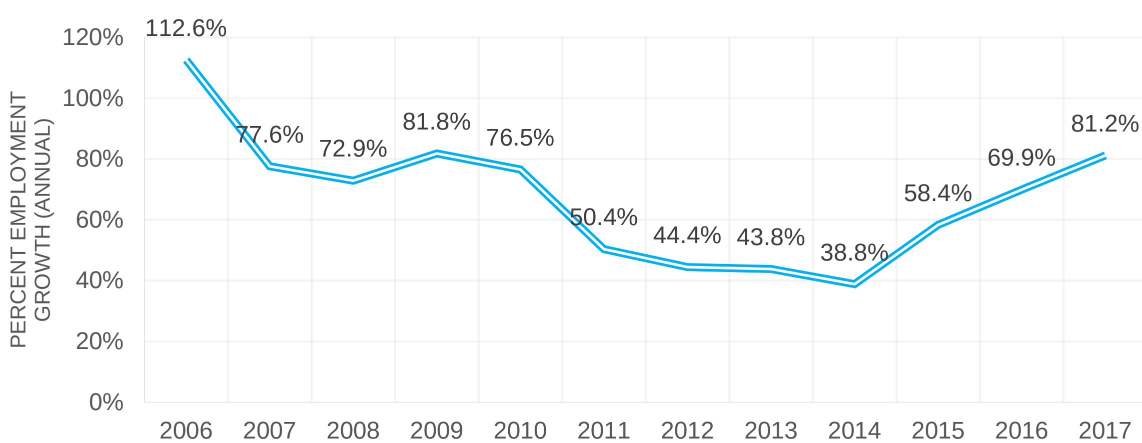
The rate of growth for startup businesses in the San Diego-Carlsbad-San Marcos MSA region has been strong since 2014.[22] The following figure measures the average employment growth of all startups five years after they were founded. In 2017, the average startup—founded five years ago in 2012—had about 4.7 employees and grew by 81 percent to 8.5 employees between 2012 and 2017. Over time, it appears as if startups have been growing faster since 2014 (Figure 13).

At the same time, the percent of the region's adult population that became entrepreneurs in a given month increased dramatically between 2015 and 2016. As of 2016, 490 out of every 100,000 adults became entrepreneurs in the San Diego-Carlsbad-San Marcos MSA (Figure 14).

WHY DOES THIS MATTER?

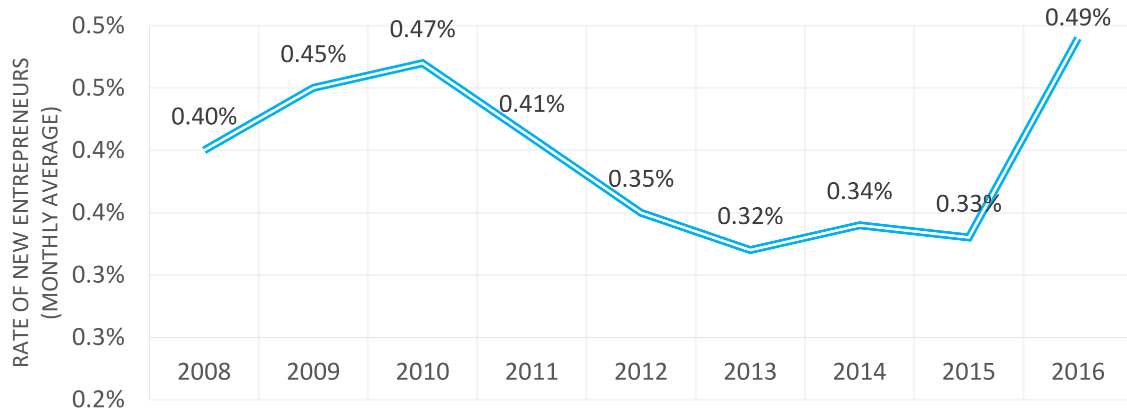
Entrepreneurial activity and new business growth is a valuable metric for assessing the health of a regional ecosystem as it relates to new business births and the ability to foster new businesses. It also provides some indication of the quantity and quality of entrepreneurs that can be found in a given region.

Figure 13: Rate of Startup Growth, 2006 – 2017[23]



[22] It should be noted that data for this section is at the MSA level because this is the most granular region at which the Kauffman Index provides data for entrepreneurialism and start-up activity.
[23] Source: The Kaufmann Index, Growth Entrepreneurship for San Diego-Carlsbad-San Marcos MSA. Last updated October 2017.

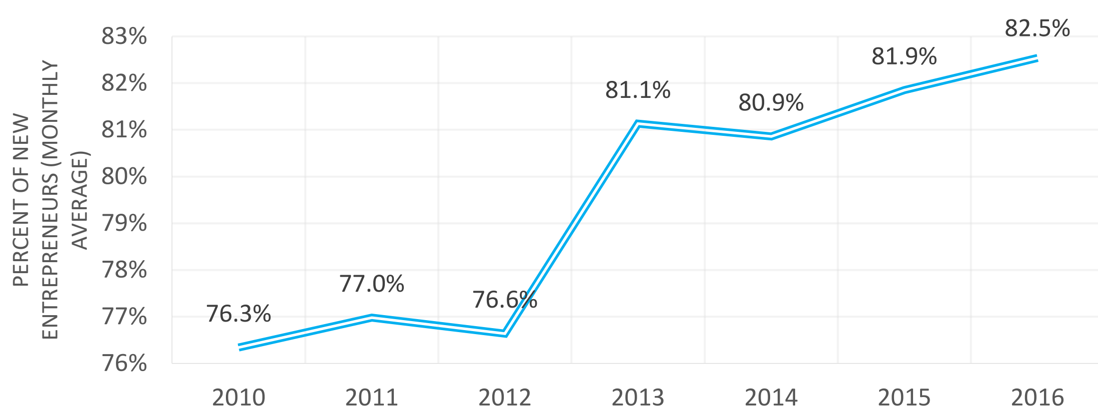
Figure 14: Rate of New Entrepreneurs, 2008 – 2016[24]



The following figure measures the percentage of new entrepreneurs who were not unemployed before starting their businesses. This is a proxy indicator of the percent of new entrepreneurs that started their business because they saw a market opportunity. In 2015, 8.3 out of every ten new entrepreneurs was not unemployed. In general, this number has seen an upward trend since 2010 (Figure 15).

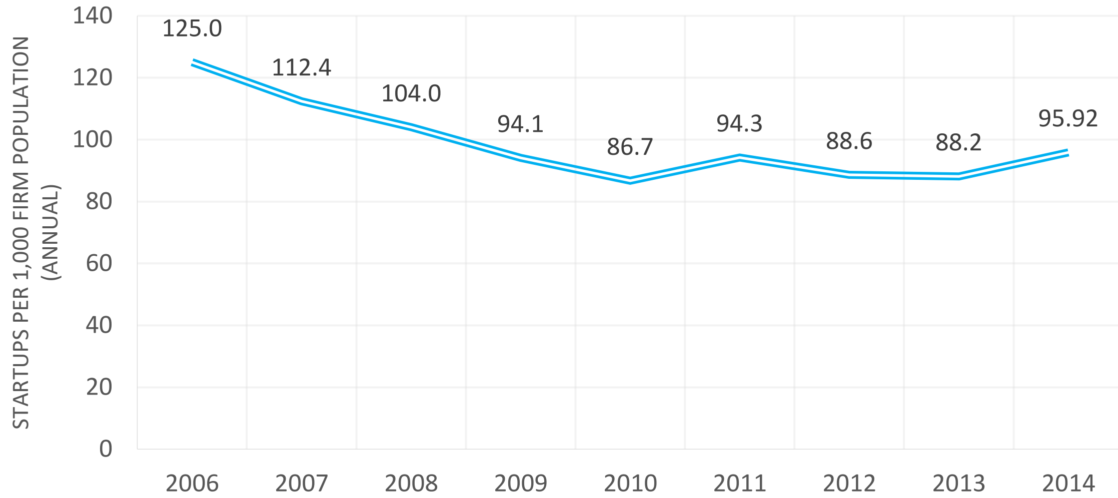
Startup density has also increased slightly following steady decline from 2006 through 2010. As of 2014, there were 96 startups per every 1,000 firms in the metropolitan area. Startup businesses are defined here as firms less than one year old that employ at least one person including the owner (Figure 16). It's possible that the decline was a result of the recession, but as the economy has exhibited steady growth, more individuals are seeking to start their own businesses.

Figure 15: Opportunity Share of New Entrepreneurs, 2010 – 2015[25]



[24] Source: The Kaufmann Index, Startup Activity for San Diego-Carlsbad-San Marcos MSA. Last updated May 2017.
[25] *Id.*

Figure 16: Startup Density 2006 – 2014[26]



26 *Id.*

Special Section: Housing in North County

BW Research recently teamed with London Moeder Advisers to follow-up on a 2016 study of the economic impacts of housing on the regional San Diego County economy. This study focused more specifically on the economy and businesses in North County and the I-15 corridor. The initial study and the follow-up research looked to:

- Assess and update the impact housing has on the region's workforce and labor supply;
- Evaluate and update the impact housing has on the region's employers and their businesses; and,
- Identify the impact housing has on regional and local economic development.

In 2018, after updating the analysis of economic, demographic, and labor market data, the follow-up research included a survey of 102 businesses in San Diego's North County. The random sampling of businesses was stratified by geography and business size (number of employees). The survey was meant to assess the priorities of San Diego North County businesses and the challenges facing the region's employers.

What We Have Learned

The research findings for the housing studies in San Diego County (2016) and North San Diego County (2018) illustrated three key findings:

<u>High rent to income ratios.</u> In North County, approximately half of renters continue to spend more than 35 percent of their gross income on housing; this is a higher portion than communities in the Bay Area, such as Santa Clara County. The discrepancy between increased housing costs and little to no wage increases continues to exacerbate this challenge and is negatively impacting employer's ability to find qualified workers.

<u>Challenges to talent attraction and retention</u>. Retaining and attracting talent was the biggest challenge identified by San Diego County businesses when asked to identify the biggest obstacle for their firm's growth. In fact, the need to attract and retain talent was identified more often than the overall cost or expenses associated with doing business in the region. This challenge of recruiting and retaining talent that can find housing in the area continues to be a real difficulty for most North County employers. Almost one in three (30 percent) North County employers indicated that "recruiting employees who can find adequate housing within a reasonable distance from work" was a great difficulty and another 43 percent indicated that it is providing some difficulty. Almost three-quarters (74 percent) of North

County businesses are having at least some difficulty "retaining valuable employees who want to purchase housing within a reasonable distance from work".

Ability to find reasonably-priced housing. Of the eight issues tested, the ability for employees to find reasonably priced housing that is close to work was the issue San Diego County employers were most dissatisfied with (28 percent). The only other issue to register just over 10 percent dissatisfaction was the ability to attract new employees that live outside the region. The nexus between talent and housing was a consistent theme in the employer survey results, as the proportion of employers dissatisfied with employee ability to find reasonably priced housing close to work increased from 28 to 47 percent between 2016 and 2018.

Provision of employee housing assistance. Employers are increasingly taking things into their own hands. Almost one-third (31 percent) of North County employers in the 2018 survey provided some type of housing assistance for their employees to move in or near North County. This housing assistance could take the form of relocation or mortgage assistance, housing allowances, or company-provided housing. Another 21 percent of North County employers are possibly considering some type of housing benefit or subsidy for their North County employees.

Growing Challenges

The housing and employment challenges uncovered in 2016 have since worsened. A growing proportion of employers are indicating dissatisfaction with the situation and noting the difficulty they are having with finding and keeping qualified workers, particularly as it relates to their ability to find housing.

Perhaps most troubling, it seems the challenges in recruitment and retention and the nexus to high housing costs is having a notable impact on employer sentiments. In 2016, **47 percent** of North County businesses indicated that San Diego County was an excellent place to do business; in 2018, that number **dropped to 26 percent**. Over the same time, the proportion of North County employers that indicated difficulty finding qualified applicants went from four percent indicating great difficulty and another 56 percent indicating some difficulty, to 17 percent great difficulty and another 61 percent indicating some difficulty.

Unemployment levels have dropped below three percent, commute times have increased, and job growth has started to slow in North County, as employers face an increasingly tight labor market with less available qualified job applicants.

These results indicate that North County employers are already feeling the costs associated with inadequate housing supply and the direct impact it has upon a qualified local workforce.

Special Section: Job Volatility in North County

The world of work is continually changing and many of the jobs of today will not be the jobs of tomorrow. BW Research recently (2017 data) completed a national analysis of job volatility by occupation and industry to better understand how the world of work could change over the next five to 10 years. The analysis focused more specifically on the impact that ***technology and automation*** can have on employment opportunities into the future. The analysis looked to:

- Assess occupations and industry employment patterns based on current job skills and the likelihood that those skills could be replaced by technology or some related advancement in automation;
- Evaluate and better understand the magnitude of change that is likely to occur in employment composition by industry and occupational segment over the next five to 10 years; and,
- Measure the potential job volatility within a given region, such as North County, and the impact it could have on leading industry clusters.

The national job volatility analysis included a review of historical industry and occupational trends from 2010 to 2016 as well as an examination into the skills and abilities that are required in today's occupations. The examination of occupational skills was built upon an assessment of the likelihood of that skill being automated and its relative importance for the position. [27]

From an occupational perspective, North County has less highly volatile jobs than the national average.

Nationally, 52 percent of employment is currently found in positions that are considered highly volatile or somewhat highly volatile according to the national analysis. Approximately 48 percent of current North County employment would fall into a higher volatility category. These findings still indicate that almost half of North County employment will likely be impacted by automation and technology in the next five to 10 years, changing the skills and training required for the position or changing the position and title altogether.

Occupationally, North County has a relatively low concentration of:

- Transportation and material movement positions
- Production positions
- Installation, maintenance, and repair positions

[27] Automation Assessment included information and analysis from the following study: https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf

This contributes to the region's below average proportion of high volatility jobs. However, North County does have a relatively high concentration of food preparation and service positions, which have the second highest job volatility score.

From an industry perspective, North County has a low concentration of higher volatility industry employment, except for the Tourism, Hospitality, and Recreation cluster.

Several of the industry clusters with the greatest proportion of highly volatile occupations, have below average employment in North County. Industry clusters such as, logistics and other manufacturing[28], have below average employment in North County. Of the five industry clusters with the lowest average job volatility score, only Tourism, Hospitality, and Recreation, a single industry cluster, had above average employment in North County.

At the other end of the spectrum, the industry clusters with the highest percentage of low volatile occupations, are more mixed in North County. The region has above average employment in Information and Communication Technologies as well as Biotechnology and Biomedical Devices, while having below average employment in Education and Knowledge Creation, Healthcare, as well as Finance, Insurance, and Real Estate.

The table below shows current national and North County employment for the four primary[29] industry clusters with the highest job volatility scores as well as their current North County employment concentration.

Table 3: Highest Volatility Industry Clusters

Industry Clusters	US Employment (2017)	NC Employment (2017)	NC Employment Concentration
Logistics	7,064,478	15,385	61%
Agriculture and Food	4,378,761	14,490	93%
Other Manufacturing	5,622,049	14,234	71%
Tourism, Hospitality, and Recreation	12,827,683	49,182	108%

[28] Other Manufacturing includes all manufacturing that is not found in one of the other 17 industry clusters.
[29] Primary Industry Clusters are defined as having at least one million people currently employed in the United States.

Generally, positions with higher median pay, both nationally and within North County, are less likely to be categorized as a highly volatile.

In North County, the median pay of those occupational categories with the highest volatility score, was approximately $33,000 annually. Those occupational categories with a negative volatility score, meaning less likely to be in a volatile position, had a median annual pay of approximately $67,000. It is also worth noting that not all low volatility occupational categories were higher paying; Community and Social Service positions had a low volatility score and offered a median wage, in the United States, below $45,000 annually.

Why is understanding Job Volatility important for educators, employers, and economic developers?

As North County's educators, employers, and regional economic developers plan for a prosperous North County, all three will generally agree that stable higher-paying occupations and industry clusters are a vital element in any successful region. Educators need to be aware of those occupational pathways and industries that are likely to experience considerable change and have their relevant curriculum change accordingly. Employers who are examining their talent pipeline need to be aware of those positions that will face different skill and knowledge requirements into the future. Lastly, regional economic development stakeholders need to be aware of the changing employment landscape for different industry clusters and what that means for employment opportunities in their region.

People

In examining a region's economic health, it is important to look not only at economic indicators, but also the composition of the region's current and future talent. North County residents contribute to overall economic health as workers through creative innovation as well as to the region's quality of life. Social characteristics like demographics, education, and income highlight the hiring landscape for employers and income sustainability for the workforce—does the income distribution reflect the higher costs of living in North San Diego County. Furthermore, examining the gap in North County's resident workforce against the number of workers in North County by specific occupational categories provides insight as to where the region is a net importer or exporter of specific talents and skillsets.

People

Demographics

The following section examines North County's age distribution compared to other regions. This is important in the context of the local economy, and particularly job growth, as growth in the working age population determines the level of jobseekers and labor supply for the region's businesses.

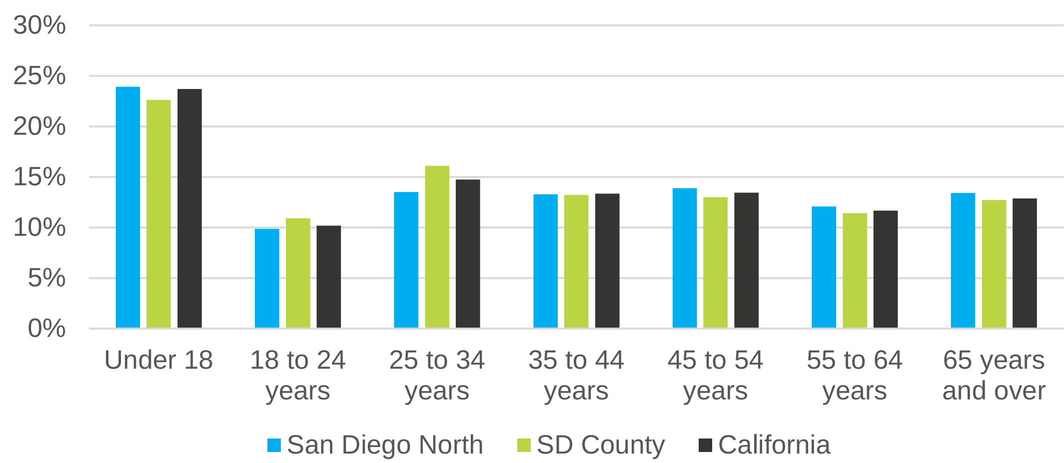
About 24 percent of San Diego North County's population is under the age of 18; this is about one point higher than the countywide average. Thirty-nine percent of the region's population is 45 years of age or older, about two points higher than the statewide average and one point higher than the countywide average.

North County has a healthy proportion of working-age adults, roughly ages 18 to 54; this age cohort represents just over half, or 51 percent of the population—comparable to the rest of the county, state, and nation (Table 4, Figure 17). In general, North County's population is becoming slightly more concentrated in the younger and older range, while middle-aged residents are shrinking. In 2010, 31 percent of the population was under 25 compared to 34 percent in 2016. At the same time, residents between the ages of 25 and 54 shrank by about four points from 45 percent in 2010 to 41 percent in 2016. Residents over the age of 54 comprised 26 percent of the population in 2016, compared to 24 percent in 2010.

WHY DOES THIS MATTER?

The regional age distribution provides a better understanding of a region's potential workforce, student, and senior population. These populations impact regional healthcare demand, education, training, and childcare investments.

Figure 17: Age Distribution, 2016[30]



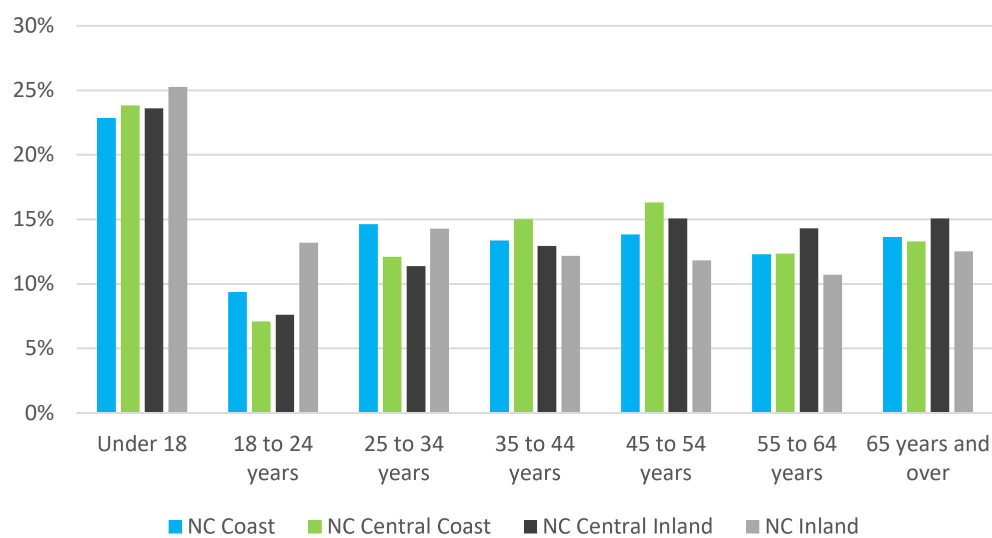
[30] Source: American Community Survey (ACS) 2016 5-year estimates

Table 4: Age Distribution, 2016[31]

	North County	San Diego County	California	United States
Under 18	23.9%	22.6%	23.7%	23.1%
18 to 24 years	9.9%	10.9%	10.2%	9.8%
25 to 54 years	40.7%	42.3%	41.6%	39.9%
55 to 64 years	12.1%	11.4%	11.7%	12.6%
65 years and over	13.4%	12.7%	12.9%	14.5%

The Inland region has a higher proportion of young adults under the age of 25 compared to the rest North County's sub-regions, while Central Coast and Central Inland have a higher proportion of older residents (Figure 18).

Figure 18. Age Distribution by Sub-Region, 2016



[31] Source: American Community Survey (ACS) 2016 5-year estimates

People

Healthcare

In general, North County has a high proportion of insured individuals in the region—89 percent compared to the state- and nationwide averages of 87 and 88 percent respectively. North County also has a higher proportion of insured individuals compared to South and East San Diego County (Table 5).

In North County, individuals earning less than $25,000 per year in household income are slightly more likely to be insured compared to the state and national averages (Table 6).

Table 5. Healthcare Coverage by Region, 2016[32]

Area/Region	% Insured	% Uninsured
San Diego North County	89.0%	11.0%
San Diego South County	86.5%	13.5%
Sam Diego East County	88.8%	11.2%
California	87.4%	12.6%
United States	88.3%	11.7%

Table 6. Percent Insured by Household Income, 2016[33]

	Under $25,000	$25,000 to $49,000	$50,000 to $74,999	$75,000 to $99,999	$100,000 and over
SD North County	82.4%	80.9%	85.4%	90.6%	94.9%
California	81.9%	80.7%	84.8%	88.9%	94.1%
United States	81.4%	82.3%	87.5%	91.4%	95.1%

[32] Source: American Community Survey (ACS) 2016 5-year estimates. Based on civilian noninstitutionalized population.
[33] Source: American Community Survey (ACS) 2016 5-year estimates

People
Education

North County has a higher-than-average concentration of residents with a college degree. Just over half, or 51 percent, of the population has at least an Associate's degree if not a graduate or professional degree; this is nine to 10 points higher than the county, state, and nationwide average, as well as other San Diego County sub-regions such as South and East County (Table 7, Figure 19).

The educational distribution varies by sub-region, with the Central Coast having a much higher concentration of individuals with a Bachelor's degree or higher compared to the rest of North County. About two in three residents in the Central Coast have at least a Bachelor's degree. On the other hand, Inland North County has the highest concentration—almost 40 percent—of individuals with a high school diploma or less (Figure 20). Figure 21 highlights the high concentration of educated individuals around the Central Coast.

WHY DOES THIS MATTER?

Educational attainment metrics provide an initial assessment of how skilled a regional workforce is today and will be in the immediate future.

Table 7: Educational Attainment for the Population 25 Years and Older, 2016[34]

	North County	East County	South County	San Diego County Overall	California	United States
High school or less	**28.5%**	37.9%	33.5%	32.4%	**38.1%**	40.5%
Some college or Associate's	**30.5%**	36.8%	29.8%	31.1%	**29.0%**	29.2%
Bachelor's or higher	**40.9%**	25.3%	36.7%	36.5%	**32.9%**	30.3%

[34] Source: American Community Survey (ACS) 2016 5-year estimates

Figure 19: Educational Attainment for the Population 25 Years and Older, 2016[35]

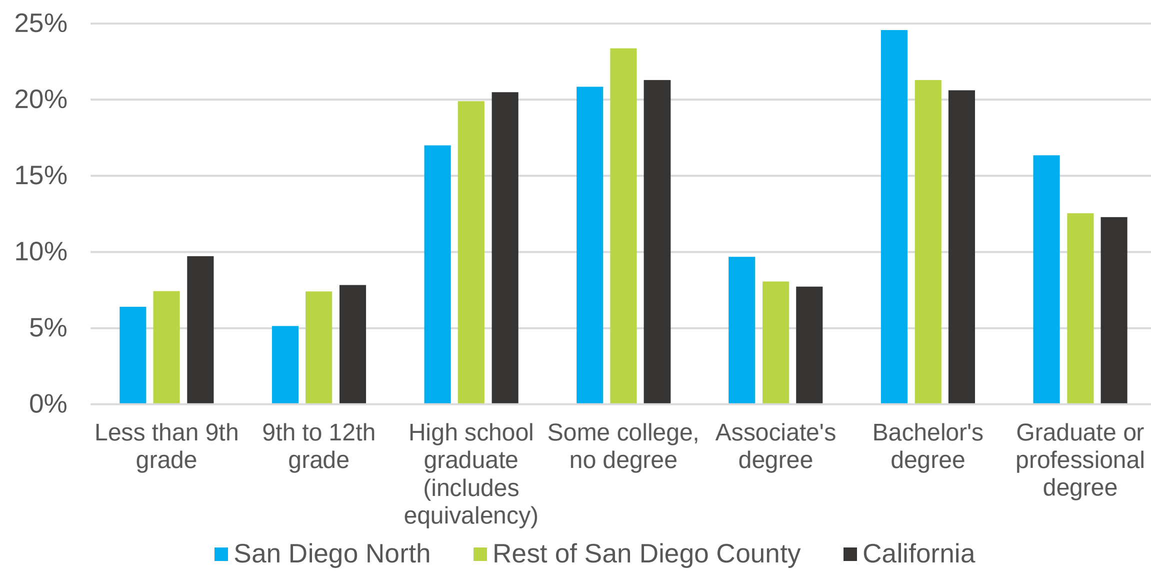
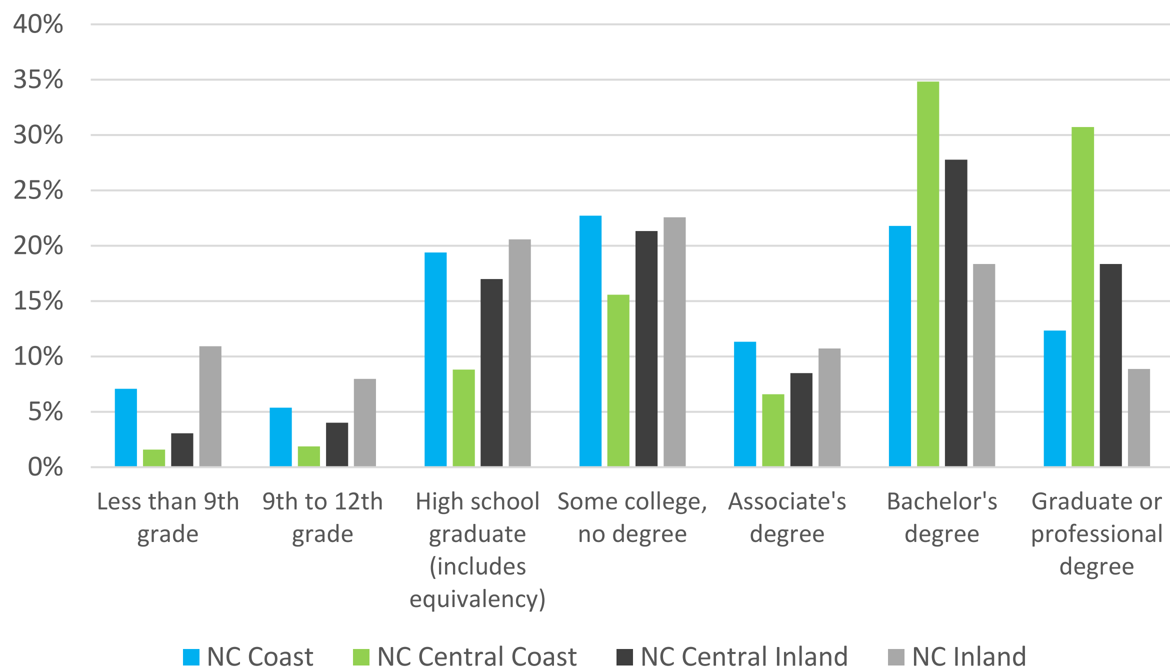
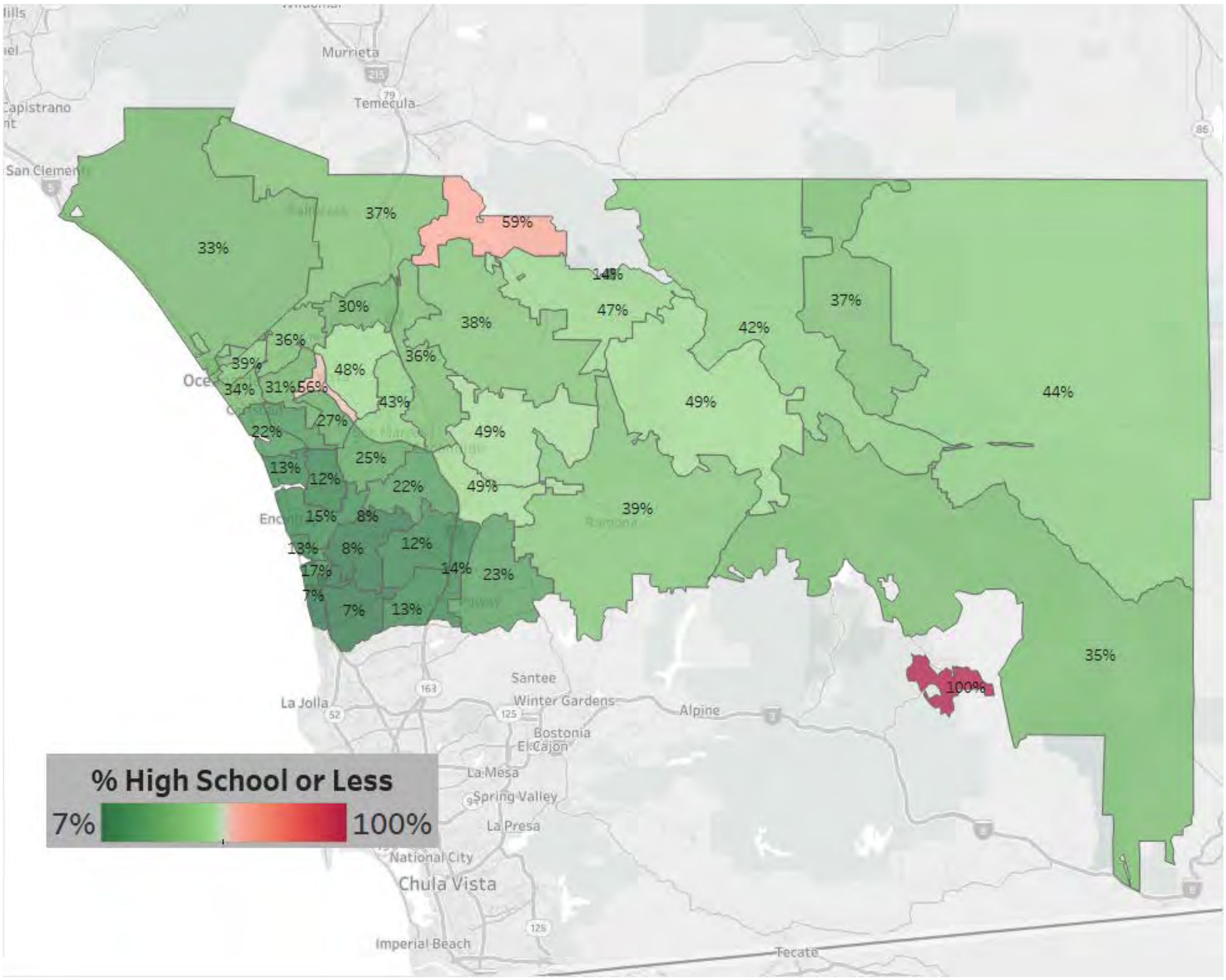


Figure 20: Educational Attainment for Population 25 Years and Older by Sub-region, 2016[36]



[35] Source: American Community Survey (ACS) 2016 5-year estimates
[36] Source: American Community Survey (ACS) 2016 5-year estimates

Figure 21: Proportion of Population 25 Years and Older in North County with a High School Degree or Less by Zip Code, 2016[37]



[37] Source: American Community Survey (ACS) 2016 5-year estimates

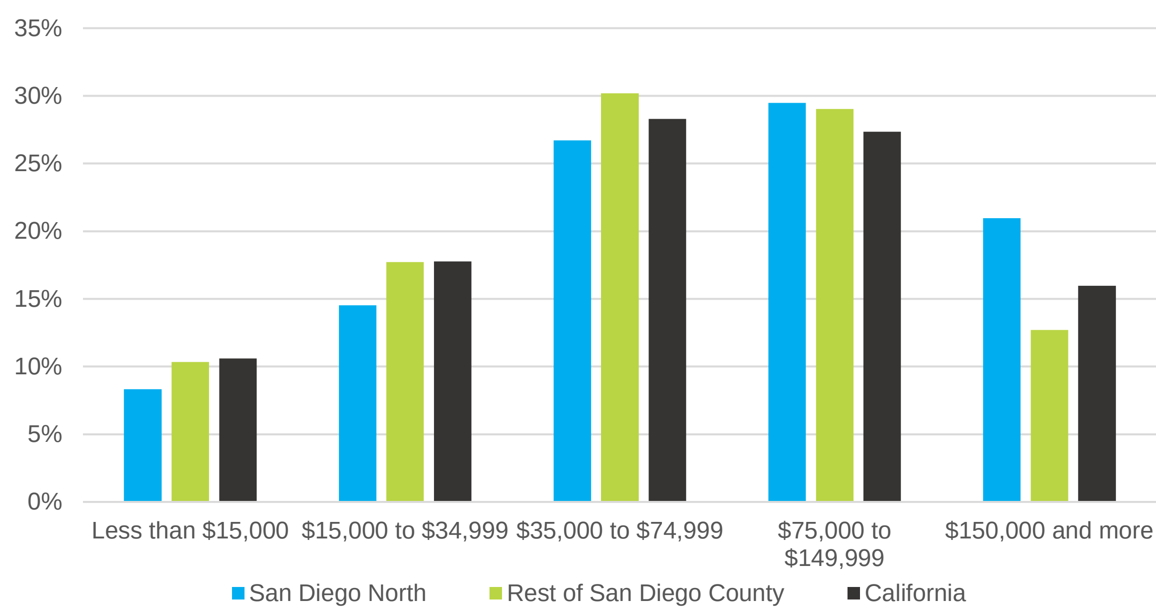
People

Income Distribution

North County San Diego has a significantly higher proportion of households who earn $150,000 a year or more—21 percent compared to about 16 percent for the overall county and statewide average and 11 percent for the national average. In general, just over half the population earns at least $75,000 a year.

Both the Central Coast (37 percent) and Central Inland (25 percent) have a higher-than-average concentration of households earning an annual average income of $150,000 a year or more. On the contrary, the Coast (25 percent) and Inland (30 percent) have more households that earn less than $35,000 a year compared to the North County overall average of 23 percent (Figure 22, Table 8, Figure 23).

Figure 22: Household Income Distribution, 2016[38]

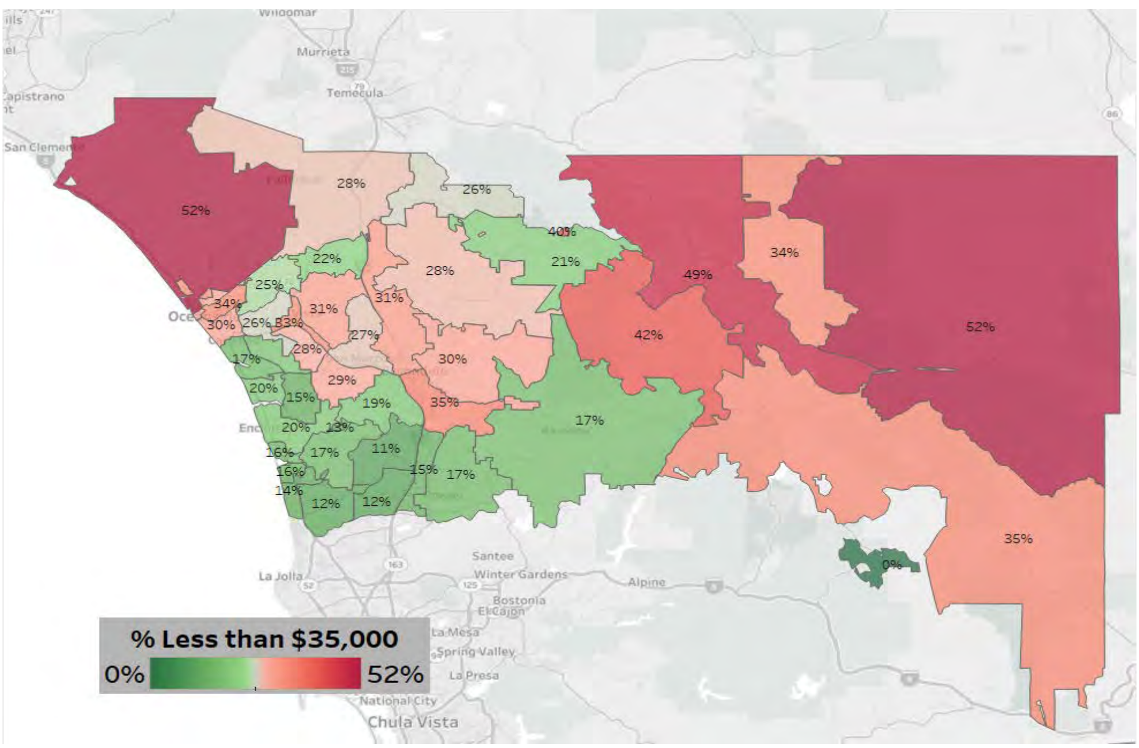


[38] Source: American Community Survey (ACS) 2016 5-year estimates

Table 8: Household Income Distribution by Sub-region, 2016[39]

Sub-Region	Less than $35,000	$150,000 or more
NC Coast	25.3%	15.6%
NC Central Coast	14.7%	36.7%
NC Central Inland	15.6%	24.8%
NC Inland	30.0%	12.8%
San Diego North County	22.9%	21.0%
San Diego County	26.1%	15.8%
California	28.4%	16.0%
United States	32.2%	11.1%

Figure 23. Proportion of Population in North County with Household Income Less than $35,000 by Zip Code, 2016[40]



[39] Source: American Community Survey (ACS) 2016 5-year estimates
[40] Source: American Community Survey (ACS) 2016 5-year estimates

People

Workforce

North County's resident workforce—or those individuals that live in North County and are in the labor force—is larger than the number of people that are self-employed or work at North County firms. There are a total of 551,544 individuals in the resident workforce compared to 470,617 individuals working in North County, indicating that the region is a net exporter of talent, of a little more than 80,000 individuals.

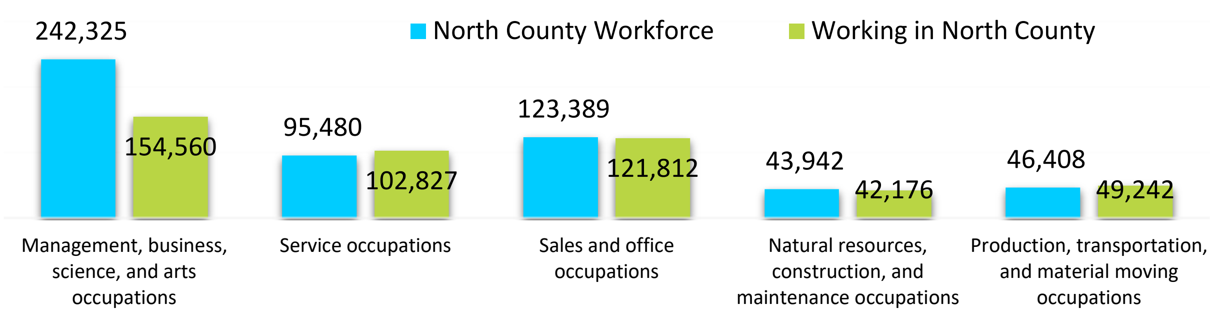
The largest gap between resident workforce and those employed in the region is found in the management, business, science, and arts occupations. There are 242,325 individuals in this occupational category living in North County, yet only 154,560 such jobs in North County; this means that the region is a net exporter of high-skill, higher-pay positions (87,765 jobs). On the other hand, the region is a net importer of workers in service occupations (7,347 jobs) as well as production, transportation, and material moving occupations (Figure 24).

The region could continue to benefit from economic development efforts targeting employers whose North County employees must face daily commutes on Interstates 5 and 15. While North County is facing a shortage of available industrial and commercial space, the region is not entirely built out and thus there remains opportunities for focused economic development attraction efforts. Furthermore, the net import of service and production workers highlights the challenges North County faces in providing sufficient middle-tier housing. Key to the region's sustainable economic development will be the build out of a sufficient supply of housing at various price points to support the entirety of North County's workforce across the wage spectrum.

WHY DOES THIS MATTER?

The resident workforce versus employees working in the region metric provides a direct measure of how a region's workforce overlays with the available jobs in a given area. This analysis has important implications for transportation and commuting, housing, employment opportunities, and ultimately a region's economic vitality and quality of life.

Figure 24: Resident Workforce vs. Working in the Region by Occupations[41]



[41] Source: American Community Survey (ACS) 2016 5-year estimates and EMSI 2018 q.1 Class of Worker, QCEW and Non-QCEW employees.

Place

Another important component of economic vitality is a region's ability to support both businesses and residents with affordable office rent and housing. Housing costs often impact the quality of life and labor supply—inadequate supply or high costs might drive residents out of the region at the same time deterring others from moving in. Unaffordable housing also prompts workers to move to more affordable areas outside of North County, increasing commute times, traffic, and wear on roads and infrastructure. The amount of time spent commuting to work also affects the quality of life and productivity—as workers spend more time in traffic, they are dedicating less time to both work and leisure activities such as spending time with family, in the community, or on mental and physical health and well-being.

Place

Commercial Real Estate

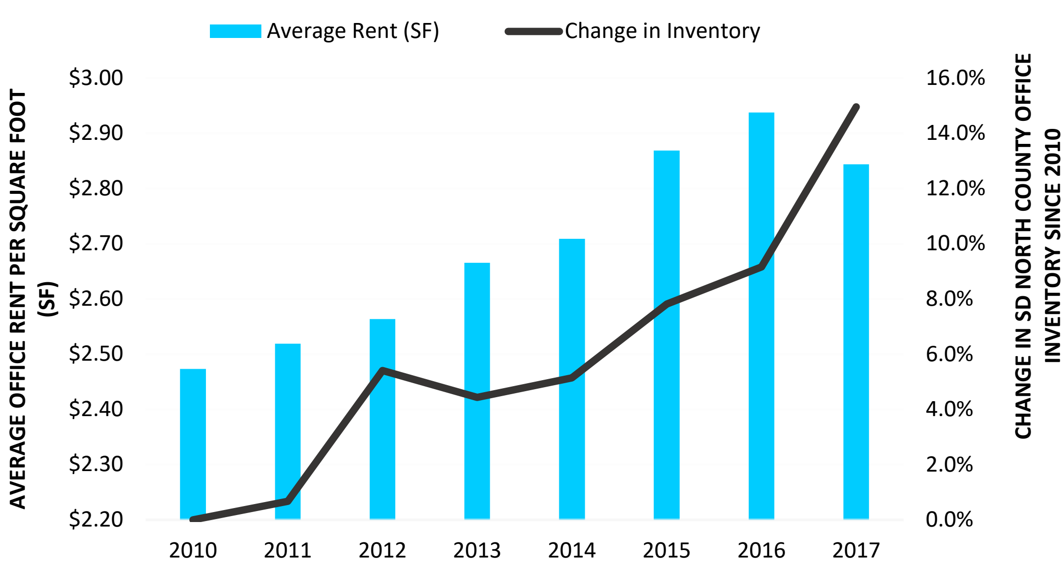
To complement the region's continuous job growth, North County has also seen steady increase in office inventory since 2010—roughly 15 percent increase over eight years. At the same time, average office rent has increased steadily from 2010 through 2016. However, between 2016 and 2017, average rent per square footage declined by about three percent (Figure 25).

Average office rent varies by sub-region, where the Central Coast has had the highest average rent per square footage since 2010. The remaining three sub-regions are roughly similar in rent—about $2.00 to $2.50 per square footage in 2017—with Central Inland having the lowest historical rents (Figure 26).

WHY DOES THIS MATTER?

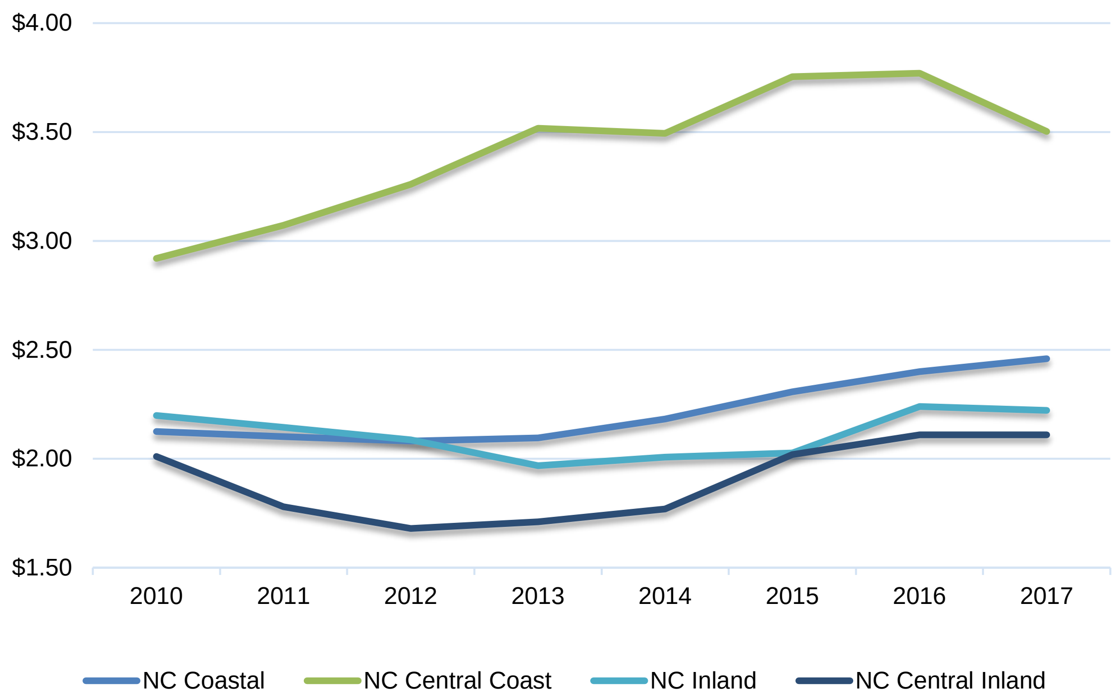
The changing cost of commercial real estate provides a measure of the evolving demand for business space in the region as well as the changing costs of doing business in North County.

Figure 25: Average Office Rent and Change in Office Inventory, 2010 to 2017[42]



[42] Source: Cushman and Wakefield

Figure 26: Average Office Rents by Sub-Region, 2010 to 2017[43]



[43] Source: Cushman and Wakefield

People

Housing Insecurity

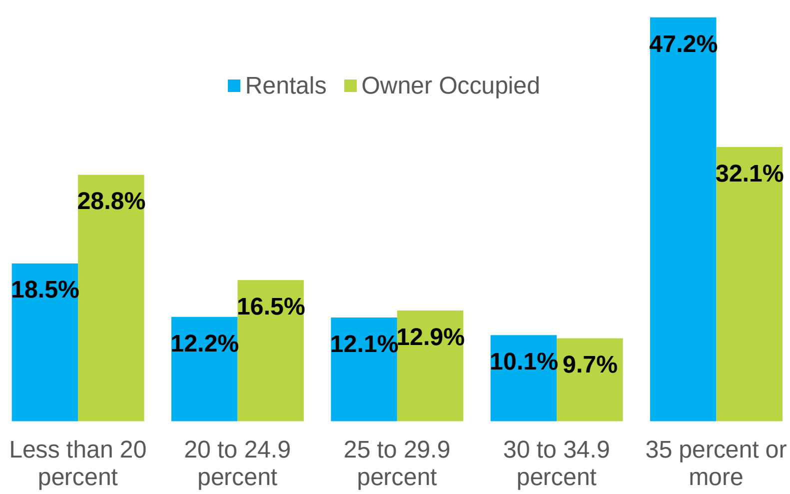
North County's housing market for renters is comparable to both state and county averages. The proportion of household income that must be dedicated to housing is particularly high for renters. Almost half (47 percent) of renters in North County and a third of homeowners must spend 35 percent or more of their household income on monthly rent (Figure 27). While the proportion of homeowners that spend more than a third of household income on monthly mortgage payments has decreased by four points since 2014, renters have remained unchanged. About 45 percent of all households in North County were renters in 2016; this proportion has remained quite steady since 2013.

Renters along the Coast and Inland are more likely to spend 35 percent or more of their household income on rent—roughly 51 percent of homes on the Coast and Inland, compared to the regional average of 47 percent. In contrast, renters in the Central Coast and Central Inland are lower than the regional average, at 40 and 34 percent respectively (Figure 28).

WHY DOES THIS MATTER?

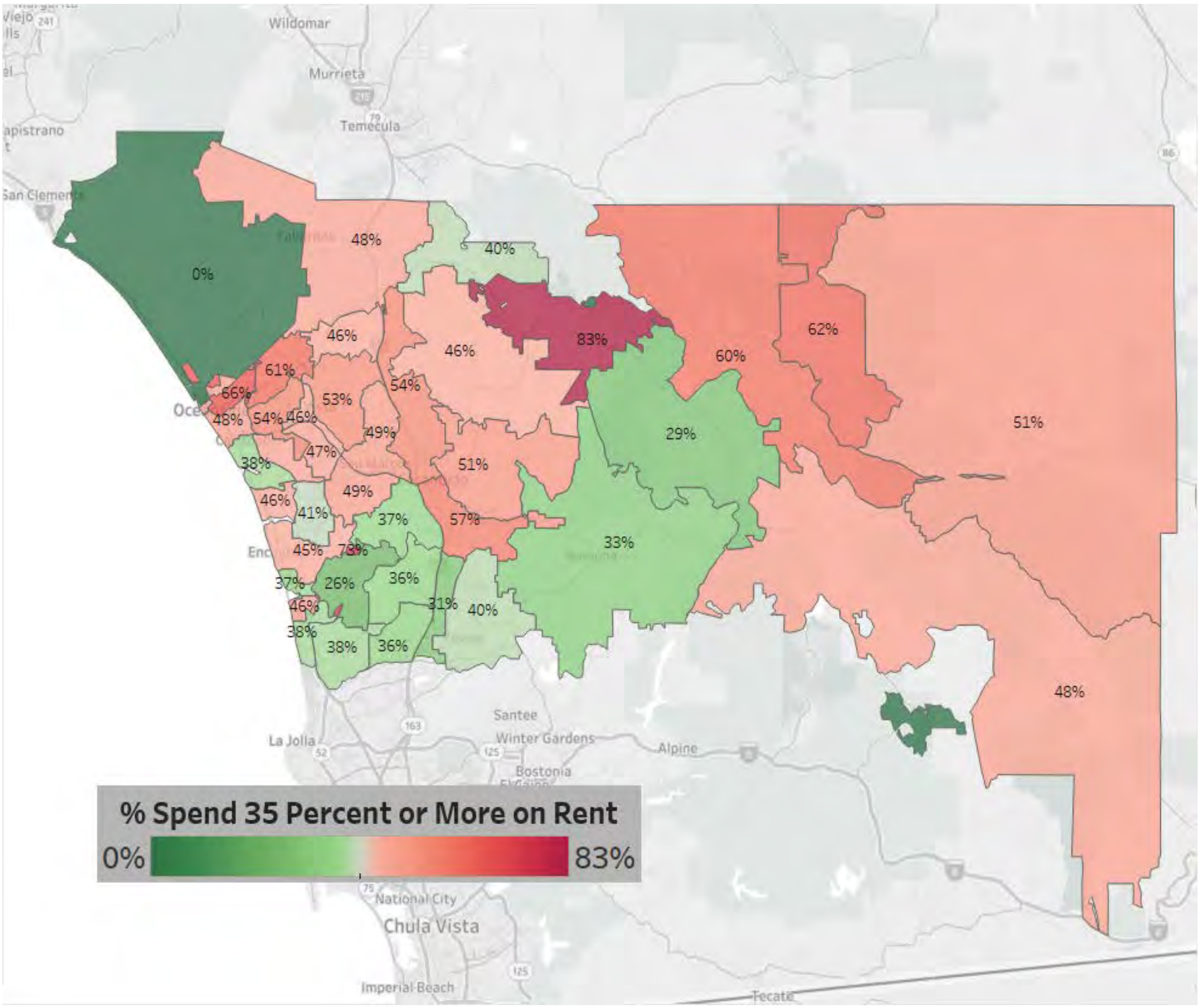
Housing costs have largely taken over food as the primary expense of a household. Housing costs as a percentage of gross income tell a complete story of the total expense of living in a region.

Figure 27: Housing Costs as a Percentage of Household Income, 2016[44]



[44] Source: American Community Survey (ACS) 2016 5-year estimates

Figure 28. Proportion of Population in North County that Spends 35 Percent or More of Household Income on Rent by Zip Code, 2016[45]



[45] Source: American Community Survey (ACS) 2016 5-year estimates

Place
Commute

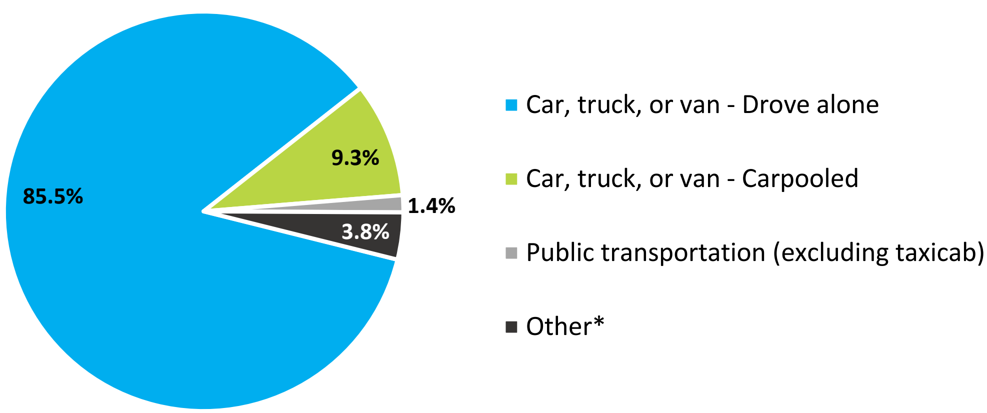
The majority of workers (86 percent) travel to work alone in a motor vehicle—car, truck, or van (Figure 29). In fact, this number has continued to increase since 2014, where only 415,600 individuals drove to work alone, to the 574,332 workers who drove to work alone in 2016. At the same time, the proportion of individuals that use public transportation has declined to only 1.4 percent from 4.3 percent in 2015. The decline in public transit use shifted entirely to driving alone instead of other categories—individuals who stopped taking public transit resorted to driving alone instead of carpooling, walking, or biking.

In general, North County has a higher proportion of workers that commute to work alone compared to the county, state, and nationwide averages (Table 9).

WHY DOES THIS MATTER?

Commuting times and behavior have a considerable impact on residents perceived quality of life. They also impact employer's ability to recruit workers for a larger geographic area.

Figure 29: Type of Travel for Workers 16 Years and Older, 2016[46]



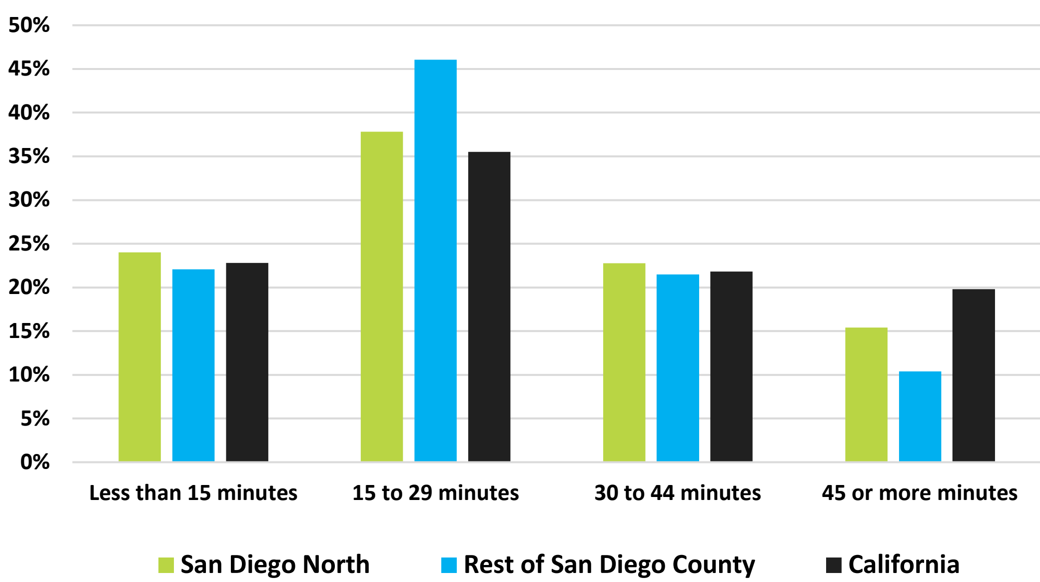
[46] Source: American Community Survey (ACS) 2016 5-year estimates. *Other includes biking, walking, taxicab, and motorcycle.

Table 9: Type of Travel for Workers 16 Years and Older by Region, 2016[47]

Region	Car, truck, or van – Drove alone	Car, truck, or van - Carpooled	Public transportation (excluding taxicab)	Other
San Diego North County	85.5%	9.3%	1.4%	3.8%
San Diego County Overall	81.6%	9.8%	3.2%	5.4%
California	77.7%	11.2%	5.5%	5.6%
United States	80.1%	9.7%	5.3%	4.8%

About two in five workers in North County spend at least 30 minutes if not more in getting to work. This proportion is higher than both the rest of San Diego County and the statewide average (Figure 30). The percentage commuting for over 45 minutes has increased slightly over the last several years. Between 2014 and 2016, the proportion of individuals who must commute at least 45 minutes to work increased by one point to 15.4 percent in 2016. In general, North County has a higher proportion of individuals who commute for 45 minutes or longer to get to work than South (11 percent) or East County (15 percent) (Figure 31).

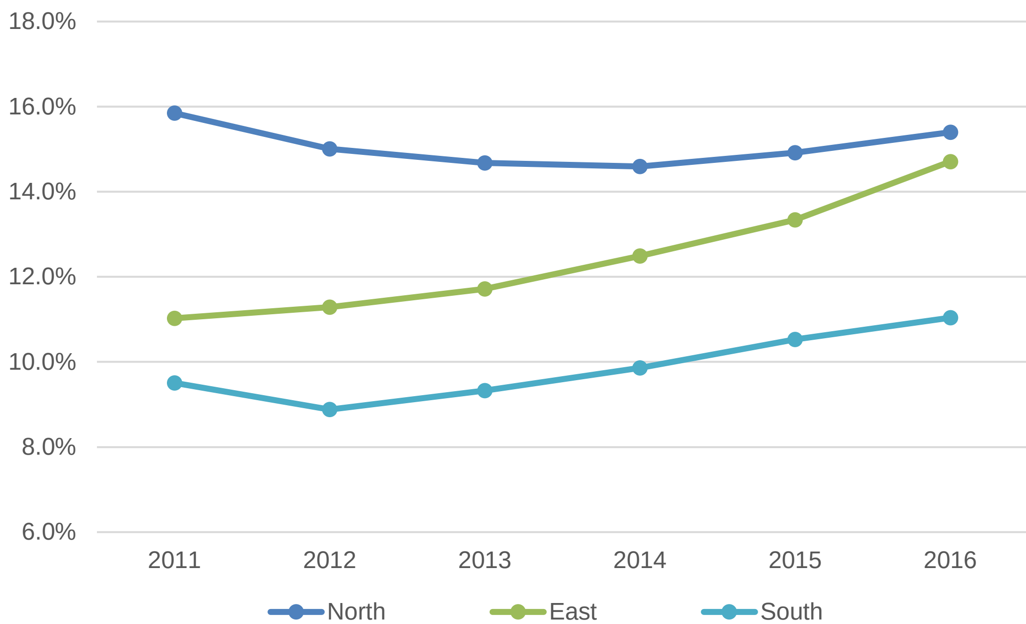
Figure 30: Travel Time for Workers 16 Years and Older by Region, 2016[48]



[47] *Id.*

[48] Source: American Community Survey (ACS) 2016 5-year estimates

Figure 31. Percent of Workers 16 Years and Older that Commute 45 or More Minutes to Work[49]



[49] Source: American Community Survey (ACS) 2016 5-year estimates

Appendix A: Research Methodology

Data compiled for this report were drawn from secondary data sources.

Secondary Research

Complete employment, gross regional product, population, and educational completion statistics datasets for San Diego North County were defined by zip code, census tracts, or classification of instructional programs (CIP) codes.

For this study, industry clusters were defined using the North American Industry Classification System (NAICS) codes.

Complete employment data was compiled from EMSI 2018 q.1 Class of Worker dataset for the zip code defined North County. The EMSI dataset includes state and federal level data sources and include QCEW and non-QCEW workers.

EMSI estimates are partial projections based on the Quarterly Census of Employment and Wages (QCEW) and Current Employment Statistics (CES) provided by the Bureau of Labor Statistics (BLS).

Complete employment datasets were also called directly from the Economic Development Department (EDD) and Bureau of Labor Statistics (BLS).

Population statistics were compiled from the Census Bureau's American Community Survey (ACS) 2016 5-year estimates for the census tract or zip code defined North County.

Patent data was compiled using the United States Patent and Trademark Office.

Appendix A:

North County City & Zip Codes

North County Coast Region

City	Zip Codes
Carlsbad	92008, 92009, 92010, 92011
Oceanside	92049, 92051, 92052, 92054, 92056, 92057, 92058
Camp Pendleton	92055
Vista	92081, 92083, 92084, 92085

North County Central Coast Region

City	Zip Codes
Cardiff by The Sea	92007
Del Mar	92014
Encinitas	92024
Solana Beach	92075
San Diego	92127, 92129, 92130
Rancho Santa Fe	92067, 92091

North County Central Inland Region

City	Zip Codes
Julian	92036
Poway	92064
Ramona	92065
San Diego	92128

North County Inland Region

City	Zip Codes
Mount Laguna	91948
Bonsall	92003
Borrego Springs	92004
Escondido	92025, 92026, 92027, 92029, 92030, 92033, 92046
Fallbrook	92028, 92088
Pala	92059
Palomar Mountain	92060
Pauma Valley	92061
Ranchita	92066
San Luis Rey	92068
San Marcos	92069, 92078, 92079, 92096
Santa Ysabel	92070
Valley Center	92082
Warner Springs	92086

Appendix D.

Borrego Water District Water Rate Affordability Assessment

July 24, 2018

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

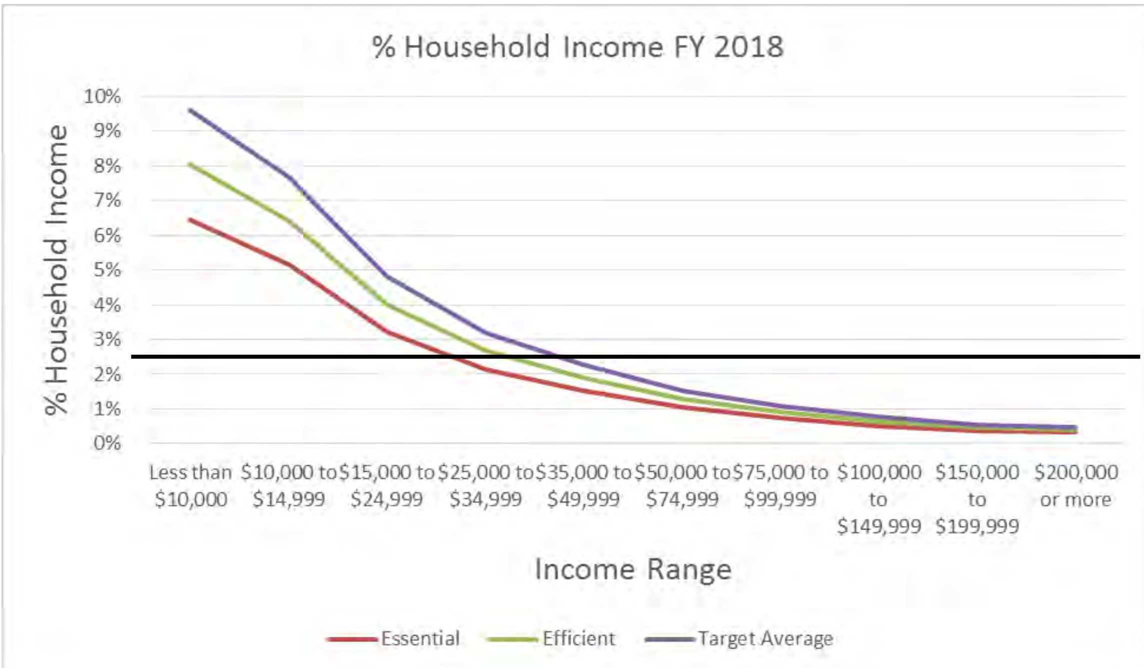


Figure 3-2: Percent Household Income, FY 2040

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.

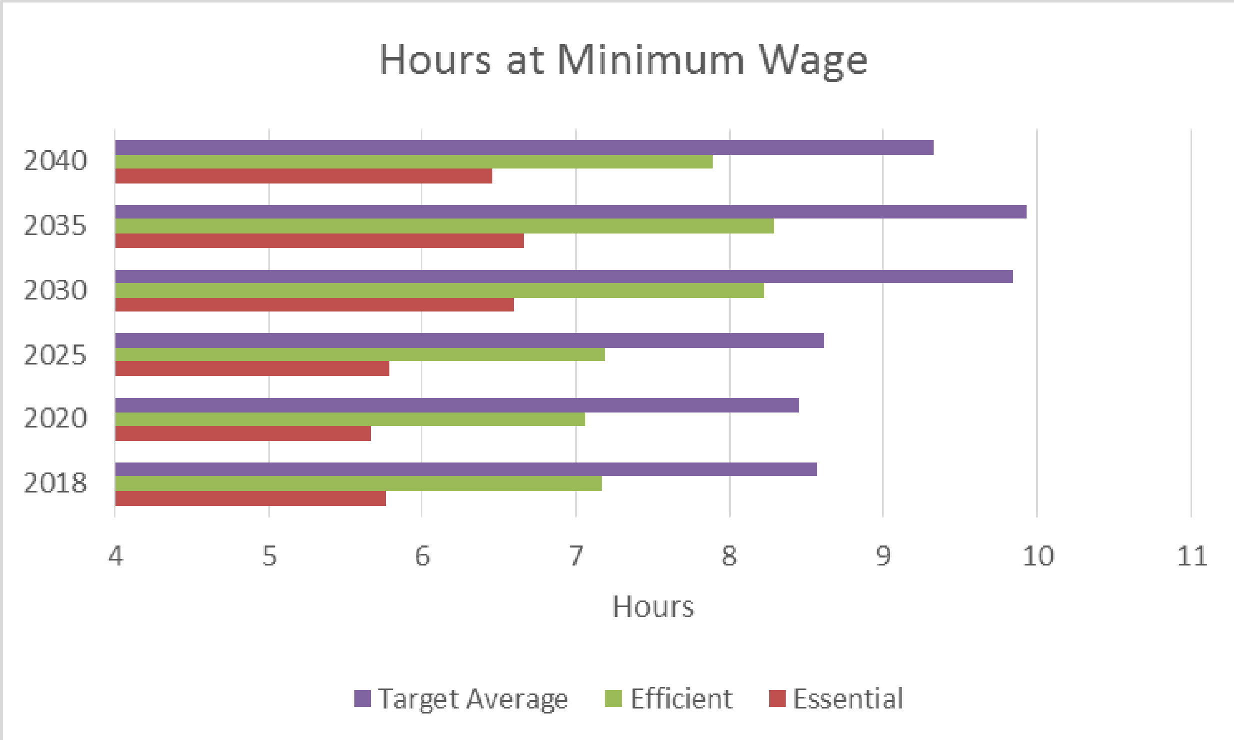
While there is no standard number of hours to suggest what is affordable or unaffordable, Teodoro suggests a value of no more than 8.0 for combined water and sewer service which represents eight hours of labor at minimum wage for a monthly bill. In many outcomes in Table 3-7 the eight hour rule is surpassed 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

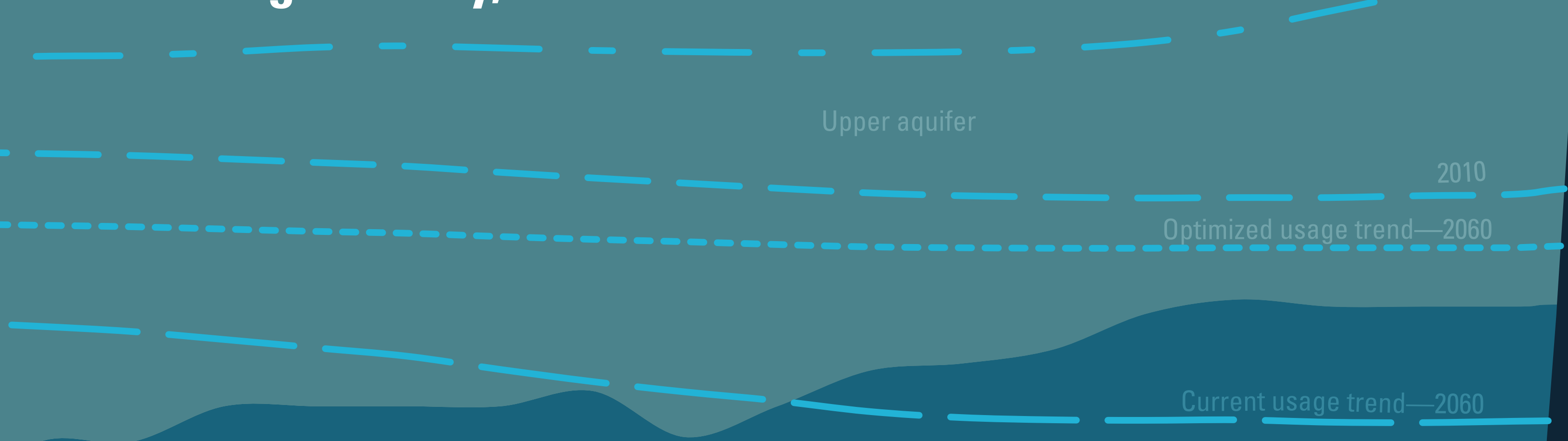
Appendix E.

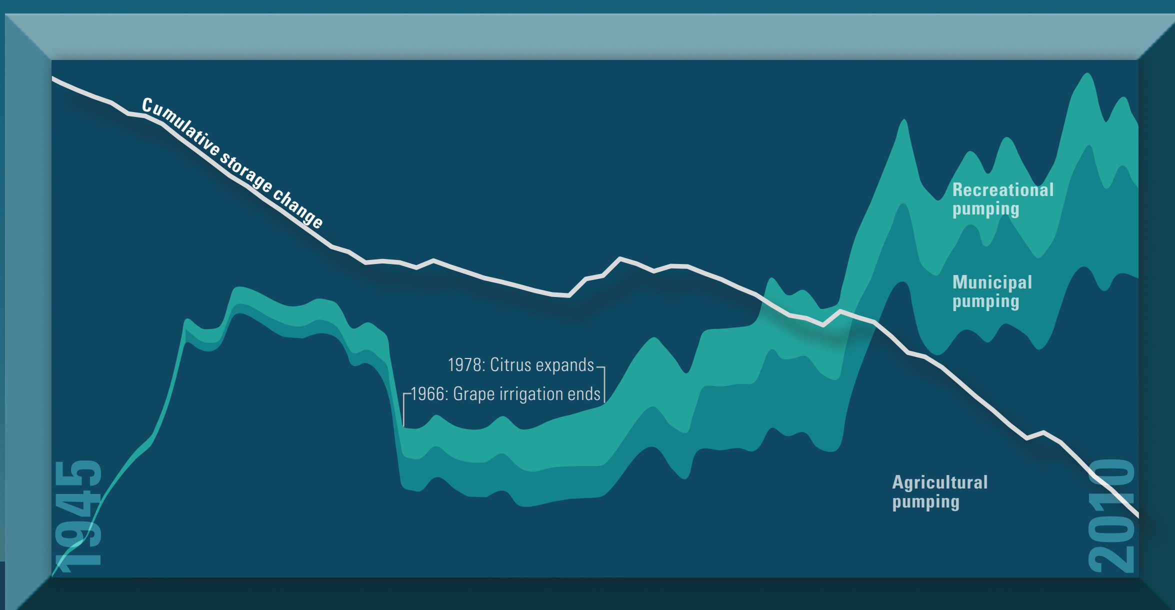
United States Geological Survey Scientific Investigations Report 2015-5150

NOTE: This Report is available at https://pubs.usgs.gov/sir/2015/5150/sir20155150.pdf and not reproduced in this LDC Report Copy science for a changing world

Prepared in cooperation with the Borrego Water District

Hydrogeology, Hydrologic Effects of Development, and Simulation of Groundwater Flow in the Borrego Valley, San Diego County, California





Scientific Investigations Report 2015–5150

U.S. Department of the Interior
U.S. Geological Survey

Faunt and others—**Hydrogeology, hydrologic effects of development, and simulation of groundwater flow in the Borrego Valley, San Diego, California**—Scientific Investigations Report 2015–5150

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Appendix F.

Borrego Springs Subbasin Groundwater Quality Risk Assessment

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DRAFT WORKING TECHNICAL MEMORANDUM

To: Geoff Poole, General Manager, Borrego Water District
From: Trey Driscoll, PG, CHG; Dan Ritter, PhD; and Jill Weinberger, PG, PhD
Subject: Borrego Springs Subbasin Groundwater Quality Risk Assessment
Date: June 16, 2017
cc: Jim Bennett, Leanne Crow, County of San Diego
Attachment(s): Figures 1–14

EXECUTIVE SUMMARY

The Borrego Springs Groundwater Subbasin of the Borrego Valley Groundwater Basin (BVGB) has been determined to be in "overdraft."[1, 2] Recent studies estimate that water users within the Borrego Springs Groundwater Subbasin of the BVGB currently withdraw approximately 19,000 acre-feet per year (AFY) and that the "sustainable yield" of the Borrego Springs Groundwater Subbasin is 5,700 AFY. Thus, the current estimated "overdraft" rate is 13,300 AFY. The State Groundwater Sustainability Plan mandates that the BVGB attain a long-term withdrawal rate less than or equal to the sustainable yield by the end of the prescribed 20-year water reduction period, in this case by the year 2040.[3]

This Technical Memorandum has been prepared to assess the potential risk associated with temporal changes in groundwater quality that may result in exceedances of California drinking water maximum contaminant levels (MCLs) in Borrego Water District (BWD) production wells due to the long-standing critical overdraft. Thus, it assesses current and historical groundwater quality data and the inter-relationship between groundwater levels and groundwater quality. Here, based on our current understanding of groundwater quality conditions, the main constituents of concern (COCs) are arsenic, nitrate, sulfate, fluoride, total dissolved solids (TDS), and radionuclides. Of primary concern is the potential for water quality degradation and the relative risk that the groundwater supply will not meet MCLs.

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1 The overdraft of the BVGB was definitively 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.

2 The Department of Water Resources approved BWD's request for a scientific internal modification of the BVGB into the Borrego Springs Subbasin (7-024-.01) and Ocotillo Wells Subbasin (7-024.02) in October 2016.

3 The 20-year water reduction period is promulgated in CWC Section 10727.2(b).

The U.S. Geological Survey (USGS), in cooperation with the BWD, recently published Scientific Investigation Report 2015–5150 that evaluated available groundwater quality data in Borrego Springs and Ocotillo Wells Groundwater Subbasins of the BVGB (Faunt et al. 2015). The USGS found that concentrations of TDS and nitrate exceed their respective water quality standard thresholds in portions of the upper aquifer of the Borrego Springs Groundwater Subbasin (for reference with depth the BVGB is comprised of three aquifers: upper, middle, and lower). The highest concentrations of both constituents were generally found in the northern portion of the Borrego Springs Groundwater Subbasin, and the concentration of TDS was found to increase as groundwater levels decline. Sulfate, another COC, was also found to increase in concentration as groundwater levels decline. In addition to nitrate, TDS, and sulfate, other potential COCs in the BVGB include arsenic and gross alpha radiation, though the latter appears to be confined to the Ocotillo Wells Groundwater Subbasin.

Since the compilation of available groundwater quality data by the USGS in 2015, additional data have been collected by the BWD for its active production wells in 2016 and for seven private wells located in the South Management Area (SMA) of the Borrego Springs Groundwater Subbasin. This recent data indicates that arsenic concentrations exceed the California drinking water MCL of 10 micrograms per liter (μg/L) in portions of the lower aquifer in the SMA. Additionally, review of historical arsenic data for BWD wells located in the SMA indicates an increasing arsenic trend in well ID1-2, and a linear regression analysis indicates a good correlation of fit among arsenic concentration, groundwater production, and declining groundwater levels in well ID1-8. Based on the 2-year lag linear regression of groundwater production and arsenic data from well ID1-8, groundwater production in excess of 300 AFY at well ID1-8 is predicted to exceed the arsenic drinking water standard of 10 μg/L. Thus, arsenic concentrations in the lower aquifer of the Borrego Springs Groundwater Subbasin are determined to be a primary COC. Because groundwater quality data for the Borrego Springs Groundwater Subbasin are limited, further data collection and evaluation is required to verify the predicted exceedance of the arsenic drinking water standards in well ID1-8 and potential for other wells in the Borrego Springs Groundwater Subbasin to exceed the arsenic drinking water standard or other COC.

INTRODUCTION

The BVGB is located in the northeastern part of San Diego County and the western part of Imperial County (Figure 1). The BVGB was recently divided into two subbasins: Borrego Springs Groundwater Subbasin (7-024.01) and Ocotillo Wells Groundwater Subbasin (7-024.02), based on a scientific internal basin boundary modification (DWR 2016, Dudek 2016). This Technical Memorandum is primarily focused on the Borrego Springs Groundwater Subbasin of the BVGB. The boundary of the Borrego Springs Groundwater Subbasin is generally defined by the contact of unconsolidated deposits with plutonic and metamorphic basement deposits. The trace of the Coyote Creek fault, which trends northwest–southeast to the north and east of the Borrego Springs Groundwater Subbasin, and the San Felipe Wash to the south, which is approximately co-located with a basement high known as the Yaqui Ridge/San Felipe anticline and San Felipe fault, are recognized barriers to flow that form additional boundaries of the subbasin (Figure 1).

Groundwater pumped from the Borrego Springs Groundwater Subbasin is the sole source of supply to meet agricultural, municipal, and recreational water demands for the community of Borrego Springs. Since the 1950s when intensive groundwater pumping began, extraction has exceeded recharge. Almost 500,000 acre-feet of groundwater has been permanently removed from groundwater storage, and groundwater levels have dropped by more than 100 feet in portions of the Borrego Springs Groundwater Subbasin (Faunt et al. 2015). Today, groundwater extraction continues to exceed recharge. Water users within the Borrego Springs Groundwater Subbasin currently withdrawal approximately 19,000 AFY of groundwater, and the "sustainable yield" is 5,700 AFY. Thus, the current estimated overdraft is 13,300 AFY. Approximately a 70% pumping reduction would be required to balance extraction with long-term average recharge.

The Sustainable Groundwater Management Act was passed in September 2014 as a means of regulating groundwater use throughout the State of California. As a result of the Sustainable Groundwater Management Act, all groundwater basins designated as medium and high priority by the Department of Water Resources (DWR) must designate a Groundwater Sustainability Agency (GSA) by June 2017. The BWD and the County of San Diego have jointly formed a GSA under a memorandum of agreement.[4]

The GSA must prepare a Groundwater Sustainability Plan (GSP). As the Borrego Springs Groundwater Subbasin is in critical overdraft, the deadline to prepare a GSP is January 2020.[5] The GSP is required to address the management needs of the basin in order to avoid undesirable results. The undesirable results have been defined by DWR and include such items as the chronic lowering of groundwater levels, reduction in groundwater storage, and unreasonably degraded water quality.

In addition to developing a water quantity path to sustainability, it is essential to evaluate groundwater quality to ensure availability of potable water for both domestic and irrigation

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4 The BWD provided notice to DWR on October 27, 2015, to become a GSA for the portion of the BVGB within the boundaries of the BWD. The County of San Diego Board of Supervisors authorized the County of San Diego to become a GSA over BVGB on January 6, 2016. The BWD and County of San Diego authorized a Memorandum of Understanding for Development of a Groundwater Sustainability Plan for the Borrego Valley Groundwater Basin on October 19, 2016.

5 The Borrego Springs Subbasin is designated as being in critical overdraft. The Final List of Designation of Critical Overdraft is available here: http://www.water.ca.gov/groundwater/sgm/pdfs/COD_BasinsTable.pdf.

supply. This technical memorandum has been prepared to assess the potential risk associated with temporal changes in groundwater quality that may result in exceedances of California drinking water MCLs in BWD production wells due to the long-standing critical overdraft. To date, the BWD has been able to supply customers with groundwater without the need for any additional treatment other than disinfection by chlorination as required by the State Water Resources Control Board's Division of Drinking Water (DDW). The potable groundwater served by the BWD currently meets all drinking water standards, and no water quality violations have been identified in active wells.

The groundwater system is generally subdivided by the USGS into three aquifers denoted as the upper, middle, and lower.[6] The upper aquifer is comprised of coarse sediments sourced from the Coyote Creek watershed. The thickness of the upper aquifer thins from a maximum thickness of about 643 feet where Coyote Creek enters the basin to about 50 feet near the Borrego Sink (Faunt et al. 2015) and becomes mostly unsaturated south of the Desert Lodge anticline near Rams Hill. The upper aquifer yields as much as 2,000 gallons per minute and has been extensively dewatered. The middle aquifer contains finer sediments thought to originate from lower energy sediment sources prior to the initiation of slip along the Coyote Creek fault (Faunt et al. 2015). The middle aquifer like the upper aquifer thins from the northeast to southwest and varies in thickness from about 1,000 feet to 50 feet. "The middle aquifer yields moderate quantities of water to wells, but is considered a non-viable source of water south of San Felipe Creek because of its diminished thickness" (Mitten 1988). The lower aquifer is comprised of partly consolidated continental sediments up to 3,831 feet thick and is thickest in the eastern part of the basin near the Borrego Airport. The lower aquifer yields smaller quantities of water to wells than the upper and middle aquifers. Understanding the spatial distribution of the upper, middle, and lower aquifers, as well as faulting and folding in the basin, is important to evaluate groundwater quality.

Production wells in the subbasin are generally screened in the upper, middle, or lower aquifers or cross-screened in multiple aquifers. Due to the variable thickness of the individual aquifers (i.e., thickness of aquifers generally thin to the south), BWD production wells are predominantly cross-screened in the upper, middle, and lower aquifers in the northern part of the subbasin; cross-screened in the middle and lower aquifers in the central part of the subbasin; and cross-screened in the middle and lower aquifers in the southern part of the subbasin (see Figures 6, 8, and 11).

Three management areas are proposed to better support groundwater management within the subbasin: the north management area (NMA), central management area (CMA), and south

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[6] The upper, middle, and lower aquifers represent a generalized description of the Borrego Springs Subbasin stratigraphy based on work performed by Moyle (1982) and described in detail in Faunt et al. (2015).

management area (SMA).[7] These management areas are based on both subsurface geological features such as the Desert Lodge anticline that limits hydrologic communication between the southern part of the subbasin and the central part of the subbasin, as well as on differences in groundwater production demands, well screens, and pumping depressions between the southern, central, and northern parts of the subbasin.

The NMA is dominated by agricultural land use with groundwater production occurring from primarily the upper and middle aquifers. The CMA is currently the primary production area for municipal supply with groundwater production from the upper, middle, and lower aquifers. The SMA includes some municipal and domestic pumping but is currently dominated by pumping for recreational use. Pumping in the SMA only occurs in the middle and lower aquifers.

General Regulatory Drinking Water Requirements

As a public water system, the BWD is regulated by the State Water Resources Control Board's DDW. California regulations related to drinking water are contained within California Code of Regulations (CCR) Title 17 and Title 22. California drinking water MCLs that shall not be exceeded in the water supplied to the public are listed in CCR Title 22 Chapter 15. The BWD samples groundwater quality from water wells at intervals required by the DDW. While bacteriological sampling of the water system occurs frequently, sampling for general minerals, aggregate properties, solids, metals, and nutrients occurs every 3 years. The BWD groundwater quality data reviewed for the analysis includes data through the 2016 DDW sampling event. Sampling of the BWD water wells for general minerals, aggregate properties, solids, metals, and nutrients is not required again until 2019.

GROUNDWATER QUALITY

Constituents of Concern

There are both anthropogenic and natural sources of the COCs in the BVGB. Anthropogenic sources that may contribute to degradation of the current water quality in the basin include agricultural use of pesticides and fertilizers, salt accumulation resulting from agricultural irrigation practices, and household septic system return flows. Natural sources of COCs in the BVGB include the rocks and minerals that comprise the aquifer matrix material. These naturally occurring COCs include evaporite minerals, which can dissolve and increase TDS concentration

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7 "Management area" refers to an area within a basin for which the Plan may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors (CCR Title 23, Division 2, Chapter 1.5. subchapter 2, Article 2, Section 351).

in the aquifer; silicate minerals, which can contribute arsenic to the groundwater; and sulfate minerals, which as their name suggests can contribute sulfate to the groundwater, All are found in differing amounts in the upper, middle, and lower aquifers. Differences in the mineralogical composition of the aquifers can result in groundwater quality differences between the aquifers.

Arsenic

Naturally occurring arsenic concentrations in groundwater are highly variable, though naturally occurring concentrations that exceed the California drinking water primary MCL of 10 µg/L are common in semi-arid and arid groundwater basins in the western United States (Welch et al. 2000, Anning et al. 2012). In these basins, groundwater recharge is limited due to low precipitation and the residence time of the groundwater in the basin is high. The long residence time of the groundwater in the basin allows for more interaction between the groundwater and the minerals that comprise the aquifer matrix material. With time, arsenic desorbs from sediments and enters the groundwater. This process is more efficient in groundwater with higher pH. The groundwater in the BVGB has a pH of 7.5 to 9.0, a range that is conducive for this transfer of arsenic from the sediment to the water.

Fluoride

Fluoride is a naturally occurring element in groundwater resulting from the dissolution of fluoride-bearing minerals from the aquifer sediments and surrounding bedrock. Brown staining or mottling of teeth and resistance to tooth decay as a result of drinking water with high concentrations of fluoride has been known since the 1930s. While drinking fluoridated water at low concentrations (i.e., 0.7 ppm) is beneficial to prevent tooth decay, excessive exposure to fluoride can result in dental and skeletal fluorosis. The California drinking water primary MCL for fluoride is 2 milligrams per liter (mg/L).

Nitrate

Sources of nitrate in groundwater are typically associated with specific land use but it can also occur naturally. Fertilizers and septic tanks are common anthropogenic sources of nitrate detected in groundwater. Potential natural sources of nitrate in groundwater may result from leaching of soil nitrate, which occurs by atmospheric deposition, and dissolution of evaporative minerals, igneous rocks, and deep geothermal fluids. In desert groundwater basins, the largest source of naturally occurring nitrates in groundwater occurs from incomplete utilization of nitrate by sparse vegetation. This nitrate accumulates in the unsaturated zone and may become mobile when surficial recharge percolates through the unsaturated zone (Walvoord et al. 2003). In arid environments, nitrate stored in the unsaturated zone may become mobilized by artificial recharge from irrigation return flow, septic effluent, and infiltration basins. The Borrego Spring Subbasin lacks appreciable evaporitic deposits, and anthropogenic sources or mobilization as a result of artificial recharge is likely the main contributor of nitrates to the subbasin. The California drinking water primary MCL for nitrate is 10 mg/L as nitrogen (N) 45 mg/L as nitrate (NO_3).

Sulfate

Natural sulfate sources include atmospheric deposition, sulfate mineral dissolution, and sulfide mineral oxidation of sulfur. Gypsum is an important source near localized deposits such as in the Ocotillo Wells Subbasin near Fish Creek Mountains in Imperial County. Fertilizers can also be a source of sulfate in groundwater but typically do not result in exceedance of drinking water standards. The California drinking water secondary MCL for sulfate is recommended at 250 mg/L, with upper and short-term limits of 500 mg/L and 600 mg/L, respectively.

Total Dissolved Solids

TDS is a measure of all dissolved solids in water including organic and suspended particles. Sources of TDS in groundwater include interaction of groundwater with the minerals that comprise the aquifer matrix material. Over time, TDS will increase as more minerals in contact with groundwater dissolve. In desert basins, evaporative enrichment near dry lake beds (playas) is known to naturally increase TDS in groundwater. This process also occurs in plants, both in agriculture and natural systems. Anthropogenic sources include synthetic fertilizers, manure, wastewater treatment facilities, and septic effluent. The California drinking water secondary MCL for TDS is recommended at 500 mg/L with upper and short-term limits of 1,000 mg/L and 1,500 mg/L, respectively.

Radionuclides

Radionuclides are naturally occurring elements of the Earth and observed in groundwater as a result of interaction with an aquifer matrix material that contains trace levels of radioactive isotopes. Gross alpha and beta measurements are screening tools for quantification of radioactivity in groundwater, which is measured as activity units of picocuries per liter (pCi/L). The California drinking water primary MCL for gross alpha is 15 pCi/L based on a four-quarter average. Other radionuclides with California drinking water primary MCLs include radium-226 + radium-228 (5 pCi/L), strontium-90 (8 pCi/L), tritium (20,000 pCi/L) and uranium (20 pCi/L).

Below, we discuss the current distribution and trends of COCs overall and as occurs within each proposed Borrego Springs Subbasin management areas (Figure 1).

Historical Groundwater Quality

This analysis evaluates historical groundwater quality for BWD wells and seven private wells located in the SMA. Data for select groundwater quality constituents are provided in Table 1 and displayed graphically in Figures 2–5, and Figures 7, 9, 10, 12, 13, and 14.

Table 1
Historical Groundwater Quality

Well ID	Date	Arsenic (µg/L)	Fluoride (mg/L)	Nitrate (as N) (mg/L)[a]	Sulfate (mg/L)	TDS (mg/L)	pH
North Management Area Wells							
ID4-4[c]	9/25/1954	NM	NM	1.81	418	NM	7.9
ID4-4[c]	5/16/1972	NM	0.68	70.48[d]	417	NM	7.6
ID4-4[c]	5/23/1973	NM	0.46	3.61	283	NM	7.4
ID4-4[c]	5/19/1975	<RL	0.47	0.50	127	508	7.76
ID4-4[c]	12/15/1975	<10	NM	13.10	NM	NM	NM
ID4-4[c]	4/29/1976	NM	NM	11.07	NM	NM	NM
ID4-4[c]	8/6/1976	NM	NM	14.01	NM	NM	NM
ID4-4[c]	9/30/1976	NM	NM	11.07	NM	NM	NM
ID4-4[c]	12/6/1976	NM	NM	14.91	NM	NM	NM
ID4-4[c]	8/18/1978	NM	NM	9.49	NM	NM	NM
ID4-4[c]	9/14/1978	NM	NM	10.40	NM	NM	NM
ID4-4[c]	11/9/1978	NM	NM	11.97	NM	NM	NM
ID4-4[c]	7/17/1979	NM	0.11	0.68	99	244	8.14
ID4-4[c]	9/26/1979	NM	0.18	0.79	129	360	7.84
ID4-4[c]	3/31/1980	<10	0.94	0.79	127	322	7.68
ID4-4[c]	10/24/1980	NM	NM	13.00	NM	NM	NM
ID4-4[c]	11/19/1980	3	0.20	NM	120	327	7.90
ID4-4[c]	8/18/1981	NM	NM	0.79	NM	NM	NM
ID4-4[c]	2/4/1983	<2	0.29	0.97	147	310	7.46
ID4-4[c]	12/9/1985	<5	0.41	0.86	132	326	7.82
ID4-4[c]	6/11/1991	<10	0.18	0.21	102	317	7.97
ID4-4[c]	12/28/1994	2	0.33	0.91	122	348	7.80
ID4-4[c]	9/8/1998	<2	0.16	0.91	120	312	7.73
ID4-4[c]	5/17/2001	<RL	0.20	0.90	120	350	7.80
ID4-4[c]	1/14/2002	<2	1.07	NM	NM	NM	NM
ID4-4[c]	4/15/2004	<RL	0.13	1.03	110	295	7.91
ID4-4[c]	5/8/2007	2.2	0.20	0.68	110	320	8.00
ID4-4[c]	6/3/2008	NM	NM	0.63	NM	NM	NM
ID4-4[c]	5/13/209	NM	NM	0.63	NM	NM	NM
ID4-4[c]	5/11/2010	2.2	0.20	0.61	120	340	7.90

Table 1
Historical Groundwater Quality

Well ID	Date	Arsenic (µg/L)	Fluoride (mg/L)	Nitrate (as N) (mg/L)[a]	Sulfate (mg/L)	TDS (mg/L)	pH
ID4-4[c]	6/7/2011	NM	NM	0.54	NM	NM	NM
ID4-4[c]	5/22/2012	NM	NM	0.54	NM	NM	NM
ID4-4[c]	7/24/2013	2.7	0.20	0.59	110	330	7.80
ID4-4[c]	8/19/2014	NM	NM	0.43	NM	NM	NM
ID4-4[c]	8/11/2015	NM	NM	0.56	NM	NM	NM
ID4-4[c]	4/12/2016	2.9	0.20	0.56	110	310	7.90
ID4-11	5/17/1995	<2	0.29	0.22	125	396	8.45
ID4-11	9/8/1998	<2	0.2	0.39	114	387	7.55
ID4-11	5/17/2001	<RL	0.2	NM	110	390	7.7
ID4-11	12/27/2002	NM	0.23	NM	101	410	NM
ID4-11	12/31/2002	NM	NM	0.32	NM	NM	NM
ID4-11	12/18/2003	NM	0.25	0.39	NM	NM	NM
ID4-11	4/15/2004	<RL	0.2	0.36	98.9	318	7.78
ID4-11	4/18/2006	NM	NM	0.36	NM	NM	NM
ID4-11	5/8/2007	<2	0.3	0.43	91	390	8
ID4-11	6/3/2008	NM	NM	0.45	NM	NM	NM
ID4-11	5/13/2009	NM	NM	0.59	NM	NM	NM
ID4-11	5/11/2010	<2	0.3	0.50	95	370	7.8
ID4-11	6/7/2011	NM	NM	0.45	NM	NM	NM
ID4-11	5/22/2012	NM	NM	0.47	NM	NM	NM
ID4-11	10/24/2013	NM	0	0.56	86	340	7.8
ID4-11	2/14/2014	<2	0.3	0.61	NM	NM	NM
ID4-11	6/1/2014	2.23	NM	NM	NM	NM	NM
ID4-11	8/12/2014	NM	NM	0.61	NM	NM	NM
ID4-11	8/11/2015	NM	NM	0.61	NM	NM	NM
ID4-11	4/12/2016	<2	0.3	0.66	85	320	7.8
ID4-18	6/18/1984	5	1.2	0.12	237	594	7.04
ID4-18	12/9/1985	<2	1.1	0.08	246	562	7.96
ID4-18	6/11/1991	<10	0.68	0.04	253	617	7.61
ID4-18	12/28/1994	<2	1.03	0.32	254	617	7.37
ID4-18	9/8/1998	<2	0.85	0.50	253	604	7.43
ID4-18	5/17/2001	<RL	0.7	NM	270	620	7.5
ID4-18	12/31/2002	NM	NM	0.27	NM	NM	NM
ID4-18	4/15/2004	<RL	0.84	0.28	242	558	7.72
ID4-18	5/8/2007	<2	0.9	NM	240	590	7.8
ID4-18	5/13/2009	NM	NM	0.29	NM	NM	NM
ID4-18	5/11/2010	<2	0.8	0.36	260	620	7.7

Table 1
Historical Groundwater Quality

Well ID	Date	Arsenic (µg/L)	Fluoride (mg/L)	Nitrate (as N) (mg/L)[a]	Sulfate (mg/L)	TDS (mg/L)	pH
ID4-18	6/7/2011	NM	NM	0.32	NM	NM	NM
ID4-18	5/22/2012	NM	NM	0.45	NM	NM	NM
ID4-18	6/10/2013	<2	1.3	0.32	250	620	7.8
ID4-18	8/12/2014	NM	NM	0.38	NM	NM	NM
ID4-18	8/11/2015	NM	NM	0.50	NM	NM	NM
ID4-18	5/16/2016	<2	0.9	0.5	250	610	7.7
MW-1	9/8/2011	3.8	NM	0.015	223	480	8.7
Central Management Area Wells							
ID4-10	6/19/1989	10[a]	0.59	1.70	66	629	8.19
ID4-10	6/11/1991	<10	0.35	1.49	17	529	7.74
ID4-10	12/28/1994	<2	0.4	2.42	26	528	7.6
ID4-10	9/8/1998	<RL	0.38	2.39	28.4	516	7.32
ID4-10	5/17/2001	<RL	0.4	2.71	27	530	7.4
ID4-10	4/15/2004	<RL	0.34	2.21	22.9	459	7.54
ID4-10	5/26/2005	NM	NM	1.74	NM	NM	NM
ID4-10	4/18/2006	NM	NM	2.06	NM	NM	NM
ID4-10	5/8/2007	<2	0.4	2.10	23	490	7.6
ID4-10	6/3/2008	NM	NM	1.92	NM	NM	NM
ID4-10	5/13/2009	NM	NM	2.10	NM	NM	NM
ID4-10	10/26/2009	0.76	0.41	2.44	25.7	NM	7.5
ID4-10	5/11/2010	<2	0.4	1.97	24	510	7.6
ID4-10	6/7/2011	NM	NM	1.81	NM	NM	NM
ID4-10	5/22/2012	NM	NM	1.97	NM	NM	NM
ID4-10	6/10/2013	<2	0.6	2.10	23	500	7.5
ID4-10	8/12/2014	NM	NM	2.48	NM	NM	NM
Wilcox	1/27/2000	7	0.6	1.90	127	267	8.27
Wilcox	5/17/2001	3	0.6	1.58	18	250	8.1
Wilcox	4/15/2004	3.4	0.51	0.40	13.8	200	8.74
Wilcox	5/26/2005	NM	NM	0.77	NM	NM	NM
Wilcox	5/8/2007	4.4	0.7	0.99	14	210	8.4
Wilcox	6/3/2008	NM	NM	0.93	NM	NM	NM
Wilcox	5/13/2009	NM	NM	1.42	NM	NM	NM
Wilcox	5/11/2010	6.1	0.8	0.36	16	220	8.7
Wilcox	6/7/2011	NM	NM	0.77	NM	NM	NM
Wilcox	5/22/2012	NM	NM	0.90	NM	NM	NM
Wilcox	3/16/2013	4.2	1	1.29	18	230	8.3
Wilcox	6/1/2014	7.8	NM	NM	NM	NM	NM

Table 1
Historical Groundwater Quality

Well ID	Date	Arsenic (µg/L)	Fluoride (mg/L)	Nitrate (as N) (mg/L)[a]	Sulfate (mg/L)	TDS (mg/L)	pH
Wilcox	8/19/2014	NM	NM	0.68	NM	NM	NM
Wilcox	8/11/2015	NM	NM	0.45	NM	NM	NM
Wilcox	3/22/2016	4.4	0.8	0.92	16	220	8.2
ID1-10	9/26/1972	<RL	0.78	0.43	105	352	8.3
ID1-10	3/17/1988	10	0.57	1.31	73	252	7.72
ID1-10	5/22/1991	<10	0.54	1.47	63	274	7.77
ID1-10	12/28/1994	2	0.46	1.61	50.7	260	7.74
ID1-10	5/17/2001	5	0.6	1.58	96	460	8
ID1-10	12/5/2002	NM	0.54	1.47	NM	250	NM
ID1-10	12/31/2002	NM	NM	1.58	NM	NM	NM
ID1-10	4/15/2004	3.3	0.42	0.82	79	274	8.17
ID1-10	5/26/2005	NM	NM	1.49	NM	NM	NM
ID1-10	4/18/2006	NM	NM	1.40	NM	NM	NM
ID1-10	5/8/2007	5.9	0.5	1.54	47	250	8.3
ID1-10	6/3/2008	NM	NM	1.56	NM	NM	NM
ID1-10	5/13/2009	NM	NM	1.72	NM	NM	NM
ID1-10	10/27/2009	9.9	0.43	2.02	46.9	NM	8.2
ID1-10	5/11/2010	7.1	0.5	1.78	45	240	8.4
ID1-10	6/7/2011	NM	NM	1.63	NM	NM	NM
ID1-10	5/22/2012	NM	NM	1.65	NM	NM	NM
ID1-10	7/22/2013	7.5	0.7	1.63	54	280	8.2
ID1-10	6/1/2014	12.2	NM	1.85	NM	NM	NM
ID1-10	8/11/2015	NM	NM	1.27	NM	NM	NM
ID1-10	4/12/2016	4	0.5	1.40	62	340	8
ID1-12	3/17/1988	7	0.45	0.44	104	242	7.23
ID1-12	5/22/1991	<10	0.5	0.42	105	292	8.3
ID1-12	12/28/1994	3	0.47	0.50	101	290	7.96
ID1-12	9/8/1998	2	0.37	0.51	106	268	8.22
ID1-12	5/17/2001	3	0.4	0.45	97	290	8.1
ID1-12	5/13/2002	NM	NM	0.52	NM	NM	NM
ID1-12	12/18/2003	NM	0.42	0.25	NM	NM	NM
ID1-12	4/15/2004	2.2	0.34	0.39	94.9	246	8.38
ID1-12	4/18/2015	NM	NM	0.38	NM	NM	NM
ID1-12	5/8/2007	<RL	0.4	0.38	91	260	8.3
ID1-12	6/3/2008	NM	NM	0.38	NM	NM	NM
ID1-12	5/13/2009	NM	NM	0.41	NM	NM	NM
ID1-12	5/11/2010	<RL	0.5	0.38	100	240	8.2

Table 1
Historical Groundwater Quality

Well ID	Date	Arsenic (µg/L)	Fluoride (mg/L)	Nitrate (as N) (mg/L)[a]	Sulfate (mg/L)	TDS (mg/L)	pH
ID1-12	4/3/2013	3	0.6	0.38	94	270	8.2
ID1-12	6/7/2011	NM	NM	0.34	NM	NM	NM
ID1-12	5/22/2012	NM	NM	0.38	NM	NM	NM
ID1-12	10/18/2012	2.5	0.35	0.441	93	NM	8.4
ID1-12	4/3/2013	3	NM	0.38	NM	NM	NM
ID1-12	6/1/2014	3.79	NM	0.38	NM	NM	NM
ID1-12	8/12/2014	NM	NM	0.38	NM	NM	NM
ID1-12	8/11/2015	NM	NM	0.36	NM	NM	NM
ID1-12	6/5/2016	3.1	0.4	0.38	90	300	8
ID1-16	7/15/1993	NM	NM	NM	74	312	7.76
ID1-16	2/25/1997	2	0.5	0.9	66	330	8.1
ID1-16	9/22/1998	<2	0.48	2.1	67.6	346	8.08
ID1-16	5/17/2001	<RL	0.5	1.4	64	360	7.9
ID1-16	12/13/2002	NM	NM	1.2	NM	NM	NM
ID1-16	12/18/2003	NM	0.56	1.2	68.8	NM	NM
ID1-16	3/6/2003	NM	NM	NM	NM	328	NM
ID1-16	4/15/2004	<RL	0.46	1.1	61.9	326	8.21
ID1-16	5/26/2005	NM	NM	1.1	NM	NM	NM
ID1-16	4/18/2006	NM	NM	1.1	NM	NM	NM
ID1-16	5/8/2007	2	0.6	1.1	60	320	8.2
ID1-16	6/3/2008	NM	NM	1.1	NM	NM	NM
ID1-16	5/13/2009	NM	NM	0.8	NM	NM	NM
ID1-16	5/11/2010	<2	0.5	1.2	66	340	8.3
ID1-16	6/7/2011	NM	NM	1.1	NM	NM	NM
ID1-16	5/22/2012	NM	NM	0.8	NM	NM	NM
ID1-16	12/18/2013	4.3	0.5	1.2	56	280	8.2
ID1-16	8/12/2014	NM	NM	1.1	NM	NM	NM
ID1-16	8/11/2015	NM	NM	1.1	NM	NM	NM
ID1-16	5/16/2016	3.2	0.5	0.95	56	300	8
ID5-5	3/2/2004	<RL	0.85	0.45	106	320	7.54
ID5-5	5/11/2010	<2	1.2	0.25	95	330	8.1
ID5-5	6/7/2011	NM	NM	0.43	NM	NM	NM
ID5-5	5/22/2012	NM	NM	0.47	NM	NM	NM
ID5-5	4/19/2013	2.1	1.4	0.45	100	310	8
ID5-5	8/12/2014	NM	NM	0.41	NM	NM	NM
ID5-5	8/11/2015	NM	NM	0.50	NM	NM	NM
ID5-5	3/22/2016	<2	1	0.44	95	350	7.8

Table 1
Historical Groundwater Quality

Well ID	Date	Arsenic (µg/L)	Fluoride (mg/L)	Nitrate (as N) (mg/L)[a]	Sulfate (mg/L)	TDS (mg/L)	pH
Cocopah	9/27/2007	6	1.6	<1.0	170	410	8.8
Cocopah	3/22/2013	6.4	2.2	<1.0	170	390	8.7
MW-4[b]	1/9/2007	<2.0	0.5	2.4	330	720	7.8
MW-5A	1/9/2007	3.9	1.3	<1.0	700	1,300	8.0
MW-5B	12/18/2006	<2.0	0.8	<0.20	1,200	2,300	7.6
South Management Area Wells							
ID1-1	6/6/1972	<RL	0.8	0.50	197	560	8.3
ID1-1	3/17/1988	5	0.62	0.68	311	724	8.04
ID1-1	6/11/2014	<RL	0.3	0.99	570	1,300	8
ID1-1	6/2/2016	<RL	0.2	0.96	650	1,400	7.7
ID1-2	7/10/1972	NM	1.0	1.5	60	400	8
ID1-2	2/8/1983	2	0.51	4.7	39	496	7.86
ID1-2	3/17/1988	4	0.61	4.2	51	290	8.54
ID1-2	4/9/2014	6	0.4	3.2	32	340	8.8
ID1-2	6/2/2016	9	0.5	3.1	37	270	8.8
ID1-8	10/10/1972	NM	1.1	0.90	49	364	8.3
ID1-8	3/17/1988	14[c]	0.92	1.59	59	314	8.07
ID1-8	5/22/1991	11[c]	1.05	1.29	47	328	8.46
ID1-8	12/28/1994	5	0.68	1.88	81.4	400	7.78
ID1-8	9/22/1998	2	0.55	0.67	82	411	8.27
ID1-8	5/17/2001	5	0.6	1.79	96	460	8
ID1-8	12/5/2002	NM	0.55	1.59	120	490	NM
ID1-8	12/31/2002	NM	NM	1.74	NM	NM	NM
ID1-8	4/15/2004	4.7	0.47	1.47	119	446	8.31
ID1-8	5/26/2005	NM	NM	1.59	NM	NM	NM
ID1-8	5/8/2007	4.6	0.7	2.12	77	430	8.3
ID1-8	6/3/2008	NM	NM	2.12	NM	NM	NM
ID1-8	5/13/2009	NM	NM	2.10	NM	NM	NM
ID1-8	5/11/2010	6.8	0.7	2.10	110	460	8.2
ID1-8	6/7/2011	NM	NM	1.97	NM	NM	NM
ID1-8	5/22/2017	NM	NM	2.05	NM	NM	NM
ID1-8	4/3/2013	6.1	1	2.18	82	500	8.1
ID1-8	6/17/2013	4.8	0.67	2.37	91.1	NM	8.2
ID1-8	8/19/2014	NM	NM	2.28	NM	NM	NM
ID1-8	8/11/2015	NM	NM	2.46	NM	NM	NM
ID1-8	3/22/2016	5.3	0.7	2.0	85	490	8
RH-3	9/29/2014	15	1.4	0.60	67	310	9

Table 1
Historical Groundwater Quality

Well ID	Date	Arsenic (µg/L)	Fluoride (mg/L)	Nitrate (as N) (mg/L)[a]	Sulfate (mg/L)	TDS (mg/L)	pH
RH-3	6/2/2016	15	1.1	1.3	63	290	8.9
RH-4	1/22/2015	22	1.4	0.33	45	300	8.9
RH-4	6/2/2016	18	1.1	0.43	81	360	8.9
RH-5	3/18/2015	4.6	0.6	6.6	180	770	8.5
RH-5	6/2/2016	16	1.3	3.8	120	510	8.8
RH-6	7/27/2015	15	1.3	3.2	25	290	9
RH-6	6/2/2016	15	1.2	3.3	28	300	9
Jack Crosby	6/2/2016	13	0.9	0.32	140	450	8.6
WWTP-1	4/5/2016	NM	0.3	119.52	87	690	7.8

Source: BWD 2016, Dudek 2016, DDW 2016
Notes: Not all historical laboratory reports were available to verify the reported laboratory result.
NM = not measured
<RL = less than laboratory reporting limit
a. Nitrate as N x 4.4288 = Nitrate as NO_3
b. MW-4 is not depicted on Figure 8.
c Analysis taken when well No. ID4-4 was first reactivated after several years of non-use. Waters entering well near static water level were found to be very high in dissolved minerals. These highly concentrated waters were sealed off by the Roscoe Moss Company during the summer of 1972. After several weeks of operating, salinity was reduced to acceptable levels noted in May 1973. Well No. 4 (ID4-4) was originally drilled for DiGiorgio Farms and carried in the DiGiorgio records as Well No. 10. Well ID4-4 was drilled in 1979 in the same location as Well No. 4.

The groundwater quality data are presented in the figures relative to the MCL for each of the COCs. Concentrations that lie between half of the MCL and the MCL are noted. While the concentrations are below the MCL for most of these points, increasing concentrations of many of the COCs are being observed with ongoing groundwater level decline so the upper range concentration data are highlighted in this risk assessment.

Groundwater Concentration Trend Statistical Analysis

Historical groundwater quality data that extends through early 2016 was evaluated to determine groundwater concentration trends for COCs (arsenic, fluoride, nitrate, sulfate, TDS, and pH). Radionuclides are of potential concern but limited radionuclide data available for BWD wells precluded trend analysis.

The Mann-Kendall test was applied to assess trends in groundwater quality. The Mann-Kendall test does not require regularly spaced sample intervals, is unaffected by missing time periods, and does not assume a pre-determined data distribution. The Mann-Kendall test assesses whether or not a dataset exhibits a trend within a selected significance level. A significance level of 0.05 or confidence level of 95% was selected for this analysis. Results of the Mann-Kendall test are listed in Table 2.

Table 2
Mann-Kendall Trend Analysis Results

Well ID	Arsenic (µg/L)	Fluoride (mg/L)	Nitrate (as N) (mg/L)	Sulfate (mg/L)	TDS (mg/L)	pH
North Management Area Wells						
ID4-4	No trend	No trend	Decreasing	Decreasing	No trend	No trend
ID4-11	Insufficient data	***Increasing***	***Increasing***	Decreasing	No trend	No trend
ID4-18	Insufficient data	No trend	***Increasing***	No trend	No trend	No trend
MW-1	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
Central Management Area Wells						
ID4-10	Insufficient Data	No trend	No trend	No trend	*Decreasing*	No trend
Wilcox	No trend	***Increasing***	No trend	No trend	No trend	No trend
ID1-10	No trend	No trend	***Increasing***	Decreasing	No trend	No trend
ID1-12	No trend	No trend	Decreasing	Decreasing	No trend	No trend
ID1-16	No trend	No trend	Decreasing	Decreasing	No trend	No trend
ID5-5	Insufficient data	Insufficient data	No trend	No trend	No trend	No trend
Cocopah	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
MW-4	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
South Management Area Wells						
ID1-1	Insufficient data	No trend	No trend	***Increasing***	***Increasing***	Decreasing
ID1-2	***Increasing***	No trend	No trend	No trend	No trend	No trend
ID1-8	No trend	No trend	***Increasing***	***Increasing***	***Increasing***	No trend
RH-3	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
RH-4	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
RH-5	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
RH-6	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
Jack Crosby	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
WWTP-1	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data

Note: A minimum of four data points are required to calculate trend (non-detects were not used as data points in this analysis to calculate trend).
Sources: BWD 2016, Dudek 2016, DDW 2016.

Increasing groundwater concentration trends were exhibited for arsenic in well ID1-2; fluoride in the Wilcox Well; nitrate in wells ID1-11, ID1-18, ID1-10, ID4-10 and ID1-8; sulfate in wells ID1-1 and ID1-8; and TDS in wells ID1-1 and ID1-8. Decreasing groundwater concentration trends were exhibited for nitrate in ID4-4 and ID1-16; sulfate in wells ID4-4, ID4-11, ID1-10, ID1-12, and ID1-

16; TDS in well ID4-10; and pH in ID1-1. A minimum of four data points are required to calculate trend. Insufficient data indicates wells were no trend was established because either four data points were not available or data reported was less than laboratory reporting limits.

Arsenic

Arsenic concentrations have been detected above laboratory reporting limits at several wells in the Borrego Springs Subbasin since the 1980s.[8] Arsenic has been detected in non-potable wells up to 22 µg/L in Rams Hill Golf Course well RH-4. The California drinking water MCL for arsenic is 10 µg/L.

Arsenic wellhead concentrations from 2016 for the Borrego Springs Subbasin are shown in Figure 2. Arsenic concentrations for wells located in the NMA were less than half the MCL (< 5 µg/L) for wells screened in the upper, middle, and lower aquifers. NMA well information including elevation, well depth, groundwater level, pump information, screen interval, casing diameter, and production rate is provided in Figure 6.

Arsenic concentrations from 2016 for wells located in the CMA were less than half the MCL (< 5 µg/L) for wells predominantly screened in the middle aquifer and less than the MCL (<10 µg/L) for wells predominantly screened in the lower aquifer. CMA well information including elevation, well depth, groundwater level, pump information, screen interval, casing diameter, and production rate is provided in Figure 7. No recent wellhead sample is available for the upper aquifer overlying the CMA.

Arsenic concentrations from 2016 for wells located in the SMA ranged from less than half the MCL (< 5 µg/L) to greater than the MCL (>10 µg/L). The screen intervals of wells in the SMA predominantly intercept the lower aquifer though most wells are partially screened in the middle aquifer as well. No recent wellhead sample is available for the upper aquifer overlying the SMA as this portion of the aquifer is currently unsaturated.

Historical arsenic data for BWD wells ID4-4, ID4-11, ID4-18, and MW-1 located in the NMA were reviewed to determine trends (Figure 7). These wells have arsenic concentrations less than the California drinking water MCL (< 10 µg/L). These wells display no trend or there is insufficient data to determine trend as many of the arsenic results are below laboratory reporting limits.

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8 Prior to the 1980s, laboratory detection limits for arsenic where often established at 10 µg/L or 50 µg/L and results were reported as below the laboratory detection limit.

Historical arsenic data for BWD wells ID1-10, ID1-12, ID1-16, Wilcox, ID4-10, ID5-5, MW-4, and the private Cocopah well located in the CMA were reviewed to determine current lateral distribution and trends (Figures 9 and 10). These wells have arsenic concentrations less than the California drinking water MCL (< 10 µg/L), except for one non-compliance sample collected from well ID1-10 in 2014 by M.H. Rezaie-Boroon et al. (2014). Subsequent compliance sampling completed by the BWD in 2016 indicates that the well ID1-10 arsenic concentration is below the MCL at a concentration of 4 µg/L. These wells display no trend or there is insufficient data to determine trend as many of the arsenic results are below laboratory reporting limits.

Historical arsenic data for BWD wells ID1-1, ID1-2, and ID1-8 located in the SMA was reviewed to determine trend. Well ID1-8 is the only potable BWD production well located in the SMA. Wells located at the Borrego Air Ranch are also used for potable water supply in the SMA. Well ID1-2 displays an increasing arsenic concentration with time, whereas well ID1-8 arsenic concentration fluctuates over time (Figure 8).[9] Well ID1-1 typically tests below the laboratory detection limit for arsenic and has different overall water chemistry than wells ID1-2 and ID1-8. SMA well information including elevation, well depth, groundwater level, pump information, screen interval, casing diameter, and production rate is provided in Figure 11.

Fluoride

The USGS identified three wells with fluoride concentrations that exceed the California drinking water primary MCL of 2 µg/L. Fluoride concentrations in these wells ranged from 2.69 to 4.87 mg/L (Faunt et al. 2015).

Historical fluoride data for BWD wells ID4-4, ID4-11, ID4-18, and MW-1 located in the NMA were also reviewed to determine trends. Fluoride concentrations of the BWD wells in the NMA are below one-half the California drinking water MCL for these wells. No trend for fluoride is indicated for these wells.

Historical fluoride data for BWD wells ID1-10, ID1-12, ID1-16, Wilcox, ID4-10, ID5-5, MW-4, and the private Cocopah well located in the CMA were reviewed to determine current lateral distribution and trends. Fluoride concentrations of the BWD wells in the CMA are typically below one-half the California drinking water MCL except for ID5-5 and the Cocopah Well. Fluoride concentration in well ID5-5 is below the California drinking water MCL. One sample tested above the California drinking water standard in the Cocopah Well at concentration of 2.2 mg/L. No trend for fluoride is indicated for any of these wells.

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9 Wells ID1-1 and ID1-2 were sold by the BWD to Rams Hill golf course around 2014.

Historical fluoride data for wells ID1-1, ID1-2, and ID1-8 located in the SMA was reviewed to determine trend. Fluoride concentrations of the BWD wells in the SMA are typically below one-half the California drinking water MCL. No trend for fluoride is indicated for any of these wells.

Nitrate

The USGS found that the concentration of nitrate as nitrogen (as N) from samples throughout the BVGB ranged from less than 1 mg/L to approximately 67 mg/L. The California drinking water primary MCL for nitrate as N is 10 mg/L. (The MCL has also been historically expressed as 45 mg/L nitrate as nitrate [as NO_3], and careful review of historical data is required to verify reporting units.)[10] Only 5 of the 36 wells sampled had nitrate concentrations that exceeded the MCL. These five wells are in the vicinity of Henderson Canyon Road in the northern part of the valley, adjacent to areas of agricultural use, and three of the five wells were screened in the upper aquifer. The concentration of nitrate measured in the remaining 31 wells was less than 7 mg/L nitrate as N (Faunt et al. 2015).

Historical nitrate data for BWD wells ID4-4, ID4-11, ID4-18, and MW-1, located in the NMA, were also reviewed to determine trends. These wells are located on the fringe of current and historical agricultural production in both the upper and middle aquifers. A decreasing nitrate as N concentration trend is observed in ID4-4. Both ID4-11 and ID4-18 show an increasing nitrate as N concentration trend. Insufficient data has been recorded for MW-1 to determine a nitrate as N concentration trend (Figure 3). All concentrations of the BWD wells are below one-half the California drinking water MCL for nitrate as N.

Historical nitrate data for BWD wells ID1-10, ID1-12, ID1-16, Wilcox, ID4-10, ID5-5, MW-4, and the private Cocopah well located in the CMA were reviewed to determine current lateral distribution and trends. These wells are located in or near to the primary area of municipal groundwater production in the Borrego Springs Subbasin. Golf courses and septic return flow with limited areas of agriculture are the probable anthropogenic sources of nitrate to wells in this area of the subbasin. A decreasing nitrate as N concentration trend is noted in ID 1-16. An increasing nitrate concentration trend is observed in well ID1-10. No trend is observed for wells ID1-1, ID1-2, ID4-10, and the Wilcox well. Insufficient data exist to determine a trend for MW-4 and the Cocopah well. Concentrations in all CMA wells are below one-half the California drinking water MCL for nitrate as N (Figures 5, 9 and 10).

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10 The Division of Drinking Water recently made revisions to California drinking water standards for nitrate in California Code of Regulations Sections 64431 (MCL), 64432 (DLR), and 64482 (Health Information). The revisions specify that nitrate laboratory results must be expressed as nitrate as nitrogen. As a result, the MCL for nitrate is now expressed as “10 mg/L (as nitrogen)” instead of “45 mg/L (as nitrate)”.

Historical nitrate data for wells ID1-1, ID1-2 and ID1-8 located in the SMA was reviewed to determine trend. Well ID1-8 displays an increasing nitrate as N concentration trend. No trend is observed for well ID1-2 with insufficient data available from well ID1-1. Concentrations for SMA wells are below one-half the California drinking water MCL (Figure 3). Well ID1-8 is downgradient from the Rams Hill golf course, which is potentially an anthropogenic source of nitrates in the SMA in addition to the percolation ponds at the wastewater treatment plant. Rams Hill wells RH-5 and RH-6, which are located on the old golf course, indicate elevated nitrate as N concentrations at 6.6 mg/L and 3.3 mg/L, respectively. Rams Hill will monitor water quality annually from its wells as part of the Long-Term Cooperation Agreement with the BWD. Additionally, Dudek recommends monitoring wells MW-3 and the WWTP well to determine groundwater quality in the middle aquifer.

TDS

TDS concentrations that exceed the California drinking water secondary MCL of 1,000 mg/L were detected in 8 of the 36 wells sampled by the USGS. Each of the wells that exceeded the MCL for nitrate also exceeded the secondary MCL for TDS. Additionally, two wells screened in the middle aquifer and one well screened in the lower aquifer that had concentrations of nitrate as N below 7 mg/L had TDS concentrations above 1,000 mg/L. Typically, however, the concentration of TDS in the lower aquifer was lower than that in the middle and upper aquifers for the wells analyzed as part of the USGS study (Faunt et al. 2015).

Historical TDS data for BWD wells ID4-4, ID4-11, ID4-18, and MW-1 located in the NMA were reviewed to determine trends. These wells display relatively stable TDS concentrations with no trend from the early 1980s to present (Figure 3).

Historical TDS data for BWD wells ID1-10, ID1-12, ID1-16, Wilcox, ID4-10, ID5-5, MW-4, and the private Cocopah well located in the CMA were reviewed to determine current lateral distribution and trends. These wells display stable TDS concentrations with no trend in each well for the period of record monitored (Figures 5 and 6).

Historical TDS data for wells ID1-1, ID1-2, and ID1-8 located in the SMA were reviewed to determine trend. Wells ID1-1 and ID1-8 indicate an increasing trend with respect to TDS concentrations since 1972 (Figure 8). No trend was observed for TDS in well ID1-2.

Sulfate

None of the samples analyzed as part of the USGS study had concentration of sulfate that exceeded the California secondary MCL for sulfate of 500 mg/L; however, four wells had increasing sulfate concentrations with time.[11] The USGS was not able to determine the reason for the increasing concentration trend observed in these wells, and the wells are spread throughout the valley, with no immediate geographic link to the observed trends.

Historical sulfate data for BWD wells ID4-4, ID4-11, ID4-18, and MW-1 located in the NMA were reviewed to determine trends. Wells ID4-4 and ID4-11 display a decreasing trend with respect to sulfate concentrations. No trend was observed for sulfate in well ID4-18 and insufficient data was available for well MW-1 (Figure 3).

Historical sulfate data for BWD wells ID1-10, ID1-12, ID1-16, Wilcox, ID4-10, ID5-5, MW-4, and the private Cocopah well located in the CMA were reviewed to determine current lateral distribution and trends. These wells display relatively stable sulfate concentrations for the period of record monitored in each well (Figures 5 and 6). A decreasing trend for sulfate was indicated in wells ID1-12 and ID1-16. All wells indicate concentrations below the California drinking water secondary recommended MCL of 250 mg/L, except MW-4 at a concentration of 330 mg/L and MW-5A and MW-5B at concentrations of 1,300 mg/L and 2,300 mg/L.

Historical sulfate data for wells ID1-1, ID1-2, and ID1-8 located in the SMA was reviewed to determine trends. Wells ID1-1 and ID1-8 indicate an increasing trend with respect to sulfate. No trend was indicated in well ID1-2. All wells indicate concentrations below the California drinking water secondary recommended MCL, except ID1-1 at a concentration of 650 mg/L.

Radiation

There is limited radionuclide data available for BWD wells. Gross alpha and gross beta results available for BWD indicate concentrations detected are below primary MCLs.

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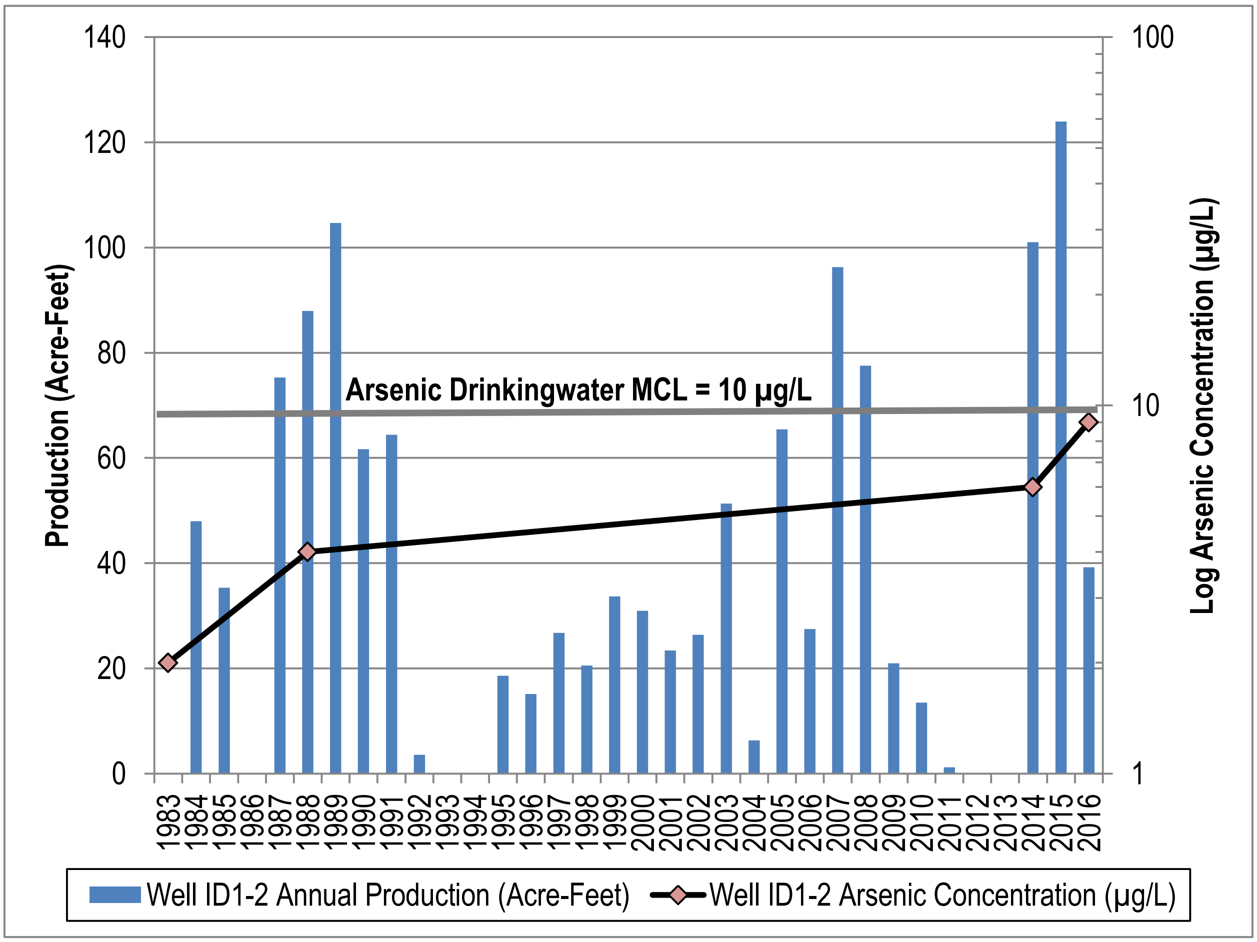
[11] The recommended, upper, and short-term California drinking water secondary MCLs for sulfate are 250 mg/L, 500 mg/L, and 600 mg/L, respectively.

Evaluation of Increasing Arsenic Concentration with Groundwater Pumping and Groundwater Levels for Wells ID1-2 and ID1-8

Well ID1-2

As indicated by the Mann-Kendall trend analysis, arsenic concentrations in Well ID1-2 has a statistically-increasing trend. Annual groundwater production at well ID1-2 was compared with available arsenic concentration data as shown in Exhibit 1.

Exhibit 1
Well ID1-2 Groundwater Production and Arsenic Data



A linear regression analysis of the dependent variable, arsenic concentration was plotted versus the independent variable, annual groundwater production for Well ID1-2. The goodness of fit for well ID1-2 linear regression was poor (R square value = 0.03).

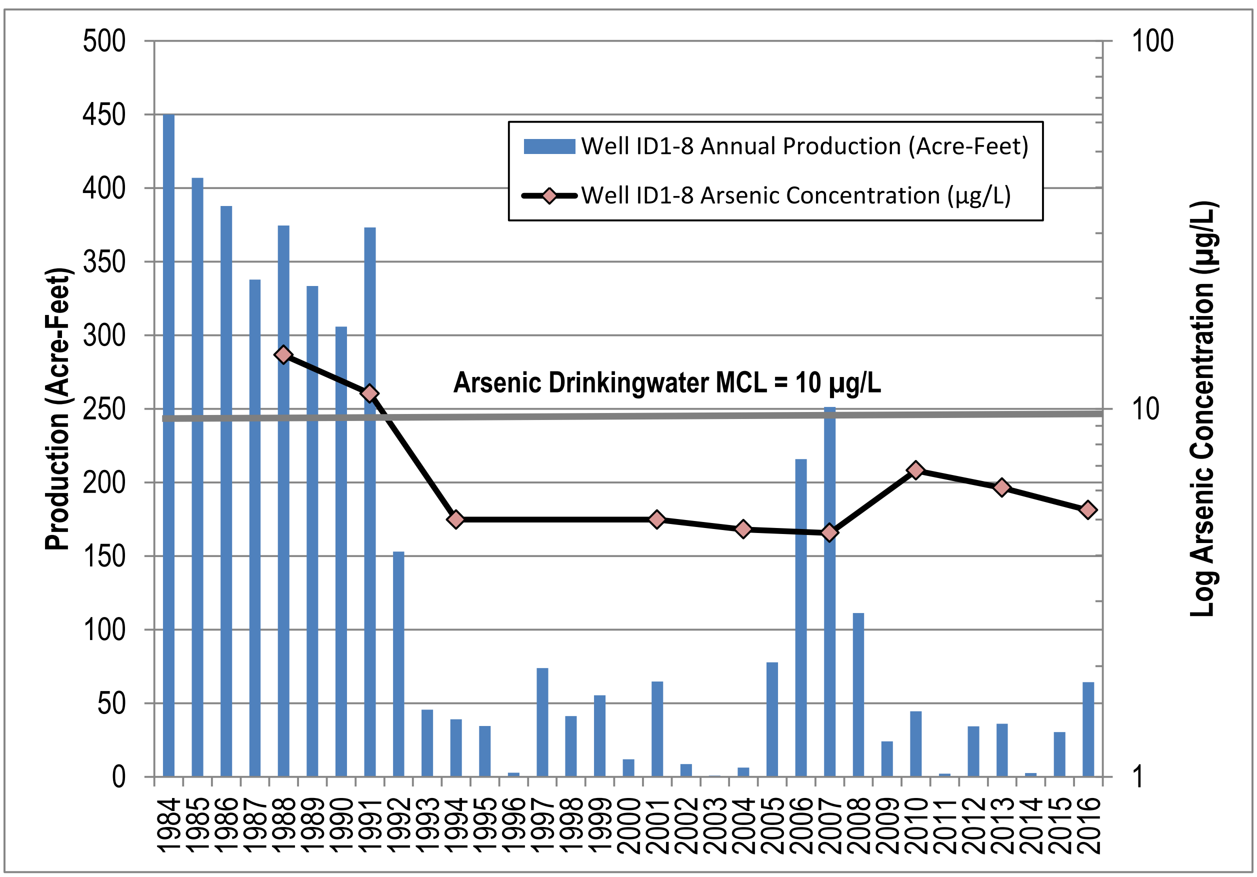
Sufficient groundwater level data is not available over the period of record to determine if there is a correlation between arsenic concentration and groundwater levels. Additional arsenic concentration, production, and groundwater level data is required to make any further correlation of the data for well ID1-2.

ID1-8

As indicated by the Mann-Kendall trend analysis, arsenic concentrations in well ID1-8 have no statistically determined trend. Visual review of the data shown in Exhibit 2 suggests that arsenic concentrations initially dropped and are now stable. However, since arsenic concentrations can vary with depth, further review of the data was conducted with respect to groundwater levels and production rates.

Annual groundwater production at Well ID1-8 was compared with available arsenic concentration data as shown in Exhibit 2.

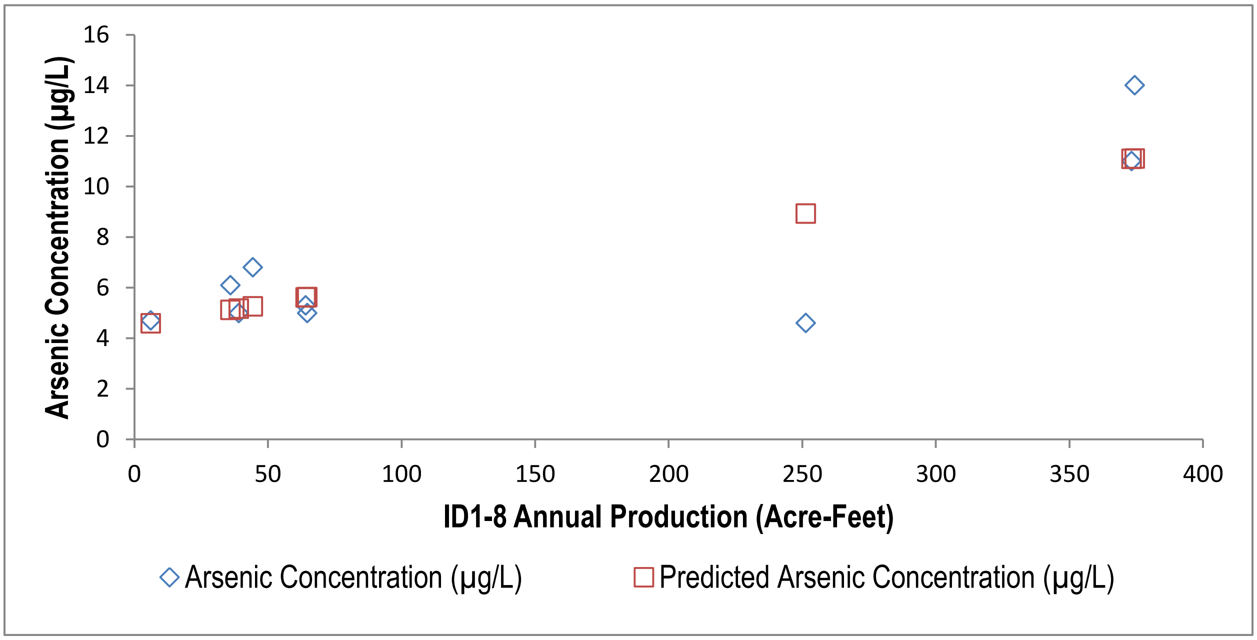
Exhibit 2
Well ID1-8 Groundwater Production and Arsenic Data



Sources: Production and groundwater quality data provided from BWD files.

A linear regression analysis of the dependent variable, arsenic concentration was plotted versus the independent variable, annual groundwater production for well ID1-8 (Exhibit 3). The goodness of fit for well ID1-8 linear regression was good (R square value = 0.65).

Exhibit 3
Well ID1-8 One-Way Linear Regression



Additional linear regression analysis was performed of the dependent variable, arsenic concentration plotted versus the independent variables, annual groundwater production, and groundwater elevation for well ID1-8 (Exhibits 4a and 4b). The goodness of fit for the two-way well ID1-8 linear regression was good (R square value = 0.66) and slightly better than the one-way linear regression.

Exhibit 4A
Well ID1-8 Two-Way Linear Regression

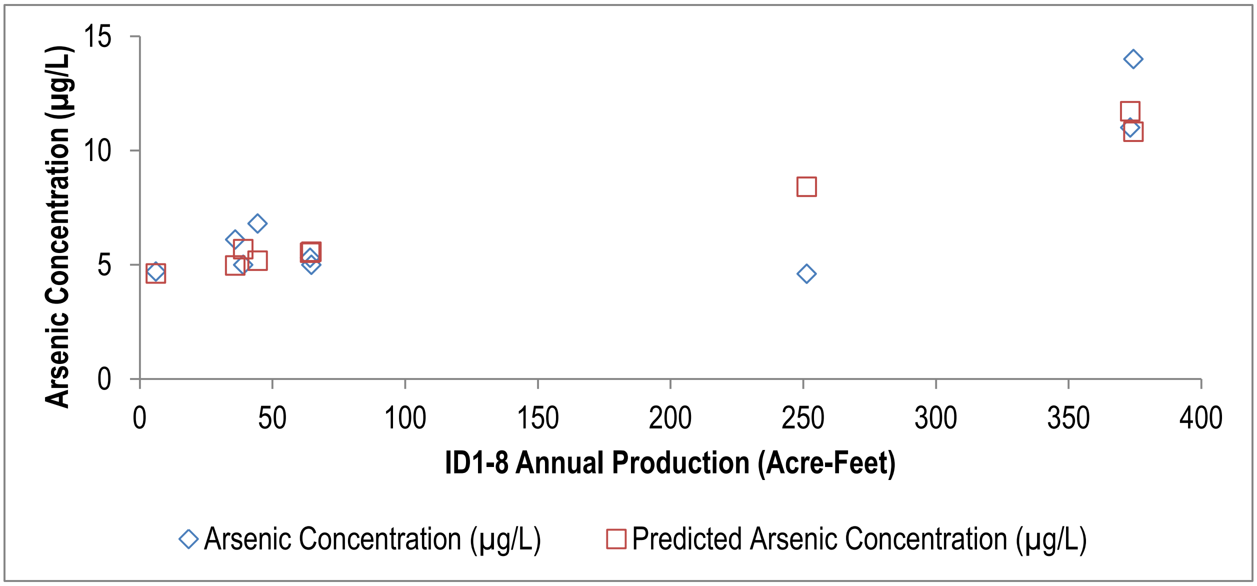
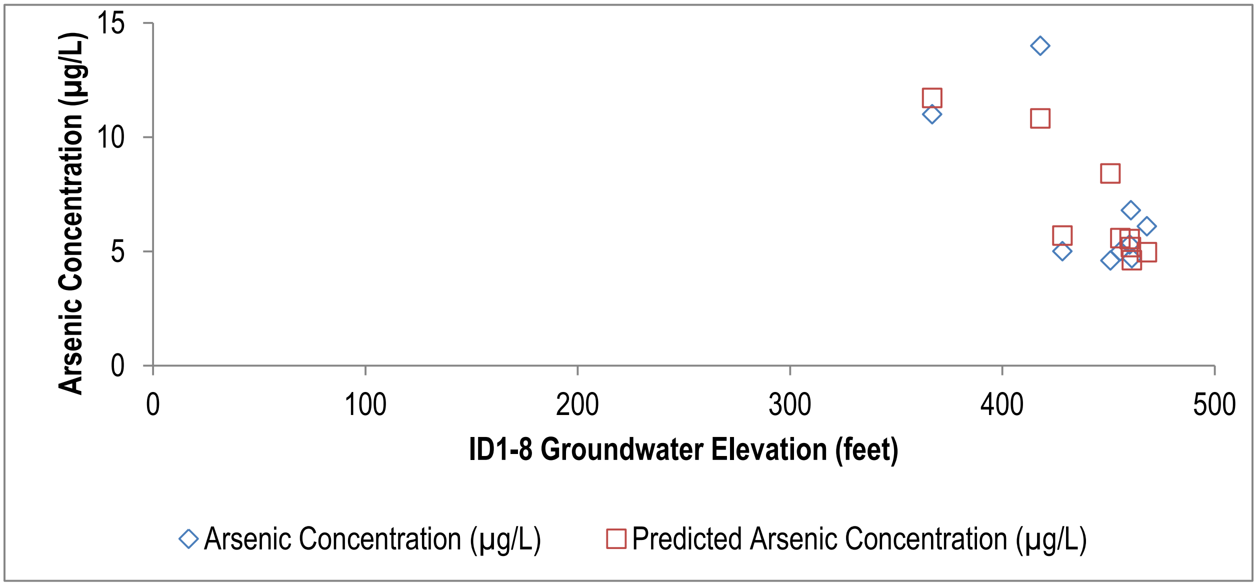


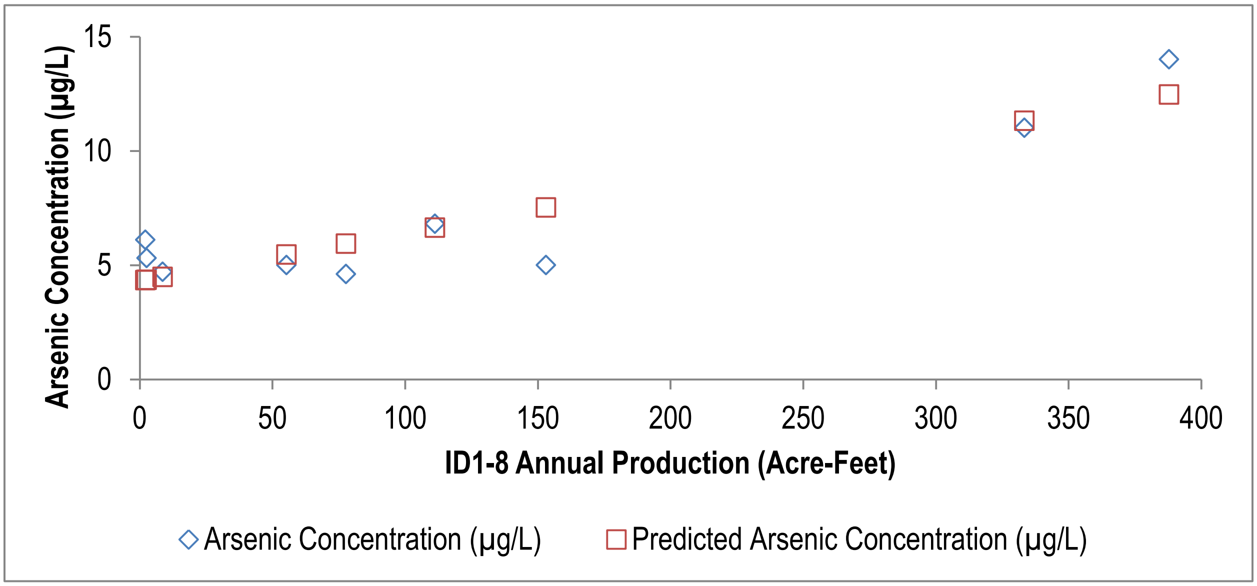
Exhibit 4B
Well ID1-8 Two-Way Linear Regression



Notes: The upper graph displays ID1-8 annual production vs. arsenic concentration linear regression while the lower graph displays ID1-8 groundwater elevation vs. arsenic concentration linear regression.
Sources: Production, groundwater level and groundwater quality data provided from BWD files.

As there appears to be about a 2-year lag in increased arsenic concentration versus pumping, an alternative linear regression was performed by forcing the data with a 2-year correction. A linear regression analysis of the dependent variable, arsenic concentration was plotted versus the independent variable, annual groundwater production with a 2-year lag applied for well ID1-8 (Exhibit 5). The goodness of fit for Well ID1-8 linear regression 2-year lag was best (R square value = 0.83).

Exhibit 5
Well ID1-8 2-Year Lag Linear Regression



Sources: Production, groundwater level and groundwater quality data provided from BWD files.

If the linear regression equation: y = Arsenic = 4.293 + (0.0177*Production Rate) from the 2-year lag regression is applied for predictive analysis, then a predicted arsenic concentration is arrived for each annual production rate (Table 3).

Table 3
2-Year Lag Predictive Arsenic Concentration ID1-8

Annual Production Rate (acre-feet)	Predicted Arsenic Concentration (µg/L)
100	6.06
200	7.83
300	9.60
400	11.37
500	13.14

Table 3
2-Year Lag Predictive Arsenic Concentration ID1-8

Annual Production Rate (acre-feet)	Predicted Arsenic Concentration (µg/L)
600	14.92
650	15.80
700	16.69
800	18.46
900	20.23
1,000	22.00

Note: The predicted arsenic concentration is based on the 2-year lag linear regression equation for pumping at ID1-8.

Based on the 2-year lag linear regression of production and arsenic data from well ID1-8, groundwater production in excess of 300 acre-feet per year at well ID1-8 is predicted to exceed the arsenic drinking water standard of 10 µg/L after approximately 2 years of production at this rate.. Assuming the 1988 and 1991 measured arsenic concentration of 14 µg/L and 11 µg/L, respectively, represent true values, there is a high probability that the current rate of groundwater production (in excess of 1,000 acre-feet) in the SMA could potentially result in exceedance of the arsenic drinking water standard at well ID1-8. Because available data is limited (only 2 years of data for newly drilled wells) in the SMA, additional analysis could not be performed.

NON-TREATMENT AND TREATMENT ALTERNATIVES

While none of the BWD's wells currently exceed California drinking water MCLs, treatment alternatives for COCs are discussed herein to explore options in the event that groundwater quality were to become impaired. Non-treatment and treatment options to meet drinking water standards typically include blending, wellhead treatment, or supplementing the impaired source of supply. In brief, the options include the following.

Switch Sources. As indicated in this Draft Working Technical Memorandum, the BWD is supplied from several wells located in the NMA, CMA, and SMA of the Borrego Springs Subbasin. If a BWD well were to exceed a drinking water standard, the likely most cost-effective option would be to switch supply to an existing water well(s).

Procurement of a New Source. If additional quantity of groundwater meeting California drinking water MCLs was required by the BWD, then acquiring existing wells or drilling new water wells in the basin may be a cost-effective option. The BWD has already initiated preliminary review of potential new sources of supply in the Borrego Springs Subbasin and should further identify strategic sources of supply that meet Title 22 potable drinking water quality requirements.

Blending. If a system has supply sources with low and high concentrations of COCs, blending is a practical option if the source of supply with a low concentration of the COCs is reliable and the sources can be brought together for mixing at a common header (i.e., blending location which may occur within a pipeline). To allow for a safety margin, target concentration of the blended stream is typically set 20% below the respective MCL.

Sidestream Treatment. If COCs were to exceed a respective MCL by a small margin, then sidestream treatment could be a viable option for some COCs such as arsenic. Sidestream treatment involves splitting flow, treating one stream, and blending it with the untreated stream prior to distribution.

Wellhead Treatment. If the typically more cost-effective options above were exhausted, then wellhead treatment would be evaluated in the event that COCs were to exceed drinking water standards. The U.S. Environmental Protection Agency (EPA) identifies several best available technologies for arsenic removal, which are discussed in further detail in a previous Dudek study, *Water Replacement and Treatment Cost Analysis for the Borrego Valley Groundwater Basin* (Dudek 2015).

CONCLUSIONS AND RECOMMENDATIONS

Groundwater quality in the Borrego Springs Subbasin varies both geographically from north to south in the subbasin and with depth in the aquifer. Dudek recommends considering the designation of three groundwater quality management zones to improve management of the subbasin. These will address the geographic effects on groundwater quality and better manage water quality moving forward. Three management areas are proposed for the subbasin: North Management Area (NMA), Central Management Area (CMA), and a South Management Area (SMA). These management areas are based on both subsurface geological features such as the Desert Lodge anticline that limit hydrologic communication between the southern part of the subbasin and the central part of the subbasin, as well as on differences in groundwater production demands, well screens, and pumping depressions between the southern, central, and northern parts of the subbasin.

Potential risks were examined in this technical memorandum associated with temporal changes in groundwater quality specific to potential exceedances of drinking water MCLs in BWD production wells due to the long-standing critical overdraft. A review of available historical groundwater quality data has identified numerous COCs in the Borrego Springs Subbasin including arsenic, fluoride, nitrate, sulfate, and TDS.

- Statistical analysis of the data indicates increasing trend for arsenic, fluoride, nitrate, sulfate, and TDS in select wells. In the NMA, well ID4-11 indicates increasing trend for fluoride, and wells ID4-11 and ID4-18 indicate increasing trend for nitrate as N. In the CMA, the Wilcox well indicates increasing trend for fluoride, and well ID1-10 indicates increasing trend for nitrate as N. In the SMA, well ID1-2 indicates increasing trend for arsenic; well ID1-8 indicates an increasing trend for nitrate as N; and wells ID1-1 and ID1-8 indicate an increasing trend for sulfate and TDS.

- Areas of the subbasin where COC concentrations exceed MCLs include arsenic in multiple wells and TDS in one well in the SMA. Historical exceedance of nitrate as N in the upper aquifer of the NMA is based on data collected from old well ID4-4. Sulfate exceeding the secondary MCL is indicated in wells MW-5A and MW-5B in the CMA at the Borrego Sink, and well ID1-1 in the SMA.
- Groundwater quality changes with depth are most pronounced in the lower aquifer of the SMA that has elevated arsenic concentrations above the California drinking water standard. Review of limited available data are uncertain as to whether arsenic or other COCs increase as a function of depth in the subbasin. Additional data collection is required to characterize groundwater quality and fill the data gap to determine whether as groundwater levels decrease if groundwater quality degrades.

Due to the limited available groundwater quality data, there is often insufficient data to determine trend, and it is recommended that BWD begin to sample wells annually rather than every 3 years as required by the DDW, at least for wells that indicated detections of COCs above one-half the drinking water MCL or where increasing concentration trend is indicated.

Groundwater quality data support that water quality decreases with depth, and it is anticipated that a greater percentage of groundwater production will be derived from the middle and lower aquifers before groundwater levels are stabilized under the GSP. However, since many of the wells have very long open screen lengths, the groundwater quality data reflect a blend of water with depth and do not clearly provide depth-specific data. It is also recommended that to better assess risks to groundwater quality and future sources of BWD supply that additional existing private wells be sampled and the potential to conduct depth-discrete sampling of existing wells and/or drilling of test/monitoring wells be evaluated.

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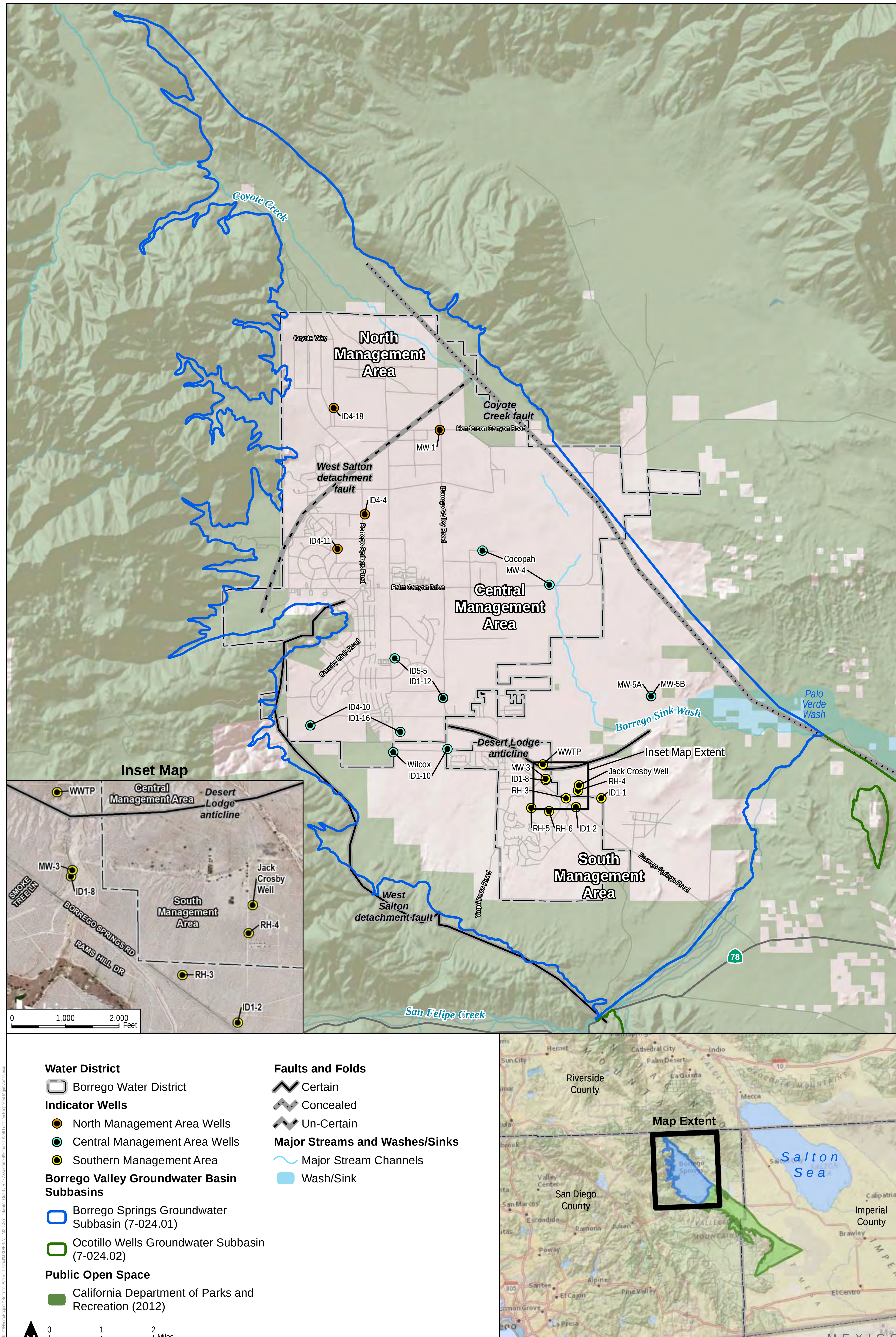
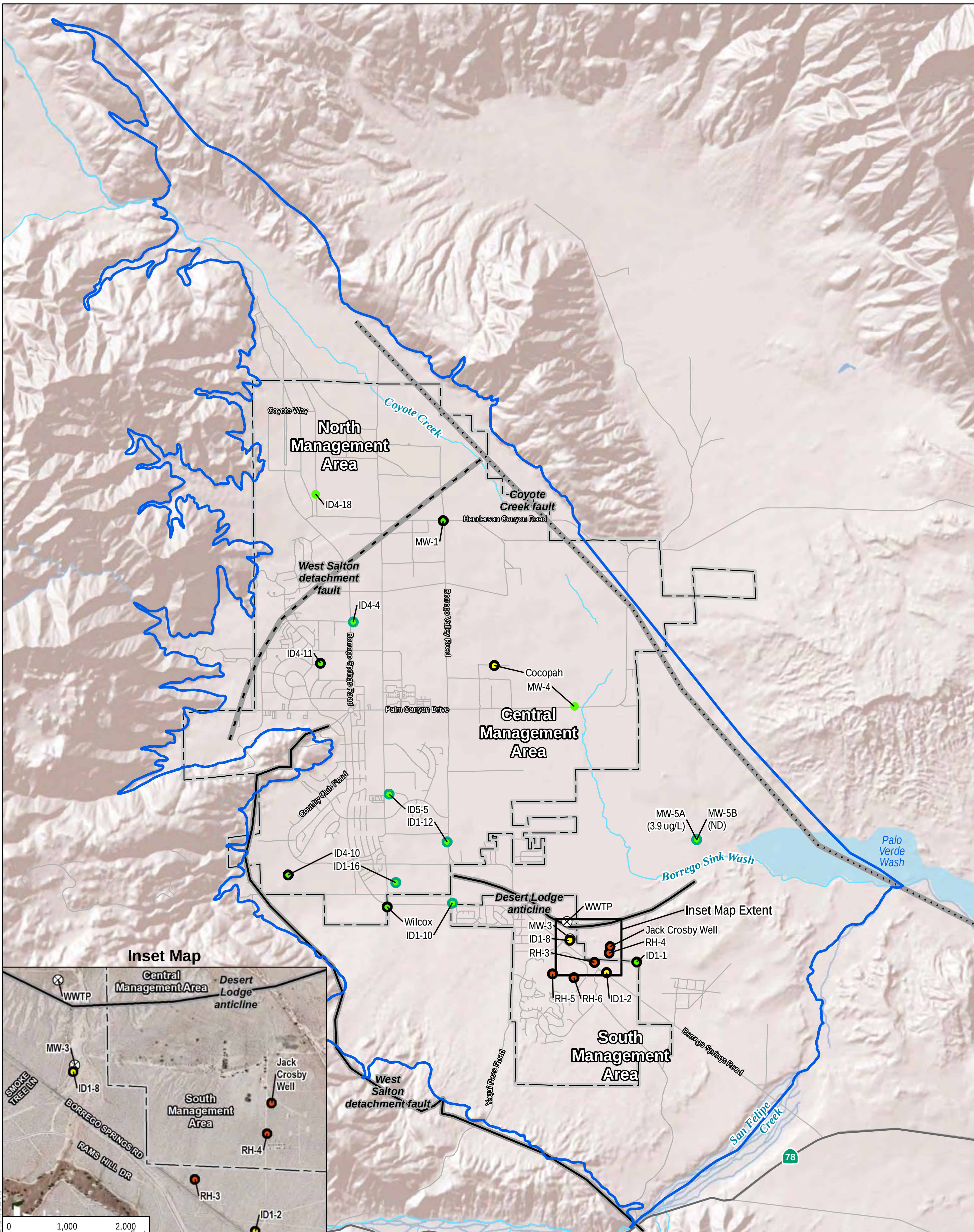


DUDEK

SOURCE: USGS; DWR; BWD; Steely et. al. 2009

Figure 1
Indicator Well Location Map and Proposed Management Areas



Borrego Water District

Borrego Springs Groundwater Subbasin (7-024.01)

Faults and Folds

Certain

Concealed

Un-Certain

Major Streams and Washes/Sinks

Major Stream Channels

Wash/Sink

Arsenic Wellhead Concentrations

Upper Aquifer

Less than 1/2 the MCL (5 ug/L)

Middle Aquifer

Less than 1/2 the MCL (5 ug/L)

Lower Aquifer

No Sample

Less than 1/2 the MCL (5 ug/L)

Less than the MCL (10 ug/L)

Greater than the MCL (10 ug/L)

Note: Many wells are screened in multiple aquifers, but wells have been designated by aquifer based on the assumed preferential pumping zone. Wellhead concentrations are based on the most recent sampling events.

N

0 1 2 Miles

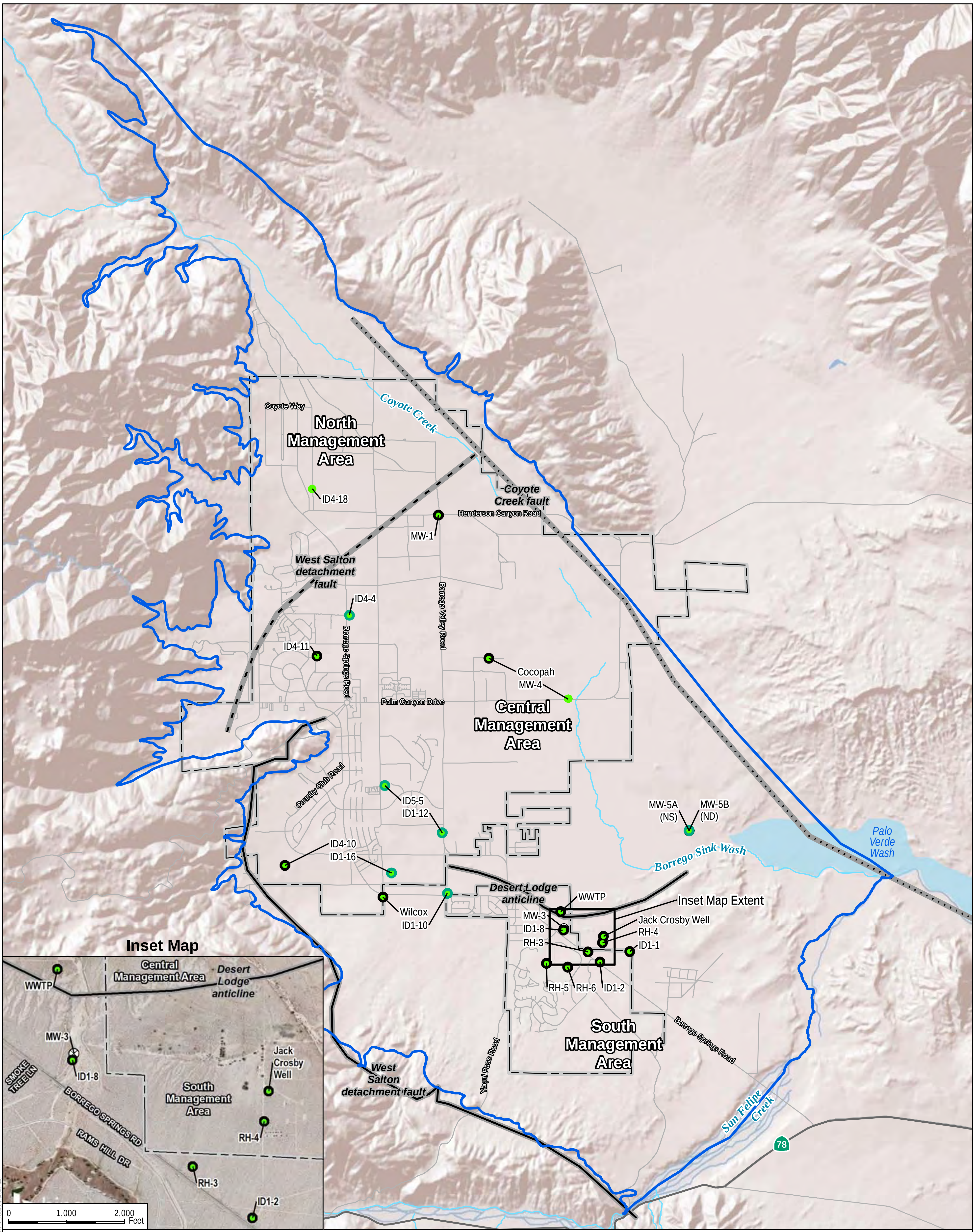
DUDEK

SOURCE: USGS; DWR; BWD; Steely et. al. 2009

Figure 2
Arsenic Wellhead Concentrations

Borrego Springs Subbasin Groundwater Quality Risk Assessment

DRAFT June 2017



Borrego Water District

Borrego Springs Groundwater Subbasin (7-024.01)

Faults and Folds

Certain

Concealed

Un-Certain

Major Streams and Washes/Sinks

Major Stream Channels

Wash/Sink

Nitrate as Nitrogen (N) Wellhead Concentrations

Upper Aquifer

Less than 1/2 the MCL (5 mg/L)

Middle Aquifer

No Sample

Less than 1/2 the MCL (5 mg/L)

Lower Aquifer

No Sample

Less than 1/2 the MCL (5 mg/L)

Less than the MCL (10 mg/L)

Note: Many wells are screened in multiple aquifers, but wells have been designated by aquifer based on the assumed preferential pumping zone. Wellhead concentrations are based on the most recent sampling events.

N

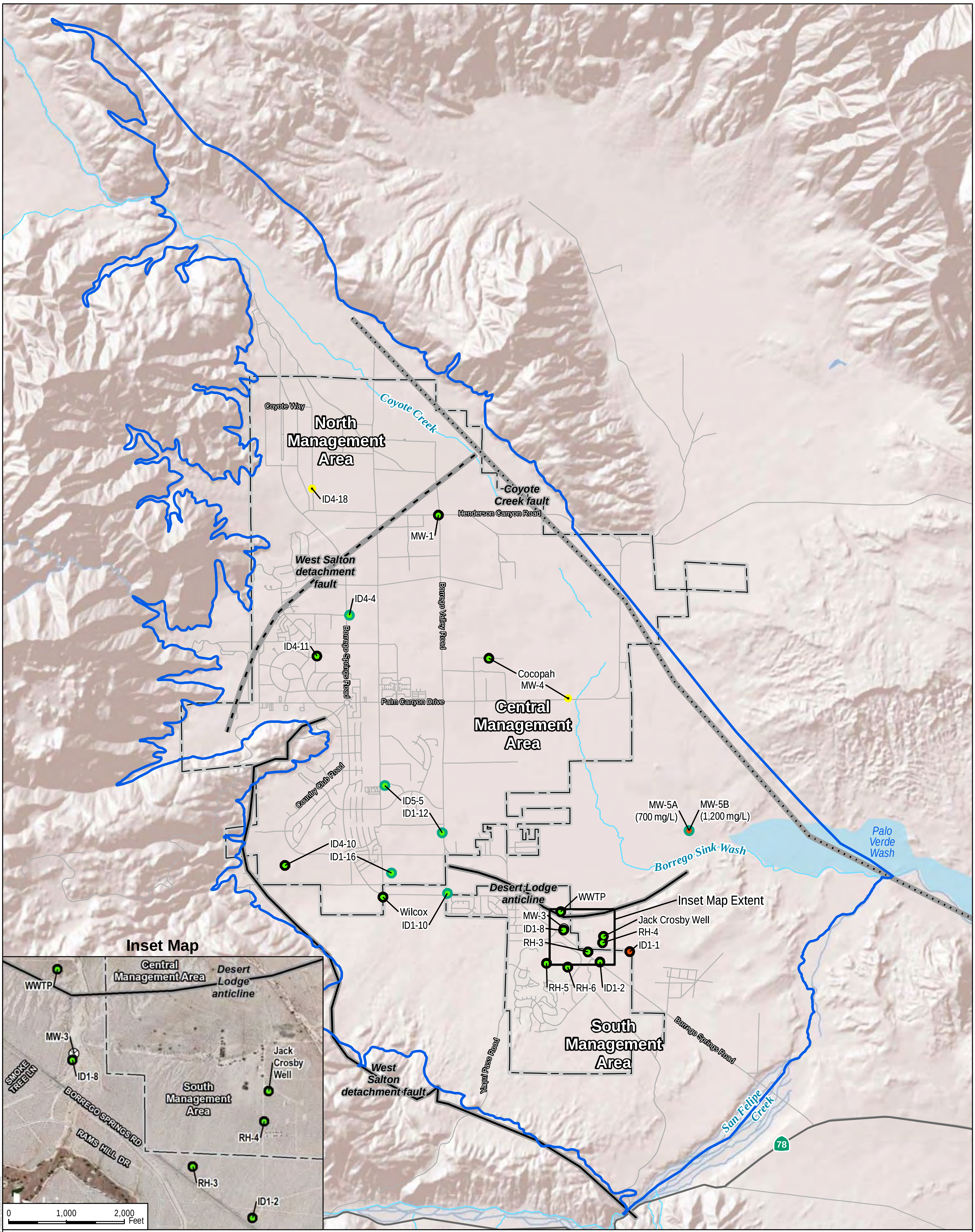
0 1 2 Miles

DUDEK

SOURCE: USGS; DWR; BWD; Steely et. al. 2009

Figure 3

Nitrate as Nitrogen (N) Wellhead Concentrations



Borrego Water District

Borrego Springs Groundwater Subbasin (7-024.01)

Faults and Folds

Certain

Concealed

Un-Certain

Major Streams and Washes/Sinks

Major Stream Channels

Wash/Sink

Sulfate Wellhead Concentrations

Upper Aquifer

Less than the secondary MCL (500 mg/L)

Middle Aquifer

Less than 1/2 the secondary MCL (250 mg/L)

Greater than the secondary MCL (500 mg/L)

Lower Aquifer

No Sample

Less than 1/2 the secondary MCL (250 mg/L)

Greater than the secondary MCL (500 mg/L)

Note: Many wells are screened in multiple aquifers, but wells have been designated by aquifer based on the assumed preferential pumping zone. Wellhead concentrations are based on the most recent sampling events.

0 1 2 Miles

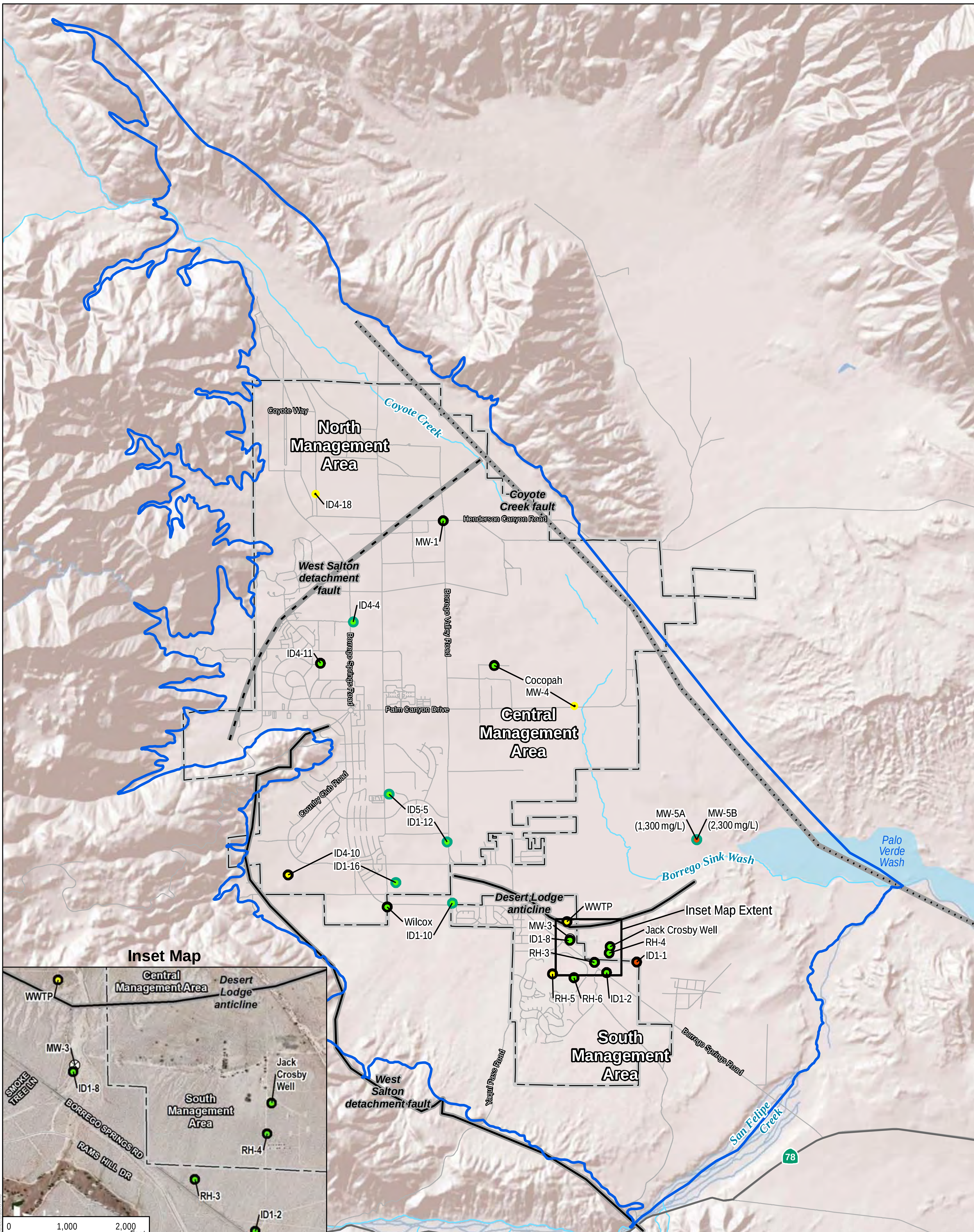
SOURCE: USGS; DWR; BWD; Steely et. al. 2009

DUDEK

Figure 4
Sulfate Wellhead Concentrations

Borrego Springs Subbasin Groundwater Quality Risk Assessment

DRAFT June 2017



Borrego Water District

Borrego Springs Groundwater Subbasin (7-024.01)

Faults and Folds

Certain

Concealed

Un-Certain

Major Streams and Washes/Sinks

Major Stream Channels

Wash/Sink

Total Dissolved Solids (TDS) Wellhead Concentrations

Upper Aquifer

Less than the secondary MCL (1,000 mg/L)

Middle Aquifer

Less than 1/2 the secondary MCL (500 mg/L)

Greater than the secondary MCL (1,000 mg/L)

Lower Aquifer

No Sample

Less than 1/2 the secondary MCL (500 mg/L)

Less than the secondary MCL (1,000 mg/L)

Greater than the secondary MCL (1,000 mg/L)

Note: Many wells are screened in multiple aquifers, but wells have been designated by aquifer based on the assumed preferential pumping zone. Wellhead concentrations are based on the most recent sampling events.

0 1 2 Miles

SOURCE: USGS; DWR; BWD; Steely et. al. 2009

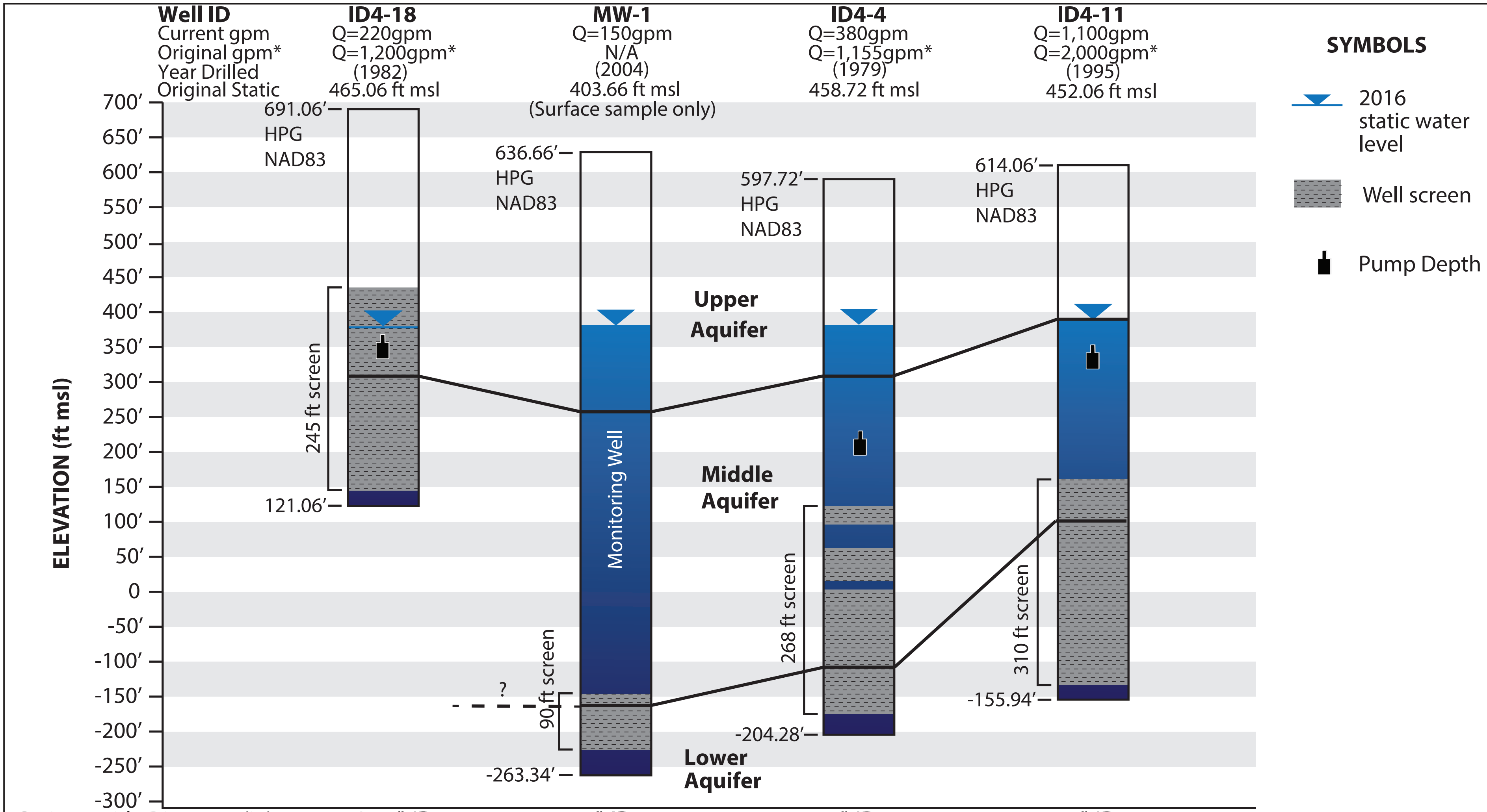
DUDEK

Figure 5

Total Dissolved Solids Wellhead Concentrations

Borrego Springs Subbasin Groundwater Quality Risk Assessment

DRAFT June 2017



	ID4-18	MW-1	ID4-4	ID4-11
Casing Inside Diameter (in):	12.75″ ID	4″ ID	14″ ID	14″ ID
Well Depth (ft bls):	570′ bls	900′ bls	786′ bls	770′ bls
Borehole Depth (ft bls):	699′ bls	1,238′ bls	802′ bls	800′ bls
Pump Size (HP):	50 HP	N/A	150 HP	200 HP
Pump Depth (ft msl):	251 ft msl	N/A	219 ft msl	269 ft msl
Specific Capacity (gpm/ft):	12.83 gpm/ft	00.36 gpm/ft	12.83 gpm/ft	86.95 gpm/ft
Current Production Rate (gpm):	220gpm	Monitoring Well	400gpm	1,1000 gpm
Casing Type:	Mild Steel	PVC	Mild Steel	Mild Steel

*Indicates original tested production rate when drilled

DUDEK

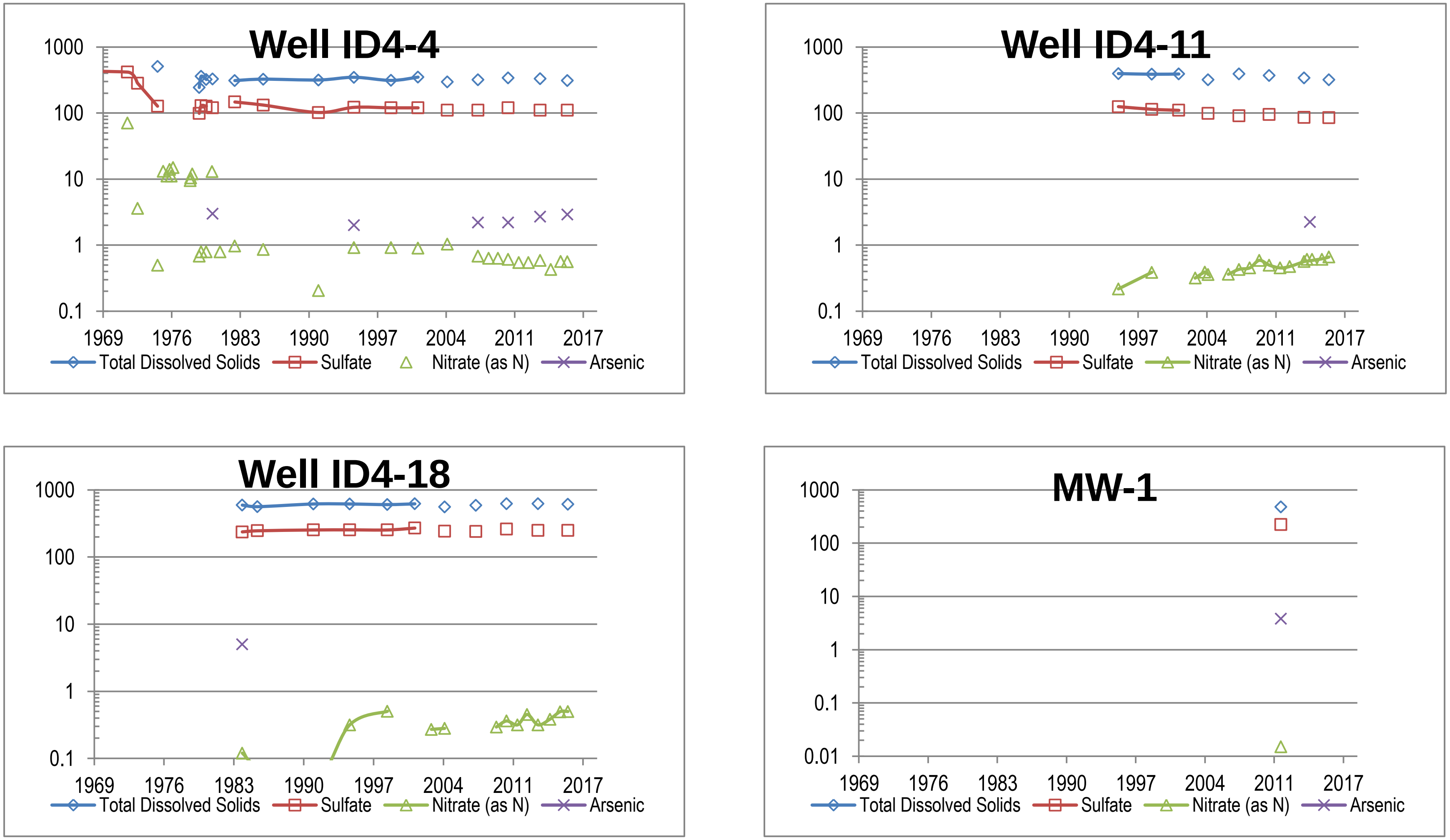
9299
June 2017

SOURCE: DWD, Pump Check 2013, DWR Well Completion Reports '79/'95/'82/'04

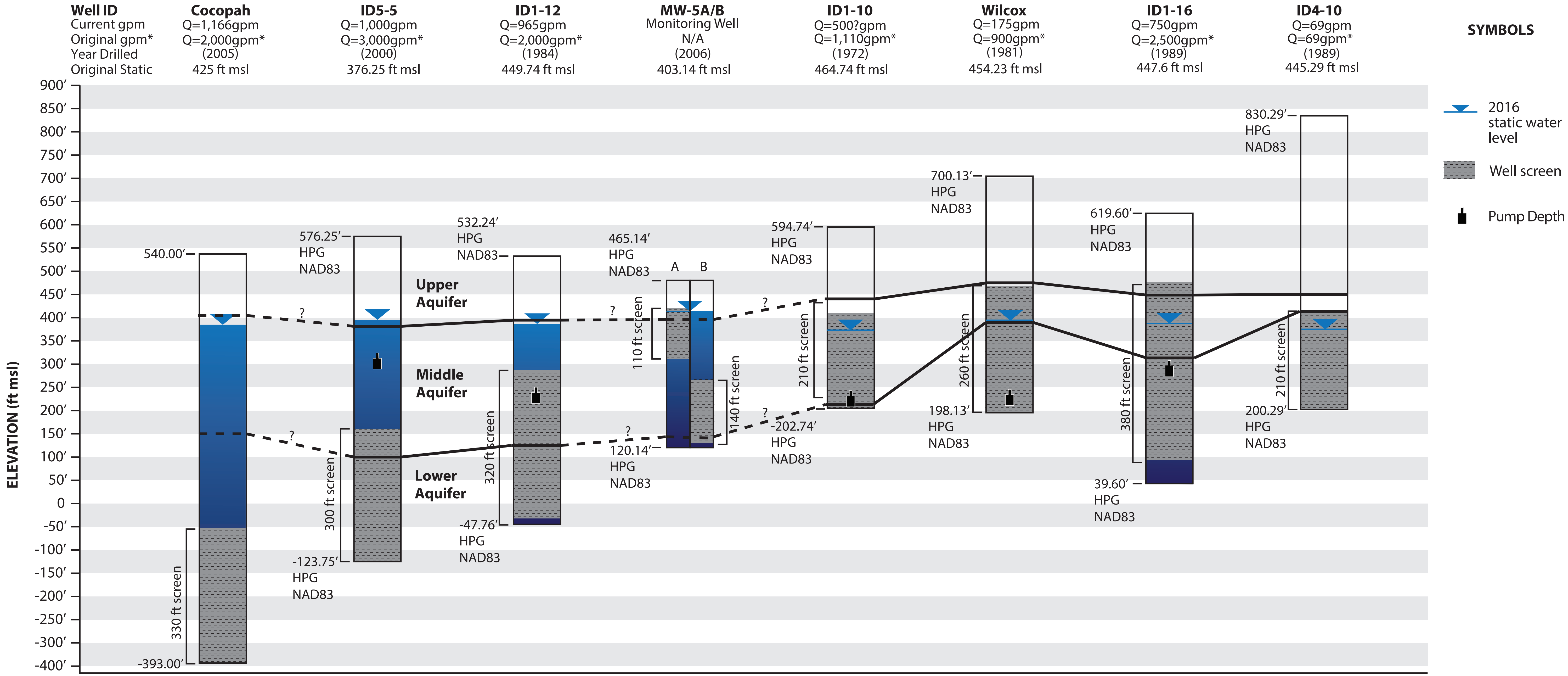
FIGURE 6
DRAFT: North Management Area Wells

Borrego Valley Groundwater Basin - Groundwater Quality Risk Assessment

Figure 7 North Management Area Groundwater Quality



Notes: Water entering well ID4-4 near static groundwater level was found to be high in dissolved minerals and nitrate. This zone was sealed off by the Roscoe Moss Co. in 1972 and redilled in 1979.
Source: BWD 2016, USGS 1980, DDW 2017



Casing Inside Diameter (in):	14″ ID	16″ ID	14.75″ ID	4″ ID	12.75″ ID	12.75″ ID	16″ ID	8″ ID
Well Depth (ft bls):	570′ bls	700′ bls	580′ bls	900′ bls	392′ bls	502′ bls	550′ bls	630′ bls
Borehole Depth (ft bls):	699′ bls	708′ bls	726′ bls (2004)	1,238′ bls (2004)	816′ bls	502′ bls	705′ bls	630′ bls
Pump Size (HP):	160 HP	200 HP	200 HP	N/A	150 HP	80 HP	200 HP	N/A
Pump Depth (ft msl):	N/A	316 ft msl	242 ft msl	N/A	204 ft msl	225 ft msl	219 ft msl	N/A
Specific Capacity (gpm/ft):	N/A	N/A	75.4 gpm/ft	N/A	20.3 gpm/ft	26.4 gpm/ft	31.0 gpm/ft	20 gpm/ft
Current Production Rate (gpm):	1,166 gpm	1,000 gpm	965 gpm	Monitoring Well	500? gpm	350? gpm	723 gpm	N/A
Casing Type:	Mild Steel	Mild Steel	Mild Steel	Mild Steel	Mild Steel	Mild Steel	Mild Steel	Mild Steel
Drop Pipe:	N/A	10″	8″	N/A	8″	6″	8″	N/A

*Indicates original tested production rate when drilled.

DUDEK

9299

June 2017

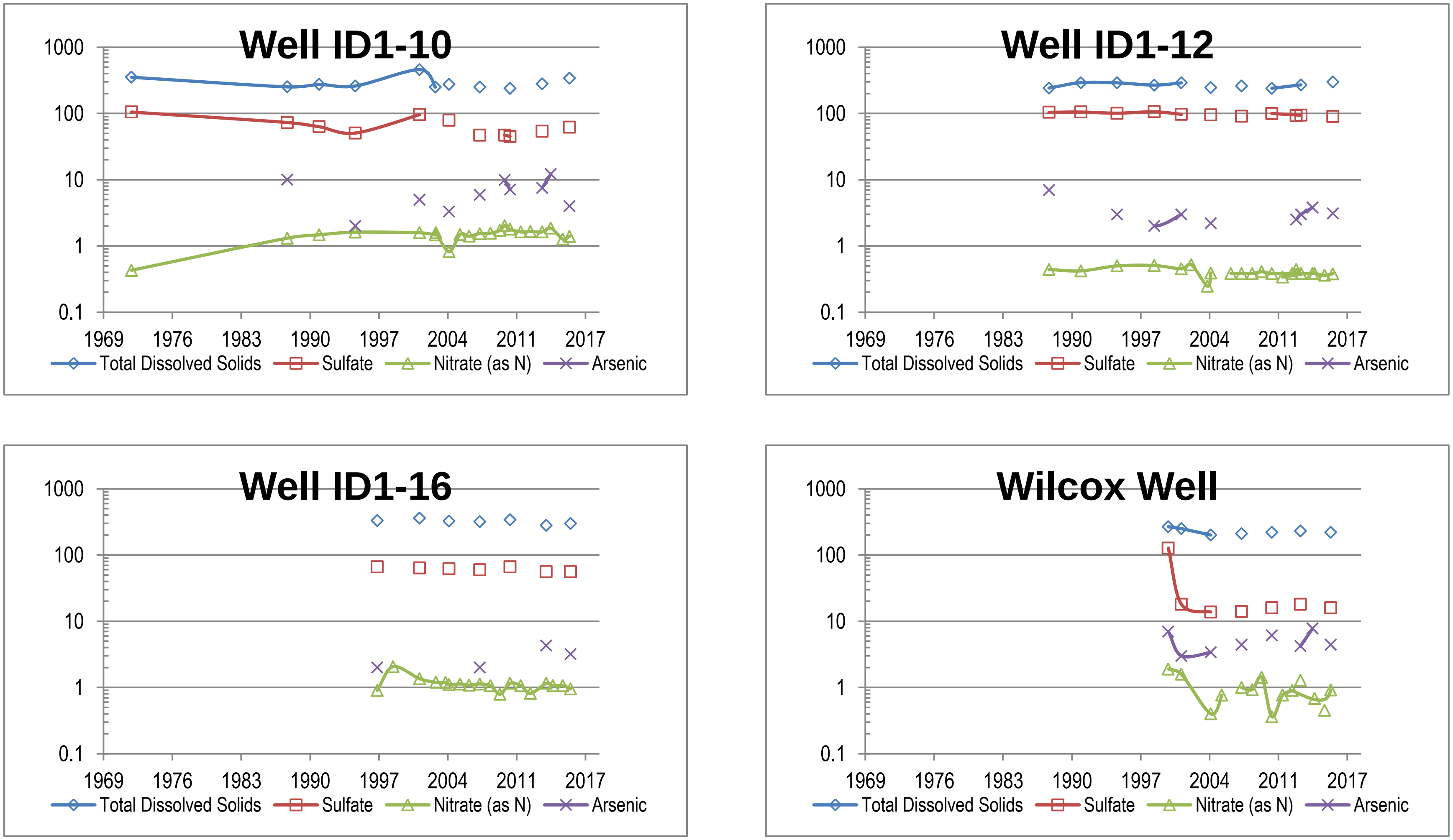
SOURCE: DWD, Pump Check 2008, 2009, 2010, 2013, DWR Well Completion Reports '79/'95/'82/'04, USGS

FIGURE 8

DRAFT: Central Management Area Wells

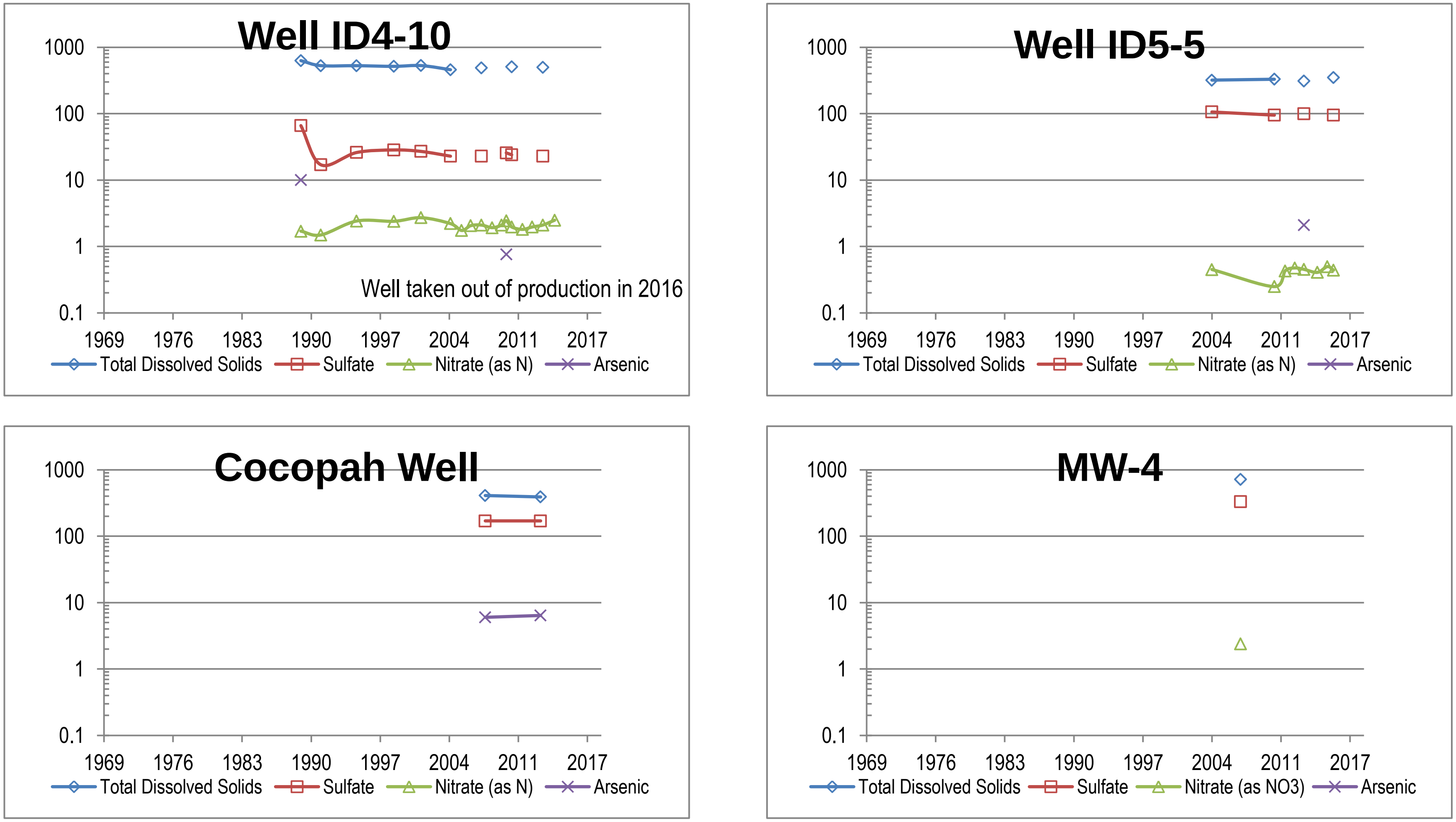
Borrego Valley Groundwater Basin - Groundwater Quality Risk Assessment

Figure 9 Central Management Area Groundwater Quality



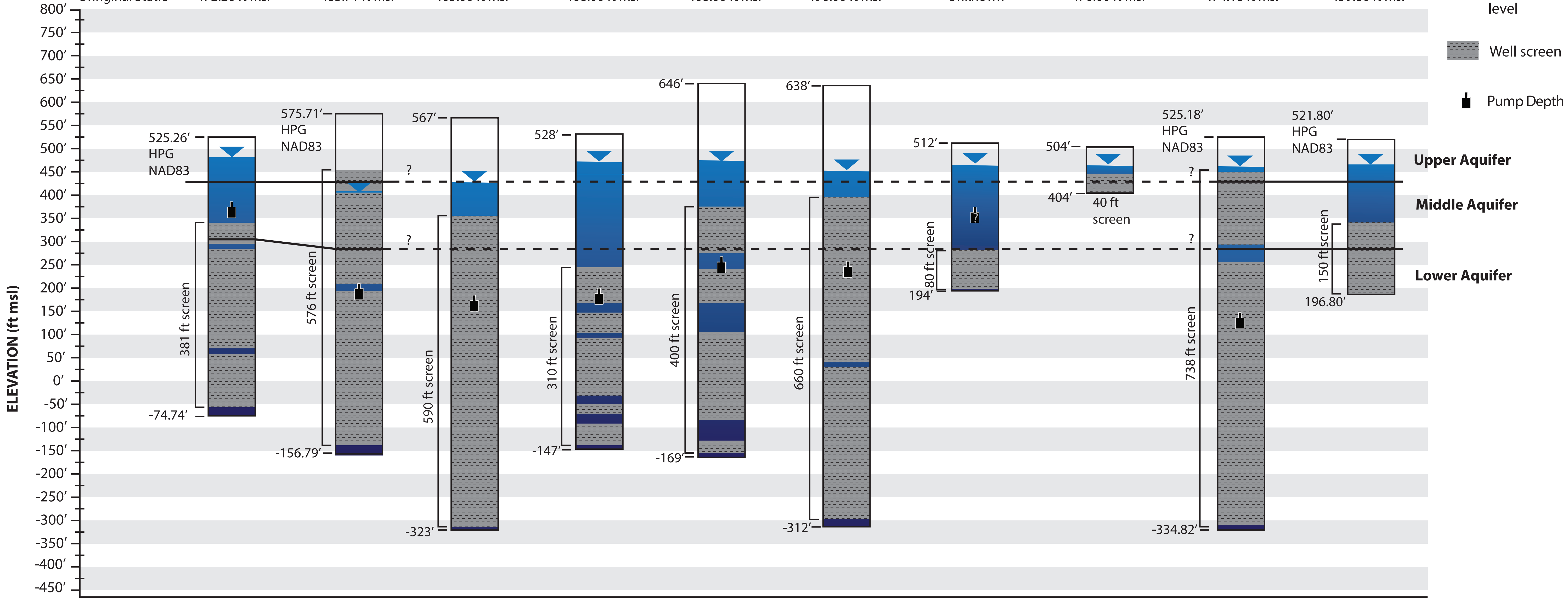
Source: BWD 2016, USGS 2009, 2012, Rezaie-Boroon et al. 2014

Figure 10 Central Management Area Groundwater Quality (Continued)



Source: BWD 2016, USGS 2009

Well ID	ID1-1	ID1-2	RH-3	RH-4	RH-5	RH-6	Jack Crosby Well	WWTP Well	ID1-8	MW-3
Current gpm	Q=200 gpm	Q=200 gpm	Q=230 gpm	Q=260 gpm	Q=350 gpm	Q=350 gpm	Q=10 gpm	Monitoring Well	Q=350 gpm (2013)	Monitoring Well
Original gpm*	Q=300 gpm*	Q=295 gpm*	Q=250 gpm*	Q=342 gpm*	Q=360 gpm*	Q=500 gpm*	Q=50 gpm*	N/A	Q=1,100 gpm*	N/A
Year Drilled	(1972)	(1972)	(2014)	(2014)	(2015)	(2015)	(2004)	(2009)	(1972)	(2005)
Oringinal Static	472.26 ft msl	483.71 ft msl	465.00 ft msl	468.00 ft msl	468.00 ft msl	496.00 ft msl	Unknown	476.00 ft msl	474.18 ft msl	459.80 ft msl



	ID1-1	ID1-2	RH-3	RH-4	RH-5	RH-6	Jack Crosby Well	WWTP Well	ID1-8	MW-3
Casing Inside Diameter (in):	12.75″ ID	12.75″ ID	12.75″ ID	10.75″ ID	10.75″ ID	10.75″ ID	4.5″ ID	4.5″ ID	12.75″ ID	4″ ID
Well Depth (ft bls):	600′ bls	732′ bls	890′ bls	675 bls	815′ bls	900′ bls	318′ bls	100′ bls	850′ bls	325′ bls
Borehole Depth (ft bls):	609′ bls	740 bls	998′ bls	844′ bls	830′ bls	1,000′ bls	318′ bls	100′ bls	938′ bls	344′ bls
Pump Size (HP):	40 HP	40 HP	40 HP	40 HP	40 HP	40 HP	unknown	N/A	100 HP	N/A
Pump Depth (ft msl):	357 ft msl	188 ft msl	187 ft msl	168 ft msl	246 ft msl	238 ft msl	N/A	N/A	135 ft msl	N/A
Specific Capacity (gpm/ft):	3.25 gpm/ft	1.45 gpm/ft	1.24 gpm/ft	1.69 gpm/ft	7.0 gpm/ft	5.9 gpm/ft	unknown	N/A	8.7 gpm/ft	N/A
Current Production Rate (gpm):	200 gpm	200 gpm	230 gpm	260 gpm	350 gpm	350 gpm	10 gpm	N/A	350 gpm (2013)	N/A
Casing Type:	Mild Steel	Mild Steel	Mild Steel	Mild Steel	Mild Steel	Mild Steel	PVC	PVC	Mild Steel	Mild Steel

* Indicates original tested production rate when drilled

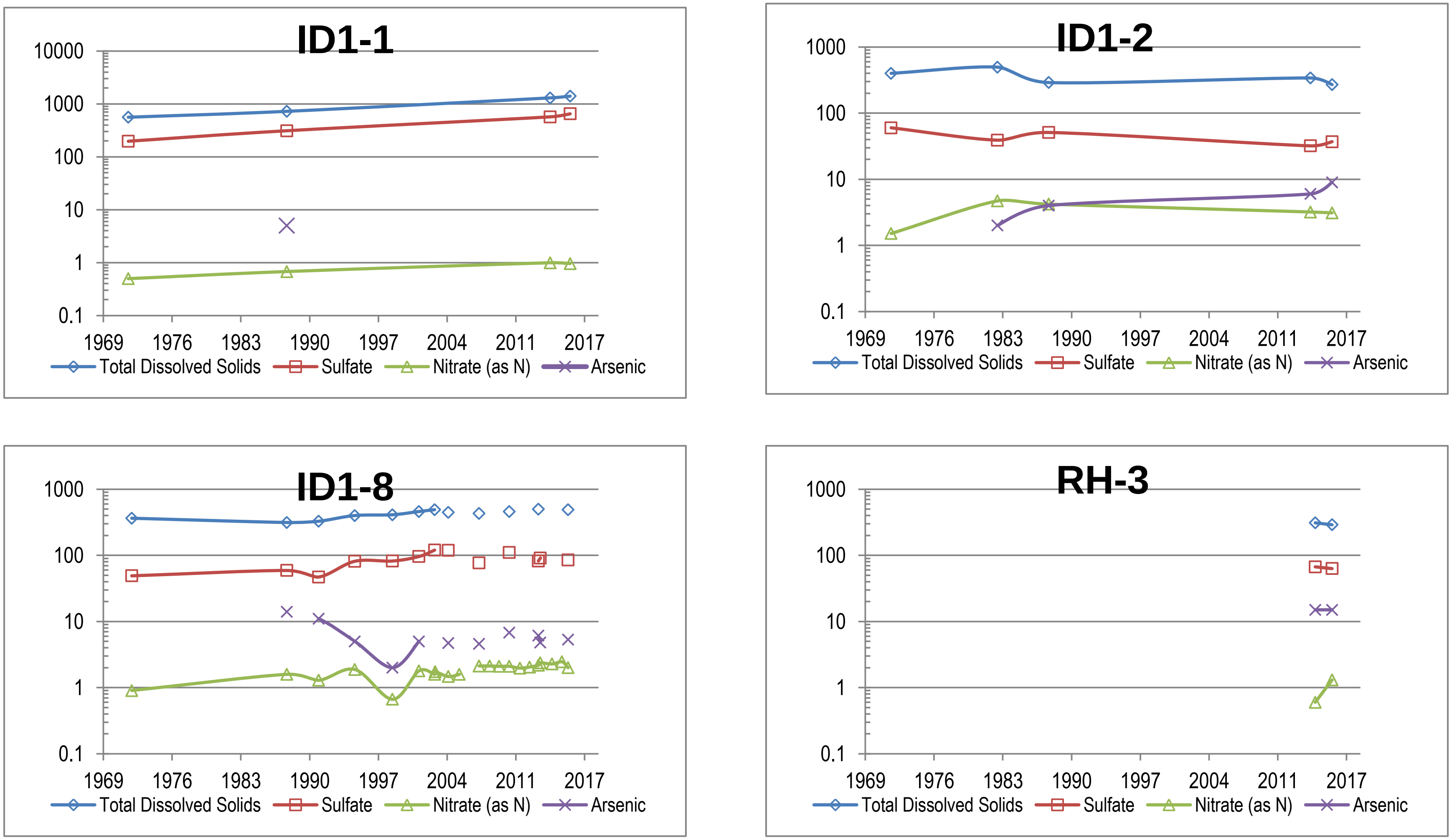
DUDEK

9299
June 2017

SOURCE: DWD, Pump Check 2008, 2009, 2010, 2013, DWR Well Completion Reports '79/'95/'82/'04, USGS (ID1-1, ID1-2, ID1-8, MW-3 elevation data source), other elevation data from Google Earth

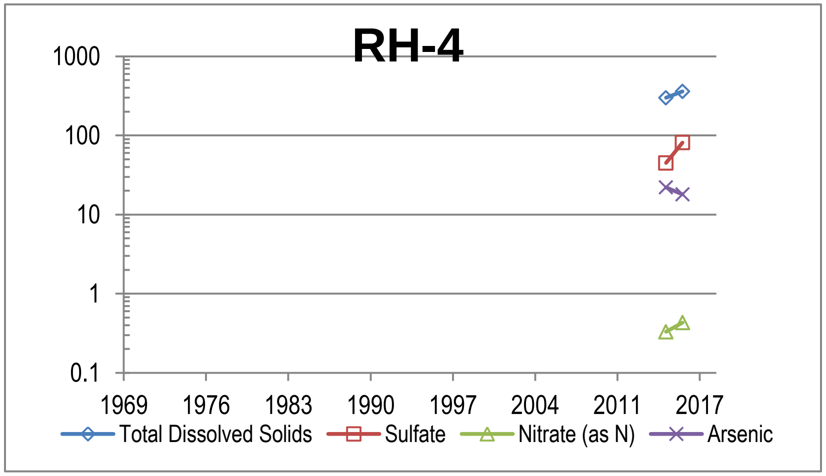
FIGURE 11
DRAFT: Southern Management Area Wells

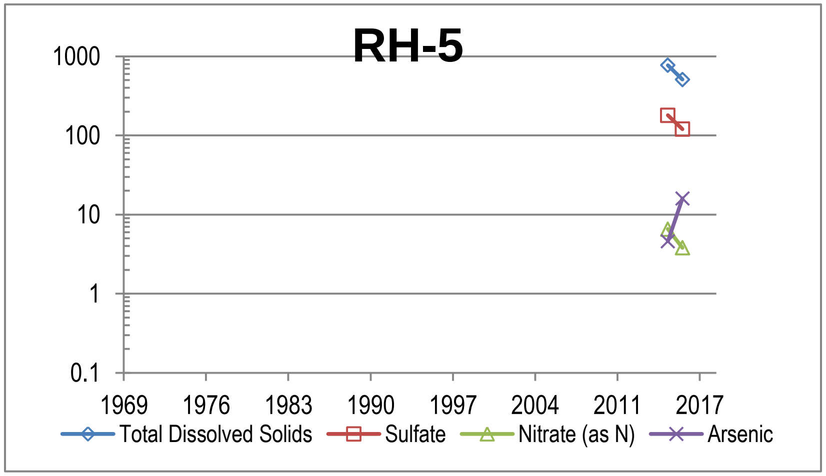
Figure 12 South Management Area Groundwater Quality

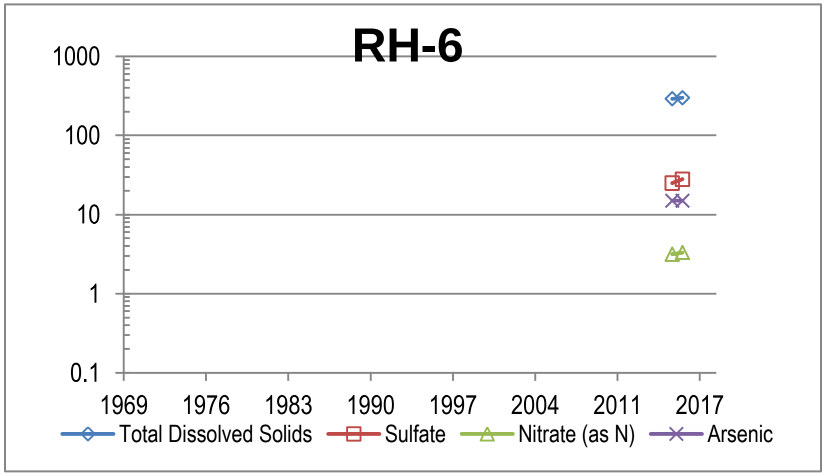


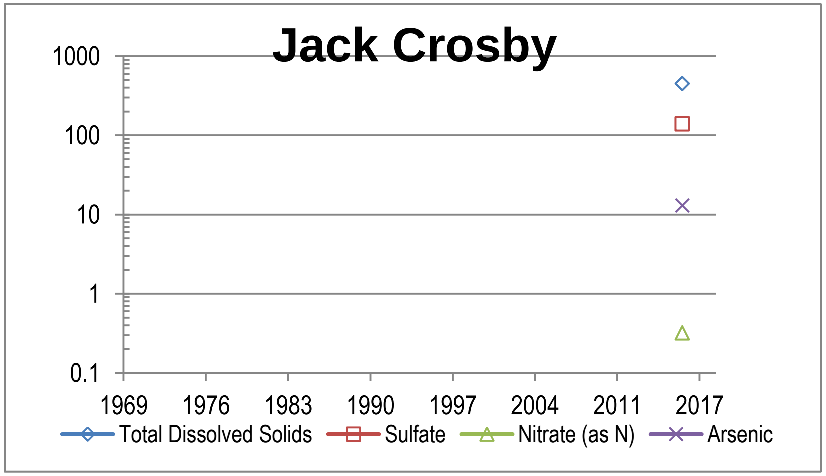
Source: BWD 2016, USGS 2013

Figure 13 South Management Area Groundwater Quality (Continued)



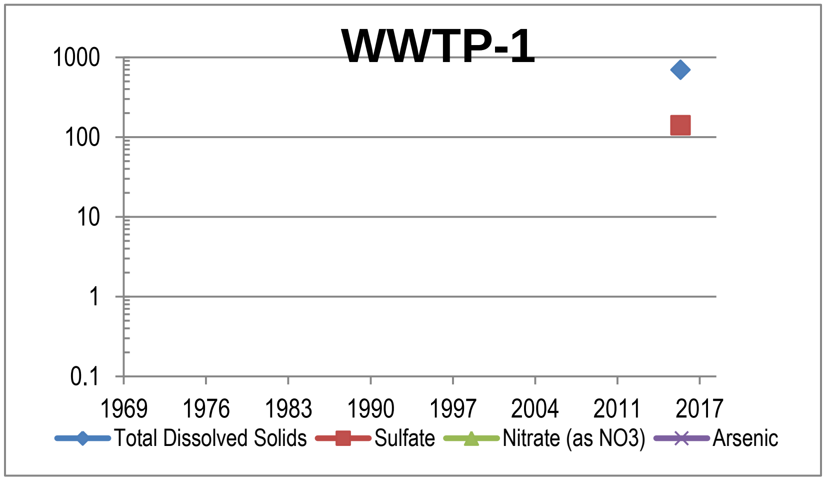






Source: Dudek 2016

Figure 14 South Management Area Groundwater Quality (Continued)



Source: BWD 2016

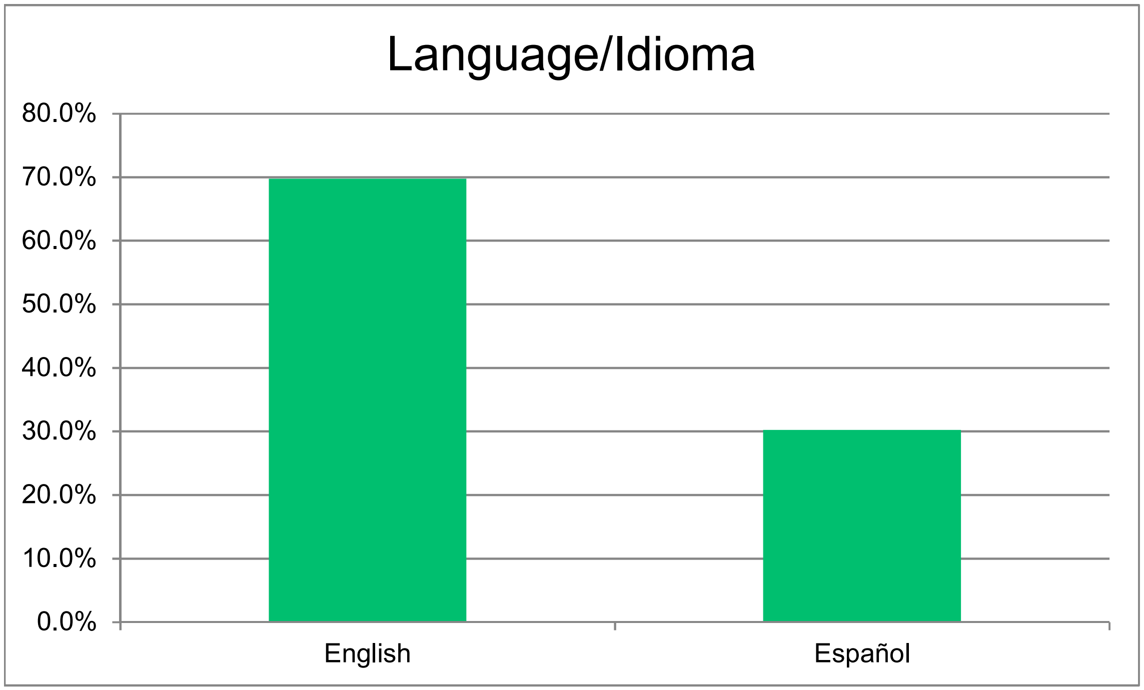
Appendix G.

Borrego Municipal User Survey Results

BWD Municipal User Survey

1. Language/Idioma

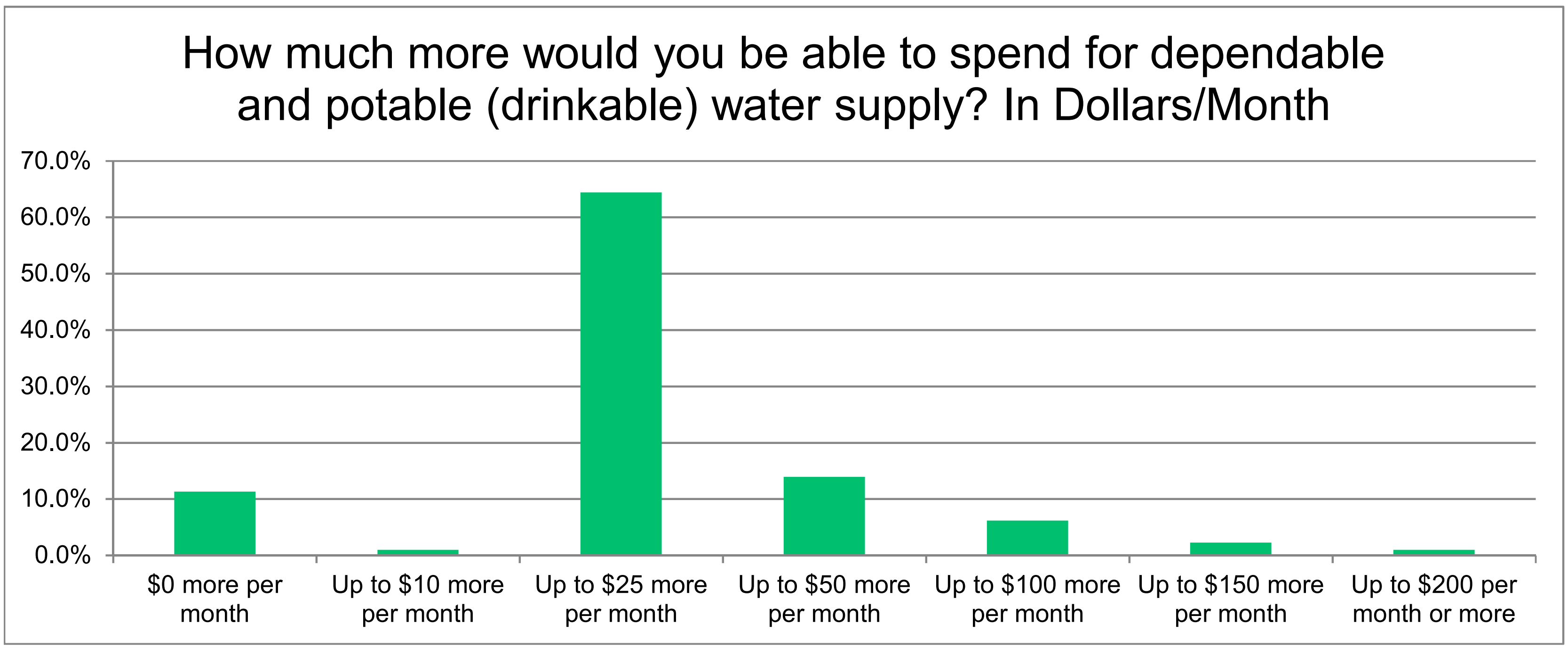
Answer Choices	Responses	
English	69.8%	256
Español	30.2%	111
	Answered	**367**
	Skipped	**0**



BWD Municipal User Survey

2. How much more would you be able to spend for dependable and potable (drinkable) water supply? In Dollars/Month
¿Cuánto más aparte de lo que paga actualmente de agua pagaría por el suministro de agua fiable y potable? En Cantidad

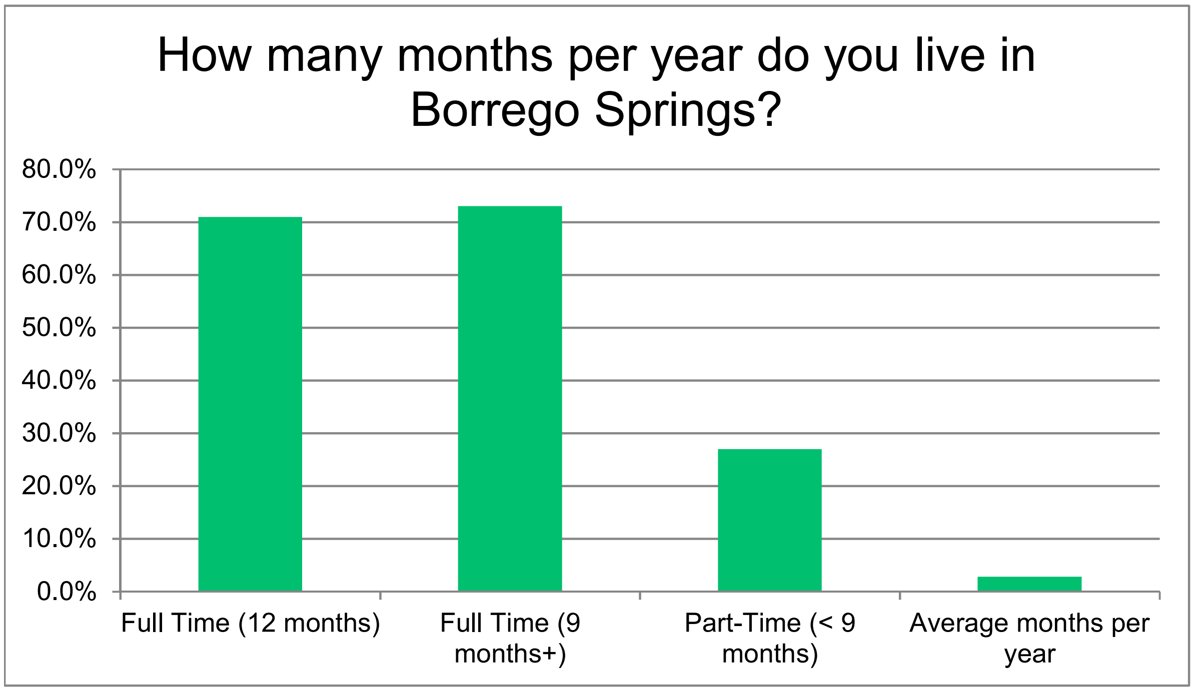
Answer Choices	Responses	
$0 more per month	11.3%	35
Up to $10 more per month	1.0%	3
Up to $25 more per month	64.4%	199
Up to $50 more per month	13.9%	43
Up to $100 more per month	6.1%	19
Up to $150 more per month	2.3%	7
Up to $200 per month or more	1.0%	3
	Answered	**309**
	Skipped	**58**



BWD Municipal User Survey

3. How many months per year do you live in Borrego Springs?
¿Cuántos meses del año vive en Borrego Springs?

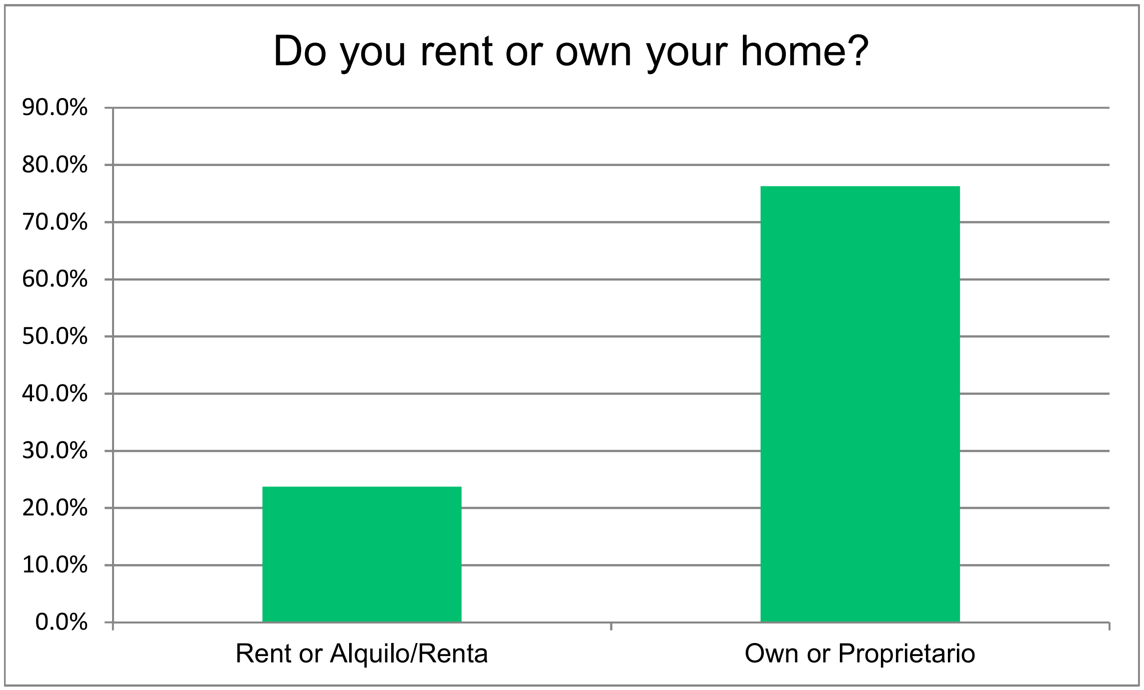
Tenure	Responses	
Full Time (12 months)	71.0%	247
Full Time (9 months+)	73.0%	254
Part-Time (< 9 months)	27.0%	94
Average months per year	2.8%	9.8
Answered		**348**
Skipped		**19**



BWD Municipal User Survey

4. Do you rent or own your home?
¿Alquilo/Renta o Propietario?

Answer Choices	Responses	
Rent or Alquilo/Renta	23.7%	73
Own or Proprietario	76.3%	235
	Answered	**308**
	Skipped	**59**

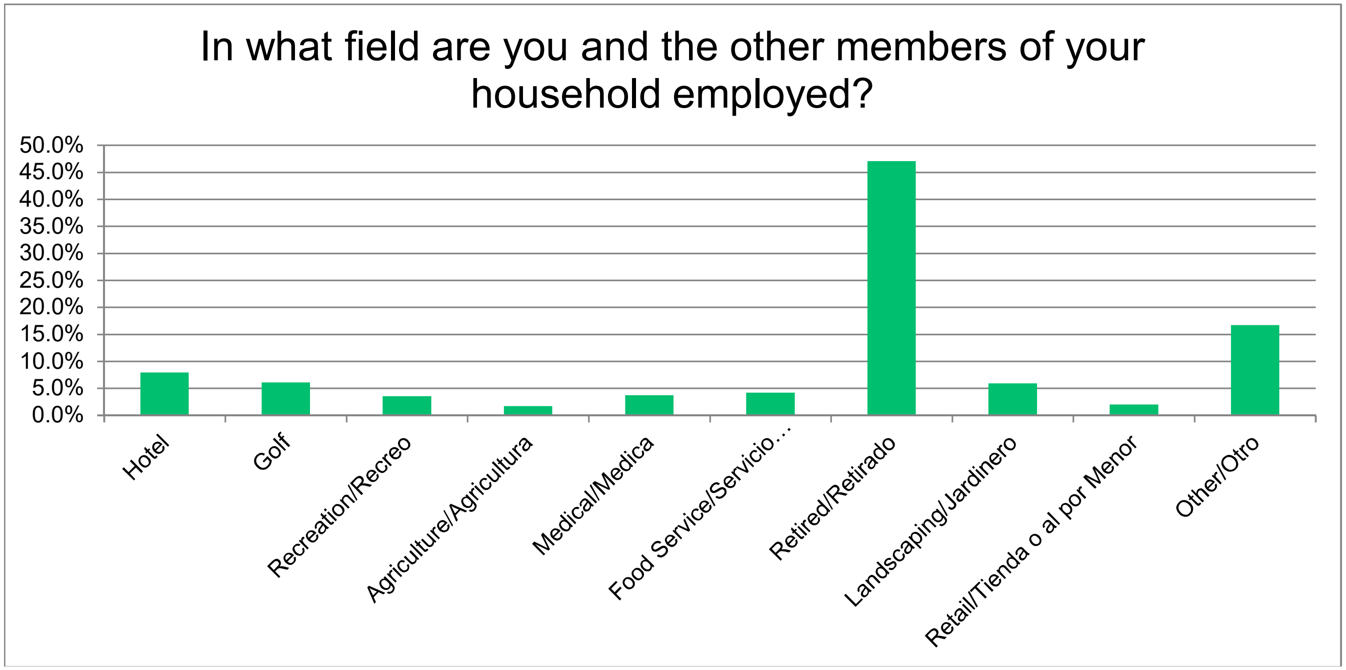


BWD Municipal User Survey

5. In what field are you and the other members of your household employed? (Include total number of people employed per field, e.g. Food Service, Indique TODOS los trabajos que apliquen a los miembros de su hogar

Answer Choices	Responses	
Hotel	7.9%	47
Golf	6.1%	36
Recreation/Recreo	3.5%	21
Agriculture/Agricultura	1.7%	10
Medical/Medica	3.7%	22
Food Service/Servicio Alimenticio o Restauran	4.2%	25
Retired/Retirado	47.0%	279
Landscaping/Jardinero	5.9%	35
Retail/Tienda o al por Menor	2.0%	12
Other/Otro	16.7%	99
		593

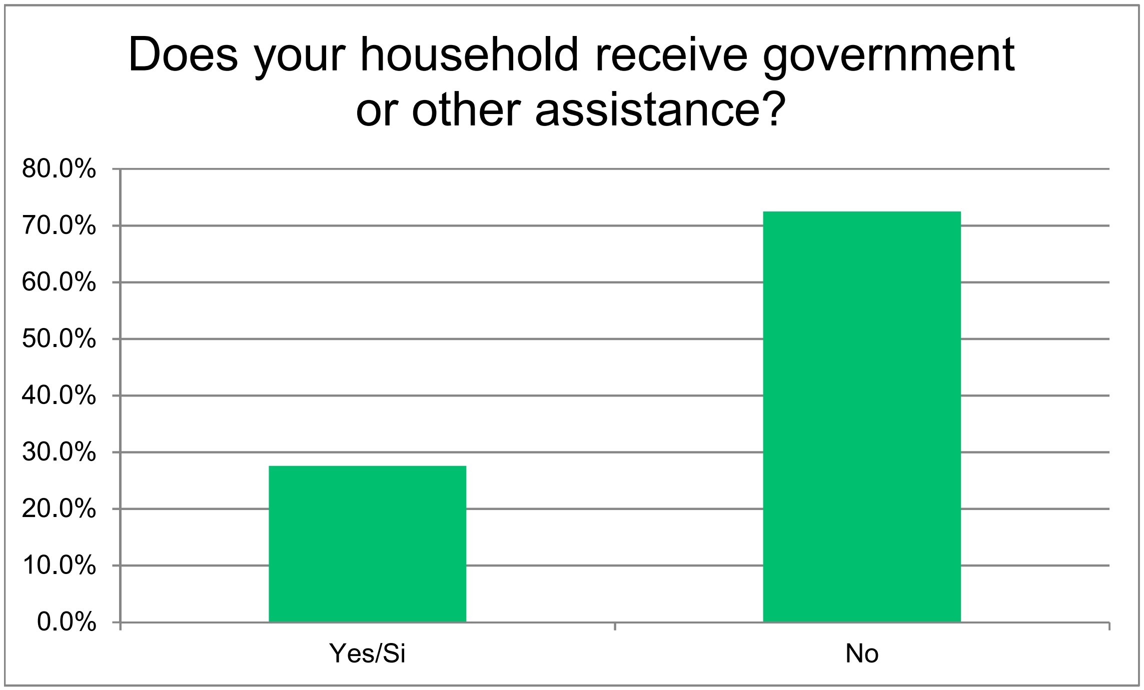
***Reflects households with multiple members employed, some employed in multiple occupations/industries**



BWD Municipal User Survey

6. Does your household receive government or other assistance?
¿Su hogar recibe assistencia de gobierno o alguna otra asistencia?

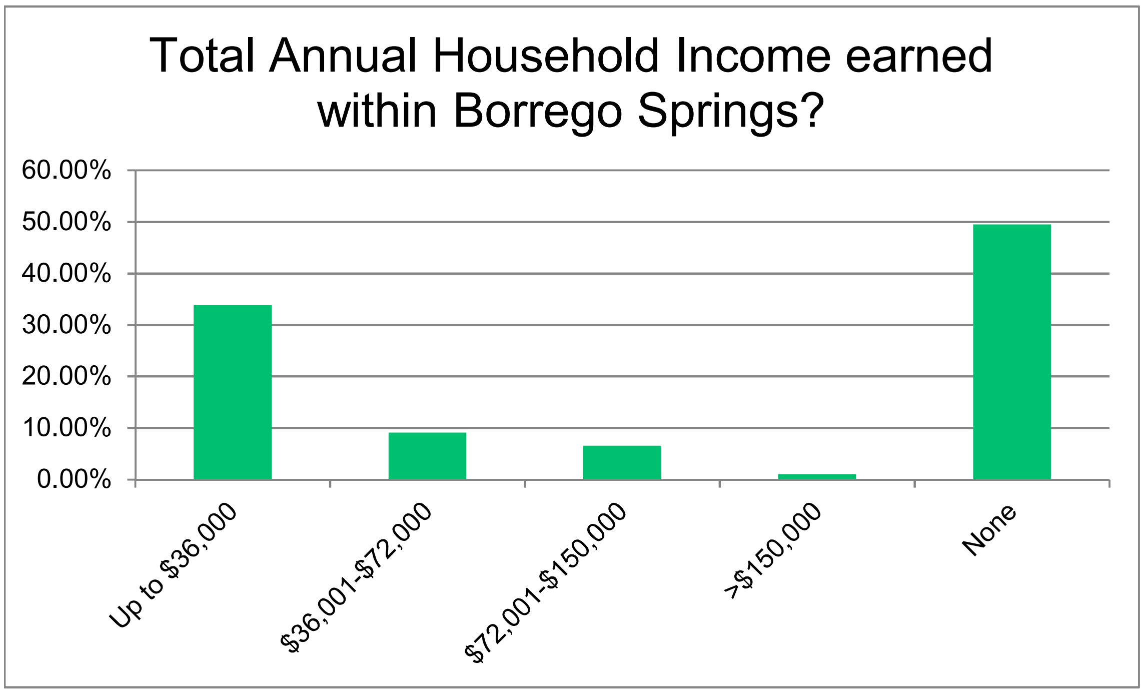
Answer Choices	Responses	
Yes/Si	27.6%	97
No	72.4%	255
	Answered	**352**
	Skipped	**15**



BWD Municipal User Survey

11. Total Annual Household Income earned within Borrego Springs?
¿Qué parte de los ingresos brutos totales de su hogar se ganan en Borrego Springs?

Answer Choices	Responses	
Up to $36,000	33.84%	148
$36,001-$72,000	9.09%	37
$72,001-$150,000	6.57%	13
>$150,000	1.01%	2
None	49.49%	98
	Answered	**298**
	Skipped	**69**

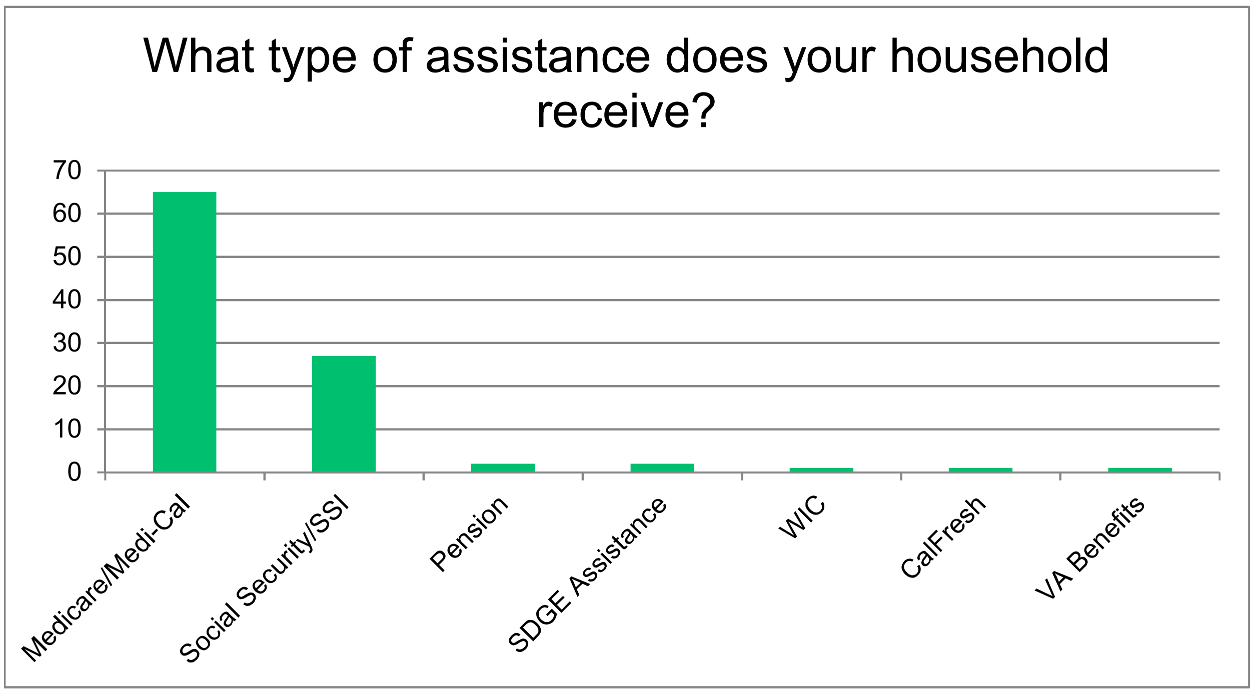


BWD Municipal User Survey

7. If Yes to #6, what type of assistance?
¿Si su respuesta es si cual?

Categories	Responses
Medicare/Medi-Cal	65
Social Security/SS	27
Pension	2
SDGE Assistance	2
WIC	1
CalFresh	1
VA Benefits	1

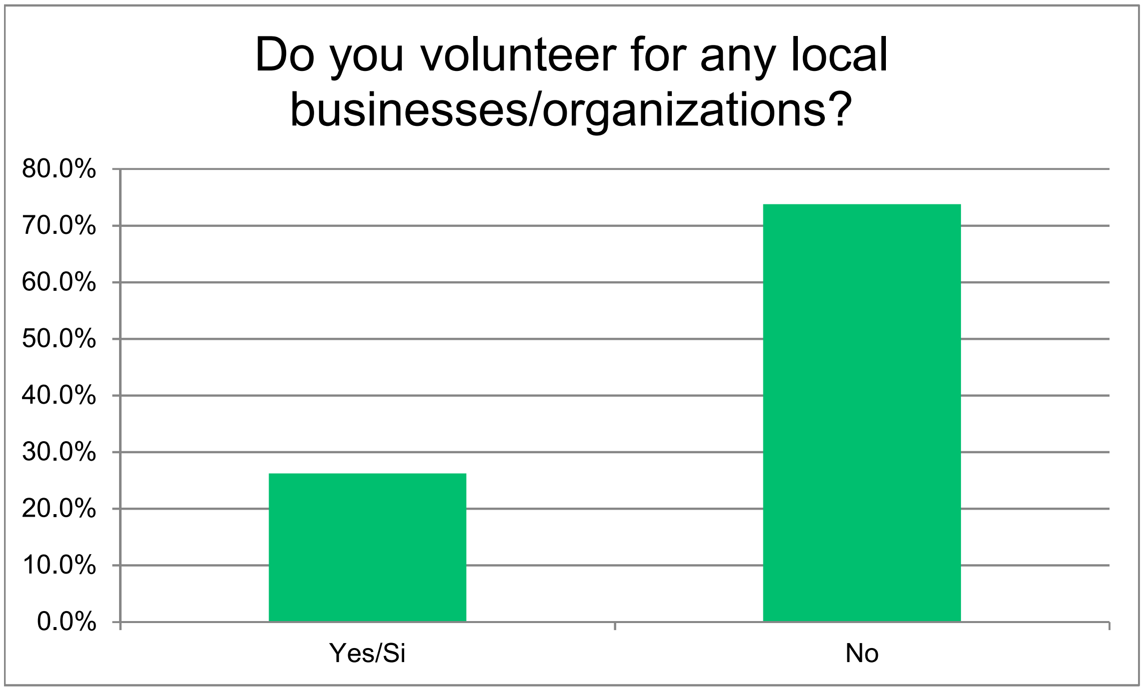
***Reflects households receiving multiple types of assistance**



BWD Municipal User Survey

8. Do you volunteer for any local businesses/organizations?
¿Es voluntario de negocios/organizaciones locales?

Answer Choices	Responses	
Yes/Si	26.2%	91
No	73.8%	256
	Answered	**347**
	Skipped	**20**



BWD Municipal User Survey

9. If Yes to #8, where do you volunteer and for how many hours per week?
Si su respuesta es si, dónde y horas/semana?

Answered	**91**
Skipped	**276**

Responses	
Little League, Borrego Springs Imagination Library	
Senior Center	
Civic Foundation Site Council	2 hours/week
Borrego Little League	8 hrs/season
Chamber of Commerce, ABDNHA	varies
New to Borrego, but looking to volunteer	
Soroptimist, American Legion, St. Barnabas	5 hours/week
Paleo Society	4-6 hours/week
American Legion	16 hours/week
Church	4 hours/week
Bargain Barn Monday, Food Dist., Friend of the Library	20 hrs/week, 9 hrs/month, 4 hrs/month
Lutheran Church	
Borrego Community Health Foundation (BCHF)	4 hours per week
	10-30 hours various
BVEF	15-30
Little League	10-15 hours/week
	20
BAI Garden	6 hours/week
ABF - Botany Society; Seasonal	15-20 hours/month
BAI, Food Bank	4 hours/month (1 hour/week)
Catholic Church	2 hours/week
Chamber & State Park	4 hours/week
Borrego Senior Center delivering lunches	6 hours/week
Food share	4 hours/month (1 hour/week)
State Park	4 or less/week

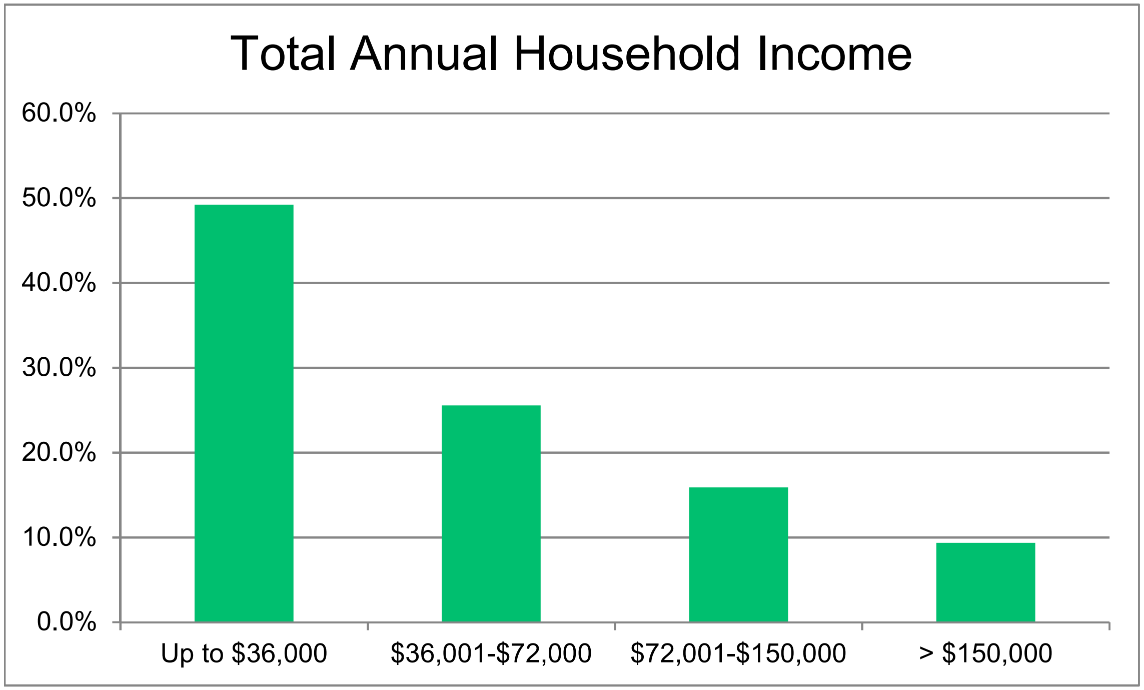
BSUSD	
American Legion	5 hours/week
Library - literacy tutoring	
Charitable Organization	
Rotary	2 hours/week
Non-Profits	5 hours/week
Rotary	2 hours/week
Paleontology, Art Farm	12 hours/week
Chamber	10 hrs/week
ABDSP, ABDNHA	5 hrs per week, 2 hrs per week
senior center	
BASIC	2 hours per week
golf course, civic	10 hours
Roadrunner Club, Borrego Valley Endowment Fund	6 hours/week, 4 hours/week
ABDNHA	2 hours/week
ABDSP Visitor Center	4-8 hours/week
ABDNHA, Park	10-12 hours/week
Art Guild/BAI	
Food programs, summer months	
Senior Center	2 hours/week
Paleontology Park	30 hours/week
ABDSP	
We pay to support ABDHA and other orgs	
ABF & State Park	10+ hours/week
Chamber of Commerce	8 hours/week
American Legion	12 hours/week
American Legion	
ABDNHA	2 hours/month
American Legion	10 hours/week
ABDNA, Soroptimist, Senior Center	4 hrs, 6 hrs, 2 hrs
ABDNHA, BS Film Festival	26 hrs/week
Cal State Park	2-4 hours/week
Methodist Church, Weight Watchers	1 hour/week
Sponsor Group	1 hour/week

Library, Visitors Center, Newspaper	4-5 hours/week
Church	8 hours/week
American Legion	20 hours/week
Anza Borrego Desert State Park	~38 during the season, ~30 during the remainder of the year
We give $94/month to ABDNHA, ABG, and Borrego Art Institute	
ABD State Park, Church	20 hours +
Rotary	1-2 hours/week
Chamber, Theater, Park, ASF Church	20-30 hours/week
BASIC (Basic Assistance to Students in the Community)	4 hours/week
Rotary	
ABNHA	3 hours/week during season
St. Barnabas	6 hours/week
Deliver meals	6 hours/week
Little League	12 hours/week
American Legion	5 hours/month, 1.25 hours/week
BAI and Artfarm	
Church of Jesus Christ of Latter Day Saints	3 hours
State Park	8 hours per week
BSPAC Church, Laubach	10 hours
XL	30 hours per week
ABDNHA, Literacy	.5 hrs/wk, .25/wk
State Park	6 hrs/week
SGMA	
Thrift store	4 hours
ABDNHA	
Escuela	2 hrs/semana
Iglesia	2 hrs/semana
Iglesia	2 hrs/semana
Iglesia	3 hrs/semana
Iglesia	2 hrs/mes
Iglesia	4 hrs/mes
Baseball & Soccer	4 hrs/week
Sus Iglesia (church)	2-4 hours/week

BWD Municipal User Survey

10. Total Annual Household Income
¿A cuánto ascienden los ingresos brutos totales de su hogar?

Answer Choices	Responses	
Up to $36,000	49.2%	158
$36,001-$72,000	25.5%	82
$72,001-$150,000	15.9%	51
> $150,000	9.3%	30
	Answered	**321**
	Skipped	**46**



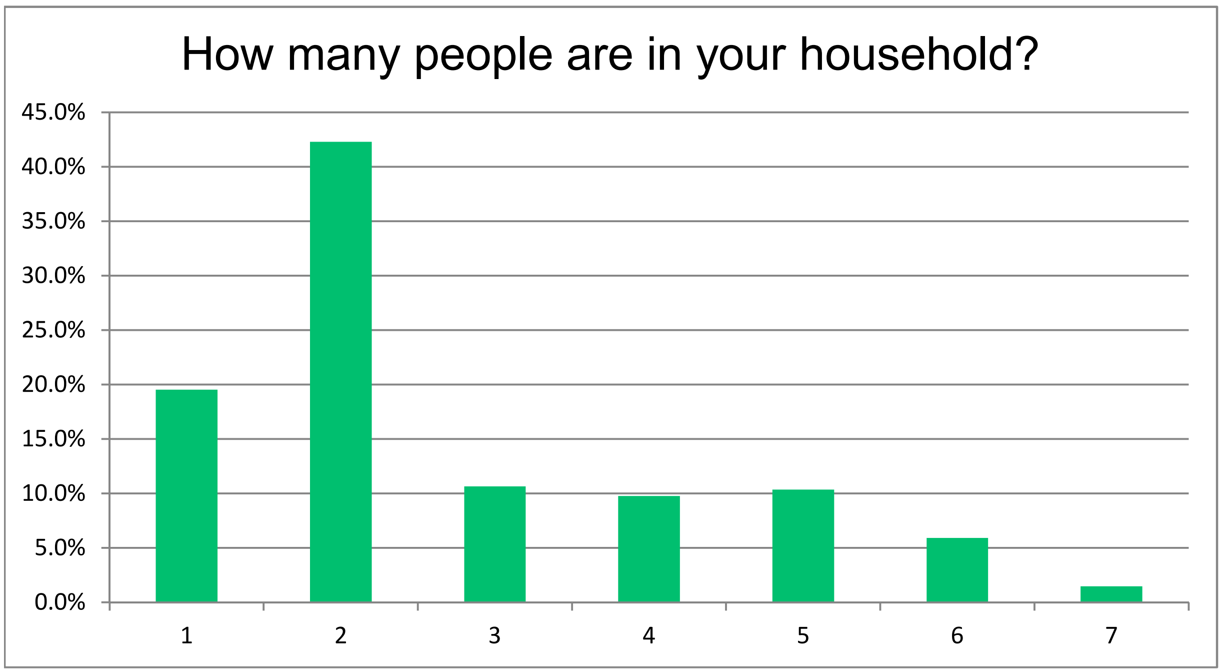
12. What is your Average spending per month in Borrego Springs?
¿De su gasto mensual que es el prodmedio gastado en Borrego Springs?

Answer Choices	Responses	Average
Rent/Mortgage	231	$847.32
Groceries	254	$290.20
Auto and Gas	247	$204.04
Insurance (all types)	165	$450.44
Utilities (not including water)	215	$223.13
Average monthly water bill	268	$100.44
Sewer	88	$16.31
Golf	99	$71.83
Travel	99	$166.83
Entertainment	136	$143.36
Clothing	133	$98.76
Other Expenses	80	$479.96
	Answered	**300**
	Skipped	**67**

BWD Municipal User Survey

13. How many people are in your household?
¿Cuántas personas viven en su hogar?

Answer Choices	Responses	
1	19.5%	66
2	42.3%	143
3	10.7%	36
4	9.8%	33
5	10.4%	35
6	5.9%	20
7	1.5%	5
Answered		**338**
Skipped		**29**



BWD Municipal User Survey
Data Analysis

Amount Able/Willing to Pay for Dependable Water All Households

Zero/$0	35	11%
Up to $10	3	1%
Up to $25	199	54%
Up to $50	43	12%
Up to $100	19	5%
Up to $150	7	2%
Up to $200 or more	3	1%
No Answer	58	16%
TOTAL	367	122%

Amount Able/Willing to Pay for Dependable Water - English Surveys

Zero/$0	18	7%
Up to $10	1	0%
Up to $25	136	53%
Up to $50	36	14%
Up to $100	15	6%
Up to $150	6	2%
Up to $200 or more	3	1%
No Answer	41	16%
TOTAL	256	100%

Amount Able/Willing to Pay for Dependable Water - Spanish Surveys

Zero/$0	17	15%
Up to $10	2	2%
Up to $25	63	57%
Up to $50	7	6%
Up to $100	4	4%
Up to $150	1	1%
Up to $200 or more	0	0%
No Answer	17	15%
TOTAL	111	100%

Amount Able/Willing to Pay for Dependable Water - Income Based

	< $36,000	$36,001-$72,000	$72,001-$150,000	> $150,000	No answer	TOTAL	
Zero/$0	22	6	2	0	5	35	10%
Up to $10	2	1	0	0	0	3	1%
Up to $25	95	42	19	10	20	186	53%
Up to $50	10	5	18	4	4	41	12%
Up to $100	4	1	3	9	1	18	5%
Up to $150	1	2	3	1	0	7	2%
Up to $200 or more	0	2	1	0	0	3	1%
No answer	24	7	5	6	16	58	17%
TOTAL	158	66	51	30	46	351	100%

Income - All Households

< 36,000	158	49%
$36,001 - $72,000	82	26%
$72,001 - $150,000	51	16%
> $150,000	30	9%
TOTAL	321	100%
No Answer	46	

Income - English Surveys

< 36,000	72	34%
$36,001 - $72,000	60	28%
$72,001 - $150,000	51	24%
> $150,000	30	14%
TOTAL	213	100%
No Answer	43	

Income - Spanish Surveys

< 36,000	86	80%
$36,001 - $72,000	22	20%
$72,001 - $150,000	0	0%
> $150,000	0	0%
TOTAL	108	100%
No Answer	3	

Income - Census Estimates

< 35,000	516	48%
$35,000 - 74,999	282	26%
$75,000 - $149,999	207	19%
> $150,000	60	6%
TOTAL	1065	100%

Average Household Size - All Households

Avg Retired Household	1.9
Avg Non-Retired Household	3.6
Average Household Size	2.8

Average Household Size - English Surveys

Avg Retired Household	1.8
Avg Non-Retired Household	2.5
Average Household Size	2.0

Average Household Size - Spanish Surveys

Avg Retired Household	3.0
Avg Non-Retired Household	4.6
Average Household Size	4.4

Renters v. Homeowners - All Households

Rent	73	24%
Own	235	76%
TOTAL	308	

Renters v. Homeowners - English Surveys

Rent	15	7%
Own	226	94%
	241	

Renters v. Homeowners - Spanish Surveys

Rent	58	87%
Own	9	13%
	67	

Residency

Full time (12 months)	247	
Full time - 9 months+	254	27300%
Part-Time (< 9 months)	94	
No response	19	
Average months per year	9.8	

Occupation - All Households

Retired	279	47%	
Other	99	17%	Common Responses: law, self-employed, State Park, education, construction
Hotel	47	8%	
Golf	36	6%	
Landscaping	35	6%	
Food Service	25	4%	
Medical	22	4%	
Recreation	21	4%	
Retail	19	3%	
Agriculture	10	2%	
	593		

Occupation - English Surveys

Retired	261
Employed	143

Occupation - Spanish Surveys

Retired	18
Employed	172

Volunteering

Yes	91	26%
No	256	74%

Open Comment Themes

High Rates/Rising Rates/Cost Burdens	31
[Criticism of] Golf/Agriculture Water Use	15
Privacy/Security related to Survey	11
Fixed Income/Retirement/Senior Citizens	9
Conservation	8
Jobs/Local Economy	8
Borrego's Quality of Life/Hopes to Stay	5
Relocation	5
Water Quality	3

Appendix B:
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.

Deliverables:
- 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 C:

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

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.

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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).

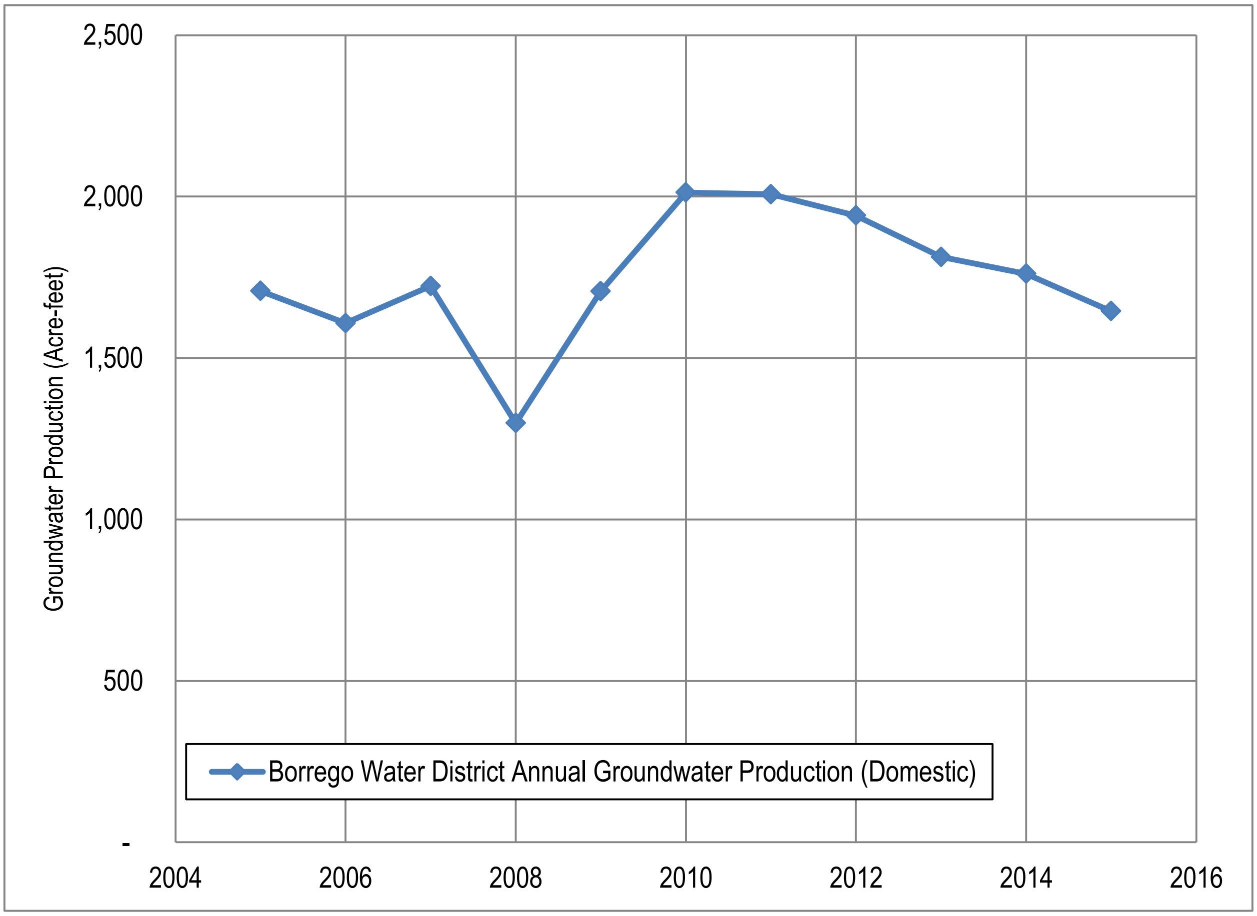
WATER USE

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).

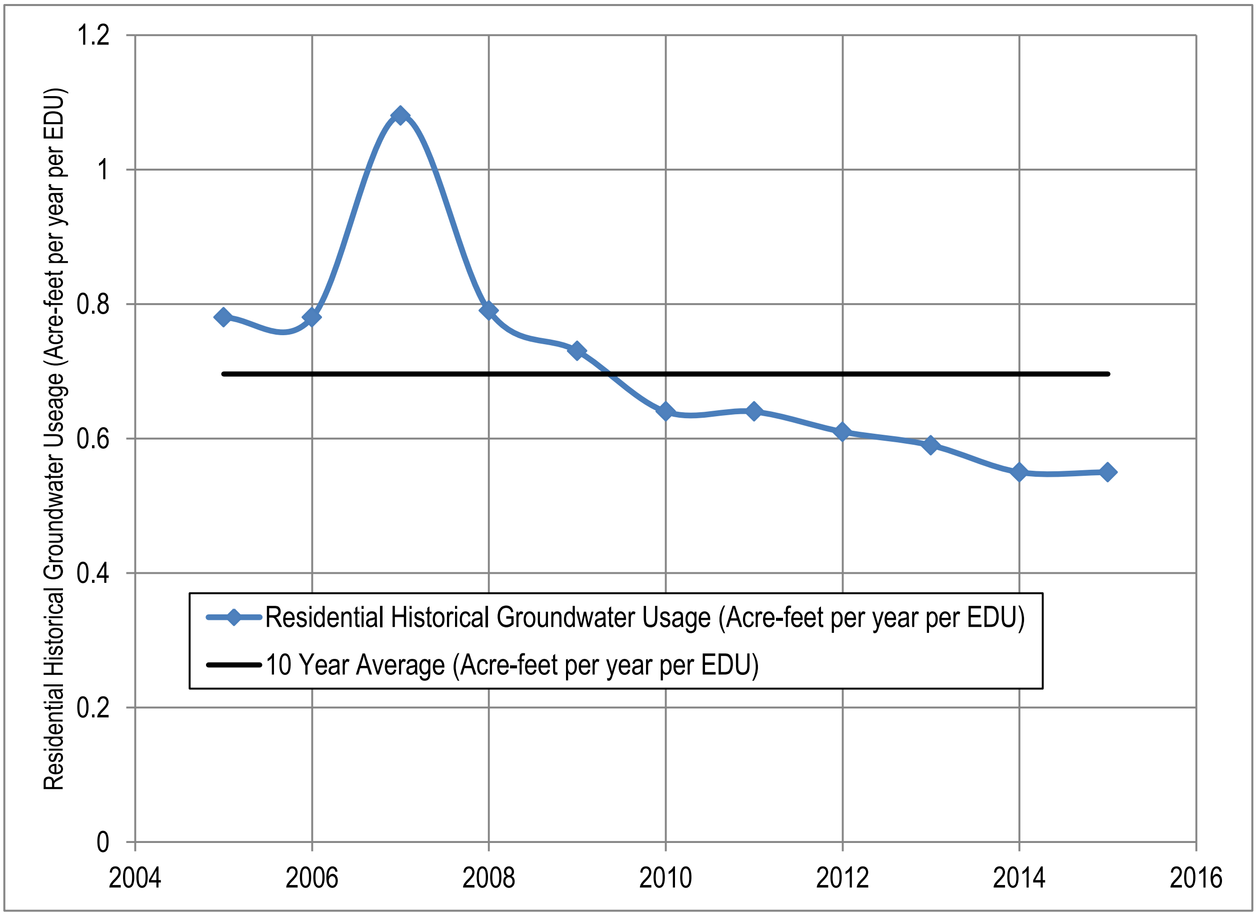
Table 5
Equivalent Dwelling Unit (EDU) Information[a]

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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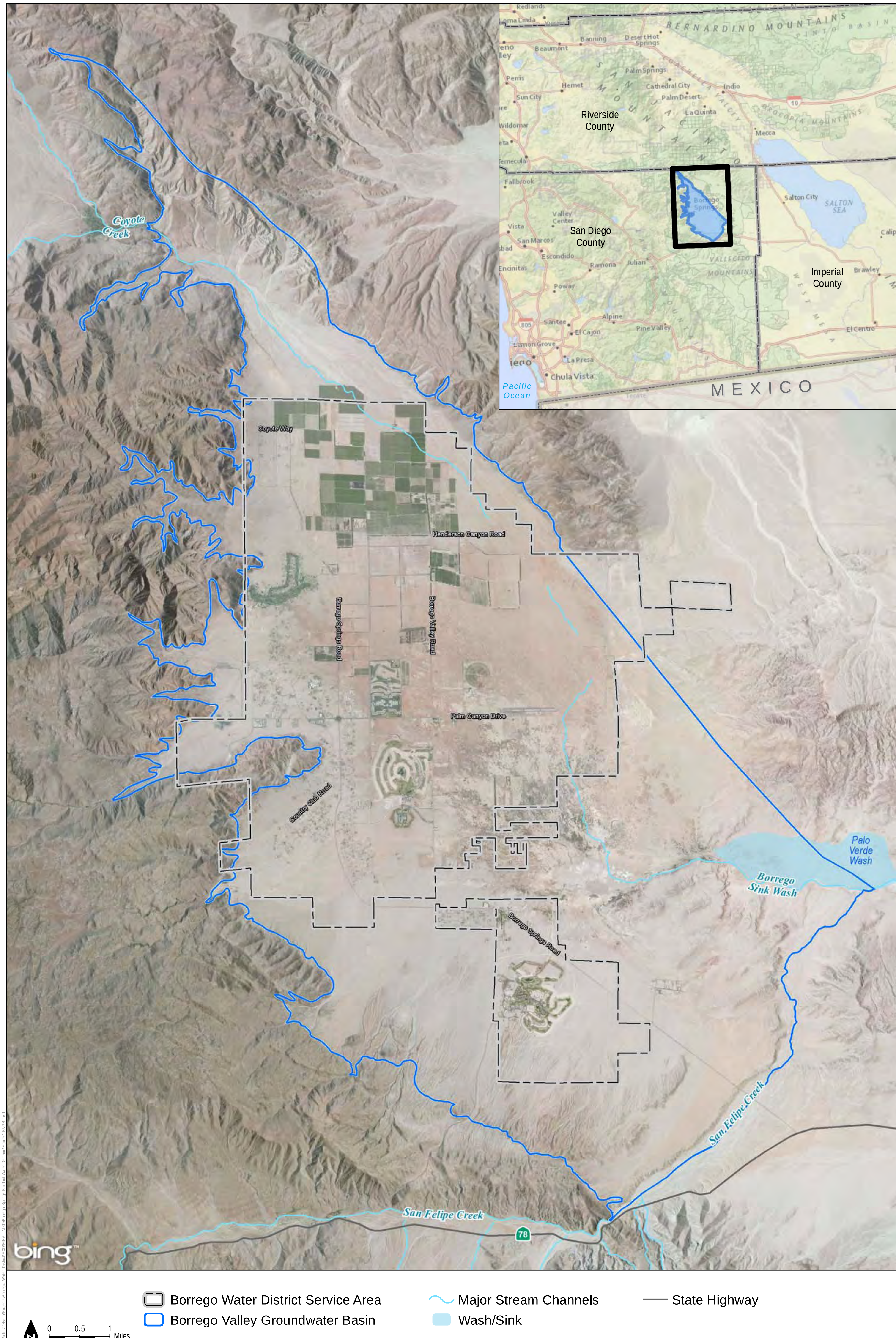


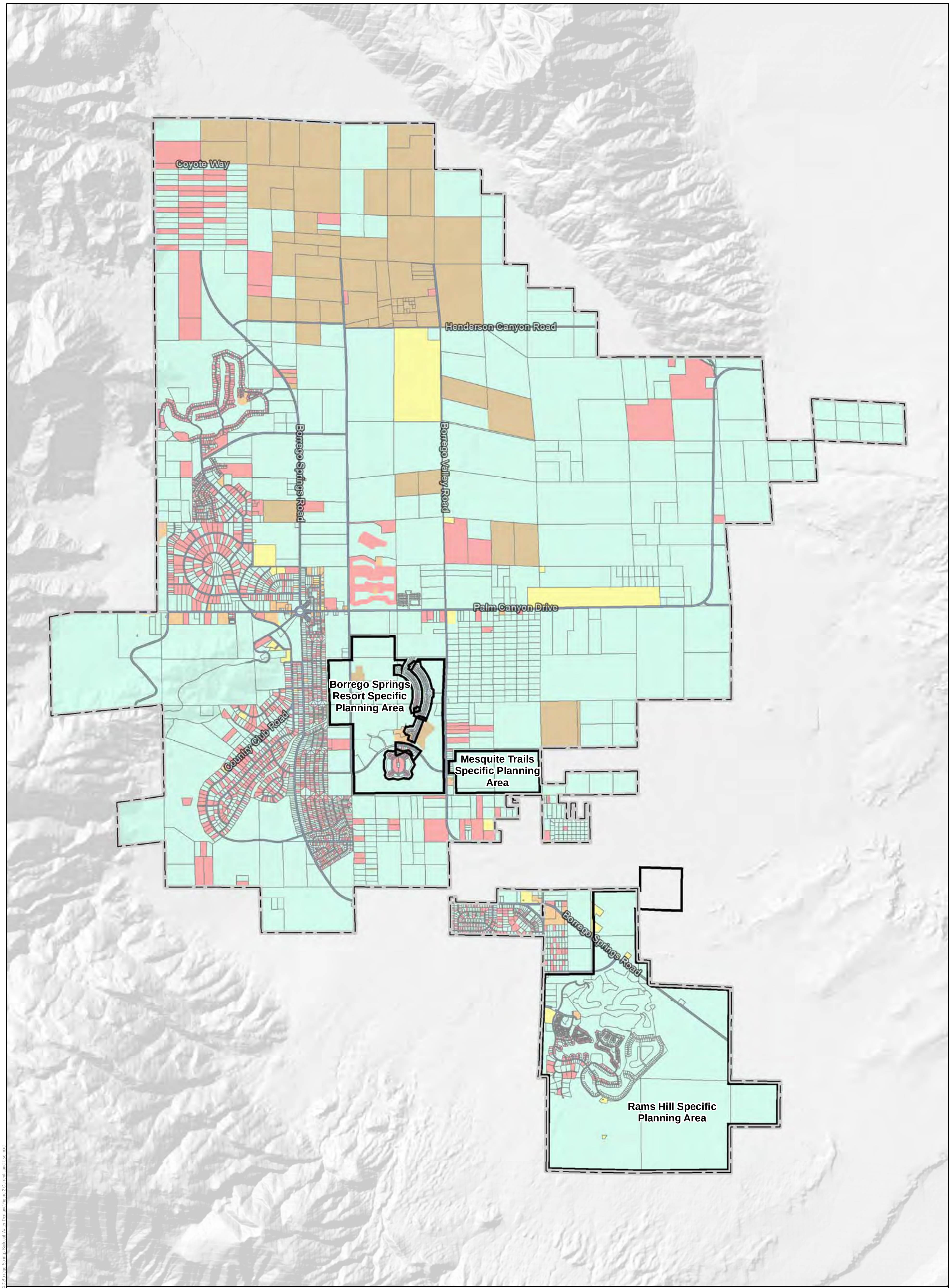
DUDEK

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

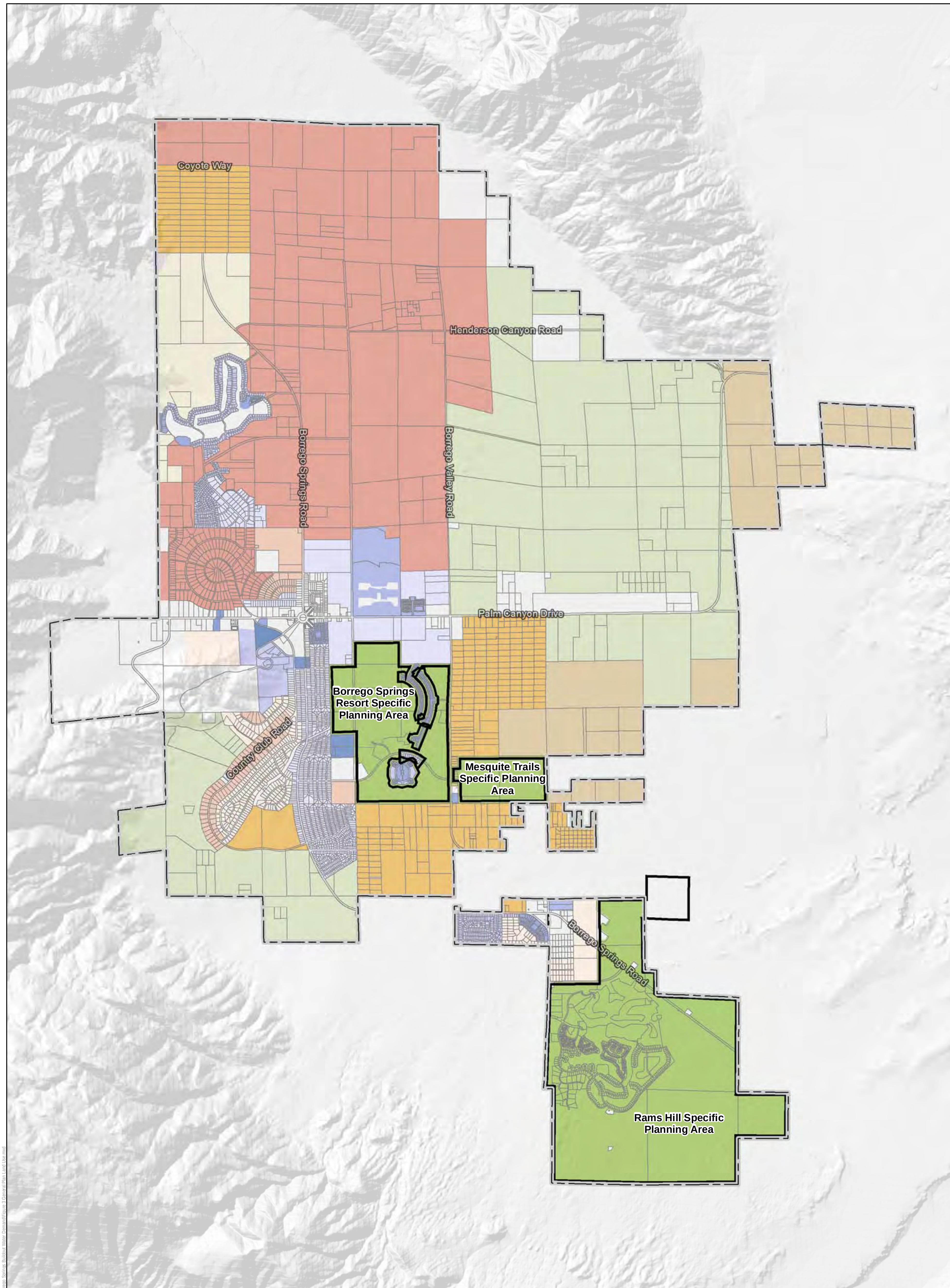
DUDEK

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)

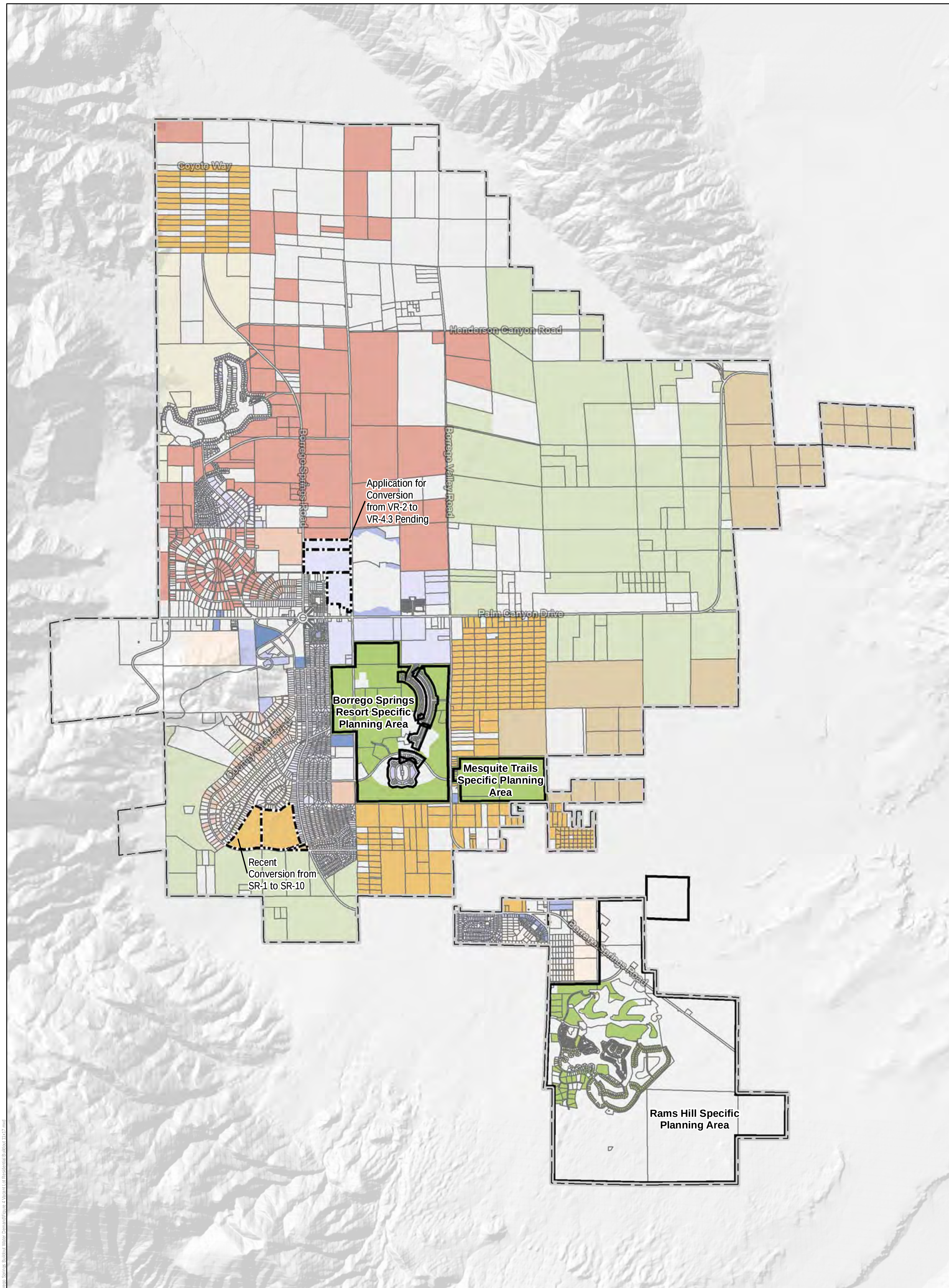
DUDEK

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



Borrego Water District Service Area
Specific Planning Areas
Up Zoning Applications
Parcel Boundary

General Plan Land Use on Vacant Land

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)

0 2,500 5,000 Feet

DUDEK

SOURCE: SANDAG; SanGIS

FIGURE 4
General Plan Designations on Vacant and Undeveloped Land

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

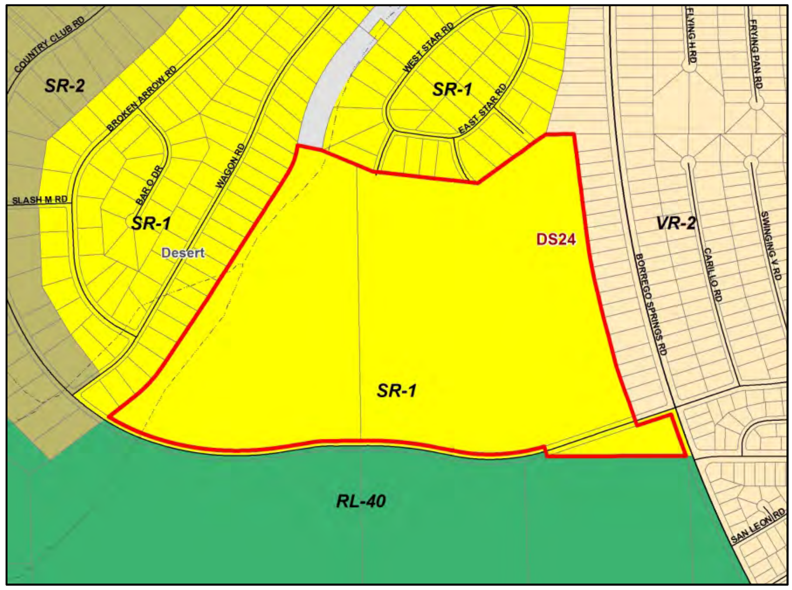
Fire Service Travel Time *(GP Policy S-6.4)*:
5 to 10 minutes

Prevalence of Constraints (See following page):
● – high; ◒ – partially; ○ - none

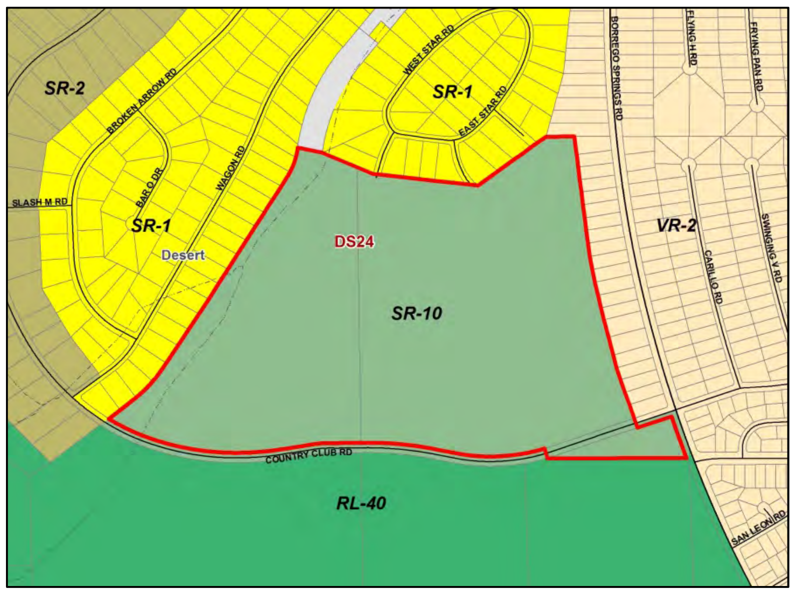
- ○ Steep Slope (Greater than 25%) *almost none*
- ● Floodplain
- ○ Wetlands
- ● Sensitive Habitat
- ○ Agricultural Lands
- ◒ Fire Hazard Severity Zones

Staff Recommendation and Summary Rationale
See General Plan Conformance Findings starting on page 5 for additional discussion of the rationale.

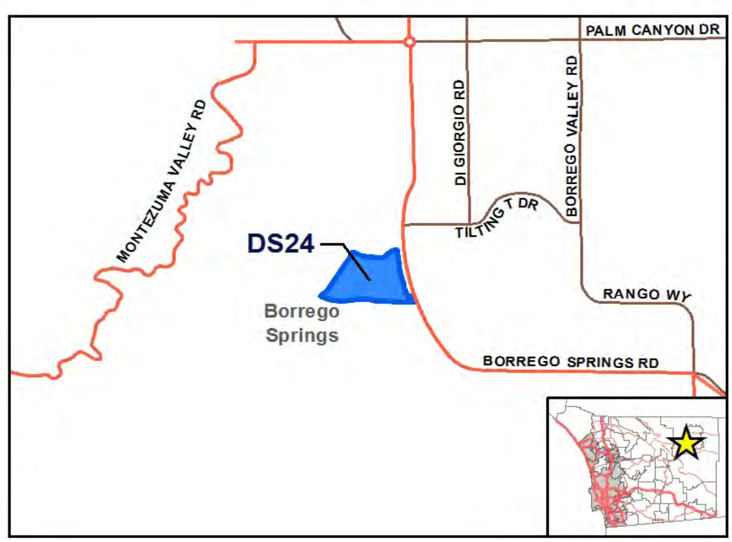
NOT DETERMINED



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

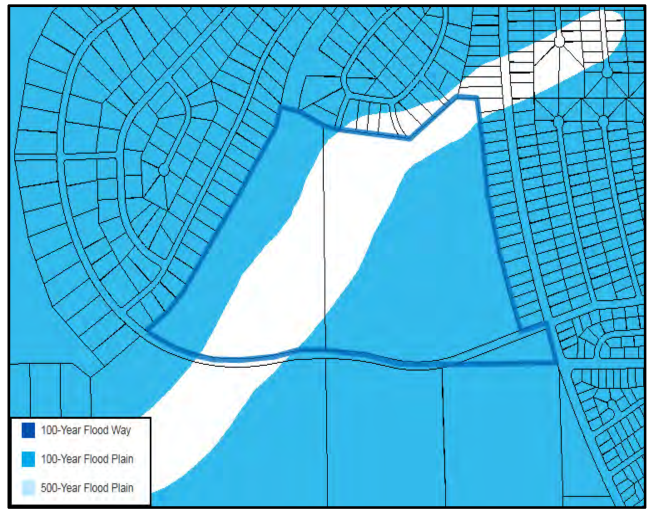

Facing northeast at site, from Montezuma Valley Road (southern border of DS24 is the curving dirt road in the upper right corner of the picture)


From the northwestern portion of the property, facing north along drainage that runs along the western portion

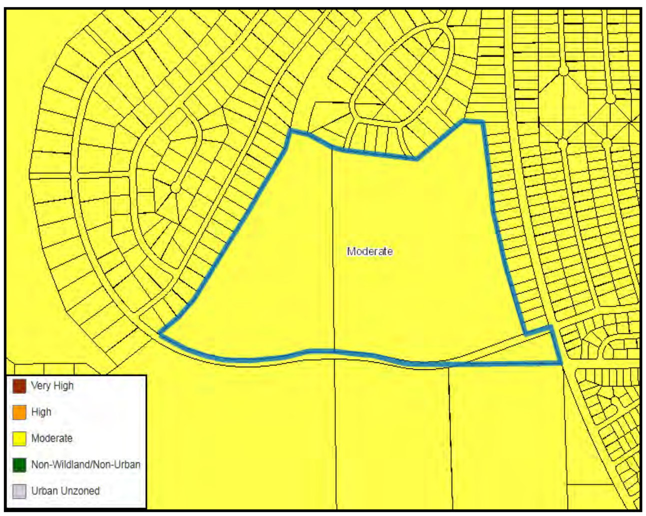

From the northern portion of the property, facing south

Constraints

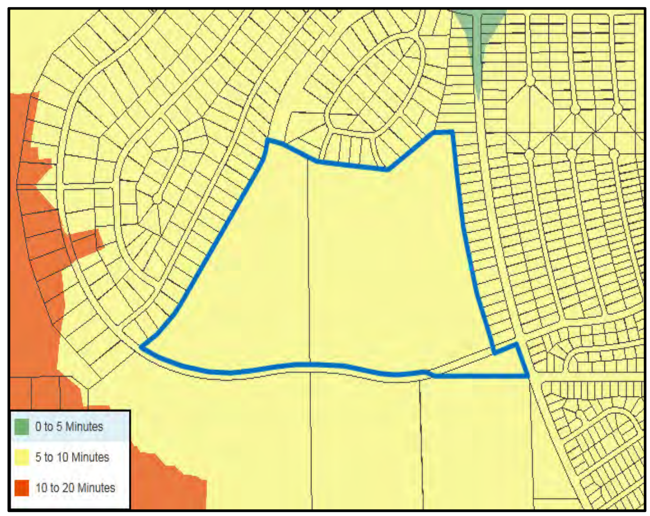
Vegetation (Sonoran Creosote bush scrub; including extensive Ocotillos)



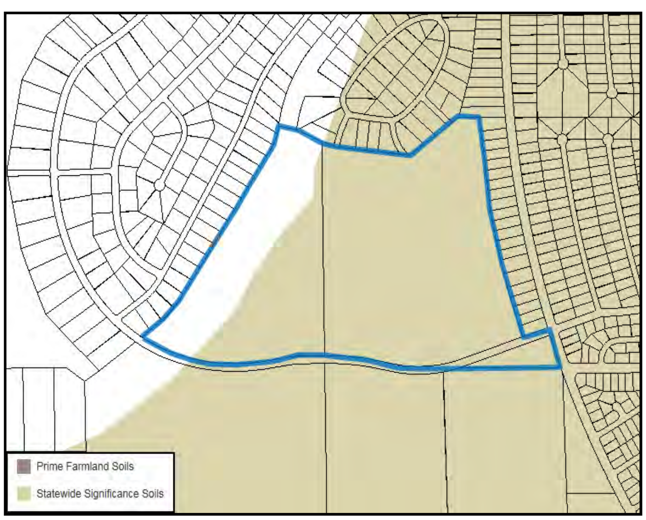
Floodplain



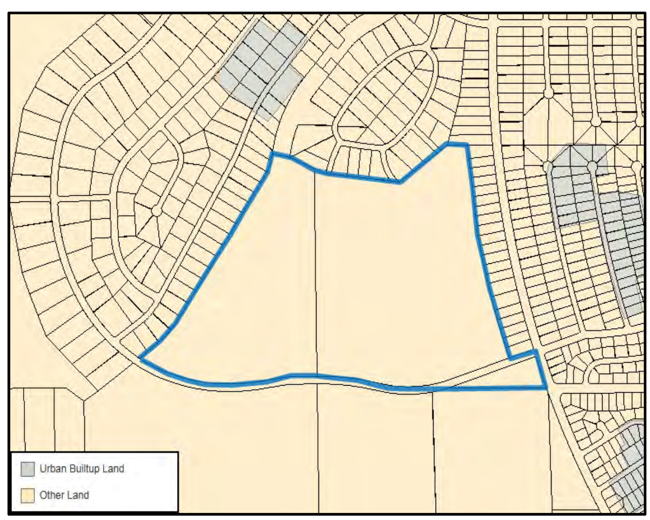
Fire Hazard Severity Zones



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 D:

Comparison of Pumping Rate Reduction Schedules Under SGMA,

Draft dated February 11, 2019

by ENSI

February 11, 2019

Mr. Geoff Poole
General Manager, Borrego Water District
806 Palm Canyon Drive,
Borrego Springs, CA 92004

RE: Comparison of Pumping Rate Reduction Schedules Under SGMA

Dear Geoff,

The following draft Report was produced under our existing contract to provide technical support to BWD for the Borrego Valley Groundwater Basin Groundwater Sustainability Plan Proposition 1 Grant Project. This Report provides supporting analysis for Task 3 specific to the assessment of pumping rate reductions to be implemented as Project and Management Action #3 in the Groundwater Sustainability Plan.

Thank you for your time and attention.

Sincerely,

Jay W. Jones
CA PG#4106
Environmental Navigation Services Inc.

The Borrego Springs Subbasin (Subbasin) of the Borrego Valley Groundwater Basin has been designated by the California Department of Water Resources (DWR) to be in a state of critical overdraft and is subject to the Sustainable Groundwater Management Act (SGMA). Pursuant to SGMA[1] a Groundwater Sustainability Plan (GSP) is currently under development for the Subbasin. Annual groundwater pumping will need to be reduced from a baseline pumping allocation (BPA) rate of approximately 24,000 AFY[2] to a target rate of 5,700 AFY during a 20-year SGMA compliance period that begins in 2020 – next year. A total reduction of approximately 76% is required.

The purpose of this Report is to examine pumping rate reduction schedules relative to that proposed in the Draft GSP. The choice of the reduction rate schedule necessary to achieve the target pumping rate can affect the following:

- The magnitude of overdraft and additional long-term groundwater level decline in the Subbasin will vary depending on the reduction rate schedule. A reduction rate schedule that minimizes overdraft will also minimize groundwater level decline and the potential that undesirable results will occur as defined under SGMA and further explained in the GSP.

- The choice of rate schedule can accelerate or delay the effects associated with decreased pumping. Making significant reductions earlier in the compliance period results in a more meaningful aquifer system response, which is necessary to support timely adaptive management. The longer the reductions are delayed the higher the risk that adaptive management will not be as effective, potentially require unanticipated additional pumping restrictions, or become more expensive to implement.

- Year-to-year pumping rate reductions are directly determined by the reduction rate schedule. Ideally the year-to-year changes are made gradually to allow the community to adapt to less water use. However, when reductions are deferred toward the end the compliance period the percentage change in pumping rate from year-to-year can rapidly increase and be much greater than 10%.

- A long-term average recharge rate determined by the USGS Groundwater Model[3] was used to develop the target pumping rate of 5,700 AFY. Being an average, the recharge rate will be lower than average 50% of the time. Failure of the reduction rate schedule to accommodate below average recharge rates by January 2040, the end of the SGMA compliance period could trigger State intervention should the GSP fail to attain a sustainable groundwater condition. The GSP describes an adaptive management strategy based on the observed aquifer response that will occur as pumping is reduced. A lower target pumping rate could also be used to increase the probability of compliance.

[1] SGMA is being managed by the State Department of Water Resources. For more information see: https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management

[2] The BPA has not been established. A BPA of 22,044 AFY was used in a previous ENSI report dated 9/12/2018. A provisional value of 24,000 AFY is used for this Report based on a preliminary draft version of the GSP.

[3] [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

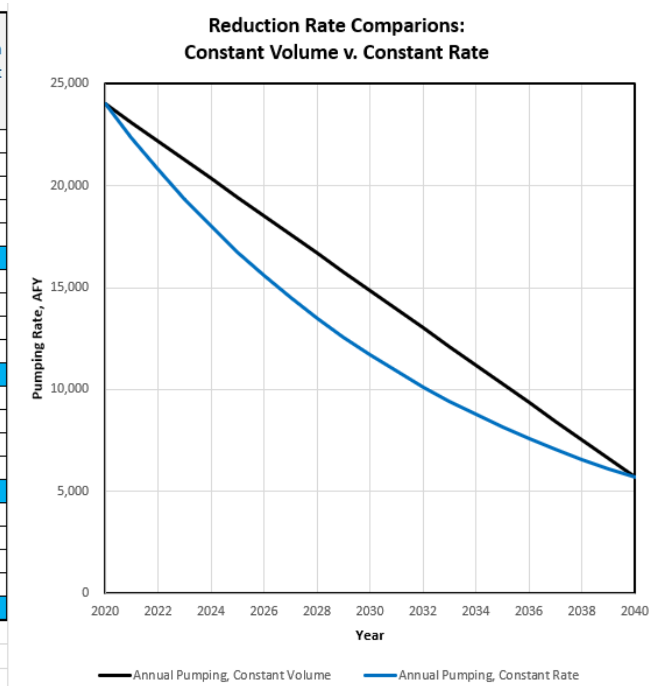
Currently the GSP[4] proposes to employ a pumping reduction rate schedule where groundwater pumping is reduced by a constant volume each year. In this case decreasing the BPA from 24,000 to 5,700 AFY requires a reduction of 18,300 AFY, or 915 AFY. This results in a linear trend as illustrated in **Figure 1**.

Alternatively, the BPA can be reduced as a constant percent of the previous year's pumping rate**. Table 1** shows the values used to develop **Figure 1,** which illustrates how the two approaches conceptually differ. Constant volume reductions result in substantially more overdraft (~179,000 versus ~132,000 AF over 20 years) and have much more impact relative to pumping rates toward the end of the compliance period. Groundwater level decline is directly proportional to overdraft and can lead to reductions in water well productivity and degraded water quality. Therefore, the greater the overdraft the higher the potential for water supply impacts to occur.

The relative impact on later years pumping is expressed as a percentage of the pumping rate at the time the reduction is made. The constant volume reduction begins as a 3.8% reduction of total pumping, doubles by year 15, and increases to 13.8% the end of the SGMA compliance period. This is compared to a constant rate reduction of 6.9% applied each year as depicted by **Figure 2**.

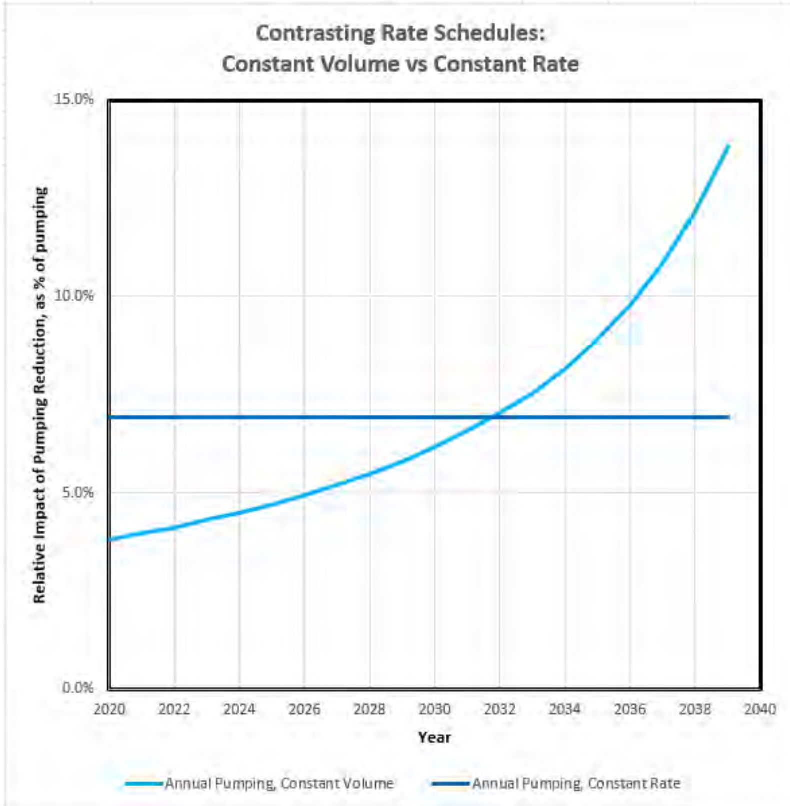
TABLE 1 / FIGURE 1

	YEAR	Annual Pumping, Constant Volume	Annual Pumping, Constant Rate	Constant Volume Annual Reduction, AFY	Constant Rate Annual Reduction, AFY	BPA Reduction as percent of pumping	Pumping Reduction as percent of pumping
	2020	24,000	24,000				
1	**2021**	23,085	22,335	915	1,665	3.8%	6.9%
2	**2022**	22,170	20,786	915	1,549	4.0%	6.9%
3	**2023**	21,255	19,345	915	1,442	4.1%	6.9%
4	**2024**	20,340	18,003	915	1,342	4.3%	6.9%
5	**2025**	19,425	16,755	915	1,249	4.5%	6.9%
6	**2026**	18,510	15,592	915	1,162	4.7%	6.9%
7	**2027**	17,595	14,511	915	1,081	4.9%	6.9%
8	**2028**	16,680	13,505	915	1,006	5.2%	6.9%
9	**2029**	15,765	12,568	915	937	5.5%	6.9%
10	**2030**	14,850	11,696	915	872	5.8%	6.9%
11	**2031**	13,935	10,885	915	811	6.2%	6.9%
12	**2032**	13,020	10,130	915	755	6.6%	6.9%
13	**2033**	12,105	9,428	915	703	7.0%	6.9%
14	**2034**	11,190	8,774	915	654	7.6%	6.9%
15	**2035**	10,275	8,165	915	609	8.2%	6.9%
16	**2036**	9,360	7,599	915	566	8.9%	6.9%
17	**2037**	8,445	7,072	915	527	9.8%	6.9%
18	**2038**	7,530	6,581	915	490	10.8%	6.9%
19	**2039**	6,615	6,125	915	456	12.2%	6.9%
20	**2040**	5,700	5,700	915	425	13.8%	6.9%
TOTAL OVERDRAFT:		**173,850**	**131,557**	(Acre-feet)			
(defined as total pumping in excess of target rate)							



[4] The GSP is being developed by the Groundwater Sustainability Agency (GSA) that consists of the County of San Diego and the Borrego Water District. See overview at: https://www.sandiegocounty.gov/pds/SGMA.html

FIGURE 2



The two reduction approaches can be generally described as 'front-end' and 'back-end' loaded in terms of relative impacts realized over time. There is a trade-off. On one hand the constant volume reductions do allow for an easier start and allow more pumping to occur over time provided undesirable results[5] are not realized. On the other hand, the use of a constant rate provides a faster aquifer response to support adaptive management, realizes much less overdraft (132,000 versus 174,000 AF over 20 years), and allows for less reductions at the end of the compliance period.

The relative acceleration between the two reduction approaches can be seen by comparing when total pumping is reduced 50%. The constant rate reduction schedule reaches the 50% point in 2030 versus 2033 for the constant volume method (see underlined values in **Table 1**). Having the pumping reductions occur 3 years earlier in the compliance period provides additional time for the aquifer response to be observed and allow adjustments to the target pumping rate to be made based on the adaptive management strategy outlined in the GSP. It also serves to reduce the amount of overdraft that will occur and lessen the risk that the GSP's sustainable management criteria will trigger additional and potentially unexpected pumping rate reductions.

[5] As explained in the GSP there are six types of undesirable results that can occur due to overdraft. Of highest concern to most groundwater users are potential decreases in well production capacity due to decreases in aquifer permeability with depth, and diminished water quality due to increased TDS with depth and ongoing degradation associated with land uses (e.g. fertilizers, septic systems, and irrigation return flows).

Progress reports are required under SGMA to be submitted to the State Department of Water Resources at 5-year intervals. Deferral of pumping reductions to 2033, for example, has the potential to defer management decisions to the last 5 years of the 20-year compliance period that ends in 2040. Having a 10-year period to manage pumping reductions provides a longer time frame for effective groundwater management. Successful achievement of the SGMA-mandated goals is a significant challenge to the Borrego Springs community and early attainment of a goal such as a 50% reduction in pumping could also provide a psychological boost.

The comparison illustrates how constant rate reductions include a higher amount of pumping reductions early in the compliance period (i.e. front-end loading) versus constant volume reductions. This can also be achieved using a rate schedule with step-wise decreasing volumes that can be used to reduce relative impacts at the end of the compliance period.

Please note that overdraft is defined here as the difference between the annual pumping rate and the target pumping rate. This is done for simplicity of comparison. The calculation of the net difference between pumping and recharge introduces uncertainty associated with the overall water balance. Among the complicating factors include the estimation of groundwater outflow and evapotranspiration losses, and the time delay and effective rate of irrigation return flows. Please refer to a more detailed discussion of net recharge and water balance uncertainty in the GSP and in an ENSI Draft Report dated 9/12/2018.

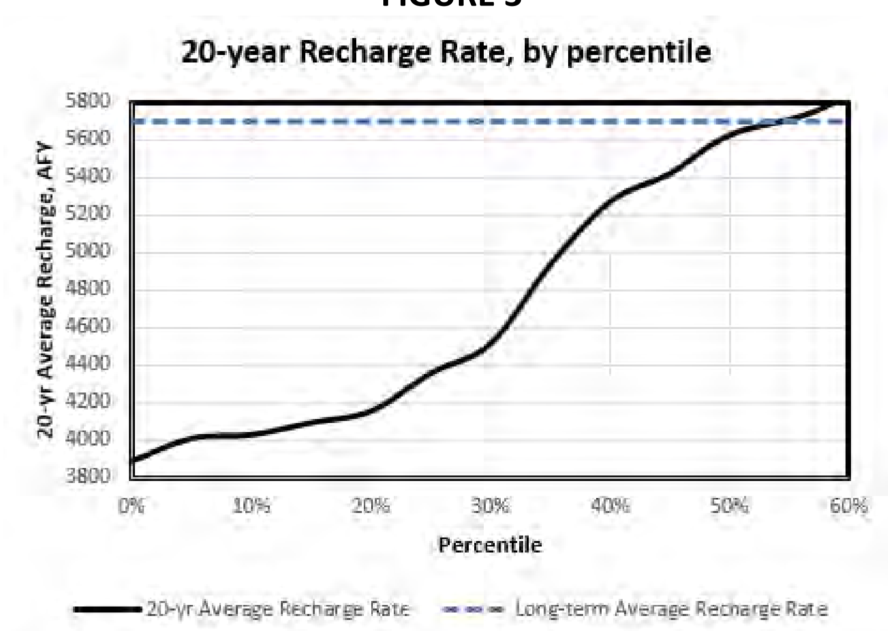
Constant Volume Reduction Schedule with a Factor of Safety

The draft GSP is currently based on a rate reduction schedule where annual pumping is reduced by a constant volume of ~915 AFY. This base case is compared to a rate reduction schedule where a Factor of Safety (FS) is included that assumes that recharge will be lower than average over the 20-year compliance period. The use of a Factor of Safety will help offset the downside risk that significantly below-average recharge will be experienced during the 20-year period, that significant overdraft will continue beyond the compliance period, and that the groundwater basin will be out of SGMA compliance by the year 2040.

A maximum 20-year compliance period is described under SGMA irrespective of natural variability. Having a 'wet' 20-year period would likely support SGMA compliance. However, while the 'wet' period may influence the long-term statistics, the long-term average will remain as the compliance objective under SGMA. Significant (well above average) recharge events occur on a decadal basis. The 5,700 AFY average used as a pumping target is based on a 1945 to 2010 model period. The recharge rate that will occur during the 2020 to 2040 compliance period may or may not benefit from the infrequent storm events ('wet' periods in the model calibration period) that cause above-average recharge.

The target pumping rate is based on an average recharge rate determined using the results of the USGS groundwater model where the results of recharge estimates over the model period (1945 to 2016) are being used to represent the range of recharge that may occur over 20-year periods. A target pumping rate based on a long-term average of 5,700 AFY is used in the GSP. When the results of all of the possible 20-year model periods are compiled[6] the summary statistics show that the lowest 20th percentile of recharge is 4,151 AFY. This means that a recharge rate of at least 4,151 AFY occurred 80% of the time. A chart depicting the percentile values follows as **Figure 3**.

FIGURE 3



[6] ENSI 9/12/2018 report

The Factor of Safety described in this comparison corresponds to an increased pumping rate where the target pumping rate is assumed to be 4,151 AFY, corresponding to the 20th percentile recharge rate. This is not an overly conservative approach as historically the groundwater model supports that the recharge rate was less than 4,151 AFY 20% of the time. For reference, the minimum 20-year period average was 3,882 AFY.

A third case is considered here where recharge is lower than average by applying a Factor of Safety using a target pumping rate of 4,151 AFY. **Table 3** compares this case to the constant volume pumping rate reduction with a target pumping rate of 5,700 AFY. To do so the annual pumping rate is increased from 915 to 992 AFY (~8% increase in the annual reduction rate)

TABLE 3

	YEAR	Annual Pumping, 5700 AFY target	Annual Pumping, Begin with 4151 AFY Target	Constant Volume Annual Reduction, AFY	Constant Volume Annual Reduction, AFY	Reduction as percent of pumping, 5700 AFY Target	Reduction as percent of pumping, Begin with 4151 AFY Target
	2020	24,000	24,000				
1	2021	23,085	23,008	915	992	3.8%	3.8%
2	2022	22,170	22,015	915	992	4.0%	4.0%
3	2023	21,255	21,023	915	992	4.1%	4.2%
4	2024	20,340	20,030	915	992	4.3%	4.4%
5	2025	19,425	19,038	915	992	4.5%	4.6%
6	2026	18,510	18,045	915	992	4.7%	4.8%
7	2027	17,595	17,053	915	992	4.9%	5.1%
8	2028	16,680	16,060	915	992	5.2%	5.4%
9	2029	15,765	15,068	915	992	5.5%	5.7%
10	2030	14,850	14,076	915	992	5.8%	6.1%
11	2031	13,935	13,083	915	992	6.2%	6.5%
12	2032	13,020	12,091	915	992	6.6%	7.0%
13	2033	12,105	11,098	915	992	7.0%	7.6%
14	2034	11,190	10,106	915	992	7.6%	8.2%
15	2035	10,275	9,113	915	992	8.2%	9.1%
16	2036	9,360	8,121	915	992	8.9%	10.0%
17	2037	8,445	7,128	915	992	9.8%	11.3%
18	2038	7,530	6,136	915	992	10.8%	12.8%
19	2039	6,615	5,143	915	992	12.2%	14.9%
20	2040	5,700	4,151	915	992	13.8%	17.8%
TOTAL OVERDRAFT:		**173,850**	**157,586**	(Acre-feet)			
(defined as total pumping in excess of target rate)							

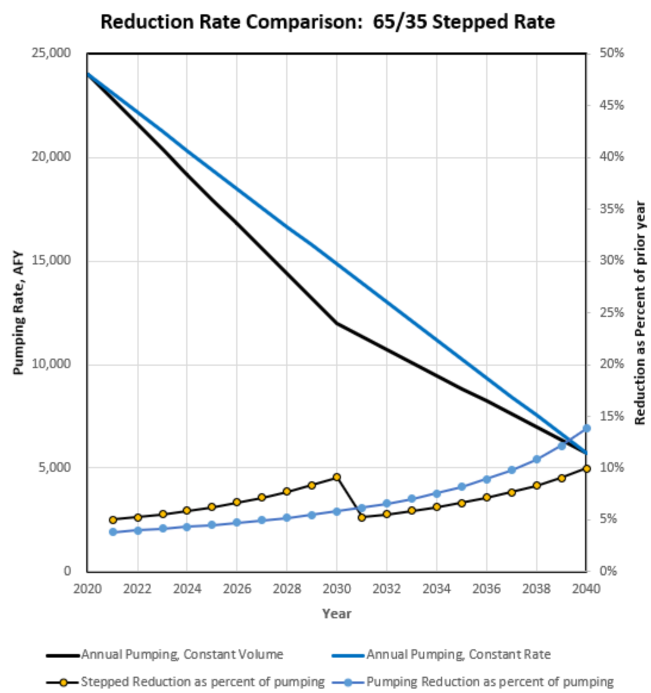
If below average recharge does not occur, this third reduction schedule that includes a Factor of Safety is effectively the same as reducing the compliance time to year 18. It has the benefit of reducing total overdraft by ~16,000 AF but causes the relative impact of pumping reductions to increase toward the end of the compliance period and further illustrates how the constant volume reductions are 'back-end' loaded.

Stepped Reduction Alternative (65/35 Example)

A fourth case is presented where the reduction is ‘stepped’ by having a higher initial reduction rate over the first 10 years, then decreased for the last 10 years. By stepping the rate, the ‘back-end’ effects on year-to-year pumping can be reduced and, in this case, limited to a maximum of 10%. The higher initial pumping rate reduces overall pumping more rapidly and 50% of the BPA (12,000 AFY) is attained three years earlier (2030 versus 2033). Overdraft is also significantly reduced.

TABLE 4/ FIGURE 4

	YEAR	Annual Pumping, Constant Volume	Annual Pumping, Constant Rate	Stepped Volume Annual Reduction, AFY	Constant Volume Annual Reduction, AFY	Stepped Reduction as percent of pumping	Pumping Reduction as percent of pumping
	2020	24,000	24,000				
1	2021	22,800	23,085	1,200	915	5.0%	3.8%
2	2022	21,600	22,170	1,200	915	5.3%	4.0%
3	2023	20,400	21,255	1,200	915	5.6%	4.1%
4	2024	19,200	20,340	1,200	915	5.9%	4.3%
5	2025	18,000	19,425	1,200	915	6.3%	4.5%
6	2026	16,800	18,510	1,200	915	6.7%	4.7%
7	2027	15,600	17,595	1,200	915	7.1%	4.9%
8	2028	14,400	16,680	1,200	915	7.7%	5.2%
9	2029	13,200	15,765	1,200	915	8.3%	5.5%
10	2030	12,000	14,850	1,200	915	9.1%	5.8%
11	2031	11,370	13,935	630	915	5.3%	6.2%
12	2032	10,740	13,020	630	915	5.5%	6.6%
13	2033	10,110	12,105	630	915	5.9%	7.0%
14	2034	9,480	11,190	630	915	6.2%	7.6%
15	2035	8,850	10,275	630	915	6.6%	8.2%
16	2036	8,220	9,360	630	915	7.1%	8.9%
17	2037	7,590	8,445	630	915	7.7%	9.8%
18	2038	6,960	7,530	630	915	8.3%	10.8%
19	2039	6,330	6,615	630	915	9.1%	12.2%
20	2040	5,700	5,700	630	915	10.0%	13.8%
TOTAL OVERDRAFT:		145,350	173,850	(Acre-feet)			
(defined as total pumping in excess of target rate)							



Summary of Reduction Method Choice

Comparison of pumping rate reduction schedules shows that significant differences arise depending on how the reduction rates are selected. **Table 5** summarizes the different rate reduction schedules described in this report. The constant volume and constant rate examples used here represent either a front-end or back-end loaded rate schedule. An intermediate case was presented that uses a variably stepped rate where reductions begin at a higher rate and are then decreased after year 10.

CONSTANT VOLUME

- Pumping rate reduction schedules that use a constant volume reduction per year allow for the greatest amount of pumping to occur during the compliance period.
- The highest rates of pumping lead to the highest amounts of overdraft and increased risk that undesirable results will occur under SGMA as outlined in the GSP.
- Year to year, the use of a constant volume per year means that the relative percentage of pumping reductions occur during the back end of the compliance period (back-end loaded). These rapid changes occur after much effort has been expended to reduce groundwater use.
- If the reduction period is decreased the impact of the reductions becomes greater as illustrated by the use of a lower pumping target rate based on the recharge statistics.

CONSTANT RATE

- Pumping rate reduction schedules that use a constant percentage rate reduction per year allow for the greatest reduction of pumping to occur during the compliance period. Pumping reductions, by volume, are greatest in the early years (front-end loaded).
- Year-to-year pumping reductions remain constant when measured as a percentage. The impact of the reductions on allowable pumping rates near the end of the reduction period is lessened.

CONSTANT VOLUME: 65/35 STEPPED EXAMPLE

- A range of pumping scenarios can be examined to determine their overall characteristics, costs, and benefits. The 2-step example was presented as an intermediate case between the front-end loaded constant rate reduction and the back-end loaded constant volume example.
- The stepped rate can help reduce late impacts while accelerating the initial pumping reductions to allow time for adaptive management to be effective.

TABLE 5. COMPARISON OF PUMPING RATE REDUCTION SCHEDULES, RANKED BY OVERDRAFT IMPACT

CASE	Annual Pumping Reduction, AFY	Overdraft, AF	Year When 50% of BPA Occurs	Year-to-year Reduction Rate, last 5 years
Constant Rate Reduction to 5,700 AFY	Starts at 2,016 AFY and reduces to 381 AFY at end	132,000	2030	6.9% (constant)
Stepped Rate, Constant Volume (65/35 Example)	Begins at 1,200 AFY, then Reduces to 630 AFY at year 11.	145,000	2030	7.1 to 10.0%
Factor of Safety: Constant Volume Reduction. Target Pumping Rate is 4,151 AFY.	992 AFY	158,000	2032	10.0 to 17.8%
Constant Volume Reduction to 5,700 AFY (Draft GSP Example)	915 AFY	174,000	2033	8.9 to 13.8%

Notes:

1. Overdraft values are rounded to the nearest 1,000. Units are Acre-feet (AF) and AF/Year (AFY).
2. For perspective, while the relative impacts to overdraft may not be considered not very significant relative to the magnitude of the overdraft, BWD's current water production rate is approximately 1,500 AFY.
3. Overdraft is defined here as the difference between the annual pumping rate and the target pumping rate. This is done for simplicity of comparison because the calculation of the net difference between pumping and recharge introduces uncertainty associated with the overall water balance. (also see Page 4)

Concluding Remarks

The Borrego Springs community is facing severe reductions in water use under SGMA. Choice of pumping reduction method is one of six inter-related projects and management actions proposed in the GSP. For example, the choice of pumping rate reduction schedule will either support or detract from the water trading program necessary for long-term changes in water use, depending on whether is judged to be effective and implementable[7].

Actual pumping rates will physically differ from the rate reduction schedule that will be incorporated into the GSP. Current pumping rates are likely less than the BPA in some cases and it is possible that future pumping rates may decline faster than the GSP pumping rate reduction schedule should water trading, water conservation, and land fallowing be implemented earlier in the 20-year compliance period.

The primary purpose of presenting different pumping rate reduction schedules is to illustrate that there are multiple assessment criteria that can be applied and need to be considered as the GSP proceeds. An adaptive management strategy will be used to guide the implementation of the GSP in large part based on the observed aquifer response. Adjustments may need to be made to the target pumping rate and/or rate of reductions based on the sustainable management criteria where minimum thresholds and measurable objectives are met or need to be adjusted based on new information.

Four concepts are presented to further evaluate various pumping rate reduction schedules:

- Assess how much additional overdraft will occur and whether this additional overdraft is material to avoiding undesirable results.
- Determine whether the choice of pumping rate reductions accelerates or delays the bulk of the water use reductions and timing of the aquifer response necessary to support timely adaptive management.
- Examine how year-to-year changes in pumping occur depending on whether the reductions are ‘front-end’ or ‘back-end’ loaded.
- Consider using a Factor of Safety where the pumping target is reduced from the long-term average recharge rate (5700 AFY) to a lower target rate that allows for a lower than average recharge rate that may occur over the 20-year compliance period.

[7] Successful implementation of the reduction schedule is essential to the water trading program because water shares will entitle a shareholder to extract a reduced volume of groundwater over time based on the pumping rate reduction schedule.

The choice of rate reduction schedule will involve trade-offs. Among these include:

- A fast start with more rapid reductions in pumping will lead to less overdraft and lowers the risk that undesirable results will occur and that sustainable management thresholds will be exceeded during the compliance period. Unexpected pumping rate reductions triggered by sustainability criteria may prove very difficult to manage.

- A slow start leads to less rapid reductions and allows for more water use during the first 10 years. However, deferring the pumping rate reductions leads to a 'hard landing' with large year-to-year pumping rate adjustments and greater risk of non-compliance as aquifer response will be deferred, thus compressing the time frame for adaptive management to be successful.

- Accelerated (front-end) reduction is illustrated by the constant rate reduction and the stepped volume rate reduction schedules. An accelerated schedule also leads to lower pumping rates during years 10 to 15 when the target pumping rate may need to be adjusted downward should below-average recharge be realized. These sorts of adjustments will be easier to make and have less relative impact at the end of the compliance period if a constant rate or stepped volume reduction schedule is in place.

- As noted in this Report, using a lower target pumping rate at the start of the GSP could be used to increase the probability of compliance. Simply reducing the target rate to allow for below average recharge is similar in effect to reducing the compliance period. However, this has a consequence where the relative impact on year-to-year changes is significant.

In closing, the choice of reduction rate schedule and associated impacts needs to be considered in the broader context of the GSP. Multiple water supply management options are available to the Borrego Water District and other stakeholders that can reduce reliance on pumping rate reductions to mitigate chronic overdraft and attain long-term sustainability under SGMA.

Appendix E:

Borrego Water District
Water Rates Affordability Assessment,
dated October 2, 2017
Raftelis Financial Consultants

October 4, 2017

Borrego Water District

Water Rates Affordability Assessment

Prepared by

RAFTELIS FINANCIAL CONSULTANTS

RAFTELIS FINANCIAL CONSULTANTS, INC.

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

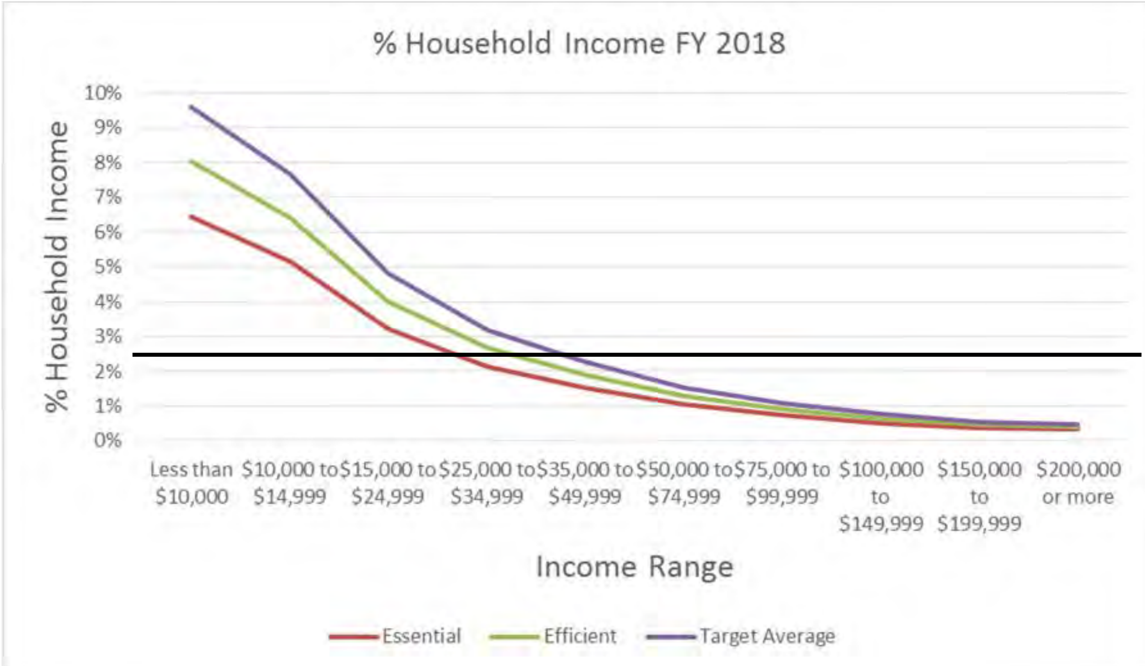


Figure 3-2: Percent Household Income, FY 2040

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