RICHARD C. SLADE & ASSOCIATES LLC
CONSULTING GROUNDWATER GEOLOGISTS

HYDROGEOLOGIC ASSESSMENT AND WATER WELL SITING STUDY 1234-ACRE UNDEVELOPED PROPERTY LLANO AREA LOS ANGELES COUNTY, CALIFORNIA

Prepared for:

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Job No. 323-LAS01

January 2007

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INTRODUCTION

General Statement

Provided herein are the findings, conclusions and preliminary recommendations of our Phase 1 hydrogeologic assessment of two contiguous properties, which total 1234 acres in area, and which are located in the Llano area of northeastern Los Angeles County, California. Specifically, the subject property, which was previously known as the Hagenbaugh Ranch, lies at the northern edge of the San Gabriel Mountains, about 1 mile southeast of the intersection of Fort Tejon Road and Largo Vista Avenue, Los Angeles County.

Figure 1, "Location Map," illustrates the boundaries of the subject property relative to local roads and the mountain front. The locations of water wells observed on the property, together with the approximate locations of offsite wells in the region for which limited data are available, are also illustrated on Figure 1. The figure also reveals that the property is comprised by the two following contiguous parcels:

- The 402-acre Hagenbaugh Ranch LLC property in the middle, comprised by APNs 3064-007-007, -008, -013, -017, -018, and -019; and APNs 3064-017-006, -007, and -021;
- The 832-acre Sinkin property on the east, comprised by APNs 3064-007-014, -020, and -021; and APNs 3064-017-001, -002, -004, -005; APN 3064-016-001; and APN 3064-028-001.

Purpose and Scope of Services

The basic purposes of this hydrogeologic assessment were to: evaluate the feasibility of siting and constructing new water-supply wells on the subject property; select locations for the new wells; and identify potential drilling depths for those new wells.

As defined in our revised proposal to you dated October 12, 2006, the Scope of Services for this Phase 1 hydrogeologic work is summarized by the following tasks:

- Task 1 – Collect and Review Data
- Task 2 – Field Reconnaissance
- Task 3 – Hydrogeologic Analysis of Data
- Task 4 – Report

This report represents Task 4 and provides the results of our Phase 1 work effort.

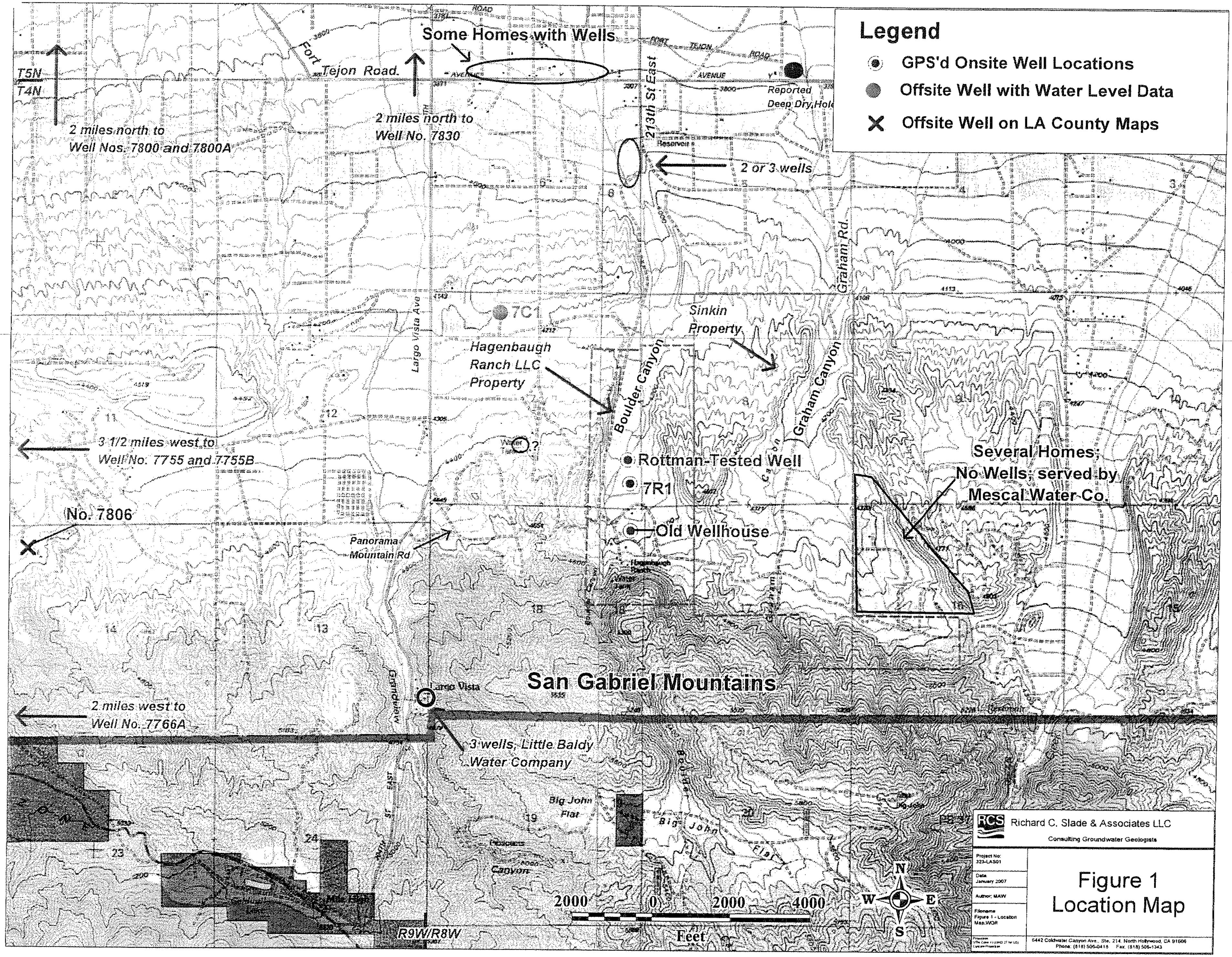
Legend
GPS'd Onsite Well Locations
Offsite Well with Water Level Data
Offsite Well on LA County Maps
Some Homes with Wells
Fort Tejon Road.
T5N
T4N
2 miles north to Well Nos. 7800 and 7800A
2 miles north to Well No. 7830
213th St East
2 or 3 wells
Reported Deep Dry Hole
Graham Rd.
7C1
Largo Vista Ave
Sinkin Property
Hagenbaugh Ranch LLC Property
Boulder Canyon
Graham Canyon
3 1/2 miles west to Well No. 7755 and 7755B
Rottman-Tested Well
7R1
Old Wellhouse
No. 7806
Panorama Mountain Rd
Several Homes; No Wells; served by Mescal Water Co.
San Gabriel Mountains
Largo Vista
2 miles west to Well No. 7766A
3 wells, Little Baldy Water Company
Big John Flat
R9W/R8W
2000 0 2000 4000
Feet
N
W
E
S
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Figure 1
Location Map

This Phase 1 project discusses only hydrogeologic issues relating to possible development of groundwater resources for beneficial onsite use for the proposed project. Excluded from this RCS work are any and all work tasks dealing with faults, seismicity, grading and earthwork, slope stability, foundation design, soils engineering, and constructability of the proposed project. Also excluded from RCS work are any and all issues dealing with the feasibility, siting, design and/or monitoring of private subsurface leachfields and/or septic systems for the proposed project.

FINDINGS

Property Location and Drainage

As shown on Figure 1, the two contiguous properties which comprise the subject property occupy portions of Sections 7, 8, 16, 17 and 18 of Township 4 North, Range 8 West (T4N/R8W), San Bernardino Baseline and Meridian (SBBM). Lying roughly between Boulder Canyon on the west and Graham Road on the east, the two main properties extend a maximum of 1 to 1 ½ miles in a northerly direction away from (north of) the lower lying hillside areas of the San Gabriel Mountains on the south (see Figure 1). The maximum topographic relief across the parcels is about 1160 ft for the Hagenbaugh Ranch LLC property on the west (from 5300 ft near the southeastern corner to 4140 ft near the northern edge of this property); and about 892 ft for the Sinkin property (from 5040 ft near the south-central edge to 4108 ft at the northeastern corner of this property).

Geomorphically, the subject property is comprised by: the low-lying, north-sloping hillsides of the San Gabriel Mountains on the south side of both parcels; and north-south oriented and topographically elevated terraces that have been intersected by northerly-flowing drainage courses. These drainage channels were observed to be relatively wide during our field visits. Topographic contours on the Figure 1 base map readily display the current width of these drainages. However, these drainage ways, which include Boulder Canyon on the west and Graham Canyon on the east, are drained solely by ephemeral creeks of the same name. Thus, the creeks in these canyons flow only during or for some time period after precipitation events have occurred in the area. Neither creek is perennial and no stream gage data exist for either creek to document the rate, nature, volume or frequency of its actual surface water runoff. Noteworthy, however, is that prior drainage in these two canyons had to be much greater than at present due to the widths of the canyons and to how deeply they have been incised into the adjoining terraces. In essence, these two canyons likely represent historically larger (antecedent) stream channels that are now considered to be virtually abandoned drainage courses.

Rainfall

There are no rainfall gages near the subject property. Hence, to help determine the magnitude of the average annual rainfall near the site, RCS reviewed computer databases and encountered rainfall data for the following three rainfall gages in the region:

- The El Mirage gage, which lies at an elevation of 2860 ft above mean sea level (msl) and is located about 15 miles north/northwest of the subject property. The data base for this gage dates from 1971 to 2005.
- The Victorville gage, which has a data base dating from 1948 to 2005, and which is located about 26 miles east/northeast of the subject property. The elevation of this gage is 2840 ft above msl.
- The Palmdale gage, at elevation 2660. Data for this gage date from 1931 to 2005, although there are a few gaps early in the data record for annual rainfall totals. Gage elevation is 2660 ft above msl.

For this project, we have utilized data from the Palmdale gage (Gage No. 46624) to evaluate the variation in annual rainfall totals and the long-term average annual rainfall in the region. Figure 2, "Yearly Rainfall for Palmdale, CA," provides a bar chart graph of the annual rainfall totals for Gage No. 46624. As indicated, over the period of record (1931-2005), total annual rainfall at this gage has ranged from a low of 1.35 inches in 1984, to a high of 18.92 inches in 1942. The long-term average annual rainfall to this gage is calculated to be 7.87 inches (0.65 ft).

Because this rainfall gage is located at a much lower elevation than the subject property (the lowest property elevation is 4108 ft above msl; the Palmdale gage elevation is 2660 ft) above msl, RCS relied on an isohyetal map of the County, as prepared by the County Engineer as a 100-year annual average. That map (not provided herein) reveals that the long-term average annual rainfall at the subject property has ranged between 11 inches on the north side of the property, to 15 inches in the low-lying foothills at the south end of the property. Hence, the long-term average annual rainfall at the site can be taken in the middle of the property to be approximately 13 inches (1.1 ft) per year.

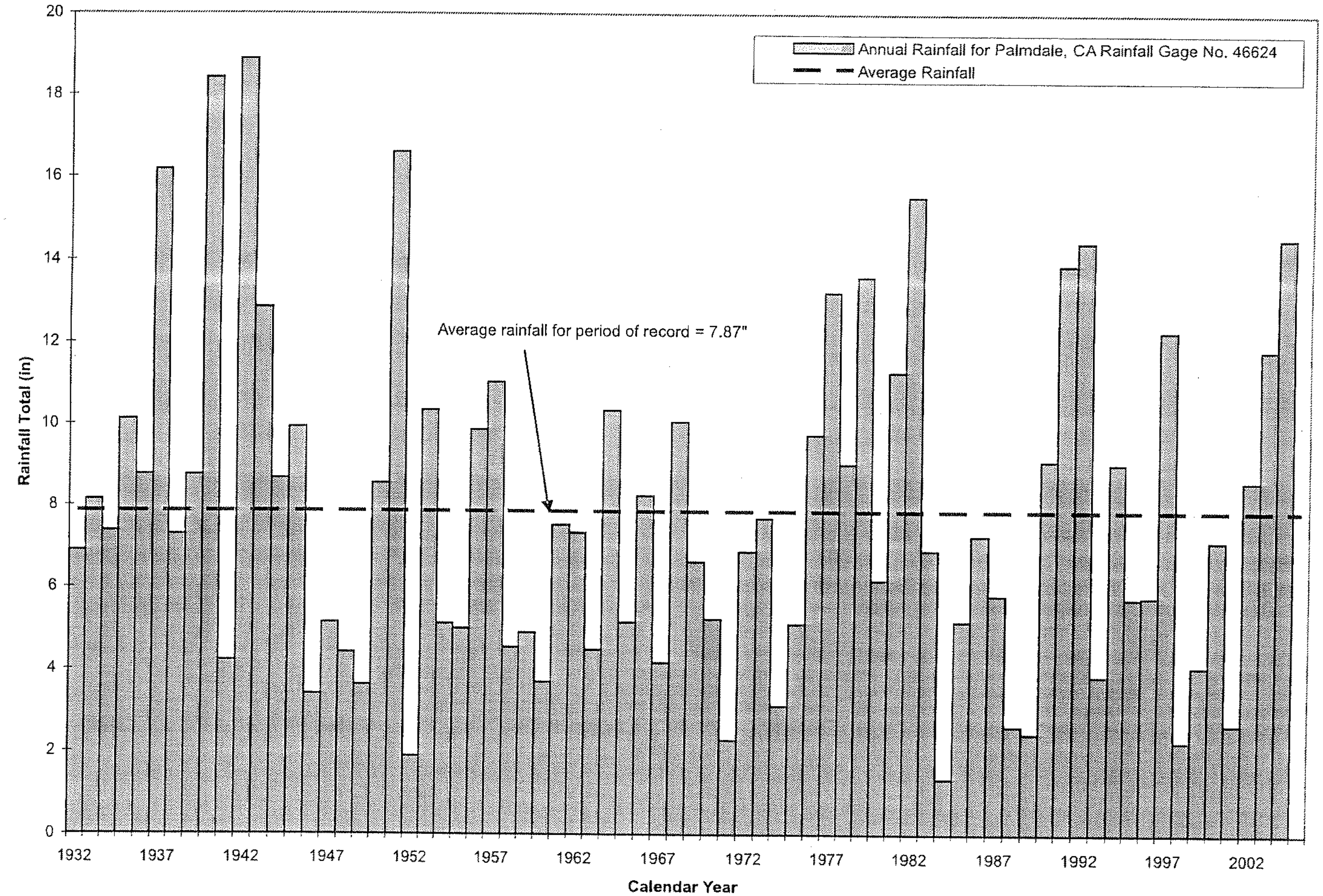

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FIGURE 2
Yearly Rainfall for Palmdale, CA
Gage No. 46624

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To help define possible trends in rainfall over time in the region, it was necessary to create Figure 3, "Accumulated Rainfall Departure Curve for Palmdale, CA." To prepare Figure 3, the total rainfall in inches for each year at the Palmdale gage, beginning with the initial year of record (in this case 1931), is divided into the long-term average annual rainfall (7.87 in), and the result (i.e., the quotient) is converted into a percent value. Then, the percent calculated for each successive year of rainfall is algebraically added to the result of the prior year, and so on through the final year of available data.

Interpretation of the curve presented on Figure 3 is as follows:

- Whenever the curve descends to the right, the total rainfall in each year during that period was generally at or below the long-term average annual rainfall. Hence, such a period displayed generally deficient rainfall; is essence, a dry period or drought had been occurring. Examples of such dry periods on Figure 3 were from 1947 through 1977; and 1984 through 1992.
- In contrast, whenever the curve ascends to the right, the total rainfall in each year during that period was generally at or above the long-term average annual rainfall. Thus, such a period displayed generally excess rainfall. In essence, a wet period had been occurring. Examples of such wet periods on Figure 3 were from 1936 through 1947 and 1977 through 1984.

Of particular interest in the accumulated departure curve is the overall declining trend in the graph since 1953. This appears to indicate declining average rainfall totals throughout the period of record.

Preliminarily Proposed Development and Water Demand

The client reports that, on a preliminary basis, the numerous parcels that comprise the two subject properties (see Figure 1) are proposed to be developed into a clustered-home community. As such, approximately 275 single family dwelling units (DUs) on a 2-acre spacing might eventually be constructed on all or portions of the 1234-acre property; the balance of the property is to remain undeveloped and in its natural state.

Sewage disposal, which is to be sited, designed and constructed by others, is also understood to be via individual private subsurface leachfields at each residence. Further, Los Angeles County reportedly will not permit the construction of individual water wells at each residence in the proposed development. Hence, water for the proposed project must be developed, if possible, from local groundwater via the construction of new water wells and the formation of a new

Accumulated Rainfall Departure (Gage No. 46624)

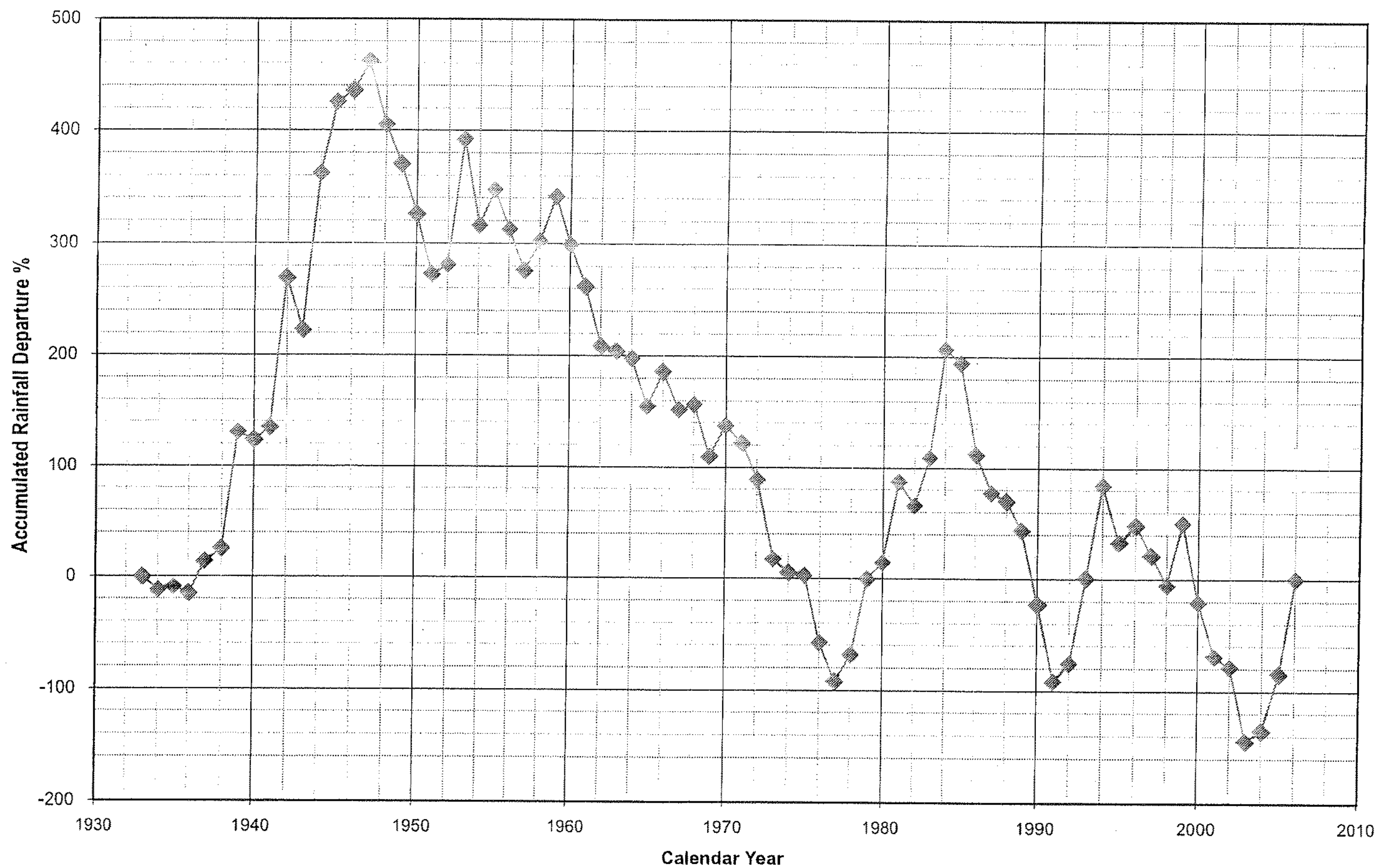

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FIGURE 3
Accumulated Rainfall Departure Curve for Palmdale, CA
Gage No. 46624

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water company. Water service may not be available for the proposed development from the two existing, nearby water companies: the Mescal Water Company which currently provides water for the houses adjacent to the southeast border of the easternmost parcel; and the Little Baldy Water Company that provides water service to homes north and west of the subject property.

A preliminary estimate of the water requirements for the proposed housing development is as follows:

a. approximate number of homes = 275 DUs
b. approximate water demand/DU = 1 acre foot per year (AF/yr/DU)
c. approximate total water demand = (a)(b) = (275 DUs)(1AF/yr/DU) = 275 AF/yr

This annual water demand represents the total volume of water (in this case, groundwater) that might be needed on an average annual basis to meet all domestic-supply and outside irrigation-supply for the 275 proposed DUs. It should be noted that this basic preliminary assessment of project water demand does not take into consideration the peak water demands and/or the fire flow requirements that the County of Los Angeles will require for the proposed housing development. Clearly, it will be important to site, design and construct substantial storage tanks in the community to help meet peak water demands and fire flow requirements, as needed.

In terms of water demand, the basic 275 AF/yr flow requirement calculates to a total instantaneous maximum combined groundwater pumping demand of 170 gallons per minute (gpm), assuming all new onsite wells were to be pumping on a 100% operational basis, that is, 24 hours per day, 7 days per week, continuously for each year. However, because wells should not be pumped on such a continuous 100% operational basis, a more realistic operational usage is needed. For example, using a 50% operational pumping basis (12 hrs/day, 7 days/week, 52 weeks/yr), all new onsite water wells, if feasible, would need to be pumped at a total combined pumping rate of 340 gpm. If the wells were to be pumped at a 40% operational basis (about 10 hrs/day, every day), then the total combined pumping rate from all new wells would need to be 425 gpm.

Of the required annual water demand of approximately 275 AF, roughly $^1/_3$, or about 91 AF/yr, would be the annual domestic requirement. Of this amount, perhaps 10% to 15% (9 to 13 AF/yr) would be available to recharge the local groundwater beneath the subject property via deep percolation from the subsurface leachfield systems.

The remaining $^2/_3$ of the total annual water requirement for the project (or about 184 AF/yr) would be used outside for irrigation purposes. However, of this outside usage, on the order of 30% (i.e., about 55 AF/yr), is considered to be available to deep percolate to (and recharge) the groundwater beneath the subject property on an average annual basis.

Thus, on a long-term, average annual basis, deep percolation and recharge to the local groundwater beneath the property, from both the leachfields and excess irrigation, could be on the order of 64 to 68 AF/yr (9 to 13 AF/yr from the leachfields plus 55 AF/yr from the excess irrigation).

The other and larger form of recharge to the local groundwater beneath the subject property is via deep percolation of onsite rainfall. A preliminary estimate of the volume of the long-term average annual recharge to groundwater beneath the property is as follows:

a. area of subject property = 1234 ac
b. average annual rainfall (1.1 ft) = 13 in (to the topographically low-lying central portions of the site, based on County isohyethal maps)
c. total volume of annual rainfall directly onto the property = (a)(b)

   = (1234 ac)(1.1 ft/yr) = 1357 AF/yr
d. estimated amount of direct annual rainfall that is available for deep percolation to groundwater = 15%
e. estimated recharge to the groundwater beneath the property from direct rainfall on a long-term average annual basis

   = (c)(d)

   = (1234 AF/yr)(15%) = 204 AF/yr

The above estimate does not include the potential additional amount of recharge that would be known to occur from deep percolation of rainfall in the San Gabriel Mountains that would flow across the two properties as surface water runoff along Boulder Canyon and Graham Canyon. Unfortunately, no stream runoff gage data are available for either creek; both creek channels do display flows in the crystalline rocks in the hillsides south of the property, but neither creek is perennial across the topographically flatter portions of the property. A few to several tens of acre feet of water are estimated to be available on an average annual, long-term basis to help recharge the groundwater beneath the property via deep percolation of surface water runoff from the adjoining hillsides.

In summary, the total magnitude of the volume of recharge to local groundwater, on a long-term average annual basis could be on the order of 300 to 340 AF/yr. This represents the sums of recharge from: onsite leachfields (9 to 13 AF/yr); excess irrigation (55 AF/yr); deep percolation of direct rainfall (204 AF/yr); and deep percolation of surface water runoff from the mountains (perhaps 30 to 70 AF/yr).

Geologic Conditions

Figure 4A, "Geology Map," has been adapted directly from regional geologic field mapping of the Mescal Creek and the Valyermo quadrangles, as published in 2002 by Thomas Dibblee Jr. In essence, Figure 4A illustrates the locations and types of earth materials exposed at ground surface throughout the area. Also shown for reference on Figure 4A are the property boundary lines, the locations of the three onsite wells discussed in this report, and a reported deep "dry" hole located to the north along Fort Tejon Road. A Legend to the geologic symbols shown on Figure 4A is provided on Figure 4B. From geologically youngest to oldest, earth materials exposed on and near the property include:

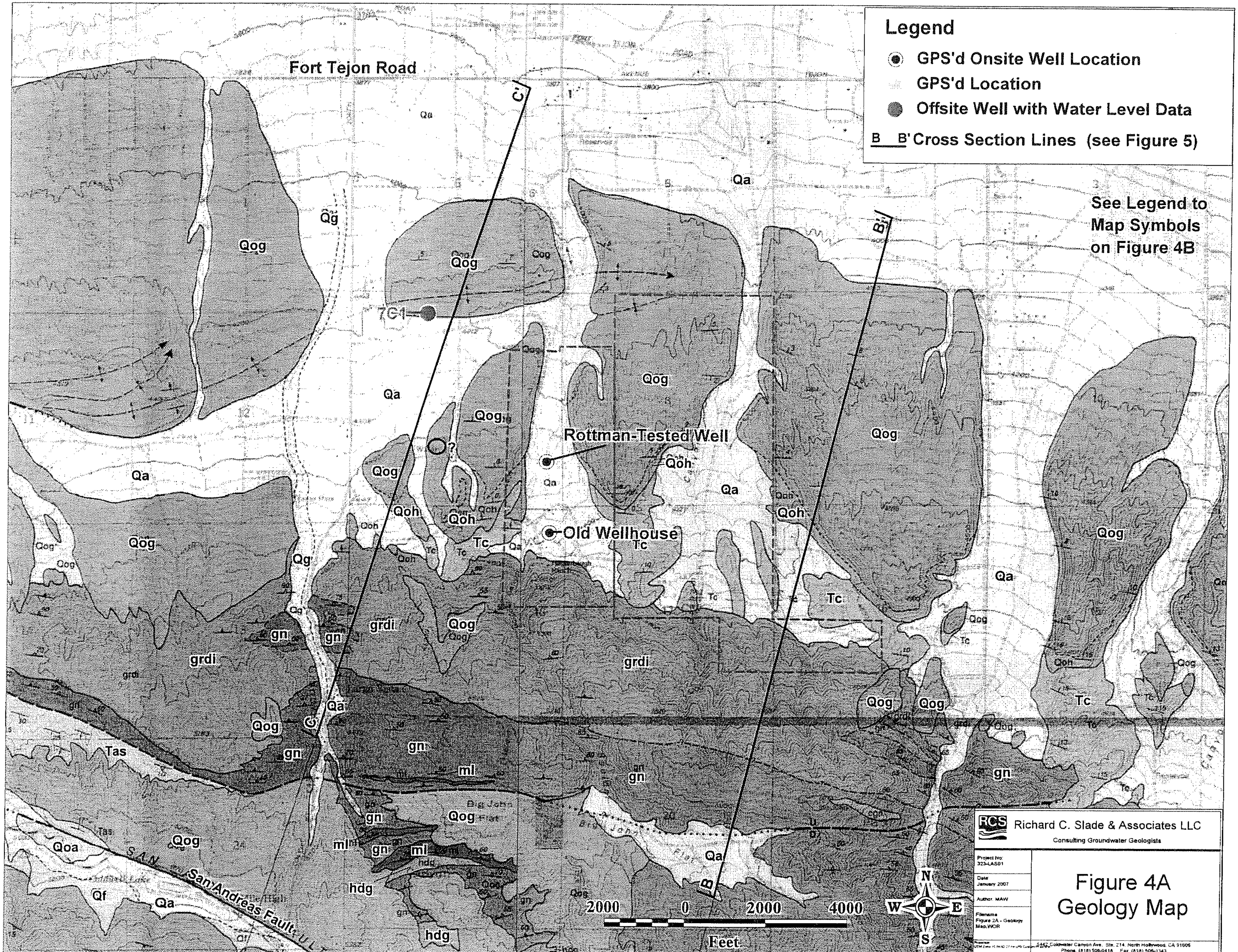
a. Map symbol, Qg; gravel and sand deposits along active stream channels like Grapevine Canyon just west of the property.

b. Symbol, Qa; layers and lenses of alluvial sand, gravel, silt and clay on the valley floor north of the mountain front. As shown on Figure 4A, Qa deposits lie along the topographically wide, remnant channels of Boulder Canyon and Graham Canyon. Qa deposits also extend over large areas to the west, east and north of the subject property. The Rottman-tested well, the USGS water level monitoring well (7R1), and the abandoned old wellhouse well were constructed into these Qa deposits.

c. Symbol, Qog; these sediments are alluvial boulder gravel deposits and fanglomerate materials comprised by crystalline detritus eroded from the mountains to the south. Qog deposits mantle the topographically elevated terraces or hills which occur on the subject property.

d. Symbol, Qoh; this represents the Harold Formation which is comprised by layers and lenses of moderately consolidated gravel, sand, silt and clay of alluvial origin. Near the base (bottom) of this formation, Dibblee (2002) reports that a white-colored layer of caliche (calcium carbonate) is often present. Qoh deposits occur along the southerly potions of the topographically elevated terraces on the subject property as seen on Figure 4A.

e. Symbol, Tc; this is the Crowder Formation which consists of light-colored sandstone, and local pebbly conglomerate. This formation is weakly indurated and is exposed at the southern ends of the topographically elevated terraces which extend across the property from south to north.



Legend
GPS'd Onsite Well Location
GPS'd Location
Offsite Well with Water Level Data
B B' Cross Section Lines (see Figure 5)
See Legend to Map Symbols on Figure 4B
Fort Tejon Road
Rottman-Tested Well
Old Wellhouse
7G1
C
C'
B
B'
Qa
Qog
Qoh
Qg
Tc
grdi
gn
ml
hdg
Tas
Qoa
Qf
San Andreas Fault
Big John Flat
2000 0 2000 4000
Feet
N
S
E
W
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Date January 2007
Author: MAW
Figure 4A
Geology Map

Qg *gravel and sand of stream channels*

Qa *alluvial gravel, sand and clay of valley areas*

Qf *alluvial fans*

Qog *alluvial boulder gravel or fanglomerate of granitic and gneissic detritus*

Qoa *alluvial gravel and sand of mostly granitic detritus and gneissic detritus*

Qoh *Harold Formation (of Nobel, 1953&1954) alluvial gravel, sand, and silt, including basal caliche northeast of San Andreas Fault*

Tas *Anaverde Formation (of Wallace Formation, 1949) mostly light tan sandstone; locally pebbly; minor claystone, weakly indurated, (Pliocene? age)*

Tc *Crowder Formation (of Dibblee, 1967) mostly gray-white sandstone, some pebble gravel locally; weakly indurated*

grdi *mostly granodiorite; medium gray; semi-coherent; moderately rich in biotite and hornblende, may range to quartz diorite*

hdg *dark gray to black; medium-grained, massive; of mostly hornblende, and plagioclase feldspar; coherent*

ml *limestone or dolomite marble, linear pendants in qm and hdg; white, medium-grained, coherent; vaguely bedded to massive; locally contains calc-silicate tactite and mica schist; occurs in gneiss (gn) or plutonoc rocks (qm) recrystallized from gneiss*

gn *gneiss: gray, hard but closely fractured and brittle; composed of white to light gray laminae rich in quartz and feldspar, alternating with dark laminae rich in biotite; metamorphosed from sedimentary or igneous rocks under conditions of high temperature and pressure; locally includes quartz diorite similar to qd*

See Geology Map on Figure 4A

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FIGURE 4B
GEOLOGIC LEGEND

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f. Map symbols, grdi, gn, hdg and mi; these are the crystalline, massive, granitic and metamorphic rocks of the San Gabriel Mountains. These well-fractured, hard rocks are exposed in the southern portion of the subject property and in the remainder of the mountains to the south; these rocks are also known to underlie all geologically younger sedimentary materials described above that are exposed at ground surface beneath the entire valley floor (refer to Geologic Legend on Figure 4B).

Noteworthy on Figure 4A are the locations and alignments of two geologic cross sections of the region, as prepared by Dibblee (2002); these two geologic sections, which include C-C' on the west and B-B' on the east, actually traverse across a portion of the subject property. Figure 5, "Geologic Cross Sections," has been adapted directly from the 2002-published work by Dibblee to illustrate his interpretation of subsurface conditions in the region; the Dibblee cross sections traverse across the eastern portion of the Sinkin property (see Section B-B' on Figure 5) and also just west of the Hagenbaugh Ranch LLC property (see Section C-C'). RCS has annotated onto the cross sections, the approximate boundaries of the subject property.

Review of the Figure 5 cross sections reveals the following:

a. the geologically ancient granitic rocks that are exposed at ground surface throughout the San Gabriel Mountain extend to the north in the subsurface beneath the subject property.

b. The farther north of the mountain front, the thicker will be the thickness of the alluvial-type sediments (i.e., map symbols, Qa, Qog, Qoh and Tc).

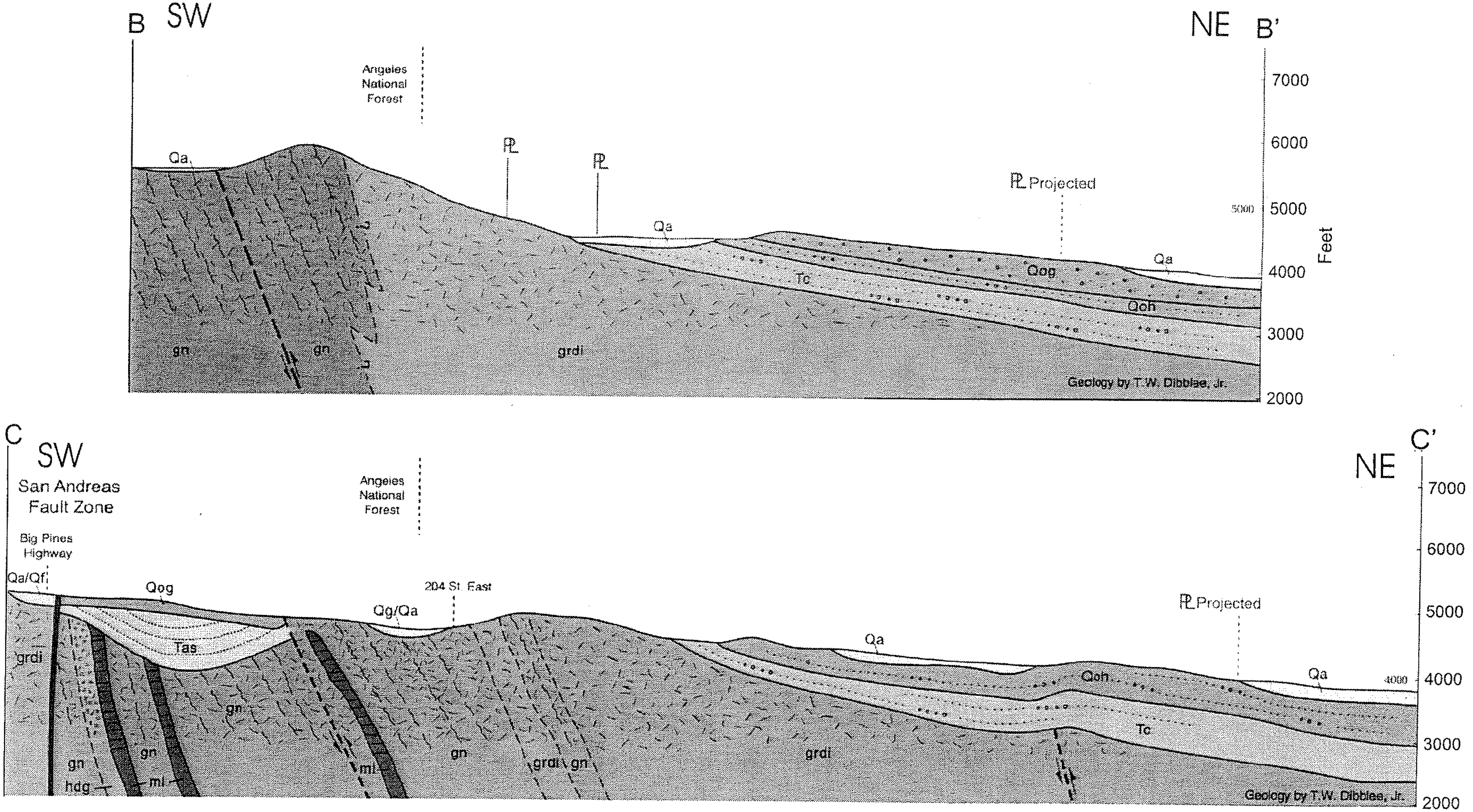
c. The maximum thickness of these alluvial-type sediments beneath the subject property will tend to occur near the northern end of the properties shown on Figure 4A. This maximum thickness may be on the order of 1000 ft at the northern edge of the easternmost (i.e., the Sinkin) property shown on Figure 1.

Potentially Water-Bearing Sediments vs Nonwater-Bearing Rocks

The various earth materials in the region can be separated into their relative ability to yield groundwater to wells. As such, two basic groups are considered to occur, as summarized below:

- Potential Water-Bearing Sediments. All of the geologically younger sedimentary deposits in the area are considered to be potentially water-bearing; this includes the map symbols Qg, Qa, Qog, Qoh and possibly even the Tc materials.

  Of these materials, Qg is mapped only within the stream canyon west of the site, and, in that area, these deposits are considered to be only on the order of 10 to 25 ft in maximum thickness. Hence, this unit is not a viable source of groundwater for the



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NOTE:
1. Cross Sections adapted from Geologic Maps of the Mescal Creek and Valyermo Quadrangles, Dibblee, 2002
2. Lines of Geologic Sections shown on Figure 4A
3. See Legend to Symbols on Figure 4B

FIGURE 5
GEOLOGIC CROSS SECTIONS

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project. Thus, only the Qa, Qog, Qoh and possibly the Tc mappable units may be potential water-bearing materials for future onsite water wells.

- Nonwater-Bearing Basement Rocks. These geologically ancient crystalline rocks are considered to be the basement rocks of the region. These materials are exposed throughout the San Gabriel Mountains south of the subject property and underlie all alluvial-type sediments beneath the subject property. Due to their age, crystalline nature and hardness, they are only capable of storing and transmitting limited amounts of groundwater to wells; typical well yields might be on the order of 1 to perhaps 5 gpm per well. Hence, none of these crystalline rocks are considered capable of yielding viable amounts of groundwater to wells on a sustained basis. Because of this, they are considered to be essentially nonwater-bearing.

Local Groundwater Basin

The California Department of Water Resources (DWR) has identified the numerous groundwater basins in the State, beginning with the publication of DWR Bulletin No. 118 in 1963. Groundwater basins are typically comprised by potentially water-bearing deposits. Subsequent modifications to that original DWR report have allowed additional basins to be identified. Lateral and vertical basin boundaries, that is, the limits of each groundwater basin, have been identified by DWR on the basis of various physical conditions. Thus, vertical boundaries for the bottom of a particular groundwater basin, i.e., the bottom of each basin, were usually selected on the geologic contact between the overlying water-bearing sediments and the underlying nonwater-bearing rock.

Lateral or surface boundaries for groundwater basins have been defined on the basis of such factors as geologic conditions (the presence of nonwater-bearing rocks or major faults), groundwater flow divides, topographic divides, and even political boundaries.

As identified by the DWR, the potentially water-bearing sediments beneath the subject properties lie within the Antelope Valley Groundwater Basin. The southerly portions of all three major properties shown on Figure 1 are not considered to be a part of the Antelope Valley Groundwater Basin because nonwater-bearing granitic-type basement rocks are exposed at ground surface in those areas (see also Figure 4A).

Various subdivisions of the Antelope Valley Groundwater Basin have been defined over the years by the DWR and even the USGS. RCS also reviewed other reports which discussed local groundwater basins, including an unpublished consulting report prepared for the Palmdale Water District by Law Environmental Inc which was titled, "Water Supply Evaluation, Antelope Valley California," (dated November 25, 1991). Review of Figure 5 therein (not presented in this report) reveals that the subject property lies within the Pearland Subunit of the main groundwater basin. Further review of Plate 4, "Well Location Map," in their report (not presented herein) reveals that no active water wells had been illustrated on that map within several miles of the subject 1234-acre subject property.

The DWR, USGS and Law reports note that the Antelope Valley Groundwater Basin is comprised by younger and older alluvial-type sediments. Nearer the center of the basin, relatively far from the adjoining mountains and hills (which are comprised by basement rocks), the sediments tend to display confined groundwater conditions due to the abundance of fine-grained deposits; in some places, lake deposits and playas are present because such areas have internal surface drainage.

However, near and along the margins of the groundwater basin, such as near the subject property, the topography tends to be steeper, the sediments that have been and continue to be deposited tend to be coarser grained, and lake deposits have not been deposited. Based on these conditions, groundwater may tend to occur under water table to semi-confined conditions beneath the subject property. Confined (artesian) conditions may occur within the slightly older Harold and Crowder formations beneath the subject property because some strata deposited within these formations are relatively fine-grained and clayey.

Onsite Water Wells

Based on RCS site visits to the property and its environs (field visits conducted on August 9 and November 15, 2006), three onsite water wells were observed to be present. As designated herein, these wells are known as: Rottman-tested well; well 7R1; and Old Wellhouse well. The locations of these wells, as determined using a hand-held GPS device, are shown on Figure 1; as seen, all three observed wells lie on the Hagenbaugh Ranch LLC property.

1. <u>Rottman-tested well</u>

   An official State Water Well Completion Report (i.e., driller's log) for this well was not available from the current or prior property owners. Moreover, an RCS visit to the offices of the Los Angeles County Engineer-Water Resources Section, Hydrologic Records Unit on November 29, 2006 yielded no records for this well (or any other onsite well) either. Hence, there are no data available to determine well age, method of construction, well depth, perforation intervals, or sanitary seal depth for any of the onsite wells.

Rottman Drilling Company (Rottman) was retained by the property owner to conduct limited test pumping of this well in July, 2006. Fortunately, before installing a test pump and conducting the test pumping of this well, Rottman removed the steel cover welded atop the well casing and performed a video log survey of the inside of the casing. According to Rottman, the following were noted on this video survey:

a. the well was cased with 14-inch diameter steel casing

b. the current casing depth is 204 ft

c. the perforations are torch-cut and suggest the well is relatively old and may have been constructed by the cable tool drilling method, an archaic method of well construction by today's standards.

d. Due to limited down-well visibility, observed perforations begin at a depth of 143 ft and extend to the total depth of 204 ft. Further, it is possible that perforations may begin at depth as shallow as 45 ft to 48 ft. Neither a pump nor power exist in or near this well.

2. Well 7R1

This well is identified by the U.S. Geological Survey (USGS) as Well No. 4N/8W-7R1, and is designated as such because it lies in the R subsection of Section 7 of Township 4 North, Range 8 West (T4N/R8W-7R1), SBBM. This well was reported by the property owner to be a groundwater monitoring well for the USGS in this southeastern portion of the Antelope Valley Groundwater Basin. The USGS monitors water levels on a regular basis in this well.

As noted on the Rottman-conducted video survey of this well, it is cased with 8-inch diameter steel casing to a total current depth of 143 ft. Observable casing perforations (torch-cut) appear to begin at a depth of 120 ft and extend to the total observable casing depth. Based on the RCS visit to the County Engineer, a driller's log is not available for this well; also neither the current nor the prior property owners have a driller's log for this well. Because the top of the well casing was not secured with a welded steel cover (as observed during two RCS field visits), it is very likely that debris (such as rocks or wood) have been dumped into this well over time by persons unknown. Hence, the current well depth (and water levels) may not be wholly representative of the original (and perhaps) deeper well at this site. Neither a pump nor power exist in or near this well.

3. Old Wellhouse Well

This well, as observed during the RCS field visit of November 15, 2006, lies inside of an old wooden and stone wellhouse, south of Well 7R1; it may have been used to provide domestic water to the original Ranch house. The current depth of the casing was measured to be 5 ft at this time, likely due to the presence of debris that appears to have been dumped into this well by persons unknown.

Even though the locations for 2 or 3 other onsite wells were shown on maps provided to RCS by the current property owner, none of these wells were observed by RCS geologists during the two site visits. These possible former onsite wells may have been completely destroyed previously, or their well casings may have been covered over by others over time. One of the property owners, Mr. Bill Davis, reported to us that he has never encountered or observed these other wells during any of his numerous prior site visits.

Results of Short-Term Well Test

On July 3, 2006, Rottman conducted a 6-hour short-term pumping test of the main well. Review of the data sheet (not provided herein) reveals the following for this well (see location on Figure 1):

a. The well is cased with 14-inch diameter steel casing.
b. The pumper set the temporary test pump to a depth of about 190 ft, and installed an airline to a depth of 189 ft. The airline was provided to allow the pumper to monitor water levels inside the well casing during the pumping test.
c. The non-pumping (static) water level was reported to be at a depth of 90 ft.
d. For the limited test, the test pump was pumped at an initial rate of 100 gpm for the first 60 minutes, and thereafter at 80 gpm for the remaining 5 hours of the test.
e. At the end of the test, the final (maximum) pumping water level was monitored at a depth of 177 ft; the pumping level did not decline in the final 4 hours of the test, suggesting water level equilibrium had been obtained. Hence, the maximum recorded water level drawdown was 87 ft, within a ±1- to 2-foot measuring accuracy of the airline gage.
f. Using the above data, RCS calculates the current specific capacity of the subject well to be 0.92 gpm per foot of water level drawdown (gpm/ft ddn).

Specific capacity represents the ratio of the pumping rate (symbol "Q," in units of gpm) in a well divided by the resulting water level drawdown (i.e., the pumping water level minus the static water level; symbol "s," in units of ft of water level drawdown) that is created in that well while pumping at that rate. The specific capacity value is unique to each individual well, and hence is wholly dependent on such well factors as: method of well construction; type of perforations in the casing; well age; perforation intervals; and the condition of the casing and gravel pack and possible amounts of plugging of the perforations and gravel pack overtime by chemical precipitates and/or biological growths/slimes (biofouling) in the groundwater.

Because the well has torch-cut perforations, as observed on the available video survey, and based on its cable tool method of construction and lack of available driller's log, the tested well is considered to be relatively old; it was likely constructed 30 to 40 years, or more, ago. Hence, due to its age and type of perforations, the well likely has only limited efficiency. Hence, the calculated current specific capacity (and possibly even the pumping yield) of this well are very likely less than would occur if the well were newer and of a more modern type of well construction (e.g., the use of louvered perforations instead of the known torch-cut perforations).

Offsite Wells in Region

The approximate locations of offsite wells owned by others in the region were plotted on Figure 1 to help define the nearest wells to the subject property and the wells that have been monitored for water levels over time in the area. The bases for these approximate well locations were review of well location maps on file at the LA County Engineers office and the two RCS field visits to the region which allowed the geologist to physically observe the approximate locations of wells.

From Figure 1, the following are notable:

a. Southeast of the subject property (i.e., southeast of the Sinkin property) are a number of single-family dwelling units (SFDUs); these homes are provided with water service from the Mescal Water Company. Hence, no water wells occur in this area.

b. Three shallow wells operated by the Little Baldy Water Company were observed in the alluvium near the intersection of Largo Vista and Grandview Canyon. These wells are considered to extract groundwater from the shallow alluvial deposits within the local creek channels. This alluvium is directly underlain by the local crystalline basement rock (gneiss; map symbol Gn, on Figure 4A). As such, groundwater production from this alluvium is wholly unrelated to the production of groundwater from future wells on the subject property.

c. About 4½ miles to the west/southwest of the westernmost property is a well designated as LA County Well No. 7766A; a hydrograph (a graph of water levels vs time) is available for this well.

d. Two miles due west of this same westernmost property (see Figure 1) is LA County Well No. 7806; this well is likely an active producer of groundwater for domestic-supply purposes because it is shown on well location maps on file at the LA County Engineers office.

e. Lying roughly 6 miles due west of this westernmost property are LA County Well Nos. 7755 and 7755B. These two wells are likely active, domestic-supply producers because they are also shown on an LA County Engineers well location map; in addition, the County monitors water levels in Well No. 7755B and a hydrograph is available for this well.

f. Located approximately two miles north of the northwestern corner of the area mapped on Figure 1 are LA County Well Nos. 7800 and 7800A; these are likely wells actively pumped for domestic-supply at SFDUs in that area.

g. Roughly two miles north of the intersection of Forth Tejon Road and Largo Vista Ave (see Figure 1) is LA County Well No. 7830; this is shown on County-prepared maps and likely represents a domestic-supply well.

h. DWR Well No. 7C1 (technically 4N/8W-7C1) lies northwest of the Hagenbaugh Ranch LLC property; sufficient water level data were available for this well on a DWR website to create a hydrograph.

i. Roughly ½ mile due east of the intersection of Fort Tejon Road and Largo Vista Ave and mainly north of Fort Tejon Road are a series of SFDUs, each with its own domestic-supply water well. This area lies about 1 mile north of the subject property.

j. Roughly ½ mile north of the subject property, along the west side of 213th Street East and south of Fort Tejon Rd are 2 or 3 water wells being used for domestic supply to nearby SFDSs.

k. Along the north side of Fort Tejon Road and about ¼-mile west of its intersection with Graham Road (see Figure 1) is the approximate location of a "deep, dry hole," as reported to RCS geologists during our November 2006 field visit, by Mr. Jeff Anderson, District Manager of the Little Baldy Water Company. Although no driller's log or other data are available to document the drilling, construction or testing of this well, Mr. Anderson reports that the well was drilled to a depth of about 900 ft and supposedly was capable of producing groundwater at a rate of only "a few gpm."

During the November 29, 2006, RCS visit to the office of the Hydrologic Records Unit of the LA County Engineer, available data were reviewed on well depths, on possible airlift or pumping rates, and/or on the driller-reported description of earth materials encountered while drilling the offsite wells in the vicinity of the subject property. Key information gleaned from limited County files for these offsite wells include:

a. No privately-owned currently-active wells were shown anywhere on the 7.5 minute Valyermo Quadrangle map in which the subject property is located; this is LA County Quadrangle Map No. 78. None of the historically-known wells on the subject property are even shown on that map. Limited County-available data for other known wells on this map include:

   - Well No. 7806 which was drilled to a depth of 265 ft (at or below this depth was granite; groundwater was at a depth of 198 ft at the date of drilling; see location on Figure 1);
   - Wells 7800 and 7800A both of which lie several miles northwest of the subject property; these were drilled to depths of 635 ft and 600 ft, respectively;

- Well No. 7830 (see Figure 1) which was drilled to a depth of 542 ft and reportedly encountered groundwater at a depth of 494 ft.

b. On the adjoining 7.5 minute Juniper Hills Quadrangle map (LA County Map No. 77) to the west of the subject property, several wells are shown. Among the available data for wells in this region are: Well 7785D was drilled to a depth of 237 ft and encountered granite at a depth of 190 ft (the well originally pumped at a rate of about 90 gpm from a depth of 200 ft when constructed); and closely-spaced Well Nos. 7765, 7765A, 7765B and 7765C (all located about 6 miles due west of the subject property) which were all drilled to depths of 140 to 220 ft, and reportedly encountered "cemented clay and sand," and "sandy clay" earth materials. Such sediments are considered typical of the alluvial-type sediments that overlie granitic basement.

Hydrographs

Graphs of water levels vs time, known as hydrographs, have been prepared using available data in order to help determine the response of groundwater levels to changes in precipitation (and hence recharge) over time in the area. As such, hydrographs have been prepared for the following wells (refer to Figure 1 for well locations discussed herein): Well 4N/8W-7R1, the on-site well that is monitored in the late winter of each year by the USGS (refer to Figure 6A for the hydrograph of this well); Well 4N/8W-7C1 (see Figure 6B), which lies just northwest of the subject property (data for this well was also available on a DWR website); Well No. 7766A, which is located north of the mountain front and about 4½ miles west/southwest of the subject property (refer to its hydrograph on Figure 6C); and Well No. 7755B (see Figure 6D), which lies within the alluvial-type sediments north of the mountain front, and about 6 miles due west of the subject property (see also Figure 1). Historic water level data used to generate the hydrographs for Well Nos. 7766A and 7755B were obtained from the website of the LA County-Department of Public Works, Water Resources Division. Noteworthy is that on each of the four hydrographs (Figures 6A-6D), RCS has superposed a copy of the accumulated rainfall departure curve (from Figure 3). This facilitates the assessment of the possible relationship between long-term rainfall trends and water level fluctuations within wells in the study area.

Review of each of the hydrograph is as follows:

- <u>Well -7R1, Figure 6A</u>: USGS monitoring data for this well began in 1964, but annual water level readings date from 1974 through 2006. During this data period, depths to groundwater have ranged between a low of about 131 ft in 1978, to a high of about 95 ft in 1983. As is characteristic of water levels in wells in typical groundwater basins, such as the local Antelope Valley Groundwater Basin, seasonal water levels tend to be relatively higher in the spring months due to reduced groundwater pumpage and increased recharge, and relatively lower in the fall months of each year due to reduced recharge and increased pumping draft.

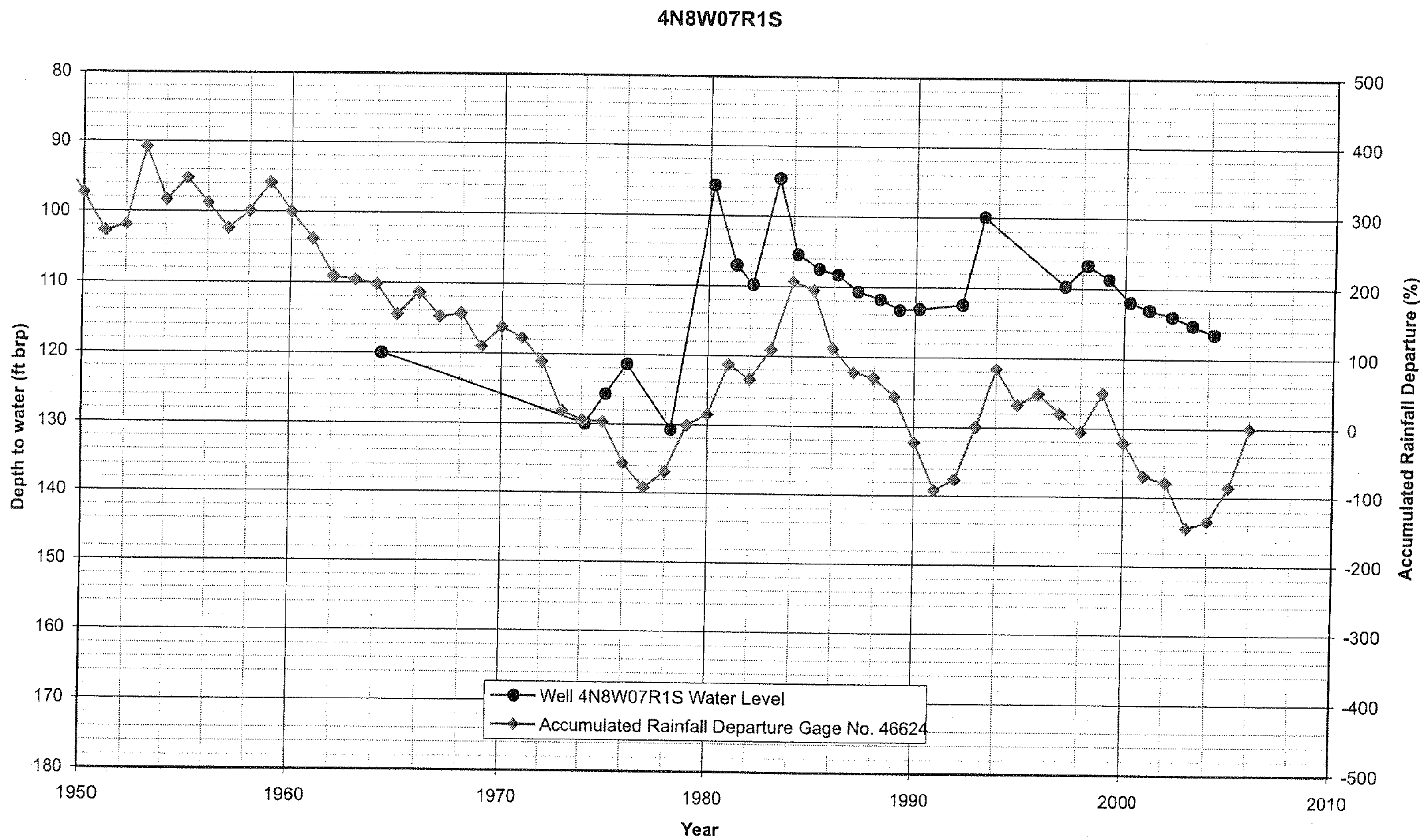
Water levels in Well –7R1 are seen to decrease overtime through about early-1978 and then to increase (rise) from 1978 through 1983. Subsequent rises and falls in water levels are also displayed on the hydrograph, and water levels in the past few years have been slowly declining. Comparison of the trends in water levels to the trends in the accumulated rainfall departure curve reveals a close similarity in trends. That is, when a dry rainfall period (or drought) has been occurring, groundwater levels have tended to naturally decline, whereas during wet periods (periods of increased recharge), groundwater levels have tended to rise. Hence, in the onsite Well -7R1, there appears to be a close relationship between groundwater levels and long-term trends in rainfall.

- Well -7C1, Figure 6B: Only limited water level data are available for this well and these date between the mid-1990s and 1999. From the data, the earliest reading (mid-1990s) shows a water level depth of about 265 ft, but shortly thereafter the depth to water was at 230 ft; it is likely this initial water level reading is an anomalous or incorrect reading. Water levels in this well also tend to mimic and respond to changes in the accumulated rainfall departure curve. Water levels in these wells have typically been at depths of 220 to 230 ft.
- Well 7766A, Figure 6C: Water levels in this County-monitored private-owned, domestic well are available for the approximate period of 1961 through 2005. During this data period, static (non-pumping) water levels have ranged between the approximate depths of about 6 ft and 24 ft; the depth of this well is not available. In a general sense, water levels in this well appear to have been in conformance with long-term rainfall trends.
- Well 7755B, Figure 6D: water levels in this County-monitored, privately-owed well are available for the period of 1984 through 2005. During this period, water levels have ranged between a low of about 72 ft (in the late-1980s) and a high of about 5 ft in the mid-and late 1990s. Seasonal changes appear to be on the order of 30 to 40 ft. As with the hydrographs for the other three wells discussed herein, changes in water levels in this well over time appear to mimic the trends in the accumulated rainfall departure curve.

  Also noteworthy on this hydrograph and on those to the other three wells, is that no continuous or progressive declining trend in water levels over time is noticeable on any of the hydrographs.

Groundwater Quality

On July 5, 2006, two days after the 6-hour pumping test conducted by Rottman in the onsite well (see Figure 1), a groundwater sample was collected by the pumper and delivered to Antelope Valley Analytical Laboratory in Lancaster, California for laboratory testing of limited chemical constituents (a copy of the laboratory test results are attached to this report). Test



Reference point = 4202 ft above mean sea level

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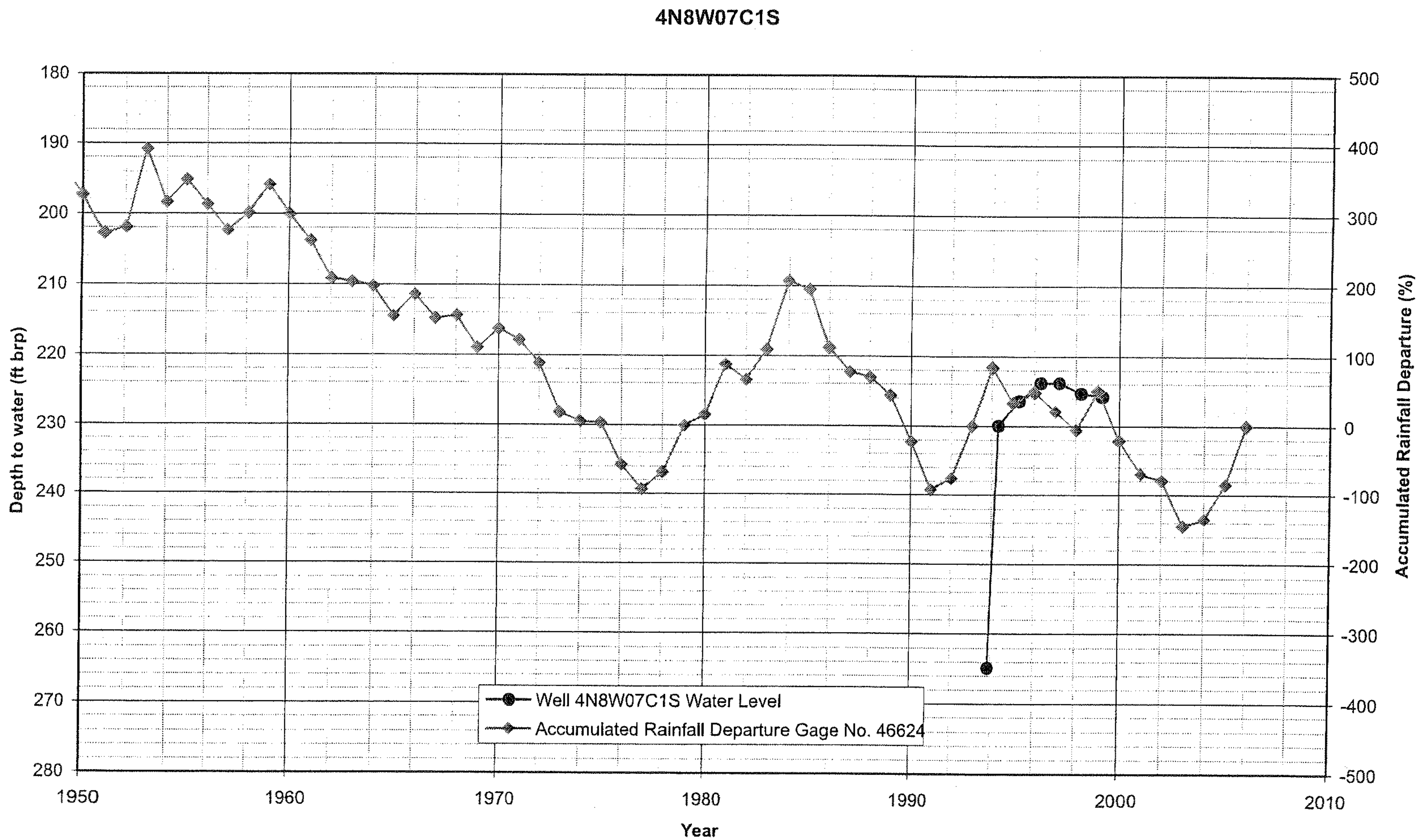
FIGURE 6A
Hydrograph for 4N/8W-7R1S with Accumulated Rainfall Departure Gage No. 46624

Job No. 323-LAS01

January 2007



Reference point = 4202 ft above mean sea level

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FIGURE 6B
Hydrograph for 4N/8W-7C1S with Accumulated Rainfall Departure Gage No. 46624

Job No. 323-LAS01

January 2007

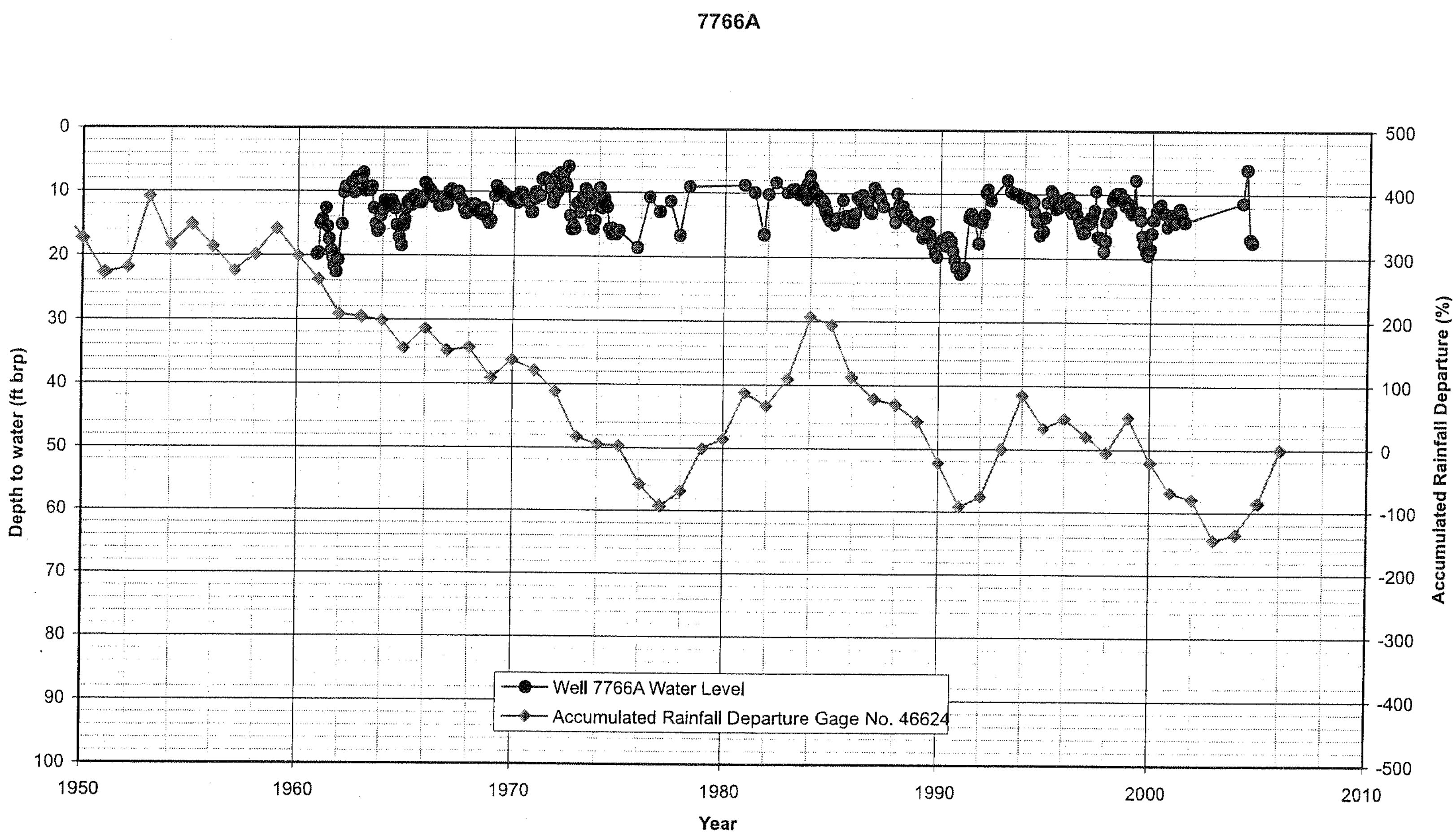

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FIGURE 6C
Hydrograph for 7766A with Accumulated Rainfall Departure Gage No. 46624

Job No. 323-LAS01

January 2007

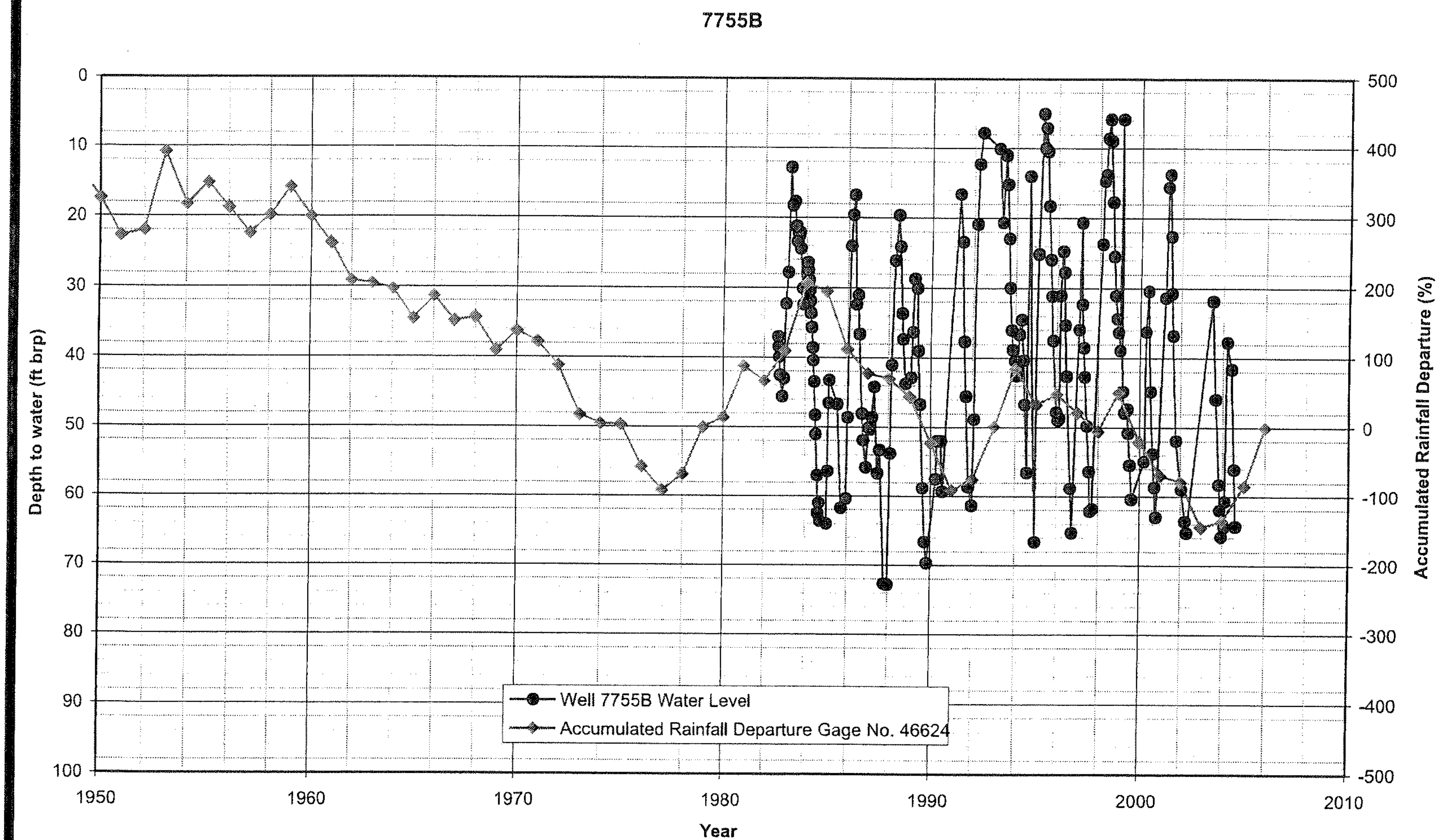

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FIGURE 6D
Hydrograph for 7755B with Accumulated Rainfall Departure Gage No. 46624

Job No. 323-LAS01

January 2007

constituents included only nitrate as NO_3, fluoride, asbestos, cyanide, and the inorganic chemicals (i.e., the heavy or trace metals).

Review of the tests indicate the following concentrations of the tested constituents:

- Nitrate as NO_3 = 14 milligrams per Liter (mg/L); this concentration is well below the State Maximum Contaminant Level (MCL) of 45 mg/L for this constituent.
- Fluoride = 0.20 mg/L; this detected concentration is well below the MCL of 2.0 mg/L for this constituent in this arid-area environment.
- Asbestos and cyanide were reported to be not-detected (ND) in the sample.
- All tested inorganic chemicals (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, selenium and thallium) were reported to be ND, except for aluminum at 400 micrograms per Liter (µg/L) and barium at 100 µg/L. These two detected concentrations are well below their respective MCLs of 100 µg/L.

No other chemical constituents such as total dissolved solids, total hardness, the common cations and anions (like sodium, calcium, chloride and sulfate), color, radiological constituents, or odor were tested for in the groundwater sample collected from the main well on July 5, 2006 by the Rottman pumper.

CONCLUSIONS

The following presents the key conclusions of this hydrogeologic assessment and water well siting study for the 1234-acre subject property.

A. Project Water Demand and Potential Recharge

The proposed project includes the construction of approximately 275 dwelling units (DUs) on 2-acre spacing on portions of the 1234-acre subject property. The balance of the property will remain in an undeveloped, natural state. Assuming each DU has a unit water demand of 1 AF/yr, then the total water requirement for the development, excluding peak demands and fire flow requirements, would be 275 AF/yr.

To meet this annual water demand, all new onsite wells would need to be pumped at a combined instantaneous flow rate of 170 gpm; this assumes all wells would be pumped at a 100% operational basis.

Such a 100% operational pumping basis is not recommended for any well. However, the lower the operational pumping basis (i.e., the fewer number of hours the wells are pumped each day), the greater will be the total combined pumping rate required for all new pumping wells. For example, if all future wells were to be pumped 40% of the time, then the total combined pumping rate would need to be about 425 gpm.

Relative to the approximately 275 AF of groundwater pumpage required each year for the project, annual recharge to groundwater beneath the subject property is estimated to be in the range of 300 to 340 AF/yr.

B. Hydrogeologic Conditions

1. Water-Bearing Deposits

Potentially water-bearing deposits that might be used as sources of groundwater beneath the subject property are the geologically younger sedimentary materials comprised by geologic map symbols Qa, Qog, Qoh and possibly also Tc (see Figures 4A and 4B). The Qa and Qog units, and portions of the Qoh, may contain relatively coarse-grained sediments beneath the subject property due to the proximity of the property to the principal source of these sediments (i.e., the rocks of the San Gabriel Mountains). Remaining portions of the Qoh (the Harold Formation) and the underlying (and, hence, geologically somewhat older, Crowder Formation; map symbol, Tc) contain finer-grained silty and clayey deposits.

Groundwater within the shallower portions of the potentially water-bearing sediments beneath the subject property may display water table conditions, whereas the lower portions of these sediments will tend to display artesian (confined) conditions.

The thickness of these potentially water-bearing deposits is considered to increase from south to north across the subject property. That is, these deposits increase in thickness from essentially zero feet at the geologic contact mapped by others between these sediments on the north and non-water-bearing basement rocks on the south, to perhaps as great as 1000 ft at the northeastern corner of the easternmost (i.e., the Sinkin property) of the two contiguous subject properties shown on Figures 1 and 4A (see also cross sections on Figure 5).

2. Nonwater-Bearing Rocks

Exposed at ground surface near and along the southern portions of the subject property, and extending into the San Gabriel Mountains to the south are hard, crystalline granitic-type rocks. These basement rocks are also considered to underlie all younger sedimentary deposits beneath the subject property (refer to the Figure 5 geologic cross sections). These granitic rocks are considered to be essentially nonwater-bearing.

3. Local Groundwater Basin

All but the southerly end of the subject property is considered to be located within the Antelope Valley Groundwater Basin, specifically, within the Pearland Subunit of this large groundwater basin. Included within the groundwater reservoir which comprises the groundwater basin are the various alluvial-type, potentially water-bearing sediments. The geologic contact (i.e., the ground surface boundary) shown on Figure 4A between the sedimentary deposits on the north and the crystalline basement rocks on the south is considered to be the boundary of the local groundwater basin. This geologic contact extends across the ground surface in a general east to west direction across the southern end of the two contiguous properties that comprise the subject property for this project.

4. <u>Onsite Water Wells</u>

Of the 5 or 6 wells historically reported to have been constructed on the subject property, only three (the Rottman-tested well, well 7R1 and the old well-house well) still exist. No records are available to document the age or method of construction, original casing depths, perforation intervals or sanitary seal depths of any of these wells. Video log surveys were performed by Rottman in the Rottman-tested well and well 7R1; these wells are currently only 204 ft and 143 ft deep, respectively. Perforation intervals, as observed by Rottman on the video logs, may begin at depths of 143 ft (or even at 45 ft) and 120 ft, respectively, in these two wells.

Neither well is equipped with a permanent pump and there is no power at either well site. The Rottman-tested well has been capped by Rottman for safety and to preclude vandalism. Well 7R1, which does not have a proper cap (lid) atop the well casing, has been used by the USGS for many years as a local water level monitoring well.

5. <u>Offsite Wells</u>

A few privately-owned offsite wells, used for domestic supply to individual SFDUs, are known and/or were observed in the region. Data for these wells are particularly meager (e.g., well depths, perforation intervals, pumping rates, etc). One of the offsite wells a few miles to the west was reportedly pumped at a rate of about 90 gpm.

In addition, Little Baldy Water Company utilizes three shallow wells in the active alluvium of Grandview Canyon, near its intersection with Largo Vista, to supply water to its distribution system. Groundwater extractions by these three wells will not be impacted by the proposed development of onsite groundwater resources for the proposed project, and vice versa.

The nearest known offsite well, Well 7C1, lies just northwest of the Hagenbaugh Ranch LLC property as shown on Figure 1. This well is used for domestic supply to a nearby residence. No data are available to document its depth, perforation intervals, or pumping rate.

6. <u>Short-Term Pumping Test Results</u>

The onsite 204-foot deep, Rottman-tested well, which was test pumped for 6 hours on July 3, 2006, displayed the following: a static water level depth of 90 ft; a pumping rate of 80 gpm for the final five hours of the 6-hour test; and a maximum pumping level of 177 ft and a water level drawdown of 87 ft at the end of the test. These data calculate to a specific capacity of this old, existing onsite well of about 0.92 gpm/ft ddn.

These resulting pumping data and the specific capacity value for the well are representative of this shallow well in its current condition. That is, these factors are highly dependent on such conditions as: well age; condition of the casing; possible plugging of the perforations; well depth; and perforation intervals in the casing. It is likely that the specific capacity, and possibly even the pumping yield, of this well are less than would occur if a new and deeper replacement well were to be constructed.

The potential risk in a deeper well is that its perforations would begin at depths greater than those in this Rottman-tested well (due, in part, to the need to have an adequate sanitary seal); for this existing well, a spinner log survey (a flow meter test) has not been performed to identify the quantity of groundwater flow that is entering the various depth intervals of perforations.

7. Hydrographs

Hydrographs showing the changes in water levels over time have been prepared using available records for a few wells in the region; superposed on each hydrograph is the accumulated rainfall departure curve for the Palmdale rain gage, the nearest such gage with long-term data to the subject property.

Key results from the graphs include: typical water level depths of 95 ft to 131 ft in onsite well 7R1 and 220 ft to 230 ft in offsite well 7C1 to the northwest. In some wells farther to the west, and hence, in the same types of earth materials expected beneath the subject property, seasonal water level fluctuations have been on the order of 30 to 40 ft.

Most notable on the hydrographs is that the water levels all tend to generally mimic the longer term trends in rainfall over time, as noted on the accumulated rainfall departure curve. Hence, local groundwater levels respond directly to changes related to drought periods and wet periods. Also, no long-term, continuous, or progressive decline in groundwater levels is observable on any of the hydrographs, even though the accumulated departure curve seems to indicate declining rainfall conditions over time.

8. Groundwater Quality

Although complete laboratory testing was not conducted on the groundwater sample collected by Rottman from this shallow onsite well, the laboratory results that do exist reveal: a concentration of nitrate as NO_3 of 14 mg/L, which is well below the Primary MCL for this constituent of 45 mg/L; very low fluoride; not-detected concentrations of asbestos and cyanide; and not-detected concentrations of all tested inorganic chemicals (trace metals) except for aluminum and barium. Those two detected concentrations were below their respective MCLs.

One group of constituents, the radiological chemicals, were not analyzed for in the July 2006 testing. Radiological constituents, which can occur in groundwater extracted near/from granitic-type rocks, have specific MCLs; if any of these constituents exceeds its particular MCL, then treatment of the groundwater would be needed.

There are no data available to document the water quality from deeper aquifer zones in the area. Hence, the suitability of the groundwater in these deeper zones for domestic use is unknown.

PRELIMINARY RECOMMENDATIONS

The following preliminary recommendations of this project are as follows:

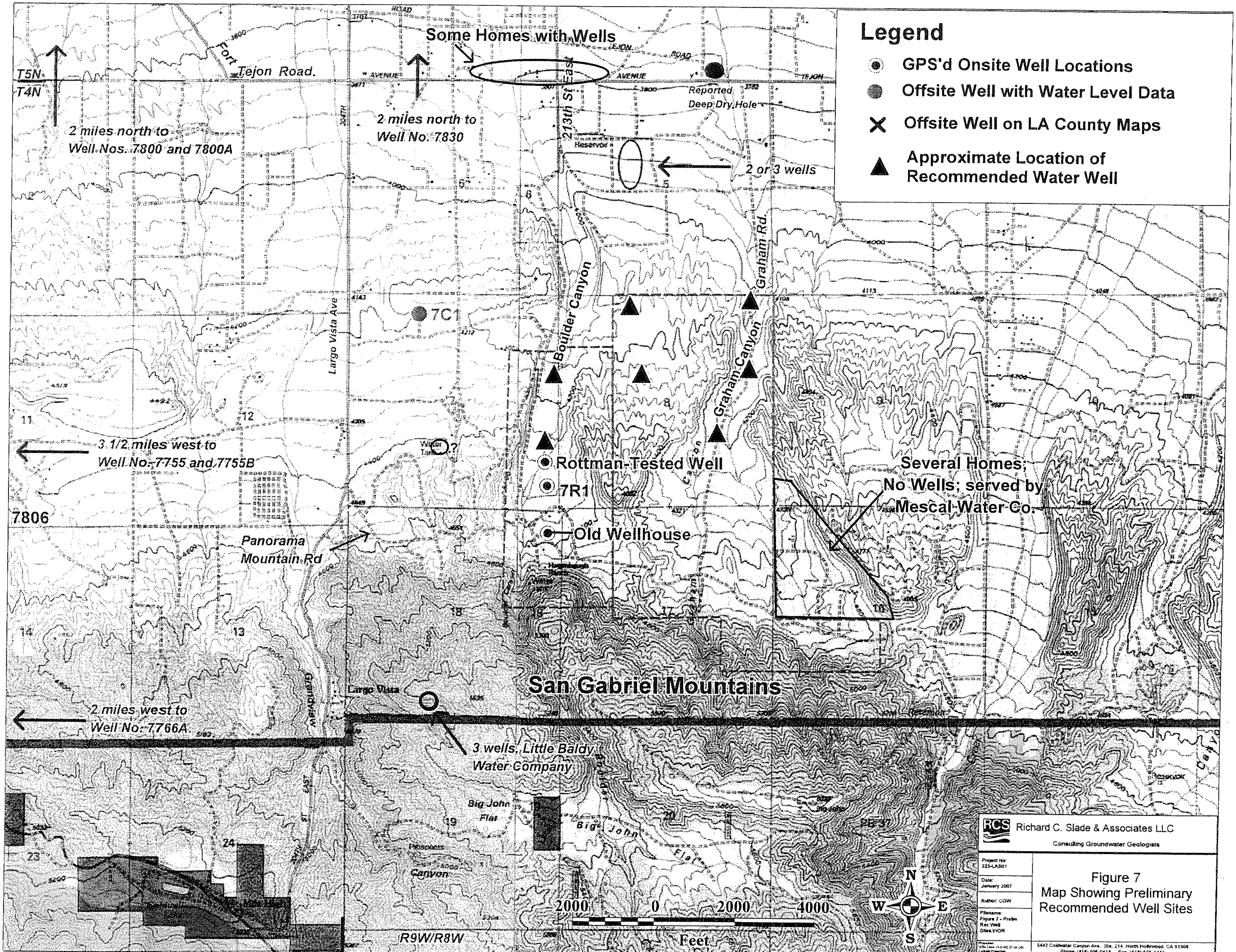
1. It is considered to be hydrogeologic feasible to drill and construct new water wells on the two subject properties to meet the estimated 275 AF/yr water demand for the proposed development of the subject property. Peak demands and fire flow requirements will need to be met by providing adequate water storage tanks, as needed and where needed. Several new wells will be needed to help meet the annual water demands of the project.

2. The preliminary locations for seven new water-supply wells on the two properties are shown on Figure 7, "Map Showing Preliminary Recommended Well Sites." We recommend that drilling, construction and testing begin at the well site along Graham Canyon in the northeastern corner of the Sinkin property. Then, the number of, depth for, and spacing between all required future wells on the properties owned by Hagenbaugh Ranch LLC and Sinkin can be better established. A tentative spacing between future onsite wells of approximately 1750 ft has been established at this time. Key factors for the future wells include:

   a. Number of New Wells Needed. As may as seven new wells might be needed to provide the required total combined rate of 425 gpm, assuming all new wells were to be pumped on a 40% operational basis. This estimated number of new wells also assumes that each new well is capable of pumping at an operational rate in the range of 60 to 75 gpm. This number of new wells helps to provide extra pumping capacity during drought, emergencies, pump/well rehabilitation, etc.

   b. Drilling Depths. The maximum drilling depth of the pilot hole for the initial well in the northeastern corner of the Sinkin property is estimated to be 1000 ft. Pilot borehole depths for each subsequent well can be adjusted as needed, based on results of the drilling, logging, and testing of this initial well.

   c. Casing Materials. At this time, we recommend the use of copper-bearing or high strength-low allow (HSLA, also known as Corten) steel for each new well. The casing diameter for the initial well can be 12 inches, based on the estimated flow rate that might be available. The casing diameters for future wells can be modified as needed after the initial well has been constructed and tested. The perforations in each well casing should be louvers, as manufactured by the Roscoe Moss Company of Los Angeles.


Legend
GPS'd Onsite Well Locations
Offsite Well with Water Level Data
Offsite Well on LA County Maps
Approximate Location of Recommended Water Well
Some Homes with Wells
Fort Tejon Road.
T5N
T4N
2 miles north to Well Nos. 7800 and 7800A
2 miles north to Well No. 7830
213th St East
Reported Deep Dry Hole
2 or 3 wells
Graham Rd
7C1
Largo Vista Ave
Boulder Canyon
Graham Canyon
3 1/2 miles west to Well No. 7755 and 7755B
Rottman-Tested Well
7R1
Old Wellhouse
Several Homes; No Wells; served by Mescal Water Co.
7806
Panorama Mountain Rd
San Gabriel Mountains
Largo Vista
2 miles west to Well No. 7766A
3 wells, Little Baldy Water Company
Big John Flat
R9W/R8W
2000 0 2000 4000
Feet
N S E W
Richard C. Slade & Associates LLC
Consulting Groundwater Geologists
Date: January 2007
Author: CGW
Figure 7
Map Showing Preliminary Recommended Well Sites

d. Sanitary Seal Depths. A minimum 50-foot sanitary seal is required for each new well, if the pumped groundwater is to be used for domestic purposes. The final seal depth in each well will depend on conditions encountered during drilling of each pilot hole, but, if possible, it will be greater than 50 ft in length.

e. Drilling Methods. The proposed wells should be drilled by either the reverse circulation (reverse rotary) or the direct (mud) rotary method, depending on availability of contractors and their equipment, and on the relative ease (and associated costs) of discharging and maintaining all drilling fluids and drill cuttings (from the well construction) on the property. No such fluids or cuttings are permitted to flow offsite or into any nearby creeks or drainages.

f. Anticipated Water Quality. Based on limited testing of a shallow onsite water well, it appears that the groundwater in aquifers to depths of about 250 ft beneath the property is adequate for domestic use. This probability is corroborated because several offsite privately-owned wells are known to exist in the region and to provide groundwater for private domestic usage; moreover, these private wells are likely relatively shallow also. However, complete Title 22 water quality testing of the shallow onsite well has not been performed (e.g., for the radioactivity constituents), and water quality in the deeper potential aquifers at the site is unknown due to a complete absence of any such deep wells.

   Hence, the potential need to treat groundwater from new onsite deep water wells, and the specific constituents for which treatment may be required, must await the drilling and testing of at least the first few new onsite wells.

3. The existing Rottman-tested well and the old wellhouse well on the Hagenbaugh Ranch LLC property are considered to be abandoned wells. Because of their advanced age, shallow depths, and lack of sanitary seals, these two wells do not meet current State DWR guidelines and regulations for domestic-supply purposes. Thus, we recommend that the wells should be thoroughly destroyed, but by methods and using materials that exceed State and County guidelines. This should include cutting new perforations in each casing in order to pressure grout the upper portion of each casing. An alternative, more efficient method of destruction is filling the casing with cement and conducting gun-perforation downhole.

   It is vital to install a proper cap atop the Well 7R1 casing for safety and to preclude vandalism or entry by animals or other persons. At the same time, it may be very useful to allow the USGS to continue to use this well as a water level monitoring site in the future; coordination is needed between your contractor and the USGS to provide a proper well cover that will still allow water level monitoring by the USGS to continue.

CLOSURE

Disclaimer

This report has been prepared solely for the exclusive use of Mr. Bill Davis of the Huntington Group and strictly for the potential development of groundwater resources for an existing 1234-acre subject property located in the Llano area of Los Angeles County, California. This report was prepared solely with specific application to the siting of possible new onsite water wells to supply domestic water to this property. Excluded from this project were any and all work related to such diverse geologic and geotechnical issues as: seismic shaking and ground rupture; the potential for liquefaction from earthquakes; grading and earthwork; foundation design; slope stability; and suitability of onsite soils for building support. Also, excluded from all RCS work were any and all issues dealing with the siting, design, feasibility and/or suitability of private subsurface sewage disposal anywhere on the subject property.

This report has been written in accordance with the care and skill generally exercised by reputable professional currently working under similar circumstances in this or similar localities. No other warranty, either express or implied, is made as to the provisional advise or opinions presented herein. Any use, interpretation, or emphasis other than that contained herein, is done at the reader's sole risk.

Respectfully submitted,
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