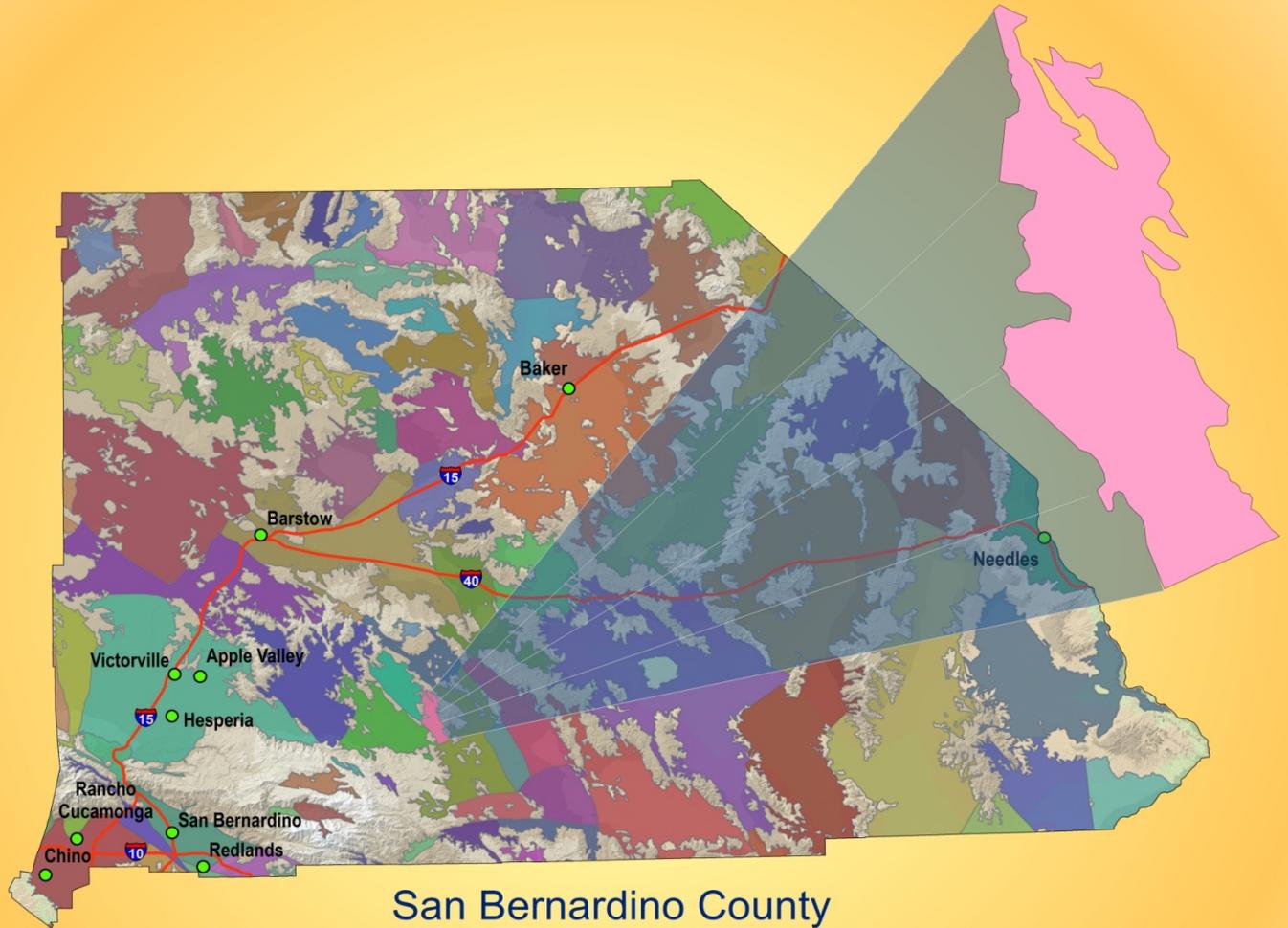


MEANS VALLEY

ALTERNATE MONITORING OF DWR BASIN 7-17



San Bernardino County

20,056 Square Miles
Population 2,035,210 (2010)
91 DWR Basins and Subbasins

Prepared By

Mojave Water Agency

June 2012

CONTENTS

| | |
|--|----|
| Executive Summary..... | 2 |
| Introduction..... | 3 |
| Basin Description (DWR, 2003) | 3 |
| Basin Boundaries and Hydrology | 3 |
| Hydrogeologic Information | 3 |
| Water Bearing Formations | 3 |
| Restrictive Structures | 3 |
| Recharge Areas | 4 |
| MWA/CASGEM Coverage (Basin Portion) | 4 |
| Land Use | 4 |
| Historic..... | 4 |
| Current..... | 4 |
| Alternate Monitoring Qualifications..... | 4 |
| Water Code Section 10932 (b) (CASGEM, 2011)..... | 4 |
| (1) Land use or TDS | 4 |
| (2) Land ownership | 5 |
| (3) Inaccessible..... | 5 |
| Basin Qualifications for Alternate Monitoring..... | 5 |
| Alternate Monitoring Plan | 5 |
| Aerial photography | 5 |
| Census data | 5 |
| Improved Value Parcel Data and Land Ownership..... | 6 |
| Well Permits and EIRs | 6 |
| Estimated Water Use..... | 6 |
| Water Levels | 6 |
| Conclusion | 7 |
| Signature..... | 7 |
| Tables | 9 |
| Figures..... | 10 |
| References | 16 |

EXECUTIVE SUMMARY

Assembly Bill 1152 (Water Code Section 10931(b)) allows for Alternate Monitoring of groundwater basins if any one of the following conditions is met:

- Groundwater levels are unaffected by land use activities or high TDS
- Land ownership prohibits access
- Inaccessible due to geologic or geographic features

Means Valley (Basin 7-17) qualifies for Alternate Monitoring in the CASGEM Program as detailed in Water Code section 10932 (b) because water levels are unaffected by land use. Land use in the valley consists of sparse residential with no significant outside irrigation, no significant agriculture, and no industry. The population of the 23.4 square mile valley is 62 people as of the 2010 Census. This amounts to 2.6 people per square mile (down 13% from 71 in 2000). Total consumptive water use for the basin is estimated at 30 acre feet per year. This is negligible relative the basin's land area of 15,000 acres (23.4 square miles), and will not have a material impact to groundwater levels.

Alternate techniques employed in monitoring this basin consist of reviewing/analyzing the following:

- Aerial photography
- Census data
- Parcel Data
- Well permits, well logs, & EIRs
- Water Use

Alternate Monitoring will continue on an ongoing basis.

INTRODUCTION

On November 6, 2009 the California Water Code was amended with SBx7-6 by the State Legislature. SBx7-6 mandates a statewide groundwater elevation monitoring program to track seasonal and long-term trends in groundwater elevations. This program requires collaboration between the Department of Water Resources (DWR) and local monitoring entities to collect groundwater elevation data. In response to SBx7-6 DWR has developed the California Statewide Groundwater Elevation Monitoring (CASGEM) Program to “establish a permanent, locally-managed program of regular and systematic monitoring in all of California's alluvial groundwater basins.” (CASGEM, 2011)

SBx7-6 states that under certain conditions basin monitoring can be carried out using alternate methods. Alternate monitoring methods of qualifying basins may be employed if: 1) Land use practices do not affect groundwater levels or natural TDS concentration prohibits use of groundwater resources, 2) the basin is government controlled and, upon request, groundwater level data is not provided or, 3) groundwater monitoring is impracticable or the basin is inaccessible. The California Department of Water Resources must approve Alternate Monitoring Status for a basin every 3 years. (CASGEM, 2011)

BASIN DESCRIPTION (DWR, 2003)

- Groundwater Basin Number: 7-17
- County: San Bernardino
- Surface Area: 15,000 acres (23.4 square miles)

BASIN BOUNDARIES AND HYDROLOGY

This groundwater basin underlies Means Valley in southcentral San Bernardino County. The basin is bounded by nonwater-bearing rocks and a drainage divide on the north, by a drainage divide on the south, by the Johnson Valley fault on the west, and by the Homestead Valley fault on the east (Rogers 1967). Drainage is to Means (dry) Lake in the central part of the valley (Rogers 1967; French 1978). Annual average precipitation ranges from about 4 to 8 inches.

HYDROGEOLOGIC INFORMATION

WATER BEARING FORMATIONS

Groundwater in the basin is found in Quaternary age alluvial and lacustrine deposits. The alluvium likely consists of unconsolidated, fine- to coarse-grained sand, pebbles, and boulders with variable amounts of silt and clay and is probably not more than 200 or 300 feet thick (French 1978).

RESTRICTIVE STRUCTURES

The southwest trending Johnson Valley and Homestead Valley faults are partial barriers to groundwater movement (Moyle 1974; French 1978).

RECHARGE AREAS

The principal source of recharge to the basin is likely percolation of runoff from surrounding mountains, with a minor contribution from percolation of precipitation to the valley floor and subsurface flow across the Johnson Valley fault southwest of Means Lake. Groundwater may migrate through fractures in bedrock toward Emerson Lake as subsurface outflow (French 1978).

MWA/CASGEM COVERAGE (BASIN PORTION)

MWA has volunteered to monitor the entire Means Valley Basin as it lies entirely within MWA Service Area Boundaries.

LAND USE

HISTORIC

Historic land use in Means Valley has, insofar as can be determined, not had any significant industry, agriculture, or population. There are no readily available historic accounts of the basin. DWR Well Completion Reports (WCRs) show a total of 8 wells in the valley. The earliest WCR is a dry hole from 1961 and the most recent was in 2008. On average (starting in 1961) one well was drilled every 6.3 years.

CURRENT

Current land use in Means Valley consists of off-road recreation, residential, and agriculture. The vast majority of the land in Means Valley is used for recreational off-highway-vehicles; numerous unpaved and unmapped jeep and dirt bike trails dominate the landscape, a sparse residential population center exists in the southern portion of the valley, and only very minimal agriculture is present.

ALTERNATE MONITORING QUALIFICATIONS

California Senate Bill SBX7-6 was amended on September 7, 2011 by AB 1152 to allow, under certain conditions, for "Alternate Monitoring" of select basins. The Alternate Monitoring sections of AB 1152 are included below.

WATER CODE SECTION 10932 (B) (CASGEM, 2011)

For purposes of reporting groundwater elevations pursuant to this part, and subject to subdivision (c), a monitoring entity may use alternate monitoring techniques for a basin or subbasin, instead of monitoring groundwater elevations directly through monitoring wells, if the basin or subbasin meets any of the following conditions:

(1) LAND USE OR TDS

Groundwater elevations are unaffected by land use activities or planned land use activities, or naturally occurring total dissolved solids within the groundwater preclude the use of that water.

(2) LAND OWNERSHIP

It is underlying land that is wholly owned or controlled, individually or collectively, by state, tribal, or federal authorities, and groundwater monitoring information is not available or was requested from, but not provided by, the state, tribal, or federal authorities.

(3) INACCESSIBLE

It is underlying an area where geographic or geologic features make monitoring impracticable, including, but not limited to, a basin or subbasin that is inaccessible to well-drilling equipment.

BASIN QUALIFICATIONS FOR ALTERNATE MONITORING

A summary of specific basin qualifications for alternate monitoring is included in Table 1.

ALTERNATE MONITORING PLAN

Means Valley qualifies for Alternate Monitoring as detailed in Table 1. Monitoring of basins under this section shall be carried out on an ongoing basis and this report will be updated every three (3) years as established in AB 1152. MWA will use the following techniques to satisfy the requirements as outlined in AB 1152 for alternate monitoring.

AERIAL PHOTOGRAPHY

Current aerial photography is surveyed to visually inspect for any activities within the basin that may use groundwater. These include agricultural, industrial, homestead, or other development. Up to date aerial photography is available from the Farm Service Agency of the United States Department of Agriculture. This agency acquires aerial imagery through the National Agriculture Imagery Program (NAIP) every three (3) years. (FSA, 2012) Figure 2 shows the most current (2010) aerial photography of the Basin.

A review of 2010 NAIP Aerial Imagery was conducted. Means Valley is a remote desert basin and the vast majority of it is uninhabited and undeveloped. The southern end of the basin has a sparse residential population consisting of approximately 50 homesteads. Among these there is no sign of significant outdoor irrigation (trees, shrubs, turf, etc...). In addition, to the homesteads there is a single visible agricultural development in Means Valley. This agricultural development appears to be a poorly irrigated 10 acre pistachio orchard and is located about 3 miles north northwest of the residential area just described.

CENSUS DATA

Census data is analyzed to track population density within the basin. Population uses water. The higher the population the higher the water use and a low population uses very little. The most current data from the U.S. Census Bureau is used in this analysis. Figure 3 shows current population density data for the Basin.

According to the 2010 Census there are 62 people in 32 occupied dwelling units in Means Valley. This is down from 71 people from the 2000 Census. (Census, 2012) There are 2.6 people per square mile living in the basin.

IMPROVED VALUE PARCEL DATA AND LAND OWNERSHIP

Parcel data is reviewed for improved value to track development within the basin. Improved value (improvements with a value greater than \$0) correlates directly to water use. Parcels that have significant improved value generally have water use associated with them. Current parcel data is obtained from San Bernardino County for use in this review. Figure 4 shows the most current improved value parcel data for the Basin. (SBC, 2012) In addition to parcel data land ownership is considered for Alternate Monitoring qualification. AB 1152 makes an Alternate Monitoring exception for land access restrictions for government controlled lands. Figure 5 shows the most current land ownership data for the Basin. (SBC, 2012)

All parcels with improved value that are within or intersect Means Valley have a combined total area of 0.88 square miles. (SBC, 2012) Total Means Valley Basin area is 23.4 square miles. (DWR, 2003) Land area with improved value is 3.8% of total land area within Means Valley. Additionally, of all the parcels that are within or intersect Means Valley total 2.9 square miles (1844 acres) are privately owned and 37.0 total square miles (23,705 acres) are government owned. Less than 8% of the total land area is privately owned.

WELL PERMITS AND EIRS

MWA receives new Well Permits and Well Completion Reports (WCRs) from the San Bernardino County Department of Public Health and WCRs from DWR on a regular basis and is a reviewing agency for large project Environmental Impact Reports (EIRs). Incoming Well Permits, WCRs, and EIRs are monitored and investigated on an ongoing and on demand basis to track development within the basin.

MWA will routinely review well permits and WCRs from the County Department of Public Health, WCRs from DWR, and will review EIRs as they are made available.

ESTIMATED WATER USE

Any identified water use from aerial photography, census data, etc... is quantified. (Water use for the purpose of this section refers to residential scale (small scale) use only; large-scale agricultural operations would disqualify a basin from the Alternate Monitoring Land-Use exemption.) Water use estimates are based on measurements from aerial photography and GIS analysis. Individual households are counted and region-specific indoor water use assumptions are applied. (MWA, 2009 and Wagner, 2012) Vegetated area is measured and appropriate applied irrigation rates are calculated. Return flow estimates are also factored into the water use calculations. Assumed water users in the basin were discussed in the sections titled "Aerial Photography" and "Census Data" in this report. Estimated water use from the assumed users is summarized in Table 2.

Total estimated consumptive water use in Means Valley is 30 acre-feet per year (see Table 2). This is a materially insignificant quantity of water use for a basin of 23.4 square miles (15,000 acres). (DWR, 2003)

WATER LEVELS

The CASGEM Program requires groundwater level measurements taken from wells at a frequency of semiannual or greater. Remote desert basins, such as this one, often have legacy (historic but not currently monitored) and/or sporadic (currently monitored but at a less than semiannual frequency, as required by CASGEM) groundwater level data. These data, while not sufficient to eliminate the basin's "Alternate" status, are still valuable. Data from these wells can be found on the USGS National Water Information System (NWIS, waterdata.usgs.gov) and will also be uploaded to the CASGEM System. Groundwater level data that is measured less than semiannually is categorized in CASGEM as "Voluntary." Details of these wells are included in the MWA/CASGEM Monitoring Plan.

There is only one NWIS well in Means Valley with sufficient data to show a water level trend. This well (04N04E36B01) is located in the vicinity of the pistachio orchard (identified in the "Aerial Photography" Section of this report) has, over the past 37 years, experienced a decline in groundwater level of approximately 1.6 feet (less than 0.04 ft/yr). In spite of the fact that this well shows a slow long-term decline this is undoubtedly a localized effect cause by irrigation activities at the pistachio farm. The lack of significant water use from a basin-wide perspective suggests that groundwater levels in the basin as a whole are stable.

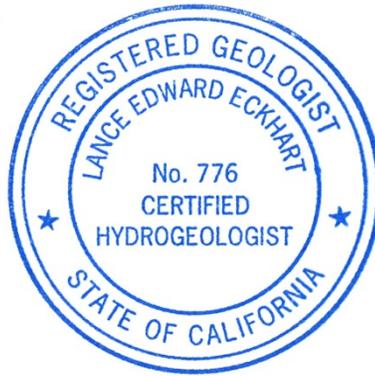
CONCLUSION

Means Valley qualifies for Alternate Monitoring under condition (1) of Section 10932(b) of the Water Code. MWA reviewed available data as required in AB 1152 and determined that groundwater elevations are unaffected by land use activities because consumptive use of water in the basin is negligible due to very sparse and minimal activities. Although the well near the pistachio farm shows a slow long-term decline the preponderance of evidence supports the idea that Means Valley as a whole has stable water levels. Alternate Monitoring of the basin will continue on an ongoing basis. In addition, this report will be updated as prescribed in AB 1152 in three (3) years. Appropriate adjustments to basin monitoring (alternate or otherwise) will be applied as necessary if existing conditions change.

SIGNATURE

Lance Eckhart, PG, CHG, REA

Principal Hydrogeologist



TABLES

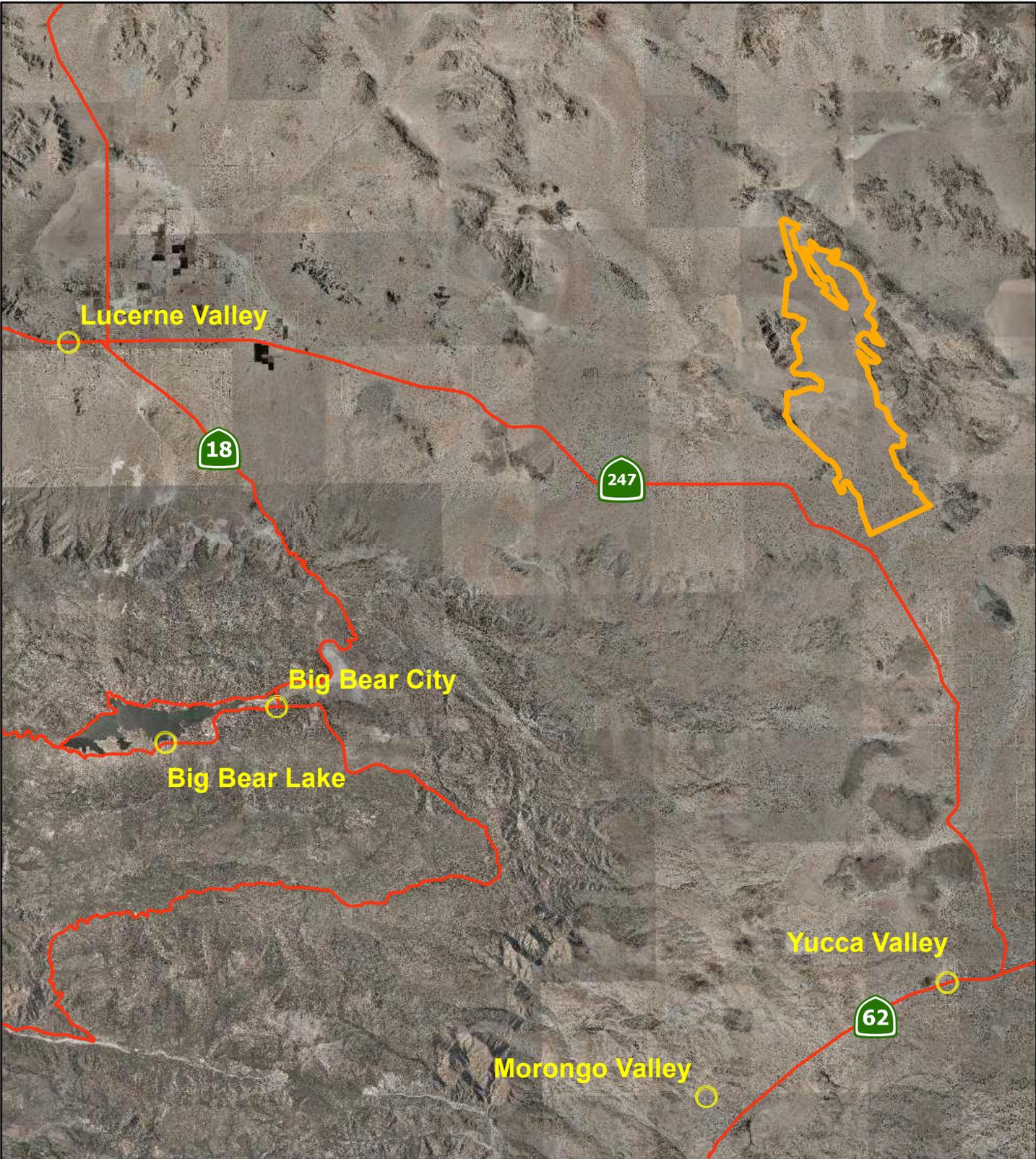
TABLE 1 MEANS VALLEY (DWR BASIN 7-17) QUALIFICATIONS FOR ALTERNATE MONITORING FOR CASGEM UNDER AB 1152. (CASGEM, 2011)

| Qualification | Applicability | Comments: |
|----------------------|----------------------|--|
| (1) Land use or TDS | Yes | Very sparse population density, no significant agriculture, and no industrial water use. |
| (2) Land ownership | No | |
| (3) Inaccessible | No | |

TABLE 2 CONSUMPTIVE WATER USES FOUND WITHIN MEANS VALLEY (DWR BASIN 7-17). HOMESTEADS AND INDUSTRIAL ARE LISTED BY NUMBER; ALL OTHERS ARE MEASURED IN TERMS OF ACRES (AREA). THESE VALUES ARE MULTIPLIED BY THE USE FACTOR (MWA, 2009 AND WAGNER, 2012) LESS AN ASSUMED RETURN FLOW COMPONENT TO OBTAIN THE TOTAL WATER USE IN ACFT/YEAR. *(RETURN FLOW ESTIMATES ARE INTENTIONALLY LOW FOR CONSERVATIVE (HIGHER WATER USAGE) ESTIMATES.)

| Development | Number/ Area (Ac) | Production Use Factor (ft) | Return Flow (%)* | Consumptive Use (Acft/year) | Comments |
|-------------------------|--------------------------|-----------------------------------|-------------------------|------------------------------------|----------------------------|
| Homesteads | 32 | 0.204 | 90% | 0.6528 | 2010 Census (Census, 2012) |
| Tree/Shrubs | 10 | 2.95 | 0% | 29.5 | Aerial Photo (FSA, 2012) |
| Turf | 0 | 8.7 | 0% | 0 | Aerial Photo (FSA, 2012) |
| Ponds | 0 | 6.7 | 0% | 0 | Aerial Photo (FSA, 2012) |
| Industrial | 0 | Varies | - | 0 | Aerial Photo (FSA, 2012) |
| Total Water Use: | | | | ~30 | |

FIGURES

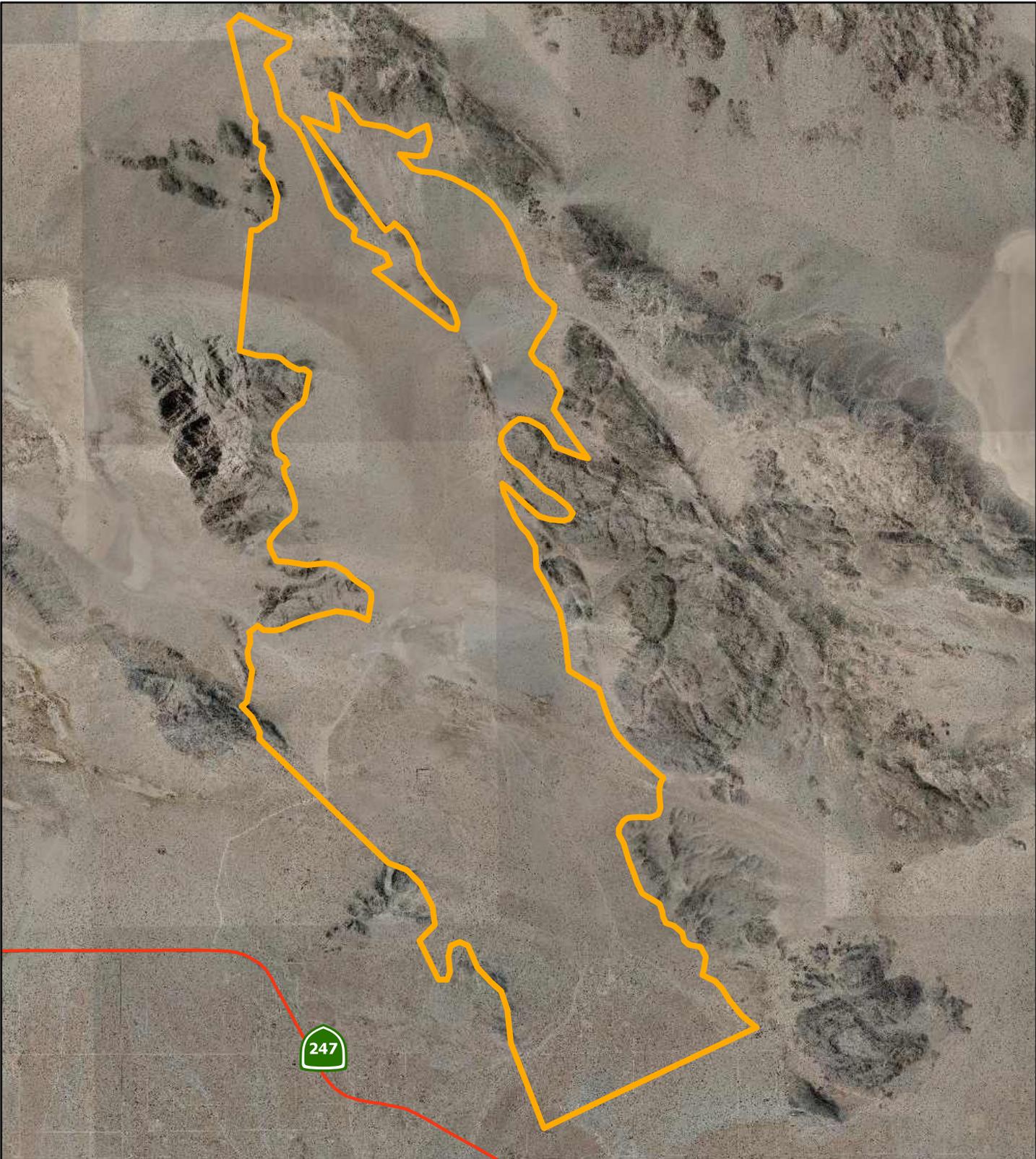


Legend
 Means Valley Basin
 NAIP Imagery Summer 2010

Means Valley Basin 7-17



Figure 1



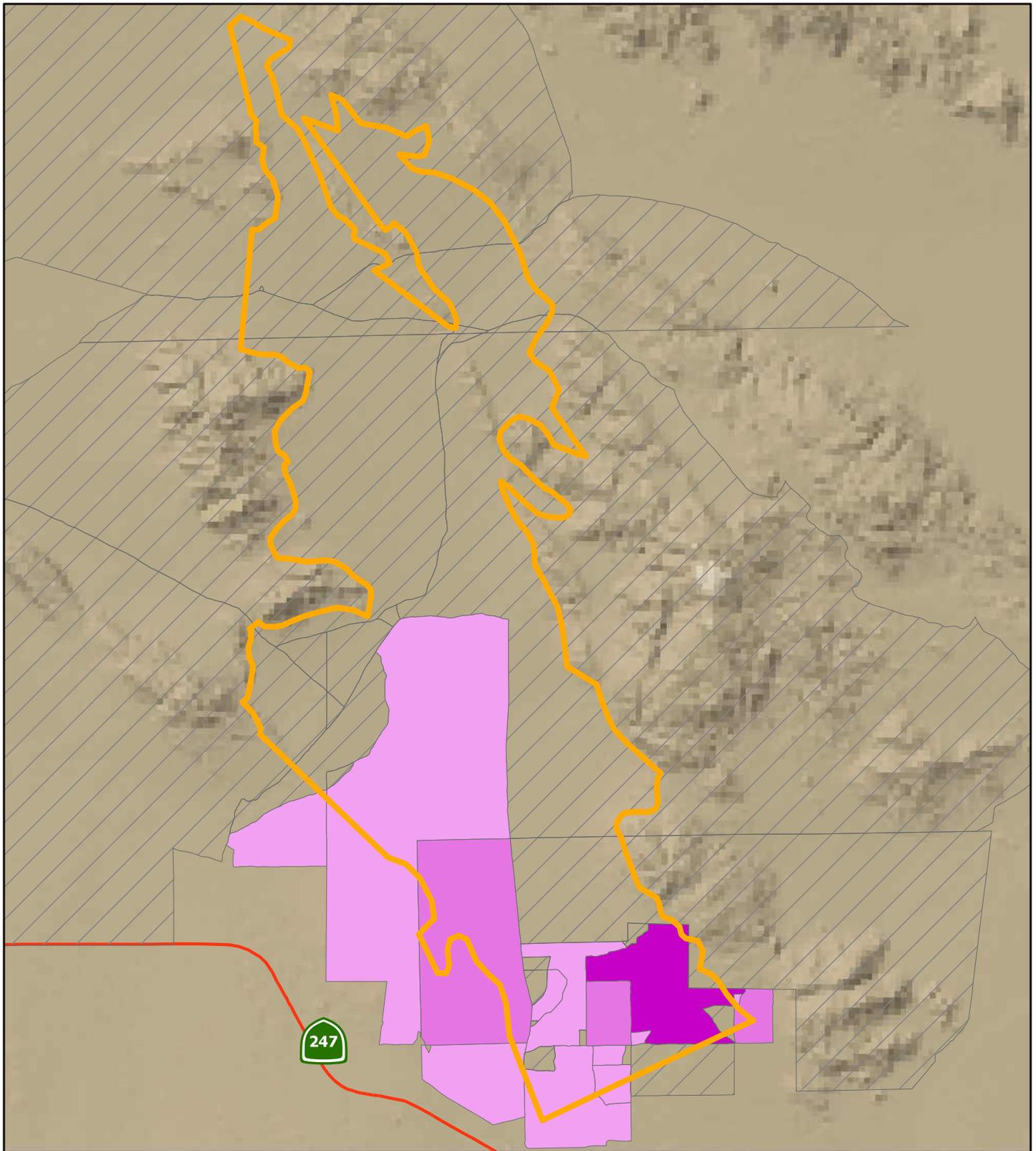
Legend

-  Means Valley Basin
- NAIP Imagery Summer 2010

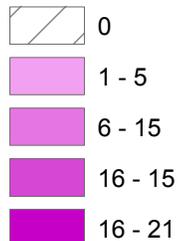
Air Photography Means Valley Basin 7-17



Figure 2



Population (2010 Census)

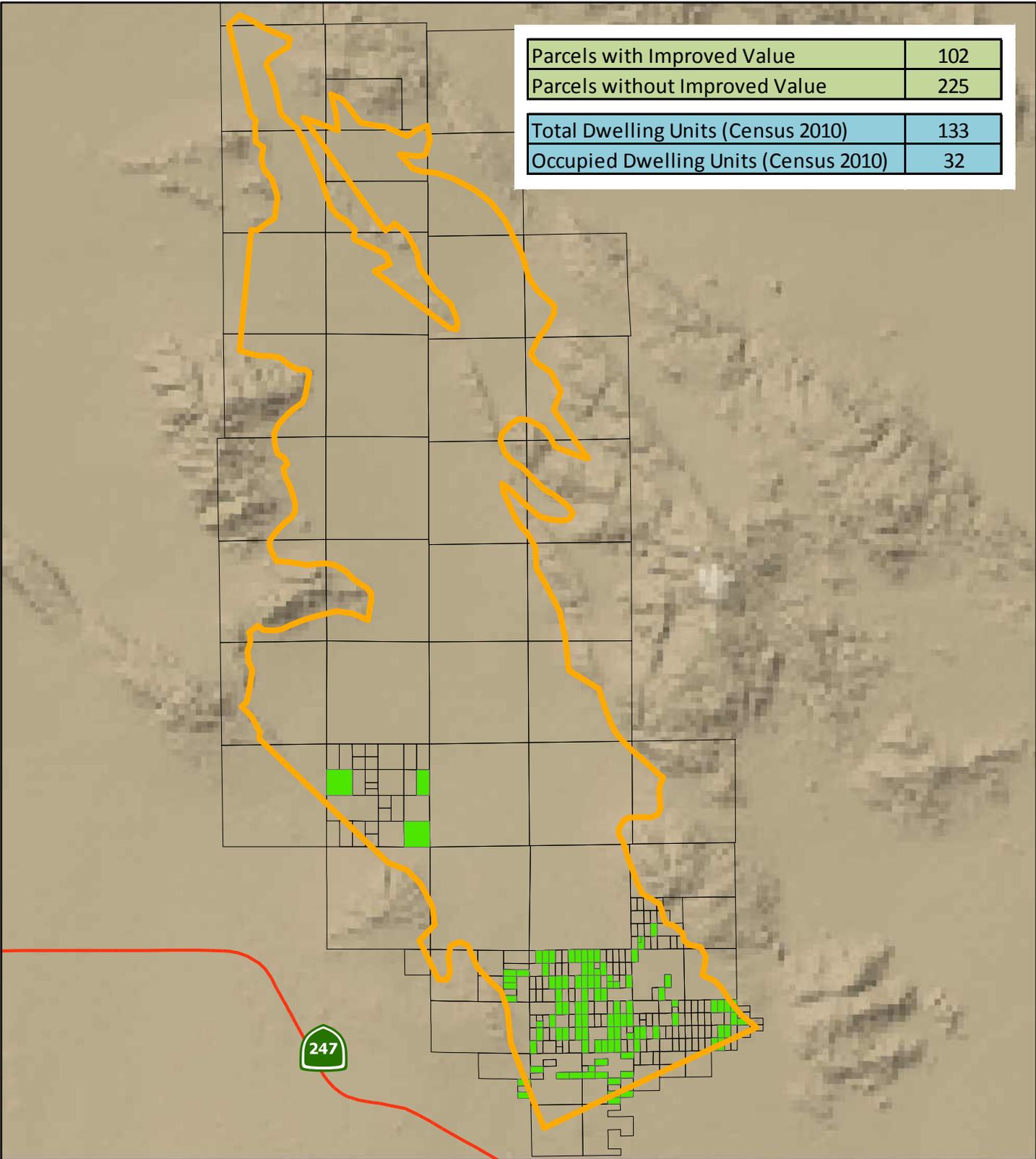


Population Density Means Valley Basin 7-17



Figure 3

| | |
|---------------------------------------|-----|
| Parcels with Improved Value | 102 |
| Parcels without Improved Value | 225 |
| Total Dwelling Units (Census 2010) | 133 |
| Occupied Dwelling Units (Census 2010) | 32 |

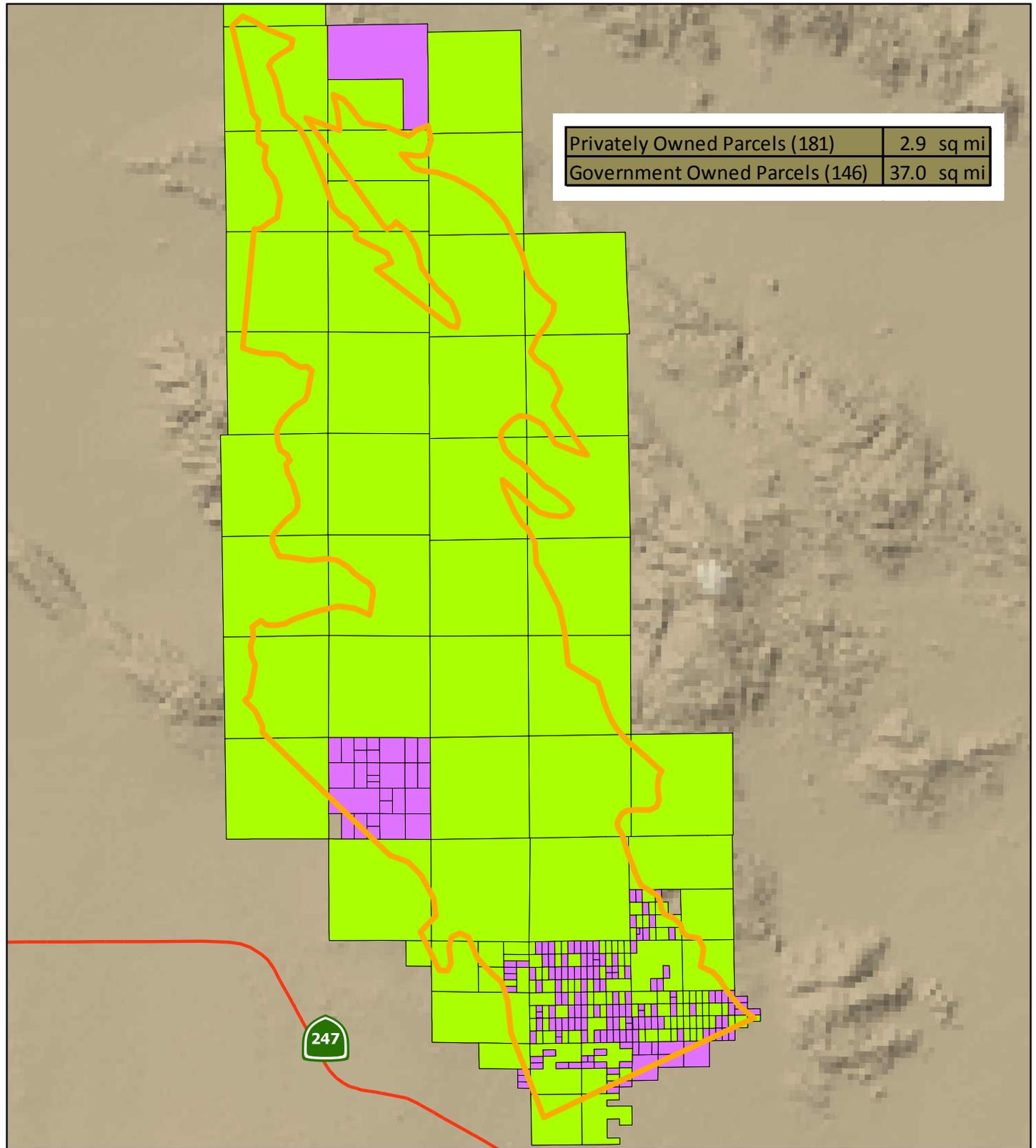


 Parcels with Improved Value
 Parcels without Improved Value

Property Valuation Means Valley Basin 7-17



Figure 4



Parcel Owner
 Government
 Private

Property Ownership Means Valley Basin 7-17

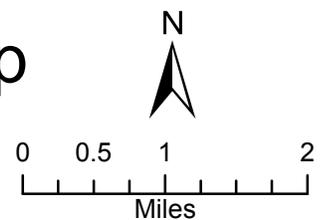


Figure 5

REFERENCES

CASGEM, 2011, California Statewide Groundwater Elevation Monitoring (CASGEM), Website: <http://www.water.ca.gov/groundwater/casgem/>, accessed October 13, 2011

Census (U.S. Census Bureau), 2012, 2010 Census TIGER/Line® Shapefiles, Geospatial data: <http://www.census.gov/geo/www/tiger/tgrshp2010/tgrshp2010.html>, US Census 2010 data: <http://2010.census.gov/2010census/index.php>, Accessed March 20, 2012

DWR, 2003, California's GROUDWATER: BULLETIN 118: Update 2003, State of California Department of Water Resources, October 2003.

FSA, 2012, Imagery Program information available at: <http://www.fsa.usda.gov/FSA/apfoapp?area=home&subject=prog&topic=nai>, Accessed March 15, 2012

MWA (Mojave Water Agency), 2009, Mojave Water Agency Program for Identification, Quantification and Administration of Water Production by Minimal Producers within Mojave Basin Area, An Unpublished White Paper, MWA Network Location: S:\Doom-Patrol\PROJECTS\MINIMAL PRODUCERS\2011 MP\20091109 Minimal Draft Ver 2 updated 20100715.DOCX

SBC (San Bernardino County), 2012, GIS Parcel Basemap, Available for download at: <ftp://gis1.sbcounty.gov/>, Disclaimer: <http://gis.sbcounty.gov/disclaimer.htm>, Accessed March 20, 2012.

Wagner, Robert C. 2012, Memo: Unit Irrigation Demand 2012, developed by Robert C. Wagner, P.E. Principal Water Resources Engineer, Wagner & Bonsignore (wbecorp.com) using evapotranspiration of applied water (ETAW) output values from California DWR's CUP+ v3.1 program based on daily climate measurements from CIMIS Barstow NE Station in San Bernardino County (supplemented by CIMIS Victorville station), soil properties from USDA's NRCS Web Soil Survey, and crop properties from FAO Irrigation and Drainage Paper No. 56. Irrigation Demand is calculated as ETAW multiplied by an irrigation efficiency of 90% based on a reported average for subsurface drip irrigation (Howell, USDA 2003).