EXHIBIT "C - PART 1"

Analysis of Historical Groundwater Production by the Phelan Pinon Hills Community Services District

Antelope Valley Area of Adjudication

July 13, 2010

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1 Executive Summary

The Phelan Pinon Hills Community Services District (PPHCSD) is located at the northern base of the San Gabriel Mountains in the westernmost portion of San Bernardino County, California. The PPHCSD provides municipal and industrial water service to its customers by distributing groundwater pumped from 13 wells. Prior to 2008, water service for the PPHCSD service area was provided by County of San Bernardino Service Area 70L (CSA 70L). All of the current water service facilities, including groundwater production wells, were constructed and operated by CSA 70L prior to 2008.

Although its service area is within the Mojave Basin Area of Adjudication, the PPHCSD operates one well (Well 14) on the west side of the Los Angeles-San Bernardino County boundary, which is within the Antelope Valley Area of Adjudication as determined by Judge Komar.

In addition to Well 14, the PPHCSD pumps from five other wells located within the Antelope Valley Groundwater Basin as defined by California Department of Water Resources (CDWR) Bulletin 118. This basin extends east of the Los Angeles-San Bernardino County boundary into the PPHCSD service area. Groundwater pumped from these wells would otherwise flow into the Antelope Valley Area of Adjudication.

The purpose of this study is to document the following:

1. The hydrogeological setting of the PPHCSD service area,
2. Groundwater extractions from the Antelope Valley Area of Adjudication by the PPHCSD via Well 14, and
3. The effects of pumping from Well 14 and other PPHCSD wells on groundwater levels and groundwater flow in the Antelope Valley Area of Adjudication.

The principal findings of this study are as follows:

- The PPHCSD service area is located on the east side of the Los Angeles-San Bernardino County boundary within the Mojave Basin Adjudication area;
- The PPHCSD provides water service to approximately 6,700 connections from 13 groundwater wells;
- The PPHCSD has historically pumped groundwater from three groundwater basins as defined by CDWR Bulletin 118: the Antelope Valley Groundwater Basin, the El Mirage Valley Groundwater Basin, and the Upper Mojave River Valley Groundwater Basin;

- The majority of groundwater currently pumped for municipal and industrial supply by the PPHCSD (59 percent) is from six wells located in the Antelope Valley Groundwater Basin as defined by CDWR Bulletin 118 (Wells 6a, 6b, 10, 11, 12, and 14);
- The PPHCSD operates one production well (Well 14) that is on the Los Angeles side of the county boundary and within the Antelope Valley Area of Adjudication;
- At the current average monthly rate of extraction from Well 14, the annual production from this well in 2010 is expected to be approximately 1,100 acre-ft.
- Groundwater in the easternmost portion of the Antelope Valley Groundwater Basin flows in a northerly direction from the base of the San Gabriel Mountains towards the alluvial valley between Black Butte and Black Mountain;
- Groundwater underflow to the north and out of the area bounded by Black Butte, Black Mountain and other granitic bedrock hills is unlikely;
- The groundwater flow direction and geology downgradient of the PPHCSD wells in the Antelope Valley Groundwater Basin result in an aquifer system that is hydraulically isolated from the central portions of the Antelope Valley Area of Adjudication;
- Although groundwater production from the six PPHCSD wells in the Antelope Valley Groundwater Basin captures groundwater that would otherwise flow into the Antelope Valley Area of Adjudication, the isolated nature of the aquifer system downgradient of the wells and the relatively stable groundwater levels in the area indicate that the impact of PPHCSD pumping on groundwater levels in the central portion of the adjudication area is negligible.

2 Preparer's Qualifications

Mr. Harder is a California registered Professional Geologist and California Certified Hydrogeologist with more than 20 years of experience in groundwater hydrology and groundwater resource management. He holds a bachelor's degree in geology from California State Polytechnic University, Pomona and a master's degree in geology (hydrogeology emphasis) from California State University, Los Angeles. His specific areas of expertise include groundwater basin analysis, perennial yield (i.e. safe yield), groundwater flow, artificial recharge, groundwater development, water well design, stratigraphic analysis, water/rock interactions, and contaminant hydrogeology. Since 1997, Mr. Harder has been extensively involved in the evaluation and management of water resources in the Mojave Desert. This has included surface water studies along the Mojave River as part of the Mojave River Basin adjudication, artificial recharge evaluations in the Eastern and Western Mojave Desert (Cadiz, Hesperia area and Alto Transition Zone of the Mojave River Basin), well siting and construction (Victorville, Hesperia, Cadiz and Blythe), groundwater quality evaluations (Barstow, Victorville and Helendale), and the effects of faults on groundwater flow (Helendale).

3 Background

3.1 Phelan Pinon Hills Community Services District

The Phelan Pinon Hills Community Services District (PPHCSD) is located at the northern base of the San Gabriel Mountains in the westernmost portion of San Bernardino County, California (see Figure 1). The PPHCSD provides municipal and industrial water supply to approximately 6,700 connections within a service area of approximately 117 square miles (see Figure 2). Water is supplied as groundwater pumped from 13 wells. The PPHCSD does not currently import water for supply although the California Aqueduct extends west to east across the service area (see Figure 2).

Prior to 2008, water service for the PPHCSD service area was provided by County of San Bernardino Service Area 70L (CSA 70L). In February 2008, the PPHCSD was formed through a Local Agency Formation Commission (LAFCO) resolution. All of the current water service facilities, including groundwater production wells, were constructed and operated by CSA 70L prior to 2008.

3.2 Jurisdictional Areas

The PPHCSD service area is located in the westernmost portion of the Mojave Basin Area of Adjudication (see Figure 2). The western half of the service area is within the Oeste Hydrologic Subarea and the eastern half is within the Alto Subarea. Encompassed within the PPHCSD service area is the Sheep Creek Water Company as shown on Figure 2.

The western boundary of the PPHCSD is the Los Angeles-San Bernardino County line, which is the eastern boundary of the Antelope Valley Area of Adjudication (Antelope Valley Technical Committee [AVTC], 2008).

3.3 Relationship of Phelan Pinon Hills Community Services District to the Antelope Valley Area of Adjudication

The PPHCSD operates one well (Well 14) located on the west side of the Los Angeles-San Bernardino County boundary and within the proposed Antelope Valley Area of Adjudication (see Figure 2). In addition to Well 14, the PPHCSD pumps from five other wells located within the Antelope Valley Groundwater Basin, as defined by California Department of Water

Resources Bulletin 118 (CDWR, 2003). Groundwater pumped from these wells would otherwise flow into the Antelope Valley Area of Adjudication.

3.4 Purpose and Scope of this Study

The purpose of this study is to document the following:

1. The hydrogeological setting of the PPHCSD service area,
2. Groundwater extractions from the Antelope Valley Area of Adjudication by the PPHCSD via Well 14, and
3. The effects of pumping from Well 14 and other PPHCSD wells on groundwater levels and groundwater flow in the Antelope Valley Area of Adjudication.

The area of investigation (hereafter referred to as the "Study Area") is shown on Figure 2.

3.5 Sources of Data

Sources of data used in the analysis included the following:

- Data and files provided by the PPHCSD. These files included Geographic Information System (GIS) files of the service area boundaries and well locations, borehole logs, well construction and testing records, historical groundwater production data, historical groundwater levels, and geological and hydrogeological reports specific to the area.
- Data and files provided by the Mojave Water Agency (MWA) including GIS files of the MWA main and subarea boundaries, geology, aerial photos, topographic maps, hydrologic features, and groundwater level data.
- United States Geological Survey (USGS) groundwater levels obtained from their website (USGS, 2010).

Other geological and hydrogeological reports that were used for this investigation are summarized in the references in Section 8.

4 Physical Setting of the Phelan Pinon Hills Community Services District

The PPHCSD service area is located at the northern base of the San Gabriel Mountains in the southern Mojave Desert of southern California (see Figure 1). The service area is bounded on the west by the Los Angeles-San Bernardino county boundary, on the northeast by the City of Adelanto, and on the east by the City of Victorville (see Figure 2). The service area encompasses approximately 117 square miles and includes the unincorporated communities of Phelan and Pinon Hills.

In addition to the San Gabriel Mountains, prominent area features include the Sheep Creek alluvial fan, El Mirage Lake (dry), and numerous isolated bedrock hills protruding above the alluvial desert floor to the north and northeast of the service area (see Figure 3). The Sheep Creek alluvial fan extends from the base of the San Gabriel Mountains, widening to the north where it terminates at El Mirage Lake. The alluvial fan is easily identified from aerial photos or satellite images from its dark color. Named bedrock hills to the northeast of the service area include Black Mountain, Three Sisters, Black Butte, the Adobe Mountains and the Shadow Mountains. Land surface elevations in the area range from greater than 8,000 ft above mean sea level (amsl) in the San Gabriel Mountains to approximately 2,800 ft amsl at El Mirage Lake.

Historical land use in the PPHCSD service area has included cattle ranching, farming and residential (Laton et al., 2009). The unincorporated communities of Phelan and Pinon Hills are the population centers for the area. Based on Year 2000 census data, the population of Phelan was 5,463 and the population of Pinon Hills was 6,594 (Southern California Association of Governments [SCAG], 2004). Projections from SCAG suggest that the population of the Phelan-Pinon Hills area will triple by 2030 to approximately 36,700. The population on the Los Angeles side of the county line south of State Highway 18 is projected to increase from 423 in 2000 to 747 in 2030.

4.1 Hydrology

Surface water flow in the Study Area originates primarily in the San Gabriel Mountains, where it collects in alluvial drainages before flowing north toward the low elevations of the drainage area. All surface water flow in the Study Area is ephemeral, occurring only during periods of prolonged precipitation. Surface water that is not lost to evapotranspiration infiltrates into the ground to become groundwater recharge. Although numerous small alluvial drainages extend from the northern flank of the San Gabriel Mountains, the most prominent in the PPHCSD service area is Sheep Creek. Occasionally, surface water within the Sheep Creek drainage will reach the El Mirage Lake where most of it is assumed to evaporate (CDWR, 1964; CDWR, 2003; Bookman-Edmonston, 1994). Other significant drainages in the Study Area include the Big Rock Creek drainage to the west and Oro Grande Wash on the east (see Figure 3).

Precipitation within the vicinity of the PPHCSD service area varies with elevation. Average annual precipitation at the Wrightwood Station, located approximately two miles south of the service area at an elevation of approximately 6,000 ft amsl, is approximately 25 inches per year. In contrast, average annual precipitation at the El Mirage Valley Station, located near the lowest elevation of the El Mirage Watershed (approximately 2,800 ft amsl), is approximately six inches per year. Most of the precipitation occurs during the months of October through April.

4.2 Geology

The surface geology of the mountains and hills surrounding the PPHCSD consists predominantly of Mesozoic age (251 to 65.5 million years before present [my bp]) metamorphic and granitic rocks (see Figure 4). In the San Gabriel Mountains south of the service area, the geology south of the San Andreas Fault is dominated by the metamorphic Pelona Schist (Morton and Miller, 2003). Outcrops north of the San Andreas Fault are mapped as metamorphic gneiss of Devil Canyon and minor outcrops of other metasedimentary rocks. Rocks that are exposed in the northern portion of the Study Area (e.g. Shadow Mountains, Black Butte and Three Sisters) are composed primarily of Mesozoic granitic rocks (Dibblee, 1960; Miller and Bedford, 2000). While some groundwater flow is reported to occur along fracture zones of faults within the bedrock, the bedrock itself does not yield significant quantities of water to wells (Stamos et al., 2001) and is not expected to facilitate groundwater flow.

Late Tertiary age (approximately 4 to 2.6 my bp) sedimentary rocks outcrop at the base of the San Gabriel Mountains and include, from oldest to youngest:

> **Phelan Peak Formation (Qtpp)** – Late Pliocene (4.1 my bp) to early Pleistocene (1.4 my bp) sedimentary rock unit consisting of arkosic sandstone with interbedded clayey and silty sandstone (Weldon, 1986). This rock unit has been extrapolated into the subsurface beneath the alluvial fans north of the San Gabriel Mountains (SWS, 2007; Laton et al., 2009).
>
> **Harold Formation (Qh)** – Pleistocene sedimentary rock unit composed of arkosic sandstone and conglomerate containing clasts of Pelona Schist (Laton et al., 2009).

SWS, 2007 and AVTC, 2008 have inferred that some wells may have been completed within the Harold Formation and it may be a source of water to wells.

Quaternary (2.6 my bp to present) alluvial deposits in the Study Area include, from oldest to youngest:

Old Alluvial Fan Deposits – Middle to Late Pleistocene sedimentary deposits that consist of sand, gravel and silt (Morton and Miller, 2003; PPHCSD, 2010). The older alluvial fan deposits have been subdivided into multiple units by Miller and Bedford, 2000 and AVTC, 2008. The composite older alluvial fan sediments form the regional aquifer system that supplies the majority of water to wells in the PPHCSD area.

Young Alluvial Fan Deposits (Qyf) – Holocene (10,000 yrs bp to present) sediments consisting predominantly of sand and gravel overlying the older alluvium. In the PPHCSD area, the upper 100 to 200 ft of sediment is correlated with the younger alluvial fan. In the El Mirage Lake area, the younger fan deposits include a laterally extensive layer of clay that forms a confining layer separating the regional aquifer from a shallow perched aquifer (Laton et al., 2009; Stamos et al., 2001).

Deposits of El Mirage Lake – Recent surficial deposits of brown clay cover the area of the El Mirage Dry Lake and represent the distal Sheep Creek Fan (Laton et al., 2009).

The most significant fault in the Study Area is the San Andreas Fault Zone, a right-lateral strike-slip fault that trends through Swarthout Valley along the southern margin of the Study Area (see Figure 4). Although this fault is considered active and cuts through the upper portion of the Sheep Creek Drainage, it is not considered a significant impediment to groundwater flow in the alluvium (Laton et al., 2009).

4.3 Hydrogeology

The PPHCSD service area extends across three groundwater basins defined in CDWR Bulletin 118. The western portion of the service area is over the Antelope Valley Groundwater Basin, the west-central portion of the service area is over the El Mirage Valley Groundwater Basin, and the eastern portion is over the Upper Mojave River Valley Groundwater Basin (see Figures 1 and 5).

The subsurface base of the groundwater basins in the Study Area is the top of the basement complex consisting of granitic/metamorphic bedrock or low permeability consolidated sedimentary rocks within the Phelan Peak Formation or Harold Formation. Although bedrock intercepts from boreholes have defined the basin bottom in some areas, this boundary is not well defined throughout much of the Study Area. Geophysical surveys suggest that the depth to bedrock beneath the PPHCSD service area is between approximately 1,000 and 3,000 ft below land surface (Subsurface Surveys, 1990).

There are two types of lateral boundaries that define the extents of the groundwater basins in the Study Area. The first is where the unconsolidated alluvium is in contact at the land surface with exposed bedrock. This type of basin boundary occurs primarily at the northern and southern ends of the basins and where bedrock protrudes through the alluvium (e.g. Three Sisters and Black Butte). The approximate north-south boundaries that separate the basins in the alluvium, as defined by CDWR Bulletin 118, are assumed to be based on groundwater flow divides as there are no other geologic structures or hydrologic features that separate the basins in these areas.

4.3.1 Groundwater Occurrence

Two aquifer systems have been defined in the Study Area: a regional alluvial aquifer system and a localized perched aquifer system that is specific to the El Mirage Lake area. The regional aquifer refers to the portion of the Quaternary alluvium that is below the groundwater table and yields economic quantities of groundwater to wells. The terminology is consistent and generally correlative with the regional aquifer system described for the Mojave River Groundwater Basin to the east (Stamos, et al., 2001) and the saturated older alluvium (Q1 through Q3) described for the southeastern portion of the Antelope Valley Area of Adjudication to the west (AVTC, 2008). This investigation addresses only the regional aquifer system because it is the only aquifer system from which the PPHCSD extracts water and it is common to the three groundwater basins in the Study Area (Laton, 2009; SWS, 2007).

The regional aquifer system in the Study Area is characterized by a relatively thick sequence of unconsolidated to semi-consolidated Quaternary alluvial sediments. These sediments are Pleistocene in age (2.6 million to 10,000 yrs bp) and consist of interbedded layers of sand, silt and clay with occasional gravelly layers (PPHCSD, 2010; SWS, 2007). The regional aquifer sediments are primarily associated with Older Alluvium mapped in outcrop at the surface although deeper sediments may be correlative with the Harold Formation and Phelan Peak Formation described above (SWS, 2007; AVTC, 2008). The Older Alluvium is overlain by Younger Alluvium of recent age that is above the groundwater table and is not part of the aquifer system.

4.3.2 Groundwater Recharge

The primary source of groundwater recharge to the regional aquifer system in the PPHCSD area is the Sheep Creek Drainage. Estimates of groundwater underflow into the regional aquifer system from this drainage have ranged from 1,340 acre-ft/yr to 8,000 acre-ft/yr (Laton et al., 2009; Stamos et al., 2001; Horne, 1989; CDWR, 1967). Natural groundwater recharge also occurs as infiltration of runoff in the numerous smaller drainages along the base of the San Gabriel Mountains (see Figure 3).

Groundwater recharge in the PPHCSD service area also occurs as septic system return flow. Return flow recharge in the Antelope Valley Groundwater Basin portion of the PPHCSD service area ultimately flows to the west and into the Antelope Valley Area of Adjudication. The amount of return flow in this area was estimated based on the number of service connections within the Antelope Valley Groundwater Basin boundaries of the PPHCSD service area and assumptions regarding the percent of consumptive use that is return flow. There are approximately 1,500 PPHCSD service connections in the Antelope Valley Groundwater Basin area. These connections represent 22 percent of the total connections (6,700) within the service area and are assumed to represent 22 percent of the consumptive use. In the 2008/09 water year, this would equal 22 percent of 3,250 acre-ft or 715 acre-ft of consumptive use. The Mojave Basin Watermaster uses a consumptive use factor of 52 percent for the Oeste Subarea. The remaining 48 percent is assumed to be groundwater return flow (personal communication with the Mojave Basin Watermaster, 2010). Based on this return flow factor, the amount of return flow to the Antelope Valley Groundwater Basin is estimated to be approximately 340 acre-ft for the 2008/09 water year.

4.3.3 Groundwater Discharge

Groundwater discharge from the El Mirage Valley Groundwater Basin under native (pre-pumping) groundwater conditions would be through evapotranspiration at El Mirage Lake and underflow outflow to adjacent groundwater basins. Stamos et al., 2001 estimated that 2,858 acre-ft/yr was discharged from the Oeste Subarea as either evapotranspiration loss (516 acre-ft/yr) or underflow to adjacent subareas (2,342 acre-ft/yr) under 1930 conditions. Under 1994 pumping conditions, they estimated that the evapotranspiration loss was reduced to zero due to lowering of the groundwater table beneath the dry lake and subsurface outflow to the east (Upper Mojave River Groundwater Basin) was reduced to 332 acre-ft/yr due to capture of water through pumping. Stamos et al., 2001 did not address underflow toward the Antelope Valley Groundwater Basin. Horne, 1989 has estimated that underflow out of the El Mirage

Valley Groundwater Basin toward the Antelope Valley Groundwater Basin is approximately 425 acre-ft/yr.

The primary source of groundwater discharge in the PPHCSD area is groundwater pumping. In the 2008-2009 water year (October 2008 through September 2009), the PPHCSD pumped approximately 3,250 acre-ft of groundwater from 13 wells located in each of the three groundwater basins in its service area (see Figure 6 for well locations). The Sheep Creek Water Company pumps an additional approximately 530 acre-ft/yr from its wellfield near the mouth of Sheep Creek (Laton et al., 2009). Thus, total groundwater pumping for municipal and industrial supply is estimated to be approximately 3,780 acre-ft/yr.

Most of the groundwater currently pumped by PPHCSD is from wells located in the Antelope Valley Groundwater Basin. In the 2008-2009 water year, approximately 59 percent (1,923 acre-ft) of the groundwater supply was from Well Nos. 6a, 6b, 10, 11, 12 and 14 (see Table 1). Approximately 27 percent (892 acre-ft) was pumped from wells located in the El Mirage Valley Groundwater Basin and approximately 13 percent (435 acre-ft) was pumped from wells located in the Upper Mojave River Valley Groundwater Basin.

4.3.4 Groundwater Flow

Groundwater flow in the Study Area was evaluated through the construction of groundwater elevation contour maps for three time periods between 1985 and 2010. The purpose of the groundwater flow evaluation was to assess changes in flow direction and gradient along the boundary area between the El Mirage Valley Groundwater Basin and the Antelope Valley Groundwater Basin. The 1985 contour map was constructed to evaluate groundwater flow and gradient conditions prior to the construction of wells in the Antelope Valley Groundwater Basin portion of the PPHCSD service area (see Figure 7). A 2004 groundwater contour map was constructed to assess the impacts of groundwater pumping from PPHCSD wells on groundwater flow direction and gradient as compared to 1985 and to document groundwater conditions prior to the construction and operation of Well 14 (see Figure 8). The final groundwater contour map was constructed from March 2010 groundwater levels to document the current groundwater flow direction and gradient, which reflects current groundwater production in the area (see Figure 9).

Groundwater elevations were obtained from three sources: the United States Geological Survey (USGS) online groundwater level database (USGS, 2010), the Mojave Water Agency (MWA) groundwater level database, and PPHCSD groundwater level records.

In general, groundwater in the Study Area flows in a northerly direction from areas of recharge in the San Gabriel Mountains toward the dry lakes to the north and northwest of the PPHCSD service area. The ultimate groundwater flow paths are dictated by a small groundwater divide that is inferred along an unnamed drainage between the San Gabriel Mountains and a granitic bedrock outcrop known as the Three Sisters (see Figure 7). Groundwater west of the drainage flows to the north and northwest toward the Lake Los Angeles area and ultimately Rogers Lake. Groundwater east of the drainage flows to the northeast and then north towards an alluvial area surrounded by granitic bedrock hills (i.e. Three Sisters, Black Butte, Mt. Elmo, Black Mountain, and others). Given the abundance of scattered granitic bedrock outcrops in this area, the alluvial depth between the outcrops is probably very shallow and groundwater underflow out of the area to the north is unlikely.

Groundwater pumping from PPHCSD Wells 6a, 6b, 10, 11 and 12 has resulted in a change in groundwater flow direction in the vicinity of the boundary between the El Mirage Valley Groundwater Basin and the Antelope Valley Groundwater Basin (see Figure 8). The pumping depression in the vicinity of these wells resulted in a shift in groundwater flow direction to the northwest along the groundwater basin boundary north of Wells 6a and 6b. North of the PPHCSD wells, groundwater still flows towards the valley between Black Butte and Black Mountain. The addition of pumping from Well 14 did not significantly change the groundwater flow direction between 2004 and 2010 (see Figure 9).

4.3.5 Historical Groundwater Levels

Historical groundwater level hydrographs have been prepared for 35 wells within the Study Area (see Plate 1; Appendix B). The groundwater level data for wells within the PPHCSD service area show a slight downward trend. Two wells in the USGS groundwater level database (5N8W-25H01 and 5N8W13R01) have periods of record dating back to 1951 and 1961, respectively. These wells show overall groundwater level declines of approximately 28 to 30 ft over the period of record. It is noted that other wells in the Study Area with more complete groundwater level records show groundwater level declines between 1950 and 1990 before recovering or stable throughout the 1990s and up to the present (see 6N9W4H02 and 6N9W11N01 on Plate 1). These wells are downgradient of the PPHCSD's Antelope Valley Groundwater Basin wells (Lake Los Angeles area).

Although groundwater levels have been declining in PPHCSD wells, the rate of decline is relatively low. For PPHCSD Well 2, the groundwater level has dropped approximately 20 ft since 1980, which is approximately 0.67 ft/yr. At Well 6A, the rate of decline is 0.47 ft/yr between 1985 and the present. For comparison, groundwater levels in wells in the south-central portion of the Antelope Valley Groundwater Basin were declining at rates between 2 and 5 ft/yr between 1970 and 1980 during the period of steepest decline (Figure 4.3-9 from AVTC, 2008).

5 Phelan Pinon Hills Community Services District Groundwater Production in the Antelope Valley Area of Adjudication

The PPHCSD operates one well (Well 14) within the Antelope Valley Area of Adjudication. Well 14 was constructed in 2004 to a total depth of 1,110 ft below land surface. The well was initially equipped with a temporary pump and operated periodically in 2006, 2007 and 2008. The well was equipped with a permanent 500 horsepower line-shaft pump in June 2009 and PPHCSD began full-time operation of the well in July 2009.

5.1 Groundwater Production Analysis Methodology

Historical groundwater production from Well 14 was evaluated based on original production field forms and spreadsheet summaries provided by PPHCSD. Pre-2008 records were based on documentation by CSA 70L. Groundwater production was calculated based on daily flowmeter readings at the well.

5.2 Groundwater Production Analysis Findings

Monthly groundwater production for Well No. 14 is summarized in Table 2. Total groundwater production from this well in 2009 (calendar year) was 558.65 acre-ft. Since July 2009, average monthly production from Well 14 has been approximately 92 acre-ft/month. Assuming the well continues to be operated at the average monthly rate, groundwater production for the 2010 year is expected to be approximately 1,100 acre-ft.

6 Summary of Findings

The principal findings of this investigation are as follows:

- The PPHCSD service area is located on the east side of the Los Angeles-San Bernardino County boundary within the Mojave Basin Adjudication area;
- The PPHCSD provides water service to approximately 6,700 connections from 13 groundwater wells;
- The PPHCSD has historically pumped groundwater from three groundwater basins as defined by CDWR Bulletin 118: the Antelope Valley Groundwater Basin, the El Mirage Valley Groundwater Basin, and the Upper Mojave River Valley Groundwater Basin;
- The majority of groundwater currently pumped for municipal and industrial supply by the PPHCSD (59 percent) is from six wells located in the Antelope Valley Groundwater Basin as defined by CDWR Bulletin 118 (Wells 6a, 6b, 10, 11, 12, and 14);
- The PPHCSD operates one production well (Well 14) that is on the Los Angeles side of the county boundary and within the Antelope Valley Area of Adjudication;
- At the current average monthly rate of extraction from Well 14, the annual production from this well in 2010 is expected to be approximately 1,100 acre-ft.
- Groundwater in the easternmost portion of the Antelope Valley Groundwater Basin flows in a northerly direction from the base of the San Gabriel Mountains towards the alluvial valley between Black Butte and Black Mountain;
- Groundwater underflow to the north and out of the area bounded by Black Butte, Black Mountain and other granitic bedrock hills is unlikely;
- The groundwater flow direction and geology downgradient of the PPHCSD wells in the Antelope Valley Groundwater Basin result in an aquifer system that is hydraulically isolated from the central portions of the Antelope Valley Area of Adjudication;
- Although groundwater production from the six PPHCSD wells in the Antelope Valley Groundwater Basin captures groundwater that would otherwise flow into the Antelope Valley Area of Adjudication, the isolated nature of the aquifer system downgradient of the wells and the relatively stable groundwater levels in the area indicate that the impact of PPHCSD pumping on groundwater levels in the central portion of the adjudication area is negligible.

7 References

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