

Appendix D

Water Supply Assessment

FINAL

Water Supply Assessment for SR-99/Hosking Commercial Center Bakersfield, CA

PREPARED FOR:

3J's & R, LLC
P.O. Bin 1969
Bakersfield, CA 93303
Contact: John Giumarra Jr.

PREPARED BY:

ICF International
620 Folsom Street, 2nd Floor
San Francisco, CA 94107
Contact: Alexa La Plante
415.677.7118

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Contents

List of Tables	iii
List of Figures.....	iv
List of Acronyms and Abbreviations.....	v
Executive Summary	1
Introduction.....	2
1.0 Project Overview	3
1.1 Project Location.....	3
1.2 Project Description	3
2.0 Water Supply Planning	6
2.1 Water Supply Planning Under SB 610 and SB 221	6
2.1.1 “Is the Proposed Project Subject to CEQA?”	7
2.1.2 “Is the Proposed Project Under SB 610?”	7
2.1.3 “Is there a Public Water System?”	7
2.1.4 “Is There a Current UWMP That Accounts for the Project Demand?”	8
2.1.5 “Is Groundwater a Component of the Supplies for the Project?”	8
2.1.6 “Are There Sufficient Supplies to Serve the Project Over the Next Twenty Years?”	8
2.2 Sustainable Groundwater Management Act.....	8
2.3 Executive Order B-29-15	9
3.0 Existing Conditions	10
3.1 Population	10
3.2 Land Use	10
3.3 Geography	10
3.4 Climate	11
3.5 Hydrology	11
3.5.1 Groundwater.....	12
3.5.2 Surface Water	13
4.0 Water Sources	16
4.1 Kern Delta Water District	16
4.1.1 Service Area	16
4.1.2 Water Supplies.....	16
4.2 Greenfield County Water District.....	17
4.2.1 Service Area	17
4.2.2 Water Treatment Capacity	17
4.2.3 Water Supplies.....	17

5.0	Water Demands.....	22
5.1	Water Demand by Water Use Sector	22
5.1.1	Historical Water Demand	22
5.1.2	Projected Water Deliveries.....	25
6.0	Local Water Supply Sufficiency	26
6.1	Project Water Supply Sufficiency	26
7.0	Water Supply Reliability and Water Shortage Contingency Planning.....	28
	Water-Year Types	28
7.1	Water Supply Reliability	28
7.1.1	Supply Reliability in Single and Multiple Dry Years.....	28
7.2	Water Shortage Contingency Planning	28
7.2.1	Drought Planning and Water Conservation Program	28
8.0	Conclusion	30

Attachments

Attachment A: First Amendment to the Urban Customer Service Agreement – Kern Delta Water District and Greenfield County Water District

Attachment B: Methodology for Developing Project Water Demand Projections And GCWD Calculation Of Single-Family Residence Equivalents For Water Service

Tables

	Page
Table 1: Project Annual Water Demand	3
Table 2: Average Annual Precipitation and Evapotranspiration.....	11
Table 3: Historical Water Demand 1999-20141	23
Table 4: 2013 Monthly Water Usage	24
Table 5: Greenfield County Water District Supply Demand Comparison Without Project	26
Table 6: Greenfield County Water District Supply Demand Comparison With Project.....	27

Figures

	Page
Figure 1: Project Vicinity Map.....	5
Figure 2: Greenfield County Water District Groundwater Wells Sites and District Boundary	18
Figure 3: Monthly changes in depth to groundwater for Panama Well in 2010	20
Figure 4: Annual variation in depth to groundwater for all GCWD wells from 2009 to 2012	20
Figure 5: Historical Annual Water Demand (1999-2014).....	24

Acronyms and Abbreviations

AF	acre-feet
AFY	acre-feet per year
C-2/PCD	Regional Commercial/Planned Commercial Development
CASGEM	the California Statewide Groundwater Elevation Monitoring
City	City of Bakersfield
County	Kern County
DWR	California Department of Water Resources
EIR	Environmental Impact Report
FAR	floor area ratio
FAS	Fully Appropriated Status
GC	General Commercial
GCWD	Greenfield County Water District
GMP	Groundwater Management Plan
GPA	General Plan Amendment
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
HMR	High Medium-Density Residential
ID4	Kern County Water Agency Improvement District No. 4
IRWMP	Integrated Regional Water Management Plan
KCWA	Kern County Water Agency
KDWD	Kern Delta Water District
LAFCO	Local Agency Formation Commission
LMR	Low Medium-Density Residential
LR	Low-Density Residential
M&I	municipal and industrial
MSRs	Municipal Service Reviews
MWD	Metropolitan Water District of Southern California
R-1	One Family Dwelling
SGMA	Sustainable Groundwater Management Act
SR	State Route
SR 99	State Route 99

SWRCB	California State Water Resources Control Board
UWMP	Urban Water Management Plan
WSA	Water Supply Assessment
ZC	Zone Change

Executive Summary

The proposed SR 99/Hoskings Commercial Center Project (Project or Commercial Center) specifically meets the SB610 “project” criteria by proposing to construct a commercial development that includes retail commercial establishments having more than 500,000 sq. ft. of floor space. Therefore, pursuant to the Water Code section 10192(a)(3), the Project requires the preparation of a Water Supply Assessment (WSA). This WSA provides an evaluation of water demand and supply for the Project pursuant to the requirements of Water Code sections 10910-10912. The primary issue for the WSA to determine is whether the projected water supply for the next 20 years (planning horizon) – based on normal, single dry, and multiple dry water years – will meet the demand projected for the project plus the existing and planned future uses, including agricultural and manufacturing use (or proposed water demands within the entire GCWD service area).

The Project is located on approximately 85 acres in southeast Bakersfield in Kern County. It consists of approximately 800,000 square feet of leasable retail space, 240 hotel rooms, 4,472 surface parking spaces along with internal drives, and landscaping. The Project would create an estimated 376.4 acre-feet per year (AFY) of new water demand (Table 1). The Project would be served water by Greenfield County Water District (GCWD or District), which pumps groundwater and purchases spread water from Kern Delta Water District (KDWD).

As required for the WSA analysis, a comparison of water supplies and Project demand for a 20-year planning horizon was conducted. It was determined that GCWD will have sufficient water supplies to meet Project demands, as well as overall District demands (Table 6). Project demands will be met through GCWD’s existing groundwater rights from native aquifer supplies, as well Mr. Giumarra’s overlying groundwater rights for the same aquifer that will be pumped from GCWD wells. An Agreement for Overlying Lands will be executed to allow GCWD to utilize John Giumarra’s Overlying Groundwater Rights, as a landowner in which GCWD acts as an agent. District demands will also continue be met with pumping native groundwater, which GCWD has been using to serve it’s existing customers based on existing groundwater rights.

The District currently implements several water conservation measures as part of a water conservation program that have reduced usage since initiation. As a result of the GCWD’s recent water conservation measures, water demand was reduced from 2,750 acre-feet (AF) 2013 to 2,400 AF in 2014 (Figure 5). In addition, GCWD will continue to find ways to reduce water usage within the District through their water conservation program. To ensure water supply reliability during single dry year or multiple dry years, the GCWD will use the their storage reserve of canal seepage water from KDWD. As part of an Urban Customer Service Agreement, the GCWD receives 100% of the surface water seepage losses from the Kern Island Canal system as groundwater recharge and to maintain groundwater aquifer levels. This water would be used only during times of water shortages.

Introduction

This Water Supply Assessment (WSA) provides an evaluation of water demand and supply for the proposed State Route (SR) 99/Hosking Commercial Project (Project or Commercial Center) pursuant to the requirements of sections 10910-10912 of the California Water Code. The evaluation includes a description of the existing land use, the Project, the existing regulations, the existing water supply service area, and the existing water supply and water demand of the Greenfield County Water District (GCWD or District). It quantifies the water demand of the existing land use and the Project and identifies the difference between the existing land use and the Project. The evaluation accounts for this difference within the projected water supply and water demand information for three weather year scenarios (average, single dry, and multiple dry) provided through various data sources to determine whether there is sufficient water projected by the GCWD to meet the Project water demands while also meeting overall District demands.

The final WSA for this project will be considered for adoption during a special or regular meeting of the GCWD, and its conclusions incorporated into the City of Bakersfield's (City's) Environmental Impact Report (EIR) for the Project. The WSA contained herein is one of many items to be considered before approval of the Project.

1.0 Project Overview

1.1 Project Location

The Project is located on approximately 85 acres in southeast Bakersfield in Kern County (County). The Project site is bordered by State Route (SR) 99 to the west, Berkshire Road to the north, South H Street to the east, and Hosking Avenue to the south. The Project site is adjacent to all of these roads. Figure 2.1 shows the Project location.

1.2 Project Description

The Project consists of approximately 800,000 square feet of leasable retail space, 240 hotel rooms, 4,472 surface parking spaces along with internal drives, and landscaping (Table 1). The commercial center would contain approximately 18 buildings in one- and two-story structures—including two anchor buildings, a cinema (60,000 square feet), and 11 restaurants (45,000 square feet total). The Project includes a hotel comprising two separate facilities with a total of approximately 240 rooms. The floor area ratio (FAR) for the Project site would be approximately 0.25 and pervious/landscaped areas would compose about 5% of the site. The methodology for calculating the estimated Project water demand is provided in *Appendix B, Methodology for Developing the Hosking/SR99 Project Water Demand Projections*.

Table 1: Project Annual Water Demand

Land Use	Area of Development	Water Demand Rate (gpd) per Unit ⁵	Acre-Feet per Year per Unit	Gallons per Day	Acre-Feet per Year
Retail (square feet) ¹	800,000	0.346	0.00039	276,800	310.3
Hotel (square feet) ²	78,000	0.273	0.00031	21,320	23.9
Landscaping (acres) ³	4	0	2.0000	7,137	8.000
Contingency ⁴	10%	0	0	30,510	34.2
Total:				335,767 gpd	376.3 AFY

Key:

GCWD = Greenfield County Water District; gpd = gallons per day; AFY = acre-feet per year; Unit = 1,000 square feet

Notes:

¹ Used water demand factors for Shopping Center in the GCWD Calculation of Single-Family Residence Equivalents for Water Service

² Assumption: The Project includes a hotel in two separate facilities with approximately 240 rooms. The average area of a hotel room is 325 square feet. This results in 78,000 square feet of proposed hotel space.

³ Pervious and landscaped areas would compose about 5% of the site. GCWD stated in a response to an Info Request that proposed landscaped areas would cover 4 acres (174,240 square feet).

⁴ A 10% contingency is included to provide additional buffer due to unforeseen circumstances. This results in a very conservative estimate considering that the water demand factors are also considered to be conservative due to overestimating future growth.

⁵ Parking spaces would not require water.

Source: Water demand rates and AFY rates are based on 1995 water demand factors (GCWD Calculation of Single-Family Residence Equivalents for Water Service) found in Appendix B, Methodology for Developing the Hosking/SR99 Project Water Demand Projections.

The Project involves a request for approval of a General Plan Amendment (GPA) and concurrent Zone Change (ZC) for a regional retail commercial center as well as EIR Certification. Other entitlements also requested include a change to the Metropolitan Bakersfield General Plan Circulation Element to delete the southerly extension of Colony Street from Berkshire Road to South H Street, tentative/final subdivision map approval, preliminary site plan review/planned commercial development plan approval, and GCWD annexation. The proposed GPA would change the designation of the Project area from Low-Density Residential (LR), Low Medium-Density Residential (LMR), and High Medium-Density Residential (HMR) to General Commercial (GC). The proposed ZC would convert the One-Family Dwelling (R-1) zone classification to Regional Commercial/Planned Commercial Development (C-2/PCD).

Development of the site is anticipated in two phases. Phase I would construct 400,000 square feet of leasable commercial space along with development of the first 120 hotel rooms. Phase II would construct the remaining 400,000 square feet of leasable commercial space and the remaining 120 hotel rooms. The Project is expected to begin construction in Fall 2016 and be completed in early 2017.

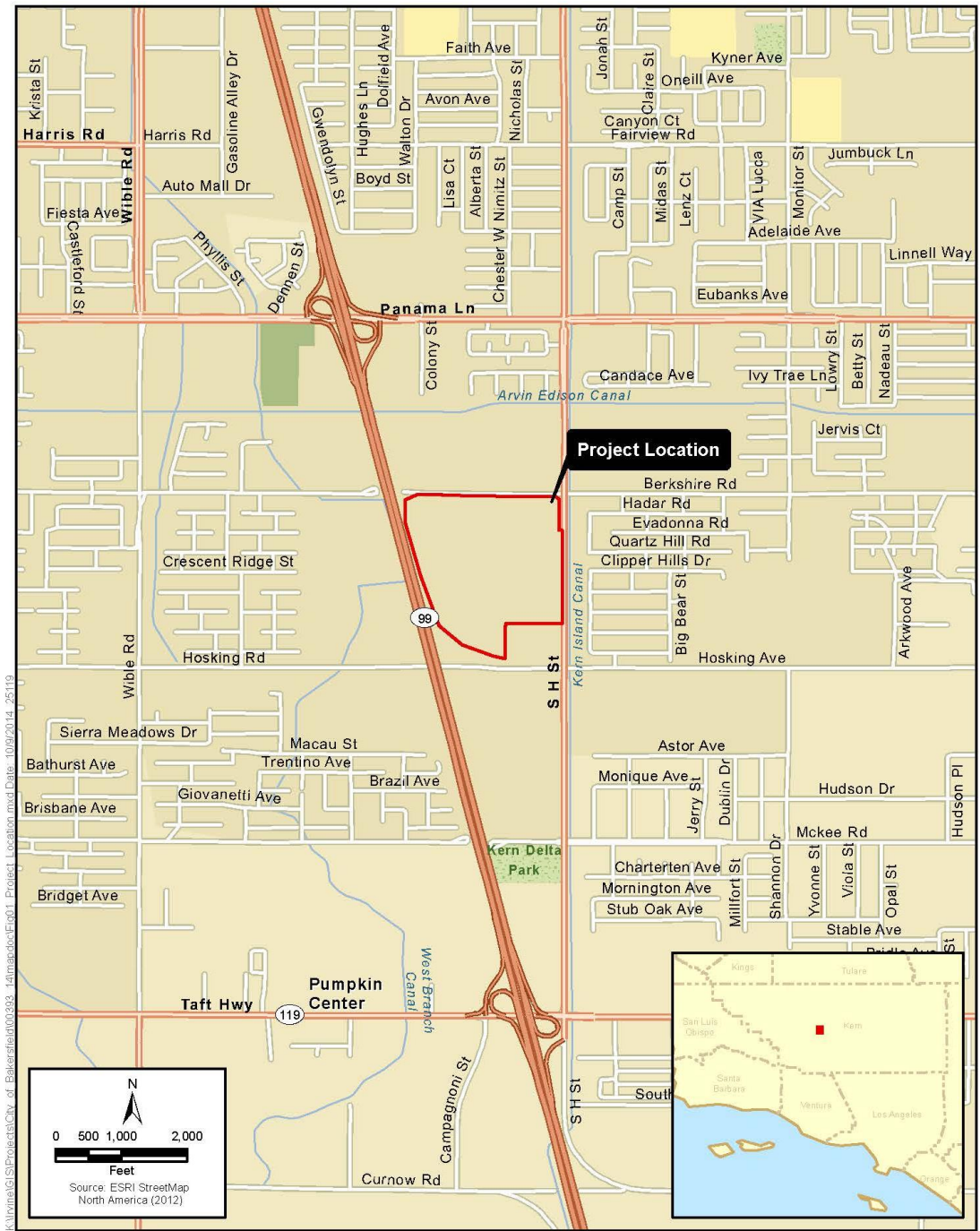


Figure 1: Project Vicinity Map

2.0 Water Supply Planning

California has multiple paths to plan for the development or maintenance of water supplies on a regional level. Urban Water Management Plans (UWMPs), Groundwater Management Plans (GMPs), Integrated Regional Water Management Plans (IRWMPs), Municipal Service Reviews (MSRs) and water resource components of General Plans are used to integrate regional planning of water supply and demand.

2.1 Water Supply Planning Under SB 610 and SB 221

To complement these large-scale planning processes, the Governor signed into law Senate Bill 610 and 221 in 2002, which emphasize the incorporation of water supply and demand analysis at the earliest possible stage of the planning process for projects undergoing more specific water supply needs.

If the lead agency is not able to identify any public water system that may supply water for the water-demand project, the lead agency shall prepare a water supply assessment after consulting with any entity serving domestic water supplies whose service area includes the site of the water-demand project, the local agency formation commission, and the governing body of any public water system adjacent to the site of the water-demand project. The governing body of the lead agency must approve the water supply assessment prepared pursuant to this section at a regular or special meeting.

The Project specifically meets the SB610 “project” criteria by proposing to construct a mixed-use development that includes a proposed shopping center or business establishment having more than 500,000 square feet of floor space. Therefore, pursuant to the Water Code section 10192(a)(3), the Project requires the preparation of a WSA.

The Project would be served water by the GCWD, which pumps groundwater and purchases spread water from KDWD. GCWD is a California water supplier providing water to 2860 single and multiple family residential customers and 29 commercial/institutional accounts as of December 2014. GCWD serves approximately 2 -3% of the population of Bakersfield.

The Project is on land that is already in the City and has general plan and zoning entitlements (combination of R-1 and General Commercial). The pending GPA/Zone Change will re-designate the entire site for commercial use. Most of the 85-acre Project site is already within GCWD. Approximately 17 acres at the south end of the Project site are proposed for annexation into the GCWD service area. A Municipal Services Review is under preparation relating to the pending annexation, and a draft annexation application has been submitted to California Local Agency Formation Commission (LAFCO) for a pre-filing review and comment. GCWD, not the property owner, is the applicant for annexation.

In the event of successful annexation, GCWD will be the entity that supplies water to the Project site and therefore is the public water supplier responsible for the preparation of a WSA for the Project. GCWD therefore must prepare the WSA to determine if a sufficient water supply exists to supply the Project plus the anticipated future build-out water demands of the entire water service area.

The SB 610 WSA process involves answering each of the following questions:

- Is the proposed Project subject to CEQA?
- Is the proposed Project under SB 610?
- Is there a public water system?
- Is there a current UWMP that accounts for the proposed Project demand?
- Is groundwater a component of the supplies for the proposed Project?
- Are there sufficient supplies available to serve the proposed Project over the next 20 years?

2.1.1 “Is the Proposed Project Subject to CEQA?”

The first step in the SB 610 process is to determine whether the proposed Project is subject to CEQA. GCWD plans to follow CEQA, with the development of an EIR.

2.1.2 “Is the Proposed Project Under SB 610?”

Pursuant to Water Code section 10910, cities and counties, acting as lead agencies, request that water purveyors prepare WSAs for certain projects (as defined in Water Code §10912) subject to CEQA. “Projects” under SB 610 are defined under Water Code section 10912(a) as:

- A proposed residential development of more than 500-dwelling units,
- A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space,
- A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space,
- A proposed hotel or motel, or both, having more than 500 rooms,
- A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.
- A mixed-use project that includes one or more of the projects specified in this subdivision, or,
- A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500-dwelling unit project.

If a proposed project meets any one of these criteria, a WSA must be prepared. The primary issue for the WSA to determine is whether the projected water supply for the next 20 years (planning horizon) – based on normal, single dry, and multiple dry water years – will meet the demand projected for the Project plus the existing and planned future uses, including agricultural and manufacturing uses (water demands within the entire GCWD service area). This Project involves a proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space, and therefore it falls under the SB 610 requirements, and therefore a WSA is required to be adopted.

2.1.3 “Is there a Public Water System?”

The third step in the SB 610 process is to determine if there is a public water system available to serve the Project. GCWD has been identified as the water purveyor for the Project.

2.1.4 “Is There a Current UWMP That Accounts for the Project Demand?”

Step four in the SB 610 process involves determining if there is a current UWMP that considers the projected water demand for the Project area. The Water Code requires that all public water systems providing water for municipal purposes to more than 3,000 customers, or supplying more than 3,000 acre-feet annually, must prepare an UWMP, and this plan must be updated at least every five years on or before December 31, in years ending in five and zero. Water Code section 10910(c)(2) states, “If the projected water demand associated with the Project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d),(e),(f), and (g) [i.e., the WSA].” GCWD does not have more than 3,000 customers or supply more than 3,000 acre-feet and therefore is not required to prepare a UWMP.

2.1.5 “Is Groundwater a Component of the Supplies for the Project?”

The requirements of Water Code section 10910(f), parts 1 through 5, apply if groundwater is a source of supply for a project. Groundwater is the primary source of municipal water supply from GCWD, and would be the primary water source for the Project.

2.1.6 “Are There Sufficient¹ Supplies to Serve the Project Over the Next Twenty Years?”

The final step in the SB 610 process is to demonstrate sufficient water supplies, including the availability of these supplies in all water-year conditions (normal, single dry and multiple-dry years) over a 20-year period, and an assessment of how these supplies relate to project-specific and cumulative demands over that same 20-year period. The regional and local demand over the next 20 years for the Project are included in Section 6 of this report.

2.2 Sustainable Groundwater Management Act

On September 16, 2014 Governor Edmund G. Brown Jr. signed historic legislation to strengthen local management and monitoring of groundwater basins most critical to the state’s water needs. The three bills, Senate Bill 1168 (Pavley), Assembly Bill 1739 (Dickinson), and Senate Bill 1319 (Pavley) together makeup the Sustainable Groundwater Management Act (SGMA). The act will establish phased requirements for high and medium priority basins to adopt groundwater sustainability

¹ Government Code section 66473.7(a)(2) States:
‘Sufficient water supply’ means the total water supplies variable during a normal, single-dry, and multiple-dry years within a 20 year projection that will meet the projected demand associated with the project, in addition to existing and planned future uses, including, but not limited to agricultural and industrial uses. In determining ‘sufficient water supply’, all of the follow factors shall be considered:

- (e) The availability of water supplies over a historical record of at least 20 years.*
- (f) The applicability of an urban water shortage contingency analysis prepared pursuant to Section 10632 of the Water Code that includes actions to be undertaken by the public water system in response to water supply shortages.*
- (g) The reduction in water supply allocated to specific water use sector pursuant to a resolution or ordinance adopted or a contract entered into, by the public water system, as long as that resolution, ordinance, or contract does not conflict with Section 354 of the Water Code.*
- (h) The amount of water that the water supplier can reasonably rely on receiving from other water supply projects, such as conjunctive use, reclaimed water, water conservation, and water transfer, including program identified under federal, state, and local water initiatives such as CALFED and Colorado River tentative agreements, to the extent that these water supplies meet the criteria of subdivision (d).*

plans, depending on whether or not a basin is in critical overdraft. It will require adoption of groundwater sustainability plans by January 31, 2020, for all high or medium priority basins in overdraft condition and by January 31, 2022 for all other high and medium priority basins unless legally adjudicated or otherwise managed sustainably.

The California Department of Water Resources (DWR) implemented the California Statewide Groundwater Elevation Monitoring (CASGEM) Program in response to legislation enacted in California's 2009 Comprehensive Water package. As part of the CASGEM Program and pursuant to the California Water Code (CWC §10933), DWR is required to prioritize California groundwater basins, so as to help identify, evaluate, and determine the need for additional groundwater level monitoring. The CASGEM Groundwater Basin Prioritization Basin Score determined the Kern County Subbasin to have an overall basin ranking score of 22.5 and High priority basin². Basin impacts used to determine this ranking are subsidence, overdraft, and water quality degradation³.

The SGMA established a new structure for managing California's groundwater resources at a local level. The SGMA requires, by June 30, 2017, the formation of locally-controlled Groundwater Sustainability Agencies (GSAs) which must develop Groundwater Sustainability Plans (GSPs) in Bulletin 118-defined groundwater basins or subbasins that were designated by the DWR as medium or high priority. As a result of its high priority basin status, a GSA will need to be formed by local agencies for the Kern County Subbasin, and DWR will need to be notified by June 30, 2017. The GCWD will likely be a member of the GSA, once it is formed.

2.3 Executive Order B-29-15

On April 1, 2015, California Governor Jerry Brown issued Executive Order B-29-15, as part of the State of Emergency actions due to severe drought conditions. The Order states that the State Water Resources Control Board (State Water Board) shall impose restrictions to achieve a statewide 25% reduction in potable urban water usage through February 28, 2016. These restrictions will require water suppliers to California's cities and towns to reduce usage as compared to the amount used in 2013. These restrictions should consider the relative per capita water usage of each water suppliers' service area, and require that those areas with high per capita use achieve proportionally greater reductions than those with low use.

The GCWD is considered to be a small water supplier (serving fewer than 3,000 connections), which are required to either reduce water use by 25 percent, or restrict outdoor irrigation to no more than two days per week. These smaller urban suppliers, that collectively serve less than 10 percent of Californians, must submit a report on December 15, 2015 to demonstrate compliance⁴.

² Department of Water Resources. 2014. CASGEM Groundwater Basin Prioritization Results - Abridged Sorted by Overall Basin Score. May 26.

³ Department of Water Resources. 2014. CASGEM Basin Summary for the Kern County Subbasin within the San Joaquin Valley Basin. Tulare lake Hydrologic Region. South Central Region Office. May 30.

⁴ State Water Resources Control Board. 2015. State Water Board Adopts 25 Percent Mandatory Water Conservation Regulation. Media Release. May 5. Available: http://www.swrcb.ca.gov/press_room/press_releases/2015/pr050515_water_conservation.pdf. Accessed: June 1, 2015.

3.0 Existing Conditions

This section describes the background information, land use planning for the County, and the City.

3.1 Population

According to the 2010 Census, the City supported a population of 347,483 which was estimated to have grown to 363,630 by 2013.⁵ Bakersfield is the county seat of Kern County and maintains a very diverse economy. Kern County is California's top oil producing county and the fourth most productive agricultural county in the United States.^{6,7} Other industries include natural gas and other energy extraction, aerospace, mining, petroleum refining, manufacturing, distribution, food processing, and corporate/regional headquarters.

The State legislature has enacted laws to ensure the increased demands are adequately addressed and that a firm source of water supply is available prior to approval of certain new development. The regulations include Senate Bill 610 (SB610), authored by Senator Jim Costa, which is briefly described below. SB 610 seeks to promote more collaborative planning between local water suppliers and cities and counties. SB 610 of 2001 amended State law, Water Code sections 10910-10912, to require detailed information regarding water availability to be provided to city and county land use planners prior to approval of certain specified large land use development projects.

3.2 Land Use

The Project Area is currently designated by the City of Bakersfield General Plan Land Use Zoning map for single-family residential units (R-1) and single-family residential units with a church overlay zone (R-1-CH). The Project would require rezoning of these parcels to Commercial Center Zone (C-C). The surrounding area to the west is zone single family residential (R-1), to the south agricultural (A), to the north single family residential (R-1) and regional commercial zone (C-2), and to the east single family residential (R-1) and residential suburban zone (R-S).

3.3 Geography

The City of Bakersfield lies near the southern end of the San Joaquin Valley in Kern County, California. The city limits extend to the Sequoia National Forest, at the foot of the Greenhorn Mountain Range and at the entrance to the Kern Canyon. The City is located approximately 100 miles north of Los Angeles and about 300 miles southeast of the state capital, Sacramento. The project site is relatively flat and is currently undeveloped and unpaved.

⁵ U.S. Census Bureau. 2013. City of Bakersfield: Community Facts. Available: <http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=PEP_2013_PEPANNRES>. Accessed: June 3, 2014.

⁶ California Department of Conservation. 2008. Annual Report of The State Oil & Gas Supervisor. Available: <ftp://ftp.consrv.ca.gov/pub/oil/annual_reports/2008/PR06_Annual_2008.pdf>. Accessed: June 3, 2014.

⁷ Bakersfield Chamber of Commerce. 2009. Agriculture. Available: <<http://www.bakersfieldchamber.org/section.asp/csasp/DepartmentID.537/cs/SectionID.1172/csasp.html>>. Accessed: June 3, 2014.

3.4 Climate

In general, the climate of the City of Bakersfield is characterized as desert with long, hot, dry summers, and brief, cool, moist (but not wet) winters. The average daily temperature in the City of Bakersfield ranges from 47.2°F (degrees Fahrenheit) in December to 83.1°F in July. Average monthly precipitation within the City of Bakersfield ranges from 0 to 1.4 inches. About 90 percent of all precipitation falls from October through April.⁸ Table 2 shows the average annual precipitation, evapotranspiration and irrigation demands in and around the project area.

Table 2: Average Annual Precipitation and Evapotranspiration

Month	Average Total ETo ^a (in)	Average Total Precipitation ^b (in)
January	1.22	0.98
February	2.20	1.05
March	3.66	0.94
April	5.67	0.61
May	7.44	0.39
June	8.15	0.11
July	8.67	0.02
August	7.81	0.01
September	5.67	0.08
October	4.03	0.26
November	2.13	0.53
December	1.22	0.85
TOTAL	57.87	5.83

Key:

ETo = reference (or potential) evapotranspiration. ETo is an estimate of the water used by a well-watered, full-cover grass surface, 8-15 cm in height (the reference crop), therefore it represents a conservative estimate.

in = inches

Notes:

^a ETo data was collected from CIMIS - Station 125 Arvin-Edison (CIMIS 2014). The period of record for the data is 3/22/1995 to 07/01/2014.

^b Precipitation data was obtained from the Bakersfield WSO Airport, California (040442) Station (Western Regional Climate Center 2015). The period of record for the data is 10/1/1937 to 12/31/2005.

3.5 Hydrology

The following section describes the existing conditions of groundwater and surface water resources within the Project Vicinity.

⁸ City of Bakersfield. 2014. *Urban Water Management Plan*. Available: <http://www.bakersfieldcity.us/cityservices/water/pdfs/2010_FINAL%20UWMP%20Bakersfield_2014_05_13.pdf>. Accessed: June, 4, 2014.

3.5.1 Groundwater

The San Joaquin Valley Groundwater Subbasin underlying the City of Bakersfield, and thus GCWD, is the Kern County Subbasin (California Department of Water Resources Basin Number 5-22.14). The Kern County Subbasin is one of the seven subbasins within the San Joaquin Valley Basin that transport, filter, and store water. The other subbasins within the San Joaquin Valley Basin are the Kings, Kaweah, Tulare Lake, Tule, Westside, and Pleasant Valley subbasins. In turn, the San Joaquin Valley Basin is one of twelve groundwater basins that make up the Tulare Lake Hydrologic Region. Four main rivers provide the majority of the surface water runoff for the Region including the Kings, Kaweah, Tule, and Kern rivers.

The Kern County Groundwater Subbasin is bounded on the north by the Kern County line and the Tule Groundwater Subbasin, on the east and southeast by granitic bedrock of the Sierra Nevada foothills and Tehachapi mountains, and on the southwest and west by the marine sediments of the San Emigdio Mountains and Coast Ranges. Principal rivers and streams include Kern River and Poso Creek. Active faults include the Edison, Pond-Poso, and White Wolf faults. Average annual precipitation values range from 5 inches at the subbasin interior and from 9 to 13 inches at the subbasin margins to the east, south, and west. Natural recharge is primarily from stream seepage along the eastern subbasin and the Kern River; recharge of applied irrigation water, however, is the largest contributor. The Kern County Subbasin covers 3,040 square miles. The subbasin is described in detail in California's Groundwater, Bulletin 118.

3.5.1.1 Groundwater Levels and Storage

The total water in storage is estimated to be 40,000,000 acre-feet and dewatered aquifer storage is estimated to be 10,000,000 acre-feet⁹. Groundwater levels in the basin have deepened in the past few years. According to DWR's 2011 groundwater elevations for the Kern County Basin, groundwater levels in the City are unknown. However, just west of the City's urban area, groundwater levels range from 80-190 feet below ground surface (bgs) and just south of Hwy 223 (Bear Mountain Road), groundwater levels range from 170-270 feet bgs¹⁰.

3.5.1.2 Groundwater Basin Management

The Kern County Subbasin is not an adjudicated basin.¹¹ However, it is currently managed by the City through various measures. The City's management of its water resources for the Kern County Subbasin is based on measured and recorded recharge and banking operations. Sources of recharge to the Kern County Subbasin include precipitation and runoff, Kern River channel and canal seepage, and spreading/banking. The City's wholesale water system accurately monitors these activities on a daily basis and publishes an annual report. The City's domestic water supply system accurately

⁹ Department of Water Resources. 2006. San Joaquin Valley Groundwater Basin: Kern County Subbasin. Available: <http://www.water.ca.gov/pubs/groundwater/bulletin_118/basindescriptions/5-22.14.pdf>. Accessed: June 4, 2014.

¹⁰ Department of Water Resources. 2011. Lines of Equal elevation of Groundwater for the San Joaquin Valley. South Central region. Spring.

¹¹ In basins where a lawsuit is brought to adjudicate the basin, the groundwater rights of all the overlies and appropriators are determined by the court. The court also decides: 1) who the extractors are; 2) how much groundwater those well owners can extract; and 3) who the Watermaster will be to ensure that the basin is managed in accordance with the court's decree. The Watermaster must report periodically to the court. (http://www.water.ca.gov/groundwater/gwmanagement/court_adjudications.cfm)

records groundwater pumping and deliveries from surface water treatment plants. One of the goals of water resource management is to limit groundwater extractions to no more than the “safe yield” for the groundwater basin. According to the Sustainable Groundwater Management Act, “Safe yield, or “Sustainable yield”, is the maximum quantity of water that can be withdrawn annually from a groundwater supply without causing undesirable results over a long-term period or planning horizon. Undesirable results include significant and unreasonable chronic lowering of groundwater levels, reduction of groundwater storage, seawater intrusion, degraded water quality, land subsidence, and depletion of interconnected surface waters.

Sources of groundwater recharge include:

- Captured and percolated precipitation (estimated 1,200 acre-feet of water per year);
- Incidental groundwater replenishment from the Kern River Channel and from unlined portions of Carrier Canal (estimated 9,800 acre-feet per year);
- Kern River water spread at the 2,800 acre recharge facility owned by the City which is comprised of old river channels, overflow lands and constructed spreading basins (estimated 5,900 acre-feet per year);
- Surface water imported via programs by the Kern County Water Agency Improvement District No. 4 (ID4) (Contracted for approximately 3,000 acre-feet);
- Incidental groundwater recharge from storage ponds containing denitrified secondary treated water from Wastewater Treatment Plant No. 3 (Projected recharge of 9,900 acre-feet by 2030) ;
- Deep percolation into the groundwater basin occurs where lands are irrigated (estimated 9,500 acre-feet per year);
- Storm water at several water amenities located in City parks (estimated 5,000 acre-feet per year).
- Incidental recharge from landscape irrigation (not estimated).

As previously stated, the GCWD will be involved in the formation and management of a locally-controlled Groundwater Sustainability Agencies GSA for the Kern County Subbasin, per SGMA requirements.

3.5.1.3 Kern County Groundwater Ordinance

The Kern County Groundwater Ordinance is a county policy to facilitate the transport and transfer of water and water rights where consistent with the public welfare of the place of export. This ordinance only applies to the County’s “native groundwater.” The term “native groundwater” does not include water which is both recharged by artificial means, including water recharged through groundwater banking programs, and which originates outside Kern County and its watershed areas.¹²

3.5.2 Surface Water

The Project site is within the Kern River watershed within the larger Tulare Lake Hydrologic Region. The Kern River enters the San Joaquin Valley through the Kern River Canyon. With the exception of

¹² Kern County, 1998. Kern County Groundwater Ordinance. Available: <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=21467>. Accessed: January 2, 2015.

very wet years, there is no flow in the river past Bakersfield due to upstream canal diversions. During very wet years, water flows in the river southwest to Buena Vista Lake Bed and then north to Tulare Lake or into the California Aqueduct Intertie near Tupman¹³.

No natural streams or rivers, either perennial or intermittent, cross the Project site. However some water features are very close and/or adjacent to the project site. The nearest water feature is the main branch of the Kern Island Canal (approximately 80 feet to the east), which runs north-south and is adjacent and to the east of South H Street. The Arvin-Edison Canal trends east-west approximately 0.25 mile to the north of the project site. The West Branch Canal trends north-south within a residential area to the west of the project site. The Kern River flows trends east-west and is approximately 6 miles north of the project site. The Kern Island Canal has a direct connection to waters of the United States at the Kern Island headgate (located in the Panorama Vista Preserve), which is where Kern River water is diverted from the river into the canal.

The City acquired historic water rights on the Kern River through its purchase of Kern Island Water Company's Kern River water holdings in 1976. Tenneco West, Inc. sold its Kern River water rights, Isabella storage rights, water transportation and distribution facilities, and other assets to the City. The City, concurrently, sold the portion of these assets that served the Kern Island Water Company to KDWD. In January 1977, KDWD assumed control of these assets and facilities and began delivery of Kern River water to landowners¹⁴.

Legal proceedings between 1996 and 2007 reviewed and considered questions regarding the potential forfeiture of appropriative Kern River water rights held by KDWD. As a result of those proceedings, California courts concluded that KDWD had "forfeited" a portion of its Kern River water rights due to non-use. Following the conclusion of those proceedings in 2007, the California State Water Resources Control Board (SWRCB) began proceedings to assess whether the Kern River was still fully appropriated. The Kern River was originally designated as a river with Fully Appropriated Status (FAS) by SWRCB in 1964. In February 2010, SWRCB issued an order revising the status of the Kern River, finding that the river was no longer fully appropriated.

3.5.2.1 State Water Project Water Rights

In 1972, KDWD contracted with Kern County Water Agency (KCWA) to receive 30,000 AFY of SWP water imported into the county via the California Aqueduct. The SWP water supply is used to balance the area's groundwater overdraft and provide supplemental surface water deliveries to the various portions of the KDWD.

Since the early 1990s, the availability of SWP water has declined. Recent restrictions on the importation of SWP water by the courts have resulted in greater uncertainty for future supplies. For the 14-year period of 1998 through 2011, the KDWD's full allotment of SWP water was available during only one year. Given the uncertainties associated with ongoing court restrictions and other conditions, the KDWD estimates that 50 percent of its SWP contract amount, on average, will be available¹⁵.

¹³ City of Bakersfield. 2000. Water Balance Report. Available: <http://www.csub.edu/~dbaron/Sci360B/2000waterrpt-1.pdf>. Accessed: May 12, 2015.

¹⁴ Kern Delta Water District. 2010. Final Groundwater Management Plan Update. Prepared by Todd Engineers. Available: http://www.water.ca.gov/groundwater/docs/GWMP/TL-11_KernDeltaWD_GWMP_2013.pdf.

¹⁵ Kern Delta Water District. 2010. Final Groundwater Management Plan Update. Prepared by Todd Engineers. Available: http://www.water.ca.gov/groundwater/docs/GWMP/TL-11_KernDeltaWD_GWMP_2013.pdf.

4.0 Water Sources

This section provides a discussion of the water districts, KDWD and GCWD, that are involved with water supply for the Project. Both agencies are classified as special districts within Kern County, which indicates that they are self-governing, and have the authority to provide services to a specific area. Therefore, they operate under their own Board of Directors and set their own budgets.

4.1 Kern Delta Water District

The KDWD was established in 1965 primarily to provide water supply for agricultural irrigation.

4.1.1 Service Area

The KDWD service area is 129,000 acres (201.5 sq mi); of which 89,212 acres make up the historical utility service areas of five former canal companies and about 35,615 acres in non-utility areas. Roads and rights-of-way cover approximately 4,133 acres within KDWD, leaving about 124,867 acres (typically rounded to 125,000 acres) available for agriculture or other development.

4.1.2 Water Supplies

KCWD manages three water sources: groundwater, imported SWP water, and local surface water. Surface water is provided to agricultural customers. Pumped groundwater supplements this demand. Additionally, KDWD has acquired SWP water rights and obtains other water sources as available through various contracts and exchanges.¹⁶

Groundwater provides most of the municipal supply for KDWD, which is replenished locally from natural recharge, canal seepage, spreading basins, and recycled water. In addition, KDWD recharges water on behalf of small community water systems including GCWD to maintain groundwater levels and support municipal pumping. In this capacity, KDWD has served as a municipal and industrial (M&I) wholesaler for groundwater replenishment.

KDWD owns and operates approximately 814 acres of spreading basins throughout the KDWD to allow for groundwater replenishment. These basins have been constructed since 2003 as part of a joint project with The Metropolitan Water District of Southern California (MWD). Although these facilities were constructed to support the KDWD banking arrangement with Metropolitan, the District also operates these facilities for local groundwater replenishment and storage of excess surface water when available. Basins have been constructed or are under construction at seven locations in Kern Island, Buena Vista, Stine, Farmers, and Eastside service areas.

KDWD participates in several of the formal banking projects along the Kern River to optimize its use of water sources and provide overdraft protection of the groundwater system. From 1995 through 2006, KDWD banked approximately 63,660 AF of excess SWP water, CVP water, and high-flow Kern River water in Berrenda Mesa, Pioneer Project, COB 2800, and Kern Water Bank. Of that amount, approximately 23,670 AF was banked for subsequent recovery and approximately 39,990 AF was banked for overdraft protection.

¹⁶ Kern Delta Water District. 2013. *Groundwater Management Plan Update*. Available: http://www.water.ca.gov/groundwater/docs/GWMP/TL-11_KernDeltaWD_GWMP_2013.pdf. Accessed: January 18, 2015.

4.2 Greenfield County Water District

GCWD, established in 1955, is a domestic water purveyor that serves a small area in south Bakersfield.

4.2.1 Service Area

The GCWD service area is bounded by the Arvin-Edison Intake Canal (north), Di Giorgio Road (south), Cottonwood Road (east), and State Route-99 Highway (west). The District service area is 206 acres (3.15 sq mi); of which 1,235 acres (2.07 sq mi) is developed into residential, commercial, and schools. Undeveloped is primarily farmland, although GCWD has no agricultural customers. Total land within the sphere of influence is 3,919 acres (6.12 sq mi).

4.2.2 Water Treatment Capacity

GCWD has no central water treatment facility. However, there is well head treatment. The GCWD disinfects all well water at the well head using liquid chlorine. The two wells with Arsenic above the Maximum Contaminant Level (MCL) will have treatment at the well head installed when state funding is available.

4.2.3 Water Supplies

The GCWD does not supply to its customers or receive surface water as a source of water supply. All water supplied to customers is from groundwater sources. However, there are secondary surface water supplies, that are delivered to the groundwater aquifer in the form of surface water seepage, received by GCWD in order to supplement the needs of the District.

4.2.3.1 Native Groundwater Aquifer (Primary Source)

GCWD currently obtains 100 percent of its water supply from five groundwater wells that pump native groundwater and stores water in four water storage tanks located within its service area based on GCWD's appropriative and prescriptive groundwater rights and as an agent for landowners within the District service area. This water is currently used for the District's primary water supply and would be used to supply water to the Project.

The locations of the groundwater wells, (1) Berkshire Road, (2) Dublin Road, (3) Mckee Road, (4) Panama Road, and (5) Taft Highway, are shown in Figure 2. The wells have a total pumping capacity of 6,110 gpm and total storage capacity in the water tanks is 1,770,000 gallons¹⁷ Although a groundwater balance model of the underlying aquifer has not been developed, extraction rates and groundwater well water levels have been monitored and recorded consistently. As shown in Figure 4, depth to groundwater for all GCWD wells has remained relatively constant annually despite the 84% increase in demand from 2002-2014 as presented in Table 3.

¹⁷ Greenfield County Water District. 2008. Water Supply Assessment, Woodmont Project SR99/Hosking Commercial Center. Prepared by Quad Knopf. March.

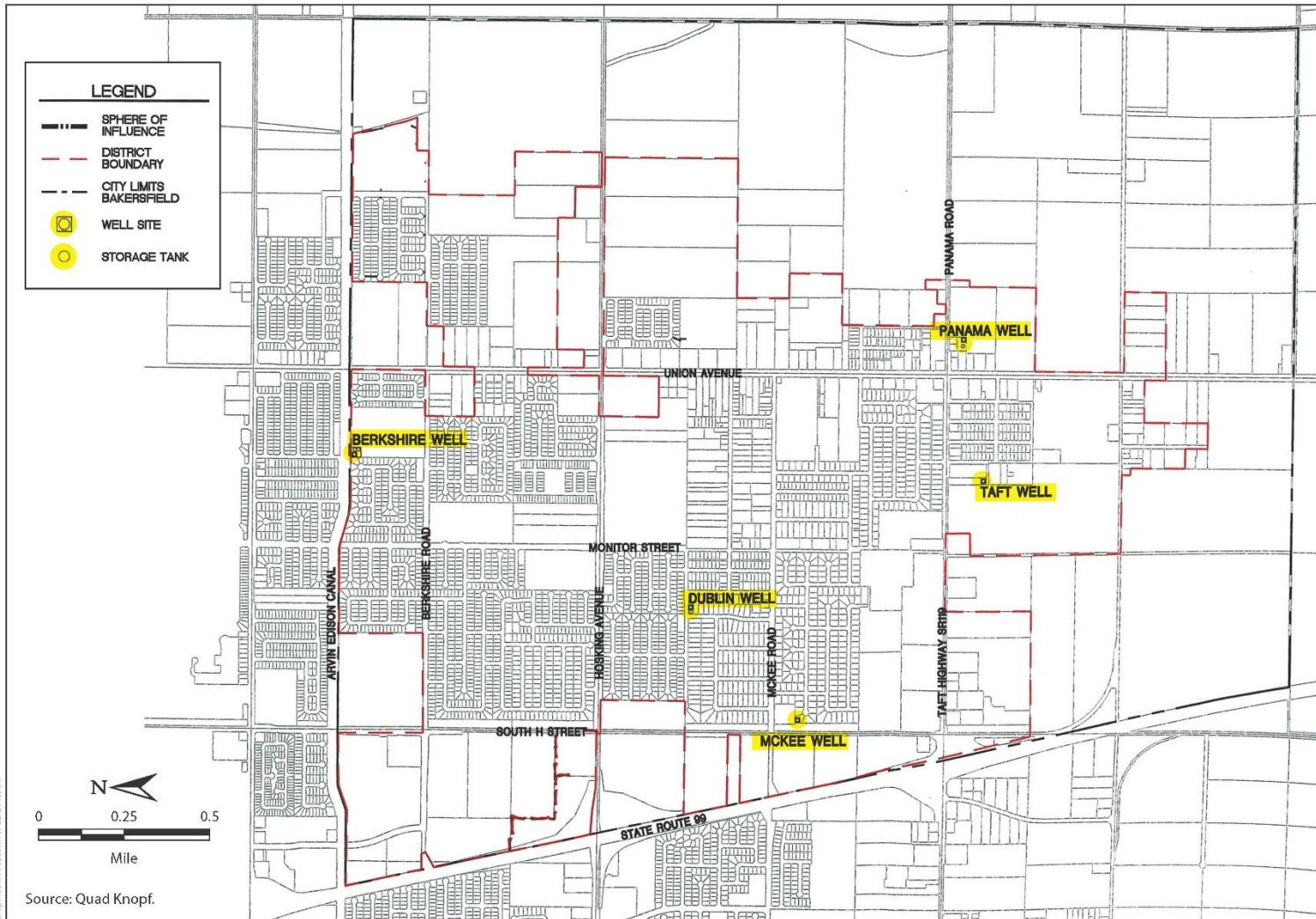


Figure 2: Greenfield County Water District Groundwater Wells Sites and District Boundary

Monthly groundwater levels recorded for each well from 2009 to 2012 show that groundwater demand fluctuates by season. As shown with the Panama well in 2010, groundwater levels deepen as demand increases and precipitation decreases during the summer months, (Figure 3). Depth to groundwater increases approximately 15-20 feet during summer months. However, on an annual scale, depth to groundwater for each well has been relatively constant since 2009 (Figure 4). Depths to groundwater between the five wells range, at most, in any given year, from approximately 170 ft. to 200 ft. during a 4-year period (2009-2012). This indicates that groundwater extraction rates are sustainable given existing conditions. Groundwater levels remain constant in part because GCWD purchases Kern Island Canal seepage water from KDWD to help recharge the underlying aquifer. Extraction rates and groundwater levels will continue to be monitored.



Figure 3: Monthly changes in depth to groundwater for Panama Well in 2010

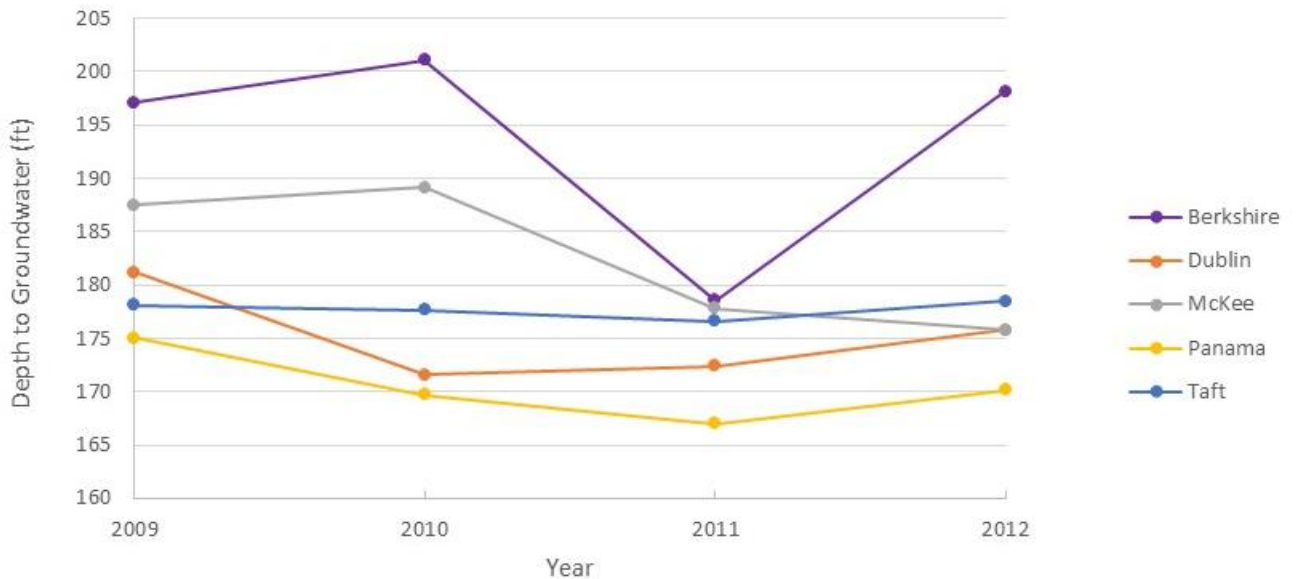


Figure 4: Annual variation in depth to groundwater for all GCWD wells from 2009 to 2012

4.2.3.2 Landowner Overlying Groundwater Rights

As a condition of annexation, the District will secure an Agreement for Overlying Lands, which would allow GCWD to utilize Mr. John Giumarra’s overlying groundwater rights, as a landowner in which GCWD acts as an agent. Groundwater will be extracted from the existing GCWD wells and will

be monitored on a regular basis. This water will be used to supplement GCWD's existing groundwater aquifer supplies for the Project.

4.2.3.3 KDWD Surface Water Seepage

As discussed above, GCWD purchases from KDWD Kern Island Canal (surface water) that seeps into the ground through unlined canals and then stores it as a reserve account. As part of an Urban Customer Service Agreement, the GCWD receives 100% of the surface water seepage losses from the Kern Island Canal system (through the portion of the Kern Island Main and Central Canals from the KDWD) as groundwater recharge to maintain groundwater aquifer levels and supplements supplies (Urban Customer Service Agreement Amendment, effective January 1, 2014) (Attachment A)¹⁸.

This water would be used only during times of water shortages. Historically, canal seepage water purchases range from approximately 2,500 to 3,000 AF/year. Currently, GCWD can purchase up to 4,500 AFY. From 2008 through February 2015, GCWD has banked 21,642 AF¹⁹. Although this water co-mingles with existing groundwater aquifer supplies, and therefore is unquantifiable within the aquifer, it provides a significant volume of additional water to the aquifer for use by GCWD.

Under this agreement, it is understood that KDWD will supply an amount of water equal to the actual seepage losses attributable to the diversion and delivery of Kern River water (other than KDWD water acquired by exchange) through that portion of Kern Delta's canal systems lying within GCWD's sphere of influence. Total seepage losses for the Kern Island Main Canal within GCWD's sphere of influence are calculated by measuring the seepage losses occurring between Arvin-Edison Canal on the north and Delfino Weir on the south and then multiplying by sixty-six percent (66%). To ensure a reliable long-term water supply, KDWD agrees that if all or a portion of the bottoms and banks of such canals become lined after June 1st, 2014, KDWD will replace the lost absorptive capacity or, subject to CEQA approval, provide replacement.

¹⁸ See Appendix A for the First Amendment to Urban Customer Water Agreement: Kern Delta Water District and Greenfield County Water District

¹⁹ Greenfield County Water District. Personal Communication. Email from Rex Mason. Water Banking Totals. May 5, 2015.

5.0 Water Demands

5.1 Water Demand by Water Use Sector

GCWD provides water distribution services to the following water sectors:

- **Single-Family Residential**—This sector refers to single-family residences in an identifiable suburban residential neighborhood or cluster-style development designed with open space and other amenities.
- **Multi-Family Residential**—This sector refers to families living in apartments and condominiums in structures of two or three stories with off-street parking and other requirements for higher density living.
- **Commercial/Institutional**—This sector includes commercial, government (city accounts), and industrial uses. It includes primarily uses associated with commercial buildings (e.g., landscaping; toilets; heating, ventilation, and air conditioning; etc.) and commercial uses (e.g., car washes, laundries, nurseries, etc.). This sector includes recycled water provided to a concrete batch plant.
- **Landscape**—This sector includes primarily raw water use for irrigation at parks, schools, cemeteries, churches, residences, or public facilities (including city accounts). This sector includes recycled water at various parkways and landscaped medians throughout the City.
- **Other**— This sector includes metered water and unmetered water. Metered water includes hydrant meter water use from which meters are read quarterly. The unmetered water volume includes water use from activities such as firefighting, construction, street sweeping, system flushing, and meter discrepancies. This also includes system losses and other unaccounted-for water use. This sector includes a water volume that accounts for the difference in water production and delivery data.

For record keeping purposes, GCWD water combines single and multi-family residential into residential. Historically, residential demand is approximately 97% of total demand.

5.1.1 Historical Water Demand

Table 3 summarizes the historical annual water demand for the GCWD from 1999 to 2014. For this period of record, 97% of demand was for residential uses. The increase in demand from 1999 to 2007 is primarily due to the expansion of urban development on the outer edges of the City of Bakersfield within the District’s service area.

Table 3: Historical Water Demand 1999-2014¹

Year	Acre-feet	Millions Gallons	Gallons per Day (gpd)	Gallons per Minute (gpm)
1999	710	231	633,848	440
2000	867	283	774,009	538
2001	1,058	345	944,523	656
2002	1,291	421	1,152,532	800
2003	1,575	513	1,406,071	976
2004	1,925	627	1,718,532	1193
2005	2,169	707	1,936,361	1345
2006	2,492	812	2,224,717	1545
2007	2,580	841	2,303,279	1599
2008	2,560	834	2,285,424	1587
2009	2,451	799	2,188,115	1520
2010	2,282	744	2,037,241	1415
2011	2,336	761	2,085,449	1448
2012	2,566	836	2,290,780	1591
2013	2,750	896	2,455,045	1705
2014	2,376	774	2,121,159	1473

¹ Average groundwater pumped on an annual basis obtained from GCWD.

Water demand has overall increased during this period, although there was a decreasing trend of water use from 2007 to 2010 (Figure 5). The years 2007, 2008, 2013, and 2014 were classified as critically dry years in the San Joaquin Valley, whereas 2009 and 2010 were classified as Below Normal and Above Normal Years, respectively. Water conservation measures and drought awareness outreach were likely responsible for these declines in water demand.

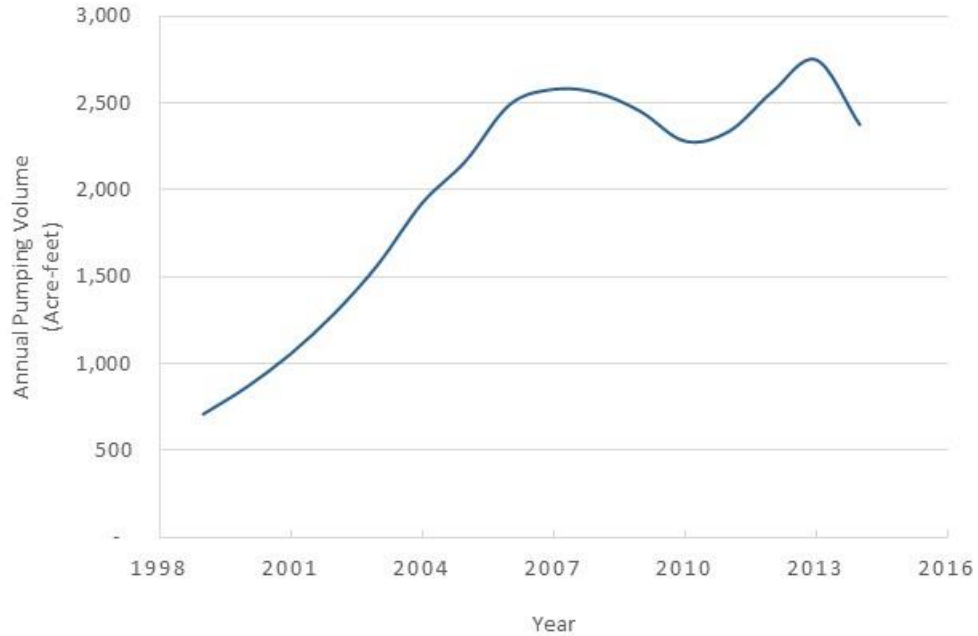


Figure 5: Historical Annual Water Demand (1999-2014)

Water usage peaks in the hotter, drier months of June, July, and August and decreases in the wetter, colder winter month of January and February, as shown in Table 4. Summer water usage is generally higher than in winter months primarily due to an increase in lawn and landscape watering.

Table 4: 2013 Monthly Water Usage

Month	Total # of Accounts	Total Consumption (Gallons)	Days in Month	Total Consumption (gpm)
January	2,679	33,972,000	31	761
February	2,691	39,895,000	28	989
March	2,712	50,267,000	31	1,126
April	2,733	67,215,000	30	1,556
May	2,743	93,358,000	31	2,091
June	2,748	105,704,500	30	2,447
July	2,763	107,533,800	31	2,409
August	2,769	102,954,400	31	2,306
September	2,781	95,302,600	30	2,206
October	2,803	90,836,700	31	2,035
November	2,808	54,081,000	30	1,252
December	2,817	55,000,000	31	1,232
Average:	2,754	Total: 896,120,000		

5.1.2 Projected Water Deliveries

GCWD purchases between 4000 to 5000 AFY (4,500 AFY on average) of canal seepage each year from the KDWD. According to GCWD's Urban Customer Water Agreement with KDWD (Attachment A), the volume will be provided even if canals are lined in the future via other KDWD sources.

6.0 Local Water Supply Sufficiency

The estimated Project water demand was based on 1995 water demand factors provided by the GCWD and Project area (Attachment B). Table 5 compares the Districts’ projected supply and demand over a 20-planning horizon out to 2035 without considering the estimated water demands for the Project. Although some of the volumes of the water sources have not yet been quantified, water demands should be met through the planning period. However, monitoring of groundwater levels will be required to ensure sustainability of the underlying groundwater aquifer.

Table 5: Greenfield County Water District Supply Demand Comparison Without Project

	Year				
	2015	2020	2025	2030	2035
Expected Demand without Project (acre-ft)	2,970	3,395	3,820	4,245	4,670
Available Canal Surface Water Seepage (acre-ft) ¹	4,500	+4,500	+4,500	+4,500	+4,500
Groundwater well aquifer (primary source) ^{2,3}	2,970	3,395	3,820	4,245	4,670

Notes:

¹This is the volume of water that is available for GCWD to purchase each year. This volume is cumulative; from 2008 through February 2015. GCWD has banked 21,642 AF. However, because the total volume that is actually available in the aquifer is unknown, the annual maximum is shown here (with a plus sign to show that it is additive) to maintain conservative assumptions and provide a supply buffer.

²Due to the un-adjudicated basin, quantification of actual water volumes within the native groundwater aquifer is not required. However, it can be at least partially accounted for using projected demands (which are based on historical annual extractions) and relatively stable groundwater levels. In addition, surface water seepage from the Kern Island Canal helps to recharge the basin and offset potential impacts of groundwater extractions and provide a reserve of groundwater for future use.

³The volume of available supply within the aquifer includes Giumarra’s overlying groundwater rights. The volume of water available via Mr. John Giumarra’s overlying groundwater rights is currently unknown. Should the GCWD secure an agreement and utilize these rights, groundwater would be extracted from the five existing GCWD wells, and it would be monitored on a regular basis.

6.1 Project Water Supply Sufficiency

The Project would result in an estimated 376.4 AFY of new water demand, as shown in Table 1. This is approximately 12.6% percent of the Districts’ anticipated total system demand of 3,346 AF in 2015, and 7.5 percent of overall treated water demands of 5,046 AFY by 2035. Table 6 compares GCWD current supplies (groundwater and surface water seepage) and demands within the entire district include those of the Project.

GCWD realizes that future water needs will require additional water banking to off-set potential aquifer drawdown due to build out of the District. Project demands will be met by current groundwater aquifer supplies and Mr. Giumarra’s overlying groundwater rights for the next 20 years. Therefore, GCWD will have sufficient water supply to meet GCWD demands and Project demands within the entire service area for the duration of WSA planning period. Groundwater levels will continue to be monitored, and should levels begin to decline, alternative supplies from the KDWD surface water seepage reserve bank or Mr. John Giumarra’s overlying groundwater rights could be used to meet Project demands while maintaining sustainable groundwater levels within the native aquifer.

Table 6: Greenfield County Water District Supply Demand Comparison With Project

	Year				
	2015 ⁴	2020	2025	2030	2035
Expected Demand with Project (acre-ft)	2,970	3,771	4,196	4,621	5,046
Available Canal Surface Water Seepage (acre-ft) ¹	4,500	+4,500	+4,500	+4,500	+4,500
Groundwater well aquifer (primary source) ^{2,3}	2,970	3,395	3,820	4,245	4,670

Notes:

¹ This is the volume of water that is available for GCWD to purchase each year. This volume is cumulative; from 2008 through February 2015. GCWD has banked 21,642 AF. However, because the total volume that is actually available in the aquifer is unknown, the annual maximum is shown here (with a plus sign to show that it is additive) to maintain conservative assumptions and provide a supply buffer.

² Due to the un-adjudicated basin, quantification of actual water volumes within the native groundwater aquifer is not required. However, it can be at least partially accounted for using projected demands (which are based on historical annual extractions) and relatively stable groundwater levels. In addition, surface water seepage from the Kern Island Canal helps to recharge the basin and offset potential impacts of groundwater extractions and provide a reserve of groundwater for future use.

³ The volume of available supply within the aquifer includes Giumarra's overlying groundwater rights. The volume of water available via Mr. John Giumarra's overlying groundwater rights is currently unknown. Should the GCWD secure an agreement and utilize these rights, groundwater would be extracted from the five existing GCWD wells, and it would be monitored on a regular basis.

⁴ The Project is not expected to begin operation until 2017. Therefore this demand volume is the same as that of without the Project. Project demands will be approximately 3,346 acre-feet in 2017.

7.0 Water Supply Reliability and Water Shortage Contingency Planning

Water-Year Types

Water Code section 10632(i) requires the reliability of the water supply as well as its vulnerability to seasonal or climatic shortages to be described for each of the following water-year types:

- **Average water year:** A year in the historical sequence that most closely represents median runoff levels and patterns. It is defined as the median runoff over the previous 30 years or more. This median is recalculated every 10 years.
- **Single dry water year:** Generally considered to be the lowest annual runoff for a watershed since the water year beginning in 1903. Suppliers should determine this for each watershed from which they receive supplies.
- **Multiple dry water years:** Generally considered to be the lowest average runoff for a consecutive multiple-year period (i.e., 3 years or more) for a watershed since 1903. For example, 1928–1934 and 1987–1992 were the two multi-year periods of lowest average runoff during the 20th century in the Central Valley. Suppliers should determine this for each watershed from which they receive supplies.

7.1 Water Supply Reliability

7.1.1 Supply Reliability in Single and Multiple Dry Years

As indicated previously, GCWD has sufficient supply through existing groundwater supplies, groundwater banking, overlying groundwater rights of the landowner, and seepage entitlements to service the Project now and in the future under a full water supply scenario. In the event of a single dry year or multiple dry years, groundwater levels may be reduced below what is sufficient for GCWD deliveries. However, there are alternative water supplies that would ensure water supply reliability for GCWD demands. Surface water stored in the aquifer from KDWD Kern River surface water seepage will be used as a reserve bank during dry years. In addition, in the event of drought, emergency water can be supplied via the canal seepage reserve bank. In addition, KDWD has available water supplies from the SWP and Kern River allocations, as well as groundwater banks. GCWD may negotiate a purchase agreement with KDWD should supplies be compromised in the future. With implementation of GCWD's water conservation measures and the provision of these alternative water supplies during dry years, if needed, the GCWD will have a sufficient water supply to meet all projected GCWD water demands throughout the planning horizon (until 2035).

7.2 Water Shortage Contingency Planning

7.2.1 Drought Planning and Water Conservation Program

GCWD has several demand management programs and/or measures at its disposal for use during single-dry and multiple-dry year scenarios in order to conserve water. These measures have proven to reduce usage since initiation. For example, water usage was reduced from 2,750 acre-feet (AF)

2013 to 2,400 AF in 2014 as a result of implementation of water conservation measures. Methods being implemented by the GCWD for conserving water include:

- **System Adjustments:**
 - Reductions in water delivery pressure by 5 psi reduces the consumption.
 - Pumping at a slower rate for a longer period to reduce the pressure on the aquifer.
 - Reductions in system flushing activities and water usage.
- **Tiered Metered Water Rates:** The majority of the GCWD's connections are metered. The current metering rate structure increases rates with increasing use. Emergency water rates can also be adopted during recognized water shortage events.
- **Mandatory Water Reduction:** In the event of a dry-year or multiple-dry year scenario, implementation of mandatory water reductions could occur. Enforcement of this option would be through the issuance of penalties on a sliding scale based on how often the violation occurs.
- **Tracking of Unauthorized Water Use:** The GCWD conducts inspections and encourages notification from the public to identify unauthorized water use, specifically at water hydrants. Groundwater well water levels are monitored on a regular basis to determine if specific wells are being over pumped. The District has lowered the well pump settings to make sure pumps are low enough if the water table continues to drop.
- **Public Outreach:**
 - Daily water patrol: GCWD interacts with customers through actions, such as identifying broken sprinklers, requesting that they shorten watering durations at each station, educating them on them how to read the meter and detect leaks by looking at the dial on the meter.
 - Customer Outreach: GCWD educates customers about water use reduction in a variety of ways, such as the following:
 - At the District Office - approximately 50% of our customers pay by coming in to the office.
 - Mail - information to customers as bill inserts or flyers
 - Contact of larger users – large users include schools, parks, apartment buildings.

8.0 Conclusion

The Project groundwater demand is anticipated to be 376.4 AFY, or approximately 12.6% of the anticipated total system demand of 3,346 AFY in 2017 (including the Project). GCWD will have sufficient water supplies to meet Project demands and the results of this assessment indicate that GCWD will have sufficient water supply to meet GCWD demands within the entire service area for the duration of WSA planning period with existing water supplies. Project demands will be met through GCWD's existing groundwater rights from native aquifer supplies, as well Mr. Giumarra's overlying groundwater rights for the same aquifer that will be pumped from GCWD wells.

During single and multiple dry years, water may need to be supplemented from KDWD via stored surface water seepage from the Kern River and/or additional supplies from KDWD should they be necessary in the future. In addition, GCWD will continue to implement water conservation measures to reduce overall water demands within the service area.