This section discusses the existing environmental and regulatory setting of the project hydrology and water quality, identifies potential impacts related to implementation of the project, and proposes mitigation measures for those impacts determined to be significant. Setting information in this section was compiled from the Reclamation Plan Amendment (RPA) (Omya California 2013), technical reports prepared in support of the RPA (**EIR Appendix G**, Stantec 2013), and peer reviews of those reports, geographic information system (GIS) data, and resource agency websites and databases.

The County published a Notice of Preparation and Initial Study (NOP/IS) for the proposed project on June 12, 2013. A copy of the NOP/IS, along with comments received during the public review period, is contained in **EIR Appendix A**. The Office of Mine Reclamation (OMR) submitted comments regarding drainage. OMR's comments were considered in the preparation of the analysis.

3.7.1 EXISTING SETTING

REGIONAL CLIMATE AND PRECIPITATION

The White Knob/White Ridge Limestone Quarries lie on the northeast side of the White Mountains, which form a portion of the northern San Bernardino Mountains, approximately 6 miles southwest of Lucerne Valley. Elevations within the White Knob area range between 4,980 and 7,146 feet above mean sea level (amsl). Annual precipitation for the Lucerne Valley area typically ranges between 5 and 10 inches per year (NWS 2006), while in the mountains adjacent to the project it ranges from 10 to 21 inches, as shown in **Figure 3.7-1**. Precipitation typically occurs in the form of periodic heavy showers, but the area experiences heavy winter snowfall at times along the top of the White Mountains. Historic temperature extremes for Lucerne Valley range between 0°F in the winter and 114° F in the summer, with an annual average temperature of 60.7° F. Climate normals from 1981 to 2010 for the project are shown in **Table 3.7-1**.

TABLE 3.7-1
WHITE KNOB/WHITE RIDGE LIMESTONE QUARRIES CLIMATE DATA – 1980–2010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Tmax,ºF	51.35	52.07	56.98	65.03	74.25	82.80	88.03	87.10	81.00	71.19	58.44	51.30	68.29
Tmin, ºF	30.58	30.70	33.21	36.45	41.83	49.48	56.07	56.52	52.03	42.66	35.69	30.65	41.32
Prec, in.	2.53	2.55	1.88	0.58	0.16	0.09	0.44	0.40	0.47	0.53	0.96	1.62	12.20

Source: WRCC 2006

SURFACE WATER HYDROLOGY AND DRAINAGE

On-site surface water flow occurs in response to precipitation only (ephemeral flow), flowing northeastward from the crest of the White Mountains downward through the White Knob/White Ridge Quarries area into the nearby Rabbit (dry) Lake-Lucerne Valley depression. No springs or perennial streams occur within the White Knob/White Ridge Limestone Quarries area (USGS 1971a, 1971b, 1996a, 1996b). Several watersheds drain surface water away from or through the White Knob Quarry area, as shown in **Figures 3.7-2** and **3.7-3**. Drainage at higher elevations occurs mainly by steep, deeply incised drainages that have been eroded into the bedrock to be replaced by gentler, relatively shallow drainages that have been eroded into the alluvium at lower elevations. Local springs are discussed later in this chapter.

Flooding

The Federal Emergency Management Agency (FEMA) is responsible for mapping areas subject to flooding during a 100-year flood event (i.e., a flood event that has a 1 percent chance of occurring in a given year). FEMA flood hazard mapping has not been done for the project area based on a search of the FEMA Map Service Center for FEMA panels (06071C7275H, 06071C7280H, 06071C6575H, and 06071C6550H) that cover the project site. The potential for flooding and associated hazards was evaluated by Stantec (2011) for the quarry area and the haul road, both on- and off-site.

Hydrologic calculations were performed in accordance with the latest version of the County of San Bernardino Hydrology Manual (1986, 2010). Since all drainages studied are smaller than 640 acres in size, the rational method was used for all calculations. CivilDesign engineering software (Version 7.0; 2007) was utilized for the project hydrology analyses. The runoff coefficient is based on soil types, type of ground cover, and the Antecedent Moisture Condition (AMC). Soil types for this study were obtained from the U.S. Department of Agriculture Natural Resources Conservation Service's (2013) Web Soil Survey. Soil types used in the drainage calculations include Type B, C, and D (the dominant soil types used were Type B and D).[1] The land use for the study area is undeveloped with no appreciable impervious areas. The only disturbed areas in the drainages are the quarry and the haul road. For areas above the quarry, the ground cover was assumed to be average, while the ground cover in the quarry and downstream of the quarry was assumed to be poor. Based on the recommendations in the San Bernardino County Hydrology Manual, AMC II was used for 2-year, 10-year, and 25-year calculations, and AMC III was used for the 100-year calculation.

Local rainfall intensity was obtained from the National Oceanic and Atmospheric Administration's (2013) Precipitation Frequency Data Server Atlas 14. A point near the centroid of the drainage area was selected, and one-hour rainfall rates for return frequencies ranging from 2 to 100 years were obtained (see **Table 3.7-2**). Rainfall intensities for other time periods were based on the slope of the intensity duration graph from the County of San Bernardino Hydrology Manual (1986, 2010). For desert and mountain areas in the county, a moderate correlation coefficient value of 0.7 is used for the slope of this graph. Two different locations were selected for rainfall intensities, one for the quarry and Turnout 64 drainages, and another for the four smaller culverts east of Turnout 64.

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[1] The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

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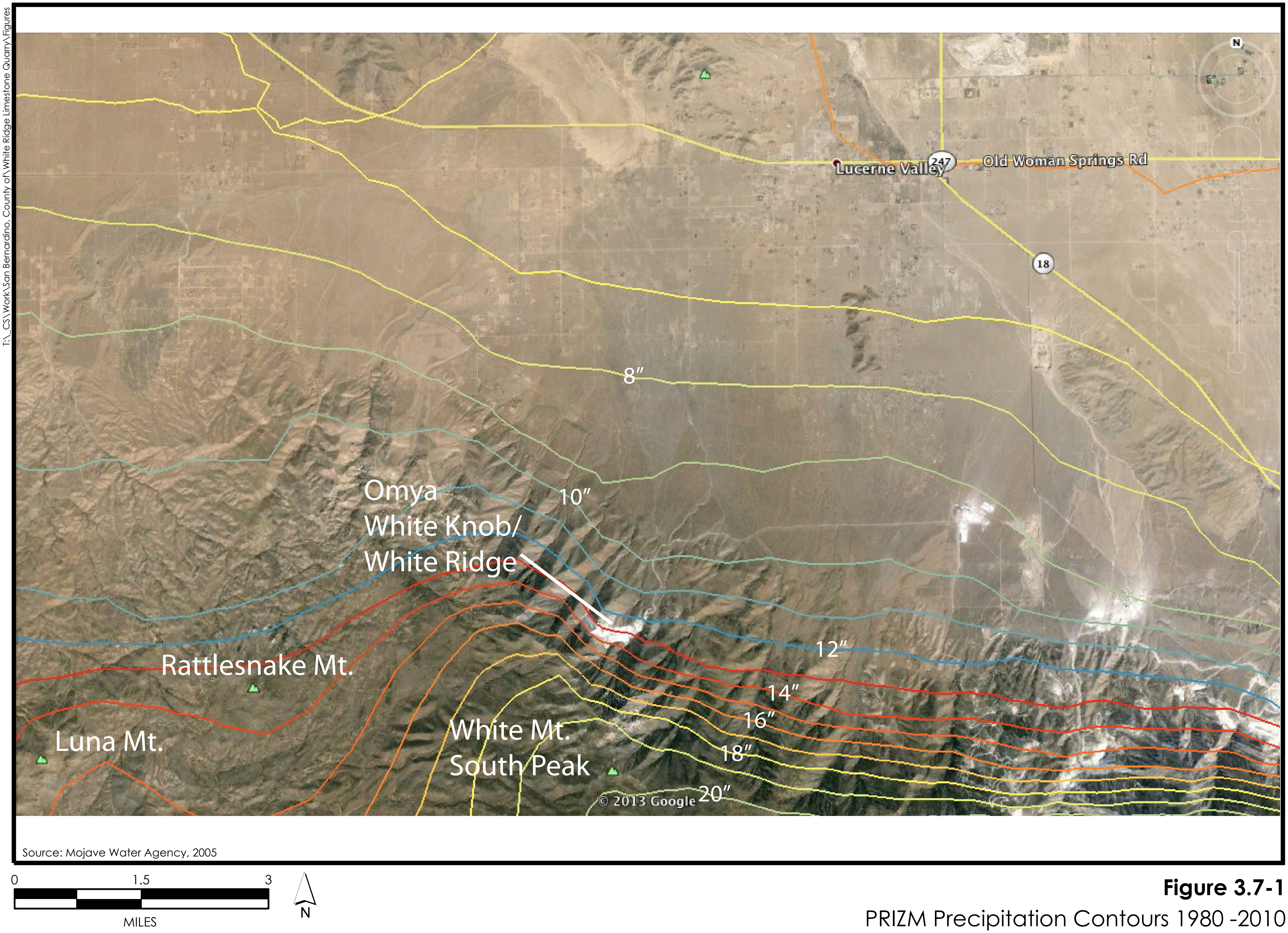

Figure 3.7-1

PRIZM Precipitation Contours 1980 -2010
for White Knob/White Ridge Quarries

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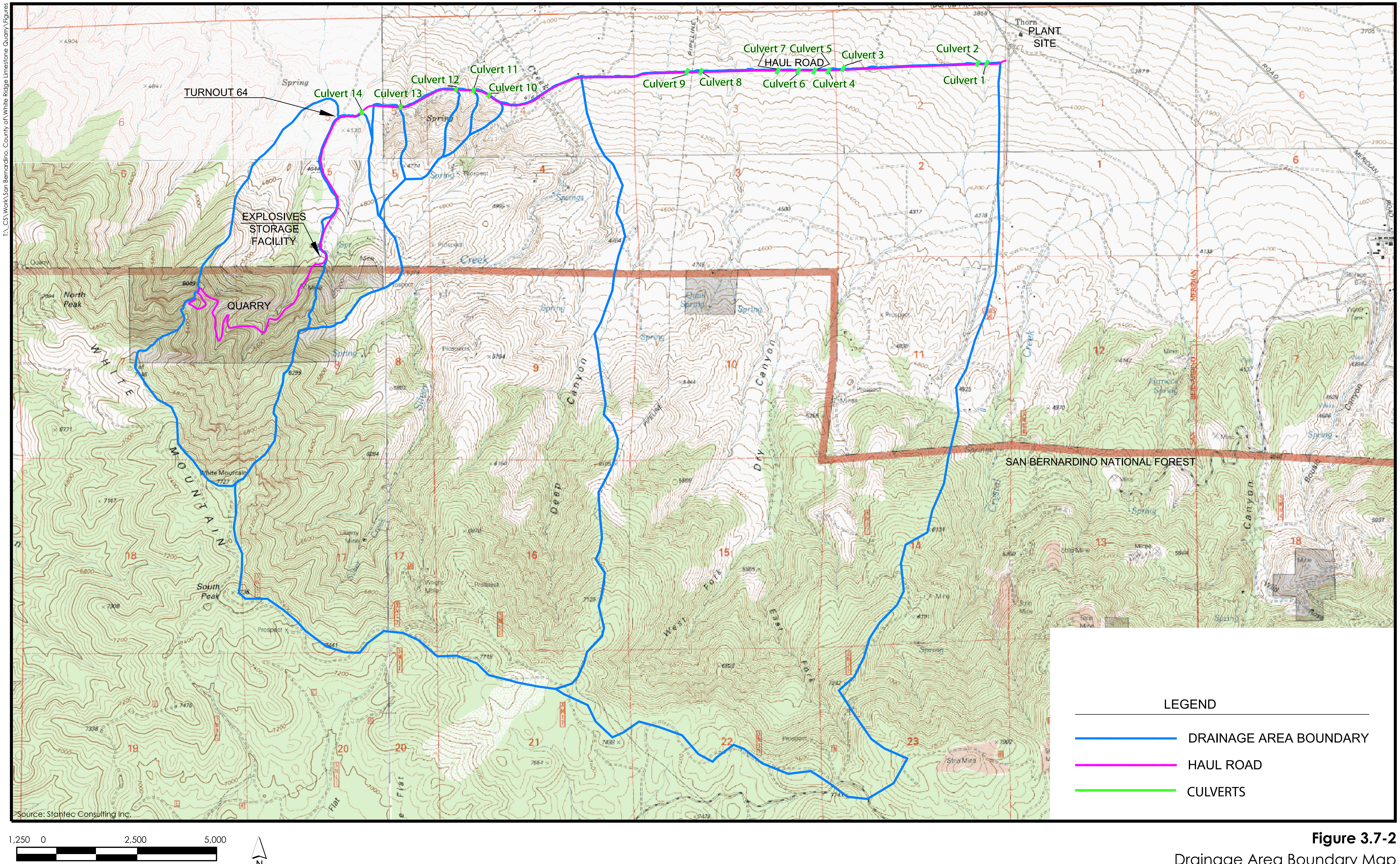

Figure 3.7-2

Drainage Area Boundary Map

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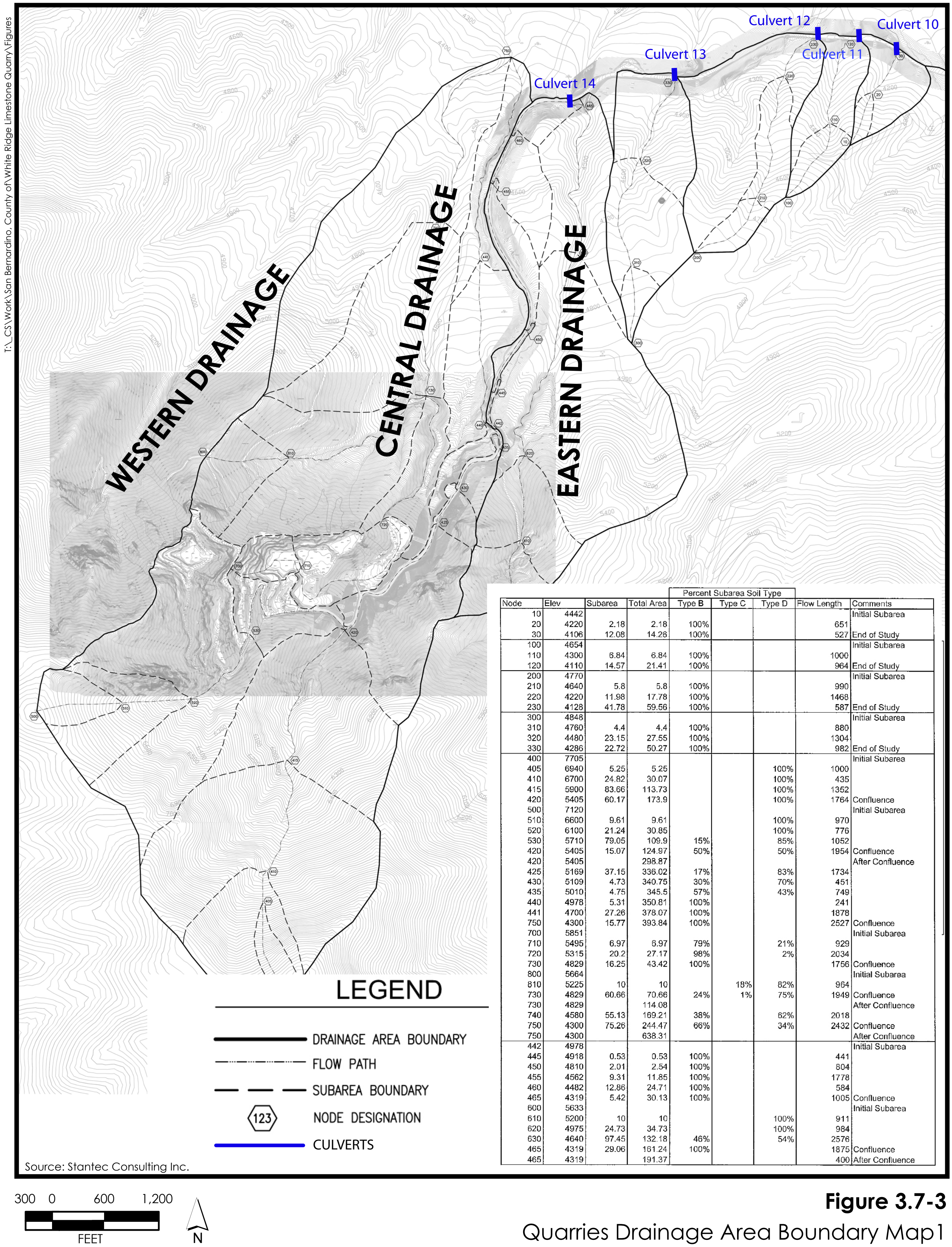

Node	Elev	Subarea	Total Area	Percent Subarea Soil Type Type B	Type C	Type D	Flow Length	Comments
10	4442							Initial Subarea
20	4220	2.18	2.18	100%			651	
30	4106	12.08	14.26	100%			527	End of Study
100	4654							Initial Subarea
110	4300	6.84	6.84	100%			1000	
120	4110	14.57	21.41	100%			964	End of Study
200	4770							Initial Subarea
210	4640	5.8	5.8	100%			990	
220	4220	11.98	17.78	100%			1468	
230	4128	41.78	59.56	100%			587	End of Study
300	4848							Initial Subarea
310	4760	4.4	4.4	100%			880	
320	4480	23.15	27.55	100%			1304	
330	4286	22.72	50.27	100%			982	End of Study
400	7705							Initial Subarea
405	6940	5.25	5.25			100%	1000	
410	6700	24.82	30.07			100%	435	
415	5900	83.66	113.73			100%	1352	
420	5405	60.17	173.9			100%	1764	Confluence
500	7120							Initial Subarea
510	6600	9.61	9.61			100%	970	
520	6100	21.24	30.85			100%	776	
530	5710	79.05	109.9	15%		85%	1052	
420	5405	15.07	124.97	50%		50%	1954	Confluence
420	5405		298.87					After Confluence
425	5169	37.15	336.02	17%		83%	1734	
430	5109	4.73	340.75	30%		70%	451	
435	5010	4.75	345.5	57%		43%	749	
440	4978	5.31	350.81	100%			241	
441	4700	27.26	378.07	100%			1878	
750	4300	15.77	393.84	100%			2527	Confluence
700	5851							Initial Subarea
710	5495	6.97	6.97	79%		21%	929	
720	5315	20.2	27.17	98%		2%	2034	
730	4829	16.25	43.42	100%			1756	Confluence
800	5664							Initial Subarea
810	5225	10	10		18%	82%	964	
730	4829	60.66	70.66	24%	1%	75%	1949	Confluence
730	4829		114.08					After Confluence
740	4580	55.13	169.21	38%		62%	2018	
750	4300	75.26	244.47	66%		34%	2432	Confluence
750	4300		638.31					After Confluence
442	4978							Initial Subarea
445	4918	0.53	0.53	100%			441	
450	4810	2.01	2.54	100%			804	
455	4562	9.31	11.85	100%			1778	
460	4482	12.86	24.71	100%			584	
465	4319	5.42	30.13	100%			1005	Confluence
600	5633							Initial Subarea
610	5200	10	10			100%	911	
620	4975	24.73	34.73			100%	984	
630	4640	97.45	132.18	46%		54%	2576	
465	4319	29.06	161.24	100%			1875	Confluence
465	4319		191.37				400	After Confluence

Figure 3.7-3

Quarries Drainage Area Boundary Map1

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TABLE 3.7-2
ONE-HOUR RAINFALL DEPTH – WHITE KNOB/WHITE RIDGE LIMESTONE QUARRIES

Return Frequency (years)	Quarry and Turnout 64 Drainages[1,2]	Smaller Culvert Drainages[1,2]
2	0.491	0.45
10	0.811	0.745
25	1.03	0.944
100	1.39	1.28

Source: NOAA 2013
1. Rainfall depths are in inches.
2. Figure 3.7-2 shows locations of points where rainfall intensity was calculated; Figure 3.7-3 shows the drainages and nodes for which calculations were made.

Tributary drainage areas were determined from topographical maps of the area. A hydrology map was prepared to show the overall drainage areas, subareas, and nodes. Hydrologic model calculations were made as shown in **Figure 3.7-3. Table 3.7-3** gives the node number, tributary area, and design flows for 2-, 10-, 25-, and 100-year storm events for critical hydrology locations in the project area.

Three main drainages cross the White Knob/White Ridge Limestone Quarries area, while the east–west haul road has 6 Arizona crossings and 14 culverts, as is shown in **Figure 2.0-2**. Stantec analyzed the hydrology for the project and determined the capacities of the existing hydraulic structures, e.g., sedimentation basins, drainage conveyances, and haul road culverts. Stantec concluded that with some minor modification, the existing hydraulic structures were adequate for the predicted 10-year stormwater flow, except Culvert 5. Hydraulic calculations for Culvert 5 suggest that it is undersized, but 24 years of historic performance suggests that it is adequate (see additional discussion below under the subheading Culvert Design and Riprap).

TABLE 3.7-3
CULVERT FLOW CAPACITY – WHITE KNOB/WHITE RIDGE LIMESTONE QUARRIES

Node	Description	Tributary Area (ac)[1]	2-Year Flow (cfs)[2]	10-Year Flow (cfs)[2]	25-Year Flow (cfs)[2]	100-Year Flow (cfs)[2]
30	Culvert 10	14.26	14.8	28.6	37.9	57.1
120	Culvert 11	21.41	17.9	35.8	48.0	73.9
230	Culvert 12	59.56	35.2	76.6	104.8	167.4
330	Culvert 13	50.27	28.9	63.4	86.9	139.2
420	Flow from off-site at southernmost basin	173.90	146.9	283.1	377.3	570.5
420	Flow from quarry road at southernmost basin	124.97	98.3	185.9	246.3	379.1
425	Flow in haul road	336.02	244.3	471.1	636.9	983.6
440	Flow in haul road near explosive storage	350.81	244.3	471.1	636.9	983.6
445	Flow in haul road just north of explosive storage	0.53	0.7	1.3	1.7	2.4
455	Flow in haul road	11.58	3.2	10.7	16.0	28.4

Node	Description	Tributary Area (ac)[1]	2-Year Flow (cfs)[2]	10-Year Flow (cfs)[2]	25-Year Flow (cfs)[2]	100-Year Flow (cfs)[2]
465	Flow in haul road near culvert 14	30.13	5.5	21.9	34.0	63.2
465	Culvert 14	191.37	128.0	262.8	358.6	559.8
750	Downstream confluence	638.31	399.6	774.9	1046.9	1609.1

Source: EIR Appendix G, Stantec 2013, p. 2.9
1. Ac = acres
2. cfs = cubic feet per second

Quarry Area Runoff

Surface water flowing from and through the White Knob/White Ridge Limestone Quarries area occurs through three separate drainages (see **Figure 3.7-3**). The western sector of the White Knob Quarry area drains into the Western Drainage and flows downstream through the Ruby Springs area. The eastern portion of the project area initially drains through the Eastern Drainage down to the Turnout 64 area. The central and largest portion of the quarry areas drains through the Central Drainage, which has been partially displaced by overburden stockpile OB-1. The White Knob/White Ridge Quarries area is not located within any recognized floodways or 100-year floodplains, but it is occasionally subject to ephemeral flash flooding. At the end of mining, the three proposed quarries would function as basins collecting runoff from the quarry highwalls and upslope areas. These quarry basins should lessen the potential effects of flash flooding, including reducing the off-site transportation of mining-derived sediments.

Groundwater

The White Knob/White Ridge Limestone Quarries area is located south of the southern border of the Upper Mojave River Valley Groundwater Basin, per California Department of Water Resources Bulletin 118 groundwater basin No. 6-42 (DWR 2004). The majority of this groundwater basin underlies the north–south elongate Mojave River Valley to the west. However, a small southeast portion of this basin extends southeast into Fifteenmile Valley just north of the White Knob/White Ridge Quarries area, which is part of the Mojave River Este Subarea, also named the Rabbit Lake Subwatershed and the Fifteenmile Valley Groundwater Basin (MWA 2005). The Este Subarea is one of the Adjudicated Mojave River subareas managed by the Mojave Water Agency (see **Figure 3.7-4**). Locally, the groundwater basin is bounded on the south by the contact between Quaternary sediment deposits and unconsolidated basement rocks of the San Bernardino Mountains (including the White Mountains), on the southeast by the Helendale fault, and on the north by the unconsolidated basement exposures of the mountains that surround Apple Valley (the Granite Mountains). The Helendale fault forms a hydraulic barrier in this part of the Este Subarea that causes groundwater to flow northwestward under a surface drainage divide into the Mojave River drainage instead of northeastward into Lucerne Lake (dry) in the Lucerne Valley Basin (DWR 2004; MWA 2005) (see **Figure 3.7-5**).

Helendale Fault

The active Helendale fault zone is a set of en echelon, right-stepping fault strands extending from the vicinity of Cushenbury Canyon in the San Bernardino Mountains northwest towards the southern flank of Kramer Hills [Bowen, 1954; and Morton et al., 1980]. The Helendale fault south of the community of Lucerne Valley is a 31 mile (50 km) zone marked by fault scarps, compressional ridges, and lines of springs [Aksoy, 1986]. Initiation of this fault has been constrained by Dokka and Travis [1990a and 1990b] to lie between ~1.5 to 0.7 Ma. Movement along the Helendale fault is evidenced by 1.2 miles (1.9 km) of displaced Pleistocene (?) aged older alluvial deposits, Mesozoic aged basement rocks, and stream courses since its initiation [Aksoy, 1986]. Additionally, Bouguer gravity field anomaly patterns across the Lucerne Valley groundwater basin correspond to the northwest structural grain of this area. Significant gravity lows along the fault trace suggest a structurally controlled basin filled with sediments, whereas gravity highs in the north and northeast adjacent to the Ord and Fry Mountains indicate a shallow basement covered by alluvial fans [Aksoy, 1986]. The gravity data supports the topographic and geologic data which indicate that there is a separation of groundwater basins between Lucerne Valley and Fifteenmile Valley.

Lenwood Fault & Camp Rock Fault

Both the Lenwood and Camp Rock faults transect the northwest portion of the Este Hydrologic Sub-basin. Characteristic of the Mojave Desert Block region and the Eastern California shear zone (ECSZ), both these faults are northwest-trending, right-lateral strike-slip faults that are late Tertiary to early Quaternary in age. The Lenwood fault extends for about 47 miles (75 km) and is part of the larger Lockhart-Lenwood fault system. The Lenwood segment of the fault intersects the eastern segment of the North Frontal thrust system. The Camp Rock fault has a length of approximately 22 miles (35 km) and is part of the Camp-Emerson-Copper Mountain fault system. According to Dokka and Travis [1990a and 1990b], the total amount of displacement along the Lenwood and Camp Rock faults, since their initiation in the late Cenozoic, has been 0.93 miles and 1.86 miles (1.5 km and 3.0 km), respectively.

North Frontal Thrust System of the San Bernardino Mountains

The North Frontal thrust system (NFTS) of the San Bernardino Mountains is a 50 mile-long (80 km) thrust system of discontinuous, overlapping scarps and folds in Pleistocene alluvium and older shear zones in bedrock. It spans a 0.6 mile-wide zone (1 km) adjacent to the northern front of the San Bernardino Mountains transecting both the Lucerne Valley and Fifteenmile Valley groundwater basins [Miller, 1987; Bryant, 1986; and Eppes et al., 2002]. These faults are the result of transpressional, right-lateral, strike-slip movement along the San Andreas fault, and subsequently are responsible for the uplift of the Big Bear plateau. The NFTS has been mapped by Dibblee [1964a] to have displaced the Old Woman Sandstone and older fanglomerates, but not younger surficial sediments. The age of the system has been constrained to the late Pleistocene [Spotila and Sieh, 2000].

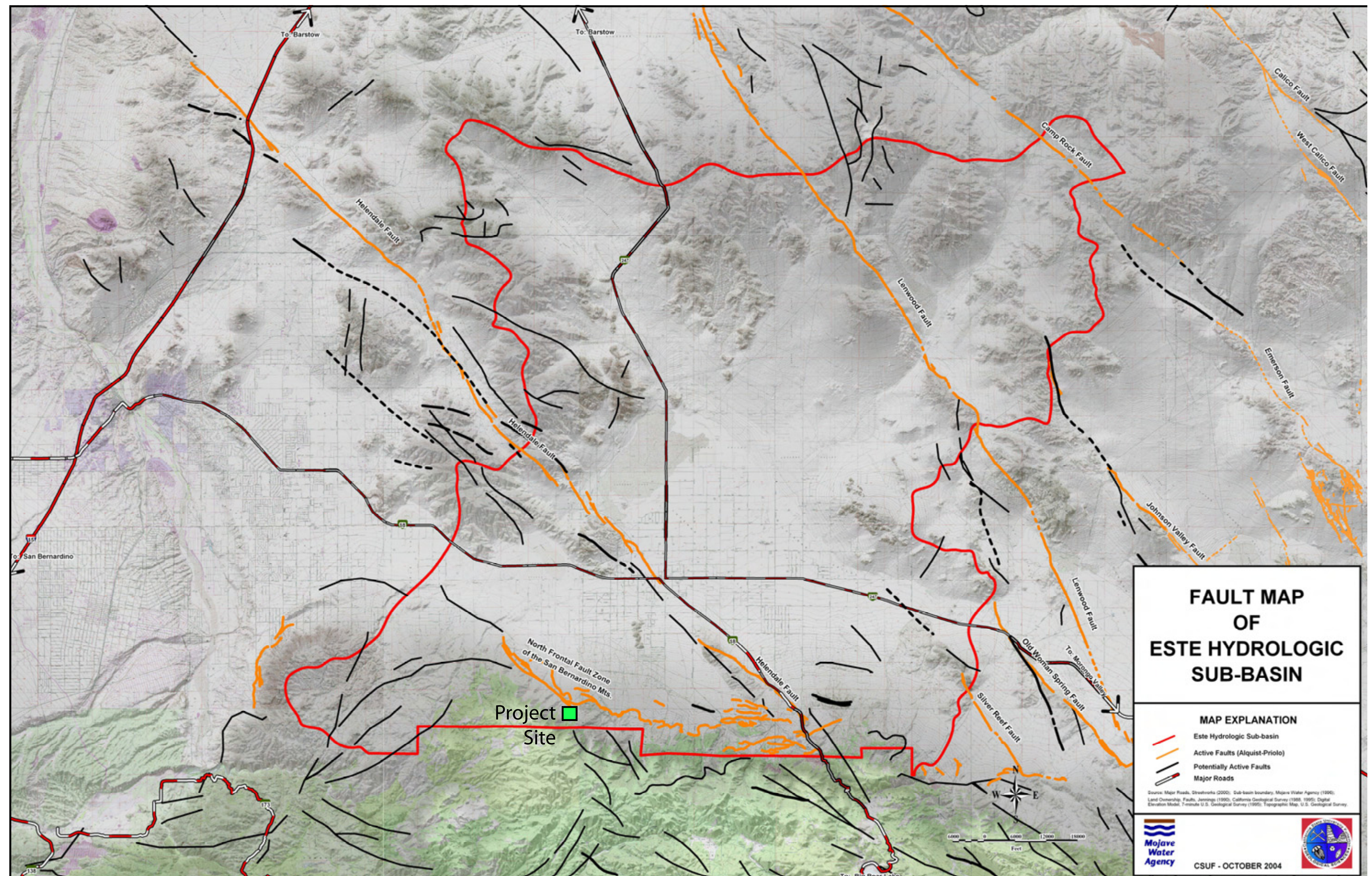

Figure 3.7-4

Fault Map of Este Sub-Basin and White Knob/White Ridge Quarries

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Current Groundwater Occurrence and Movement

The direction of groundwater movement within the Lucerne Valley groundwater basin has historically been from the outer perimeter towards the center of the valley [Goodrich, 1978, Schaefer, 1979; Brose, 1987]. Current groundwater levels (measurements by MWA in November, 2003) in the Lucerne Valley groundwater basin confirm the direction of groundwater flow is radially from the outer perimeter of the basin towards Lucerne (dry) Lake. The groundwater gradient from the northern portion of the basin to the south is 0.0067 ft/ft; from the eastern portion of the basin westward towards the center of basin is 0.0033 ft/ft; and from the southeastern portion of Lucerne Valley groundwater basin to the dry lake area the gradient is 0.0007 ft/ft. Within the Fifteenmile Valley groundwater basin, groundwater flow is towards the Mojave River. The groundwater gradient westward from the Helendale fault is 0.0096 ft/ft.

Groundwater flow patterns have changed little since the first available data in 1916-1917 and are probably similar to those prior to man's influence [Schaefer, 1979]. A review of contour maps for the Este Hydrologic Sub-basin area [DWR, 1967; Brose, 1987; Pirnie, 1990; USGS, 1994, 1996, 1998, 2000, and 2002] confirms this assessment. Within both basins, groundwater occurs primarily within the older alluvial deposits and the Old Woman Sandstone deposits at variable depths and to a limited extent within bedrock fractures. Groundwater elevations range from 2,900 to 2,740 feet (884 to 835 m) (amsl) in the Lucerne Valley groundwater basin and 2,920 to 2,840 feet (890 to 866 m) (amsl) in the Fifteenmile Valley groundwater basin. Depth to groundwater ranges from 100 to 250 feet (30 to 76 m) below ground surface in the central portion of the Lucerne Valley groundwater basin, 20 to 250 feet (6 to 76 m) below ground surface in the Fifteenmile Valley groundwater basin, and approximately 20 feet (6 m) below ground surface near the western side of the Helendale fault.

Source: Mojave Water Agency

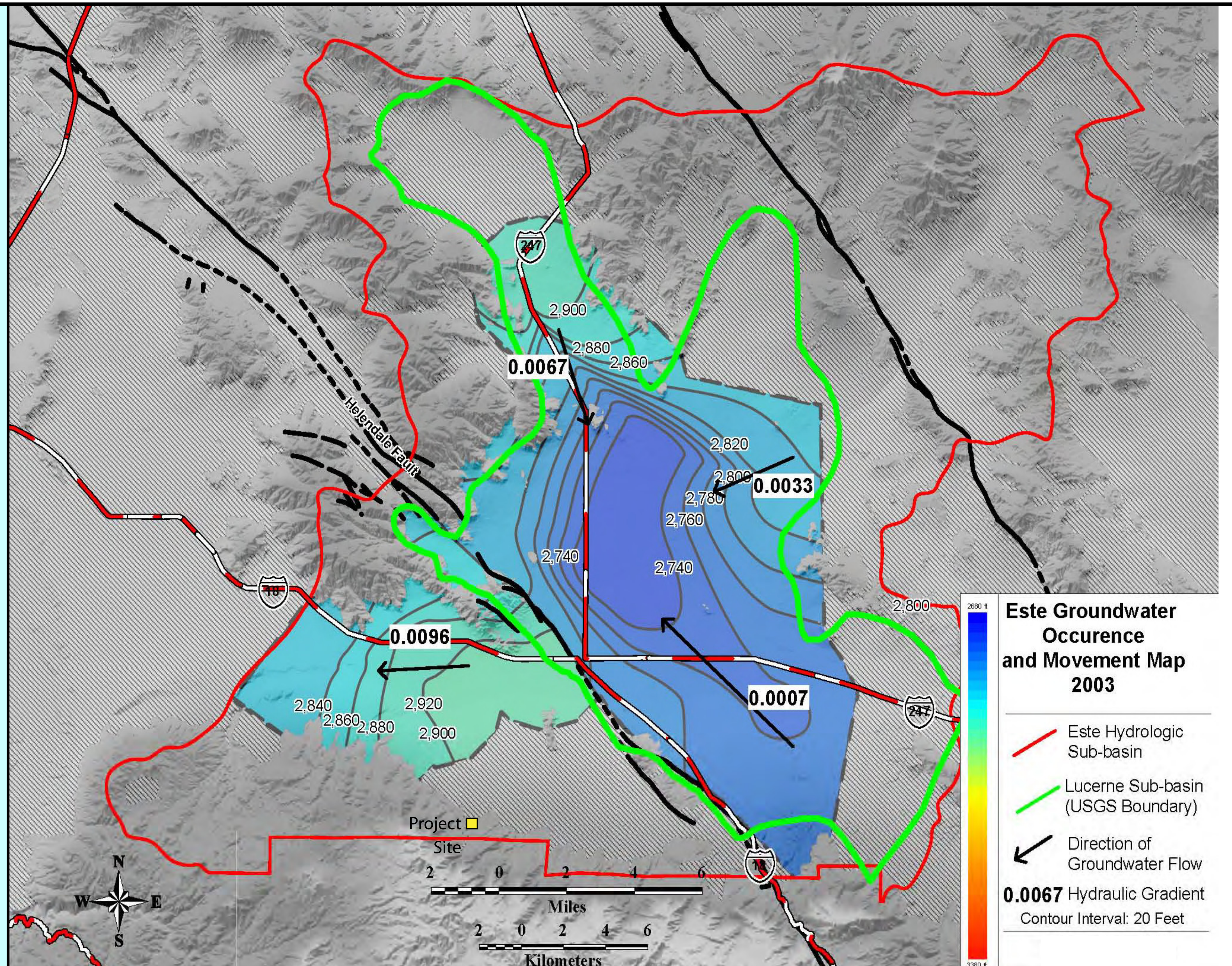

Figure 3.7-5

Este Sub-Basin Groundwater Occurance and Movement Map

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Water-bearing formations of the Fifteenmile Valley Groundwater Basin consist of regional Pliocene and younger alluvial fan deposits (the fan unit), overlain by Pleistocene and younger river channel and floodplain deposits (the floodplain unit) (DWR 2004). Groundwater generally occurs under unconfined conditions. The fan unit typically occurs within 1 mile of the active Mojave River channel, indicating that the basin portion that underlies Fifteenmile Valley comprises the younger floodplain unit. This unit occurs in thicknesses up to 1,000 feet, with permeability decreasing with depth. Specific yields for this unit range between 4 and 25 percent, with an estimated average of 10 percent. It is expected that the specific yield decreases significantly in the vicinity of Rabbit Lake (dry) because of the increase in percentage of silts and clays.

Groundwater within the hard rock that underlies the vicinity of the White Knob/White Ridge Limestone Quarries area is expected to be under fracture-flow conditions (Bulot 2004; DCI 2006a, 2007a, 2007b, 2008). An alignment of several springs extending southeastward from Ruby Springs to Quail Spring (west of Dry Canyon) is part of the North Frontal Fault Zone (CDMG 1966; Morton and Miller 2003) that intercepts groundwater flowing from the higher elevations of the White Mountains toward Rabbit Lake (dry). As the groundwater flows within the faults and joints, it is forced up to the ground surface along this fault system. Surface flow at the springs typically occurs for only short distance and then percolates into the channel sediments or is lost to evapotranspiration.

Springs

Groundwater movement across a fault may be impeded because of one or more of the following conditions: (1) permeable beds set against impermeable beds; (2) the zone consists of gouge (ground rock and clay) that has a very low hydraulic conductivity; and (3) deformation of adjacent beds (MWA 2005). Recharge entering both the Lucerne Valley and Fifteenmile Valley groundwater basins as subsurface flow is primarily derived from the San Bernardino Mountains. The North Frontal Fault Zone that runs along the northern base of the San Bernardino Mountains creates a series of springs where natural barriers such as faults and jointed bedrock force groundwater to the surface at a weak point (see **Figure 3.7-6**).

There are no springs within the White Knob/White Ridge Limestone quarry sites, but there are several adjacent springs. The Ruby Springs area, which includes an “unnamed spring,” lies to the northwest along the Western Drainage (DCI 2012). Another unnamed spring occurs east of the Eastern Drainage northeast of the White Ridge Quarry.

Periodic spring discharge measurements were made at the Ruby Springs area from 1932 to 1967 and ranged from 0.25 to 13.9 gallons per minute (gpm) (DCI 2012). Omya began collecting periodic spring discharge and surface water flow distance measurements at Ruby Springs along with precipitation data in 2005 (DCI 2012, Table 3). Omya collected precipitation data from two local residential-use rain gauges, RGS-1 and RGS-2, as shown in **Figure 3.5-17** (DCI 2012). Local precipitation and Ruby Springs discharge data since mid-2007 have been analyzed and graphed, as shown in **Figure 3.7-7** (DCI 2012). The unnamed spring east of the project has no discharge data for comparison.

Ruby Spring’s discharge rates measured from October 2005 through June 2012 ranged between approximately 1.10 gpm and 9.5 gpm, with surface flow distances ranging between approximately 432 and 953 feet (DCI 2012). All of the measured discharges from Ruby Springs fall within the 1932 to 1967 historical discharge rates. No historical Ruby Springs surface flow distances prior to October 2005 are available.

Figure 3.7-7 indicates that short-duration cycles of the Ruby Springs discharge rate occur repeatedly and are superimposed onto a long-duration discharge cycle. The short-duration cycles appear to represent the relatively immediate responses of Ruby Springs to Western Drainage storm events that occur in the lower portion of the drainage closer to Ruby Springs (DCI 2012). The short-duration cycles appear to occur during the winter rainy season, with discharge increasing following the onset of precipitation, then decreasing with the cessation of precipitation. These short-duration cycles can also be interpreted as a "base flow" condition where the surface water flow is derived entirely from groundwater discharge with the rate of flow dependent on the amount of groundwater in storage.

The cause of the long-duration cycle appears to be the response of Ruby Springs discharge precipitation occurring in the upper portion of the Western Drainage watershed (DCI 2012). The longer cycle period is likely a function of the cumulative effects of multiyear cycles of wet and dry. Thus, a series of drought years that reduce recharge resulting in a decrease in aquifer storage, regardless of the relative short-term effects of individual rain events in the lower portion of the drainage, will cause the discharge at Ruby Springs to decrease each successive year of the drought. Conversely, a series of wet years will tend to increase aquifer recharge and aquifer storage, causing higher discharge at Ruby Springs with each successive wet year. The long-duration cycle appears to represent the natural fluctuation in Ruby Springs' base-flow discharge. This was demonstrated by the decline in Ruby Springs discharge from approximately 9.5 gpm in May 2007 to approximately 1.1 gpm in December 2009, at the end of a period of drought. Following an increase in precipitation in early 2010, Ruby Springs discharge steadily increased to approximately 4.71 gpm by June 2012.

Ruby Springs surface water flow distances that have been measured since October 2005 (DCI 2012). Surface flow distances measured from October 2005 through September 2011 ranged from approximately 432 and 953 feet. In contrast to spring discharge that recovered with an increase in precipitation, surface flow distances have tended to steadily decrease over the 2008 to 2012 period of monitoring. Surface flow distances ranged from approximately 641 to 654 feet in the 2008–2009 reporting period, approximately 441 to 620 feet in the 2009–2010 reporting period, and approximately 432 to 435 feet in the 2010–2011 rain year.

During the 2011–2012 reporting period, measured surface flow distances ranged between approximately 421 and 442 feet. The decrease in surface flow distances may be the results of apparent increase in re-established vegetation within Reaches +12 through +14 due to an increase in evapotranspiration (see **Figure 3.5-17**).

WATER QUALITY

The term *water quality* is non-specific. That is, the standard applied to the quality of a water source depends on the water use. Thus, varying levels of water quality may be acceptable, depending on whether the water is used for industrial processes, drinking, or irrigation. The most important elements for the economic survival of San Bernardino County are the availability, beneficial use, and conservation of its water (San Bernardino County 2006, p. 6-126).

Groundwater underlying nearby Apple Valley is sodium-chloride in nature, with calcium bicarbonate groundwater located near the San Bernardino Mountains (DWR 2004; MWA 2005). Natural recharge occurs primarily from direct precipitation, ephemeral steam flow, and subsurface flow from the San Bernardino Mountains. Man-made recharge occurs primarily via septic tank effluent discharge and irrigation waters (DWR 2004).

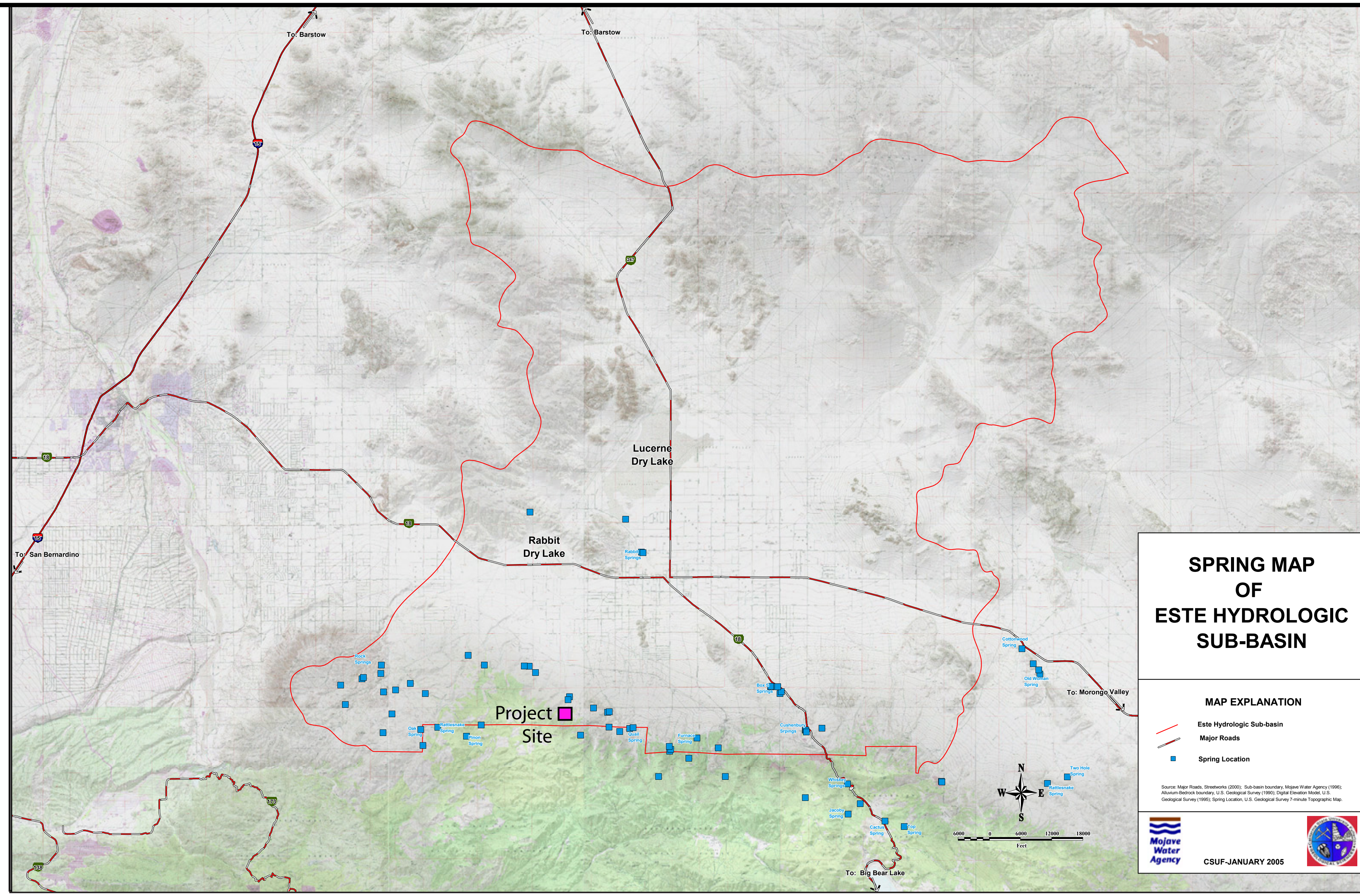
Structural Groundwater Barriers

Groundwater movement across a fault may be impeded because of one or more of the following conditions:

1. Permeable beds set against impermeable beds;
2. The zone consists of gouge (ground rock and clay) which has a very low hydraulic conductivity; and
3. Deformation of adjacent beds

Helendale Fault

The Helendale fault, which divides the Lucerne Valley and Fifteenmile Valley groundwater basins impedes groundwater flow [Goodrich, 1978; Schaefer, 1979; Brose, 1987; Stamos et al., 2001, and current data from MWA]. The figure on the previous page clearly shows the Helendale fault acting as a hydrologic barrier to groundwater flow. Water level differences across the Helendale fault range from 20 to 250 feet below ground surface (6 to 76 m) [DWR, 1967; Goodrich, 1978; Schaefer, 1979; Brose 1987; USGS, 1994, 1996, 1998, 2000, and 2002; and current data from MWA]. Because of the boundary nature of the Helendale fault, and the direction of groundwater movement in both basins, as well as the impact of well production, groundwater levels are typically higher in the Fifteenmile Valley groundwater basin. The question of whether or not groundwater is leaking across the Helendale fault from the Fifteenmile Valley groundwater basin into the Lucerne Valley groundwater basin is still under investigation.



Lenwood & Camp Rock Fault

Just north of the study area, the Lockhart-Lenwood fault system impedes groundwater flow in older alluvium and the Camp Rock-Emerson-Copper Mountain segment affects the subsurface flow within the Middle Mojave River Basin [Brose, 1987; and Stamos et al., 2001]. Both these faults have been reported by [Brose, 1987; and Stamos et al., 2001] to impede groundwater flow outside of the Lucerne Valley groundwater basin, thus separating the Este Hydrologic Sub-basin from Morongo Hydrologic Sub-basin (Johnson Valley) to the northeast.

Old Woman Springs Fault

Just east of the Este Hydrologic Sub-basin, the Old Woman Springs fault zone has disrupted the basins, developing gouge zones in the alluvium and older rock, which act as impediments to groundwater flow [Bechtel Corporation, 1992]. Between the north and south branch of the Old Woman Springs fault the direction of groundwater is generally to the northwest Once it passes the north branch of the fault, groundwater movement shifts to the northeast where it flows towards the Morongo Hydrologic Sub-basin (Johnson Valley) and not the Este Hydrologic Sub-basin [Geoscience Support Service Inc., 1992].

North Frontal Thrust System Faults

Recharge entering both Lucerne Valley and Fifteenmile Valley groundwater basins as subsurface flow is primarily derived from the San Bernardino Mountains. Along the San Bernardino Mountains, the NFTS is marked by a series of springs where natural barriers such as faults and jointed bedrock force groundwater to the surface at a weak point. These are evident on the map above.

Source: Mojave Water Agency

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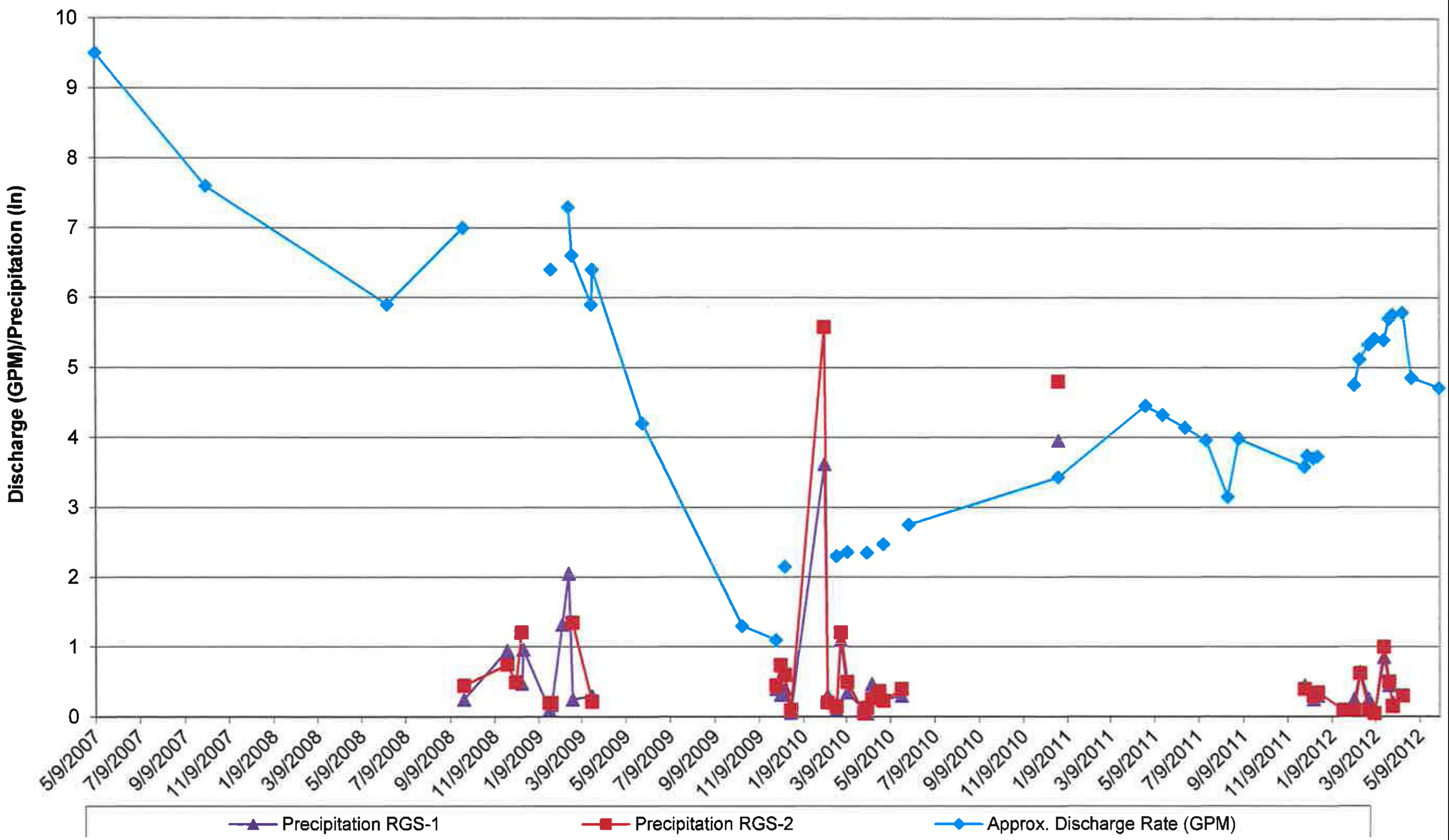
Figure 3.7-6

Springs Map of Este Sub-Basin and White Knob/White Ridge Quarries

T:_CS\Work\San Bernardino, County of\White Ridge Limestone Quarry\Figures



Source: Deane Consulting, Inc

Figure 3.7-7

Western Drainage Precipitation and Ruby Springs Discharge

PMC®

Surface water quality at the White Knob/White Ridge Limestone Quarries area is generally related to storm flow because there are no perennial streams, other than those that flow for a short duration from a spring source. The White Knob Quarry currently has an Industrial Storm Water Pollution Prevention Plan (SWPPP) (Stantec 2008) under the State Water Resources Control Board's (SWRCB) Water Quality Order No. 97-03-DWQ and National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000001, Waste Discharge Identification (WDID) 736I000880.

The project's SWPPP has been approved by the SWRCB and will continue until mining ceases. The plan includes specific prohibitions, effluent limitations, stormwater pollution prevention plans, including source identification, practices to reduce pollutants, assessment of pollutant sources, materials inventory, preventive maintenance program, spill prevention and response procedures, general stormwater management practices, training, record keeping, sampling procedures, and monitoring program.

All operations on-site comply with the NPDES General Permit for Storm Water Discharges associated with industrial activities and employ stormwater best management practices (BMPs) during construction and mining operations, and temporary cessation of mining operations. NPDES goals are to eliminate unauthorized non-stormwater discharges and to monitor stormwater discharge requirements.

WATER AVAILABILITY AND USE

The project site is not in the service area of a public water supplier, but it is within the boundaries of the Mojave Water Agency (MWA). The MWA is a State Water Project contractor, a regional groundwater management agency, and serves as Watermaster for the adjudicated Mojave Basin. The MWA published its Nineteenth Annual Report for the 2011–12 Water Year on May 1, 2013. The report summarizes information required by the adjudication judgment and includes a summary of the Watermaster's activities and water supply conditions for the water year. [2]

Water used to control dust is obtained from two previously permitted sources: a well located at the plant site in Lucerne Valley and a well located in Crystal Creek Canyon near Turnout 5 on the Crystal Creek haul road. These water sources will be used to meet water demands of the proposed operations. No substantial changes in overall water use are proposed. Both existing wells are permitted by the State Water Resources Control Board and the County of San Bernardino Department of Environmental Health Services (Permit #06259026) (see Appendix C2 of the Amended Reclamation Plan). The plant well has been assigned recordation number 36011 by the SWRCB. Bottled drinking water for employees at the mining area is brought to the site as necessary. No surface water is used in the operation.

The White Knob/White Ridge Limestone Quarries utilize a relatively small amount of groundwater during operations. Approximately 2.75 acre-feet of water are used annually for dust suppression in the quarries, overburden placement areas, haul/access roads, and at the crusher.

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[2] Subsequent to completion of the WSA in June 2013 and after the NOP/IS was released for public review in June 2013, the MWA published its Twentieth Annual Report of the Mojave Basin for Water Year 2012-2013, dated May 1, 2014 (MWA 2014). The Twentieth Annual Report presents the most current available information about conditions in the Este Subarea as of the publication date of this EIR. A review of the data in the Twentieth Annual Report indicates similar conditions to those in the Nineteenth Annual Report for the Este Subarea, including Omya's water use, and no substantial differences were identified.

Under the Mojave River adjudication, Omya has a verified base annual production allocation of 23 acre-feet per year for its two wells (MWA 2013). Water usage over the past six years (2007 through 2012) has been 19, 14, 14, 14, 14, and 14 acre-feet per year, respectively (MWA 2013). Approximately 2.75 acre-feet of this annual water is used for dust suppression at the White Knob/White Ridge Quarries site.

WATER POLLUTION CONTROL AND STORMWATER MANAGEMENT

For stormwater discharges associated with industrial activities, the SWRCB has adopted the Industrial Storm Water General Permit, SWRCB Order 97-03-DWQ, NPDES General Permit No. CAS000001 (General Industrial Permit). This permit regulates discharges associated with 10 broad categories of industrial activities, including hard rock and aggregate mining. Existing operations at the project site, as well as those activities proposed as part of the project, are and will be regulated under the General Industrial Permit (or an equivalent or more specific individual NPDES permit, as determined by the SWRCB). The General Industrial Permit serves to cover the operational life of an industrial activity. It requires the implementation of management measures that will achieve the performance standard of best available technology (BAT) economically achievable and best conventional pollutant control technology (BCT) in order to reduce or eliminate stormwater pollutants associated with industrial activity.

The General Industrial Permit also requires the development of a SWPPP and a monitoring and reporting program. In the SWPPP, sources of pollutants are to be identified and the means to manage these sources to reduce stormwater pollution are to be described (e.g., best management practices [BMPs]). The General Industrial Permit also requires that an annual report be submitted by July 1 of each year. The Omya White Knob Quarry currently has a General Industrial Permit for Storm Water that was approved in March 1992. Omya prepares and submits annual stormwater discharge reports, which contain the results of sampling and/or other runoff monitoring that occur during any given year. These records and the requirements included in the federal Clean Water Act ensure that water quality is maintained. See Appendix J of the 2013 Amended Reclamation Plan for the cover sheet of Omya's current SWPPP (Stantec 2008).

California adopted the Aboveground Petroleum Storage Act (APSA) in 1990 (California Health and Safety Code Sections 25270–25270.13), which implemented the requirements of the Federal APSA, Code of Federal Regulations, Title 40, Chapter I, Subchapter D, Part 112 (commencing with Section 112.1) (40 CFR 112). In January 2008, amendments to the California APSA gave the Certified Unified Program Agencies (CUPAs) the responsibility and authority to implement the APSA program.

The APSA requires facilities storing a combined volume of petroleum products equal to or greater than 1,320 gallons in one or more aboveground tanks or containers to file a storage statement with the local CUPA and prepare a spill prevention, control, and countermeasures plan (SPCC). The plan must identify appropriate spill containment measures and equipment for preventing and containing spills, as well as discuss facility-specific requirements for the storage system, inspections, recordkeeping, security, and personnel training. All petroleum base materials that are used or stored at the project, including motor oil (new and used), diesel fuel, hydraulic fluids, and lubrication oil, are covered under the SPCC. Fuels contained in tanks on mobile equipment and vehicles do not count toward the cumulative APSA storage volume, but a spill from these tanks and vehicles would be controlled using measures provided in the SPCC.

The existing SWPPP and SPCC for Omya's Lucerne Valley operations would continue to cover industrial activities at the White Knob/White Ridge Quarries until mining ceases. The SWPPP will be updated to account for the modification of stormwater control and conveyance features contemplated in the proposed 2013 Amended Reclamation Plan. The SWPPP will be updated, if necessary, to address the provisions of the amendment to the General Industrial Storm Water Permit currently being processed by the State Water Resources Control Board.

Erosion and Sedimentation Control

Omya has been working with San Bernardino County, the Bureau of Land Management (BLM), the California Department of Fish and Wildlife, the California Department of Conservation, Office of Mine Reclamation (OMR), and consultants to design and implement drainage control improvements along roads and other mine facilities (EIR Appendix G, Stantec 2011). Existing erosion and sedimentation controls are inspected by both Omya California and government agency personnel, and are maintained as necessary. The objective of all drainage control measures is to limit runoff to minimize or prevent erosion and to promote settling of suspended solids before the runoff leaves the site.

The April 20, 2011, Settlement Agreement with the BLM includes as Part B a section entitled "Repair, Remediate, and Monitor Improvements to the White Knob Quarry Right-of-Way Access Road and Associated Facilities to Protect Drainages." Stantec (2011) prepared the *White Knob Quarry Haul Road Drainage Report and Plan of Development* (Plan of Development) to analyze the existing drainage conditions at the quarry and along the haul road, and to provide recommendations for facilities to control stormwater and sediment runoff and provide protection to surrounding drainages.

Sediment and Debris Production Calculations

Sediment and debris production calculations for the White Knob/White Ridge Limestone Quarries utilize the methods outlined in the Los Angeles County, Department of Public Works *Sedimentation Manual*, 2nd Edition (Los Angeles County 2006; EIR Appendix G, Stantec 2011). This method determines the debris production for a Design Debris Event, which is defined as the quantity of sediment produced by a saturated watershed significantly recovered from a burn (after four years) as a result of a 50-year, 24-hour rainfall amount. The project site is located on the north-facing slope of the San Bernardino Mountains above the Lucerne Valley. For purposes of debris production analysis, this area is assumed to be similar to the north-facing slope of the San Gabriel Mountains above the Antelope Valley.

The manual calculates the potential debris volume using different Debris Production Area (DPA) zones. For the project, the Valyermo and Mescal Creek quadrangle maps in Appendix A of the *Sedimentation Manual* were used. The upper slope areas of these maps are in DPA Zones 3 and 5, while the lower elevations are in DPA Zones 8 and 9. The delineation between upper slopes and lower elevations varies from elevation 4,500 to 5,000 feet amsl.

Based on field observations and comments from Omya quarry staff, the undisturbed land surrounding the quarry and haul road has relatively light debris production. Because of this, undisturbed areas were assumed to be in DPA Zone 9, while disturbed areas (quarry and haul road) were be assumed to be in DPA Zone 5.

There are eight existing debris basins along the haul road from the quarry site to the drainage near Turnout 64. According to quarry staff, the upper four basins, from the quarry to the area near the explosives storage facility (see **Figures 3.7-2** and **2.0-2**), routinely fill up with sediment and debris, fail, and allow debris to flow down to the next basin. These upper four basins do not have overflow spillways, which seems to be the primary cause of these failures. The four basins between the explosives storage facility and Turnout 64 have spillway structures and have not experienced failure.

For these reasons, the debris production calculations were performed for two major areas: (1) the entire area tributary to the two basins near the explosives storage facility, and (2) the area between these two basins and Turnout 64. The location of the explosives storage facility is also a logical breaking point in the study because at this point the drainage can easily leave the roadway and return to its natural drainage course (EIR Appendix G, Stantec 2011).

- The drainage tributary to the basins near the explosives storage facility is 350.81 acres, of which 25.40 acres are disturbed (a portion of the quarry and the haul road). Using the above assumptions for debris production areas, this drainage area can be expected to produce 7,729 cubic yards of debris and sediment (3,254 cubic yards from the disturbed area and 4,475 from the undisturbed area).
- The drainage tributary to the haul road from the explosives storage facility to Turnout 64 is 30.13 acres, of which 3.62 acres are disturbed. Debris production from this area is expected to be 1,147 cubic yards of debris and sediment (464 cubic yards from the disturbed area and 683 from the undisturbed area).

On-Site Haul Road

The on-site haul road within the quarry area from the crusher area to the northeast corner of the project site east of overburden stockpile #1 (OB-1) carries stormwater from the southern quarry areas northward. The area where the haul road is located does not have the width to design a separate drainage channel. The 2011 Stantec study determined that the required 4-foot berms on each side (or a hillside slope or eventually the side slope of OB-1), as required for truck safety per the Mine Safety and Health Administration (MSHA), are adequate to contain the 10-year design flow and the 100-year flow within the roadway with over 2 feet of freeboard. The proposed haul road improvements would be graded with a 2 percent cross fall and berm openings for the sediment catchment basins. Omya is aware that roadway damage may occur during heavy storms, but has adequate on-site equipment and aggregate materials to quickly make repairs.

Quarries

Existing and future mining activities will create and/or deepen the pit floors at each of the three quarries, White Knob, Annex, and White Ridge. Stormwater runoff from slopes, highwalls, benches, roads, and ramps along with any sediment will be directed into the mined-out portion of the quarry or into sediment sumps located down the haul roads in the vicinity of OB-1. In the Annex and White Ridge Quarries, the final floor elevation would be lower than the exit roadways, thereby creating infiltration ponds that would be approximately 75 to 95 feet deep, which should be adequate to contain a 20-year/1-hour precipitation event. Therefore, much of the rainfall in these quarries would infiltrate rather than run off, and sediment would be trapped.

Sediment Catchment Basins

There are currently eight sediment catchment basins from the quarry site to Turnout 64: Sediment Basins 1, 3, 4, and 5 along the haul road, two just downstream outside of the quarry area (Basins 6 and 7), and Basins 8 and 9 farther down the haul road near Turnout 64 (**Figure 2.0-2**). The sediment debris production calculations determined that the four quarry area basins have a volume of 3,280 cubic yards, which is less than half of the 7,729 cubic yards of sedimentation predicted from the design 50-year, 24-hour rain event (**EIR Appendix G**, Stantec 2011). Improvements to these four basins and the construction of an additional basin, proposed Basin 2, would increase the pond volume to 8,190 cubic yards, which is sufficient to hold the anticipated sedimentation.

Culvert Design and Riprap

The portion of the project access haul road running generally east–west from the Lucerne Valley Processing Plant to approximately Turnout 64 has 14 culverts and 6 Arizona crossings (see **Figure 2.0-2**). The hydraulic design of the culverts was completed in 1987 Morrison-Knudsen Engineers, Inc. The capacities of the existing haul road culverts were checked relative to the predicted 20-year stormwater flow, which are shown in **Table 3.7-4**. The capacities of the existing haul road culverts were checked relative to the predicted 10-year and 20-year stormwater flows (see Section 2.4 in Stantec 2011 and Section 2.3 in Stantec 2013 and **Table 3.7-4**). All culverts had adequate capacity for a 10-year storm, with the exception of the 36-inch corrugated metal pipe at haul road station 54+35, Culvert 5. Analysis for a 20-year storm event (**EIR Appendix G**, Stantec 2013) found that 8 of the 14 culverts would be overtopped (**Table 3.7-4**). However, capacities of 5 of the 8 culverts are near the 20-year flow. Because of the difficult nature of predicting flows in an alluvial fan and the fact that these culverts have been in place for 26 years without reported problems, Stantec concluded that the culverts are adequately sized.

The lower haul road culverts appear to have been provided with outlet riprap protection in accordance with the 1987 Morrison-Knudsen plans. Although Stantec didn't have the original specifications for the riprap, both the thickness called out and their field observations indicate it is equivalent to a California Department of Transportation (Caltrans) Light Class riprap gradation. The 2011 Stantec report concluded that with the exception of the culverts at Stations 154+20 (Culvert 12), 170+50 (Culvert 13), and 182+00 (Culvert 14), the riprap size provided in the 1987 Morrison-Knudsen plans is adequate. The 2013 Stantec report in Section 2.4 concluded that protection for the 20-year flow requires riprap size greater than what they recommended in their 2011 report for the three culverts at Stations 19+00 (Culvert 2), 54+35 (Culvert 5), and 182+00 (Culvert 14) (see **Table 3.7-5**).

TABLE 3.7-4
CULVERT HYDRAULICS

Culvert No.[1]	Station	CMP Culvert Size (in)[2]	20-Year Flow (cfs)[3]	Headwater Depth (ft)[4]	Outlet Velocity (fps)[5]	Overtopping?
1	17+70	24	25	4.40	8.74	Yes
2	19+00	48	112	5.30	15.37	Yes
3	43+50	24	25	4.48	8.53	No
4	49+35	36	62	5.81	13.48	Yes
5	54+35	36	62	3.33	11.48	Yes
6	57+75	48	112	6.48	10.39	Yes
7	62+30	24	25	4.33	9.33	Yes
8	88+15	24	25	4.52	10.92	No
9	90+00	24	25	4.16	10.40	Yes
10	144+70	36	35	3.34	15.84	No
11	150+40	36	44	3.99	15.16	No
12	154+20	36	95	8.02	20.16	Yes
13	170+50	36	79	8.34	18.98	No
14	182+00	84	326	8.54	27.85	No

Source: EIR Appendix G, Stantec 2013
1. Culvert station number given on Morrison-Knudsen Engineers 1987 plans for haul road; culvert number corresponds to Figure 2.0-2.
2. in = inches in diameter
3. cfs = cubic feet per second
4. ft = feet
5. fps = feet per second

To check the adequacy of the culvert outlet protection, Stantec utilized the methods outlined in Section 10.2 of the Federal Highway Administration's (2006) Hydraulic Engineering Circular 14, Third Edition. This method sizes a riprap apron with the following configuration:

- The required riprap rock size is determined based on the design discharge, culvert diameter, and tail water depth.
- All of the culverts are steep enough to have supercritical flow, so the culvert diameter used in the equation is adjusted based on the normal flow depth in the culvert.
- Once the rock size is determined, the apron dimensions are determined from a table found in Hydraulic Engineering Circular 14.

Calculations for the individual culvert locations are summarized in **Table 3.7-5,** and the calculations are in Appendix G of the 2011 Stantec report and in the September 12, 2013, Stantec technical memorandum[3]. The riprap class and required thickness are based on Caltrans Standard Specifications.

TABLE 3.7-5
CULVERT RIPRAP SIZE AND THICKNESS[1]

Culvert No.	Station	Pipe Size (in)[2]	Apron Class	Apron Length (ft)[3]	Required Riprap D_{50} Size (ft)[3]	Required Riprap D_{50} Weight (lbs)[4]	Specified Riprap Class	Riprap Thickness (ft)[3]
1	17+70	24	3	10	0.80	44.4	Light	2.5
2	19+00	48	4	28	1.57	333.6	¼ Ton	3.3
3	43+50	24	3	10	0.82	48.4	Light	2.5
4	49+35	36	5	21	1.24	166.2	Light	2.5
5	54+35	36	4	21	1.41	243.3	¼ Ton	3.3
6	57+75	48	4	28	1.21	153.3	Light	2.5
7	62+30	24	3	12	0.84	51.2	Light	2.5
8	88+15	24	3	12	0.90	63.1	Light	2.5
9	90+00	24	3	12	0.90	63.8	Light	2.5
10	144+70	36	3	15	0.74	34.4	Light	2.5
11	150+40	36	4	18	0.92	68.3	Light	2.5
12	154+20	36	6	24	2.36	1142.5	1 Ton	5.4
13	170+50	36	6	24	1.78	488.5	¼ Ton	3.3
14	182+00	84	5	56	2.01	702.9	1/2 Ton	4.3

Source: EIR Appendix G, Stantec 2013
1. Riprap, class, size, and thickness based Caltrans standard specifications.
2. in = CMP diameter in inches
3. ft = feet
4. lbs = pounds

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3 The 2011 Stantec report and the 2013 Stantec technical memorandum are included in **EIR Appendix G**.

Incidental Boulder Roll

Boulder rolling and surficial sliding of side-cast overburden material has occurred on the slopes northwest and north of the White Knob Quarry. In the past, the side-casted overburden material on the northwestern slope has been transported downslope during high intensity rainfall events and deposited in the Western Drainage and in the upper portions of the Central Drainage. The Western Drainage eventually drains to Ruby Springs, one of several areas of natural springs that occur along the faulted flank of the San Bernardino Mountains. The impacts on the Western Drainage and Ruby Springs are discussed in greater detail in Section 3.5, Geology and Soils.

All White Knob/White Ridge Limestone Quarries operations comply with the requirements of the Industrial Storm Water General Permit, SWRCB Order 97-03-DWQ, NPDES General Permit No. CAS000001. Activities associated with minimizing impacts from stormwater discharge associated with industrial activities employ stormwater BMPs during construction, operations, and temporary cessation of operations. The procedures implemented in 2003 to minimize incidental boulder rolling are part of the SWPPP best management practices. NPDES goals are to eliminate unauthorized non-stormwater discharges and to monitor stormwater discharge requirements. Omya prepares and submits annual stormwater discharge reports, which contain the results of sampling and or other runoff monitoring that occur during any given year. These records and the requirements included in the federal Clean Water Act ensure that water quality is maintained.

3.7.2 REGULATORY FRAMEWORK

FEDERAL

Clean Water Act

The Clean Water Act (CWA) regulates the water quality of all discharges into waters of the United States, including wetlands and perennial and intermittent stream channels. Section 401, Title 33, Section 1341 of the CWA sets forth water quality certification requirements for "any applicant applying for a federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters."

Section 303(d) of the Clean Water Act requires that all states in the United States identify water bodies that do not meet specified water quality standards and that do not support intended beneficial uses. Identified waters are placed on the Section 303(d) List of Impaired Waters. Once placed on this list, states are required to develop a water quality control plan—called a Total Maximum Daily Load (TMDL)—for each impacted water body and each associated pollutant/stressor. TMDLs are discussed in more detail below.

The CWA contains two strategies for managing water quality: (1) a technology-based approach that envisions requirements to maintain a minimum level of pollutant management using the best available technology; and (2) a water quality–based approach that relies on evaluating the condition of surface waters and setting limitations on the amount of pollution to which the water can be exposed without adversely affecting the beneficial uses of those waters.

National Pollutant Discharge Elimination System

The National Pollutant Discharge Elimination System (NPDES) permits are issued for waste discharges to surface waters pursuant to the federal Clean Water Act and regulations. California is one of the states authorized to issue NPDES permits in lieu of direct regulation by the U.S.

Environmental Protection Agency (EPA). California Water Code Sections 13370–13389 provide the statutory authority for the State Water Resources Control Board and Regional Water Quality Control Boards (RWQCBs) to implement the NPDES permit program. The SWRCB and the nine RWQCBs preserve and enhance the quality of the state's waters through the development of water quality control plans (Basin Plans) and the issuance of waste discharge requirements (WDRs). In California, discharges to surface waters require dual permits—the WDRs (state) and NPDES (federal) that are issued by either the Regional Water Quality Control Boards or the State Water Resources Control Board whenever the discharge occurs in more than one region. The SWRCB has issued two general permits for stormwater dischargers in California, one applying to industrial dischargers, SWRCB Order 97-03-DWQ, NPDES General Permit No. CAS000001, and the other relating to construction activities, SWRCB Order 2012-0006-DWQ (amends 2009-0009-DWQ), CAS000002.

The NPDES was established by the Clean Water Act to regulate municipal and industrial discharges to surface waters of the United States. Each NPDES permit contains limits on allowable concentrations and mass emissions of pollutants contained in the discharge. Sections 401 and 402 of the act contain general requirements regarding NPDES permits. Section 307 of the CWA describes the factors that the EPA must consider in setting effluent limits for priority pollutants. The purpose of the NPDES program is to establish a comprehensive stormwater quality program to manage urban stormwater and minimize pollution of the environment to the maximum extent practicable. The NPDES program consists of (1) characterizing receiving water quality, (2) identifying harmful constituents, (3) targeting potential sources of pollutants, and (4) implementing a comprehensive stormwater management program.

In California water quality law, the Porter-Cologne Water Quality Control Act, California Water Code Section 13000 et seq. (Porter-Cologne Act,) requires each RWQCB to formulate and adopt Basin Plans for all areas in its region, which designate beneficial uses of water and establish water quality objectives to protect those uses. It also requires that a program of implementation be developed that describes how water quality standards will be attained. The Basin Plan provides narrative and numeric water quality objectives and standards to protect the beneficial uses of California's surface water and groundwater. A Basin Plan is used to set effluent limitations implementing the water quality objectives adopted by a RWQCB or the SWRCB, or water quality criteria promulgated by the Environmental Protection Agency. NPDES and WDR permits specify effluent limitations and other provisions that must be achieved to assure compliance with the water quality objectives of the affected receiving waters and protection of the beneficial uses of those waters. The water quality objectives can vary between RWQCBs and basins in one region because of variations in background water quality and beneficial uses.

Individual NPDES Permits

All point source discharges to waters of the United States not covered by a general permit are required to apply for an individual federal NPDES permit. In California, either an RWQCB or the SWRCB, when discharges cross regional boundaries, issues a NPDES permit that also serves as state waste discharge requirements, along with a monitoring and reporting requirements to ensure compliance with the Clean Water Act and the Porter-Cologne Act. The RWQCB will deny or limit a mixing zone and dilution credit as necessary to protect the beneficial use of state waters.

Total Daily Maximum Load

Section 303(d) of the CWA requires that states make a list of waters that are not attaining standards after the technology-based limits are put into place. For waters on this list, states develop Total Maximum Daily Loads. A TMDL must account for all sources of the pollutants that caused the water to be listed. Federal regulations require that the TMDL, at a minimum, account for contributions from point sources (federally permitted discharges) and contributions from nonpoint sources. The EPA is required to review and approve the list of impaired waters and each TMDL. If the Environmental Protection Agency cannot approve the list or a TMDL, the EPA is required to establish them for the state.

TMDLs are established at the level necessary to implement the applicable water quality standards. A TMDL requires that all sources of pollution and all aspects of a watershed's drainage system be reviewed, not just the pollution coming from discrete conveyances (known as point sources), such as a discharge pipe from a factory or a sewage treatment plant. Point sources are defined in the Clean Water Act, Section 502.

"Nonpoint source" pollution (also called polluted runoff) is the release of pollutants from everything other than point sources. These include landscape-scale sources such as stormwater and agricultural runoff, and dust and air pollution that find their way into water bodies. Nonpoint source pollution is not typically associated with discrete conveyances. Nonpoint sources are not defined by statute, but are considered everything that is not covered under the point source definition.

Although the Clean Water Act does not require the implementation of TMDLs, CWA Sections 303(d) and 303(e) and their implementing regulations require that approved TMDLs be incorporated into Basin Plans. In addition, the EPA regulations (40 CFR 122) require that National Pollutant Discharge Elimination System permits be consistent with any approved TMDL. Federal regulation also requires that implementation plans be developed along with the TMDLs. The SWRCB has interpreted state law, the Porter-Cologne Act, to require that implementation be addressed when Total Maximum Daily Loads are incorporated into Basin Plans.

There are a number of 303(d) listed in San Bernardino County including: Deep Creek, Mojave River, Green valley Lake Creek, Sheep Creek, Holcomb Creek, Big Bear Lake, Searles Lake, Colorado River, as well as, as others (DWR 2010). However, all drainages on the project site do not connect to any listed 303(d) waters.

Federal Flood Insurance Program

Congress passed the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 with the intent to reduce the need for large publicly funded flood control structures and disaster relief by restricting development on floodplains. The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program to provide subsidized flood insurance to communities that comply with FEMA regulations limiting development on floodplains. FEMA issues Flood Insurance Rate Maps (FIRMs) for communities participating in the National Flood Insurance Program. FIRMs delineate flood hazard zones in the community.

STATE

Surface Mining and Reclamation Act (SMARA)

The County of San Bernardino is the SMARA lead agency for the White Knob/White Ridge Limestone Quarries and the CEQA lead agency for this project. SMARA contains a number of provisions addressing geotechnical and slope stability issues (see Section 3.5, Geology and Soils, for further detail) as well as drainage diversion structures, waterways (14 California Code of Regulations (CCR) (14 CCR Section 3706) and stream protection, including surface water and groundwater (14 CCR Section 3710). SMARA also requires that erosion control methods be designed for the 20-year/1-hour intensity storm event (14 CCR Section 3706(d)) and control erosion and sedimentation (14 CCR Section 3706(c)). The SMARA regulations also require reclamation plans to include performance standards for drainage and erosion to protect water quality, including streams, surface water, and groundwater. These performance standards must ensure compliance with the Clean Water Act, the Porter-Cologne Act, and other legal requirements (14 CCR Sections 3706, 3710(a)).

Porter-Cologne Water Quality Act

The Porter-Cologne Act, California Water Code Section 13000 et seq., is the principal law governing water quality control in California. It establishes a comprehensive program to protect water quality and the beneficial uses of waters of the State. The act applies broadly to all state waters, including surface waters, wetlands, and groundwater; it covers waste discharges to land as well as to surface water and groundwater, and applies to both point and nonpoint sources of pollution. Basin Plans designate beneficial uses of water and establishes water quality objectives to protect those uses. The beneficial use designations and water quality objectives in a Basin Plan, together with the state's anti-degradation policy (SWRCB Resolution No. 68-16), constitute water quality standards for purposes of the federal Clean Water Act.

The Porter-Cologne Act governs the coordination and control of water quality in the state and provides that "all discharges of waste into the waters of the State are privileges, not rights." Furthermore, all dischargers are subject to regulation under the Porter-Cologne Act including both point and nonpoint source dischargers. The SWRCB and RWQCBs have permitting authority in the form of waste discharge requirements (WDRs), waivers of WDRs, and Basin Plan prohibitions to address ongoing and proposed waste discharges. Permits take into consideration the beneficial uses to be protected, the water quality objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and the provisions of California Water Code Section 13241.

With the exception of persons discharging into community sewer systems, any person discharging or proposing to discharge waste that could affect water quality must file a report of waste discharge with the appropriate Regional Water Quality Control Board, unless the RWQCB waives the filing. A report of waste discharge also is required if a discharger proposes a material change in the character, volume, or location of a discharge. The RWQCB must then determine the appropriate action to take, either issuing WDRs to the discharger or conditionally waiving the requirements. WDRs can prohibit the discharge of waste or certain types of waste, either under specific conditions or in specified areas. As an alternative, the RWQCB may prohibit the discharge of waste or certain types of waste in a Basin Plan. A categorical waiver of waste discharge requirements, for instance, could be adopted as a RWQCB Basin Plan amendment. The SWRCB and RWQCBs have broad discretion in how they use the administrative tools provided by the Porter-Cologne Act.

State Water Resources Control Board and Regional Water Quality Control Boards

The State Water Resources Control Board is a statewide agency that has, as one of its responsibilities, the administrative oversight of the nine Regional Water Quality Control Boards (RWQCBs) that together with the SWRCB are responsible for preserving California's water quality. The RWQCBs issue waste discharge permits (WDRs), take enforcement action against violators, and monitor water quality. The SWRCB and the RWQCBs jointly administer most of the federal clean water laws. However, the SWRCB retains oversight responsibility and, like the EPA, may intervene if it determines a project is not in compliance with SWRCB regulations. The SWRCB sets statewide policies and develops regulations for the implementation of water quality control programs mandated by state and federal water quality statutes and regulations. The RWQCBs develop and implement Basin Plans that consider regional beneficial uses, water quality characteristics, and water quality problems. The water quality regulations vary between RWQCBs even in one region. The SWRCB has sole authority in the administration of California's system of water rights.

In San Bernardino County, regulation of water quality is made even more complex by the fact that watersheds in the county may lie within more than one RWQCB jurisdiction (Santa Ana Region, Lahontan Region, and Colorado River Region), have point and/or nonpoint source pollution, and be affected by multiple pollutants, each with different health implications and necessitating different cleanup strategies (San Bernardino County 2006, p. 6-126).

The Omya White Knob/White Ridge Quarries are in a surface water basin that is overseen by the Colorado River Basin Regional Water Quality Control Board (Colorado River RWQCB). Interestingly, the Fifteenmile Valley groundwater basin to which the project groundwater drains is technically under the jurisdiction of the Colorado River RWQCB, while the direction of groundwater flow is toward the Mojave River, because of the Helendale fault (**Figure 3.7-4**), which is part of the Lahontan Regional Water Quality Control Board.

Department of Water Resources

The Department of Water Resources' major responsibilities include preparing and updating the California Water Plan to guide development and management of the state's water resources, planning, designing, constructing, operating, and maintaining the State Water Resources Development System, regulating dams, providing flood protection, assisting in emergency management to safeguard life and property, educating the public, and serving local water needs by providing technical assistance. In addition, the department cooperates with local agencies on water resources investigations, supports watershed and river restoration programs, encourages water conservation, explores conjunctive use of groundwater and surface water, facilitates voluntary water transfers, and, when needed, operates a state drought water bank.

LOCAL

County of San Bernardino Flood Control District

The San Bernardino County Flood Control District was formed in the aftermath of the disastrous March 1938 floods, which took many lives and caused millions of dollars in property damage. The district exercises control over all main streams in the county; acquires right-of-way for all main channels; and constructs, channels, and has carried out an active program of permanent channel improvements in coordination with the U.S. Army Corps of Engineers. Through the years, the district has been primarily concerned with control of floodwaters in major watercourses and channels under the district's jurisdiction. Due to the vastness of the county, it has been impossible for the district to provide assistance to individual property owners countywide (San Bernardino County 2006, p. IV-85).

San Bernardino Development Code

Division 2, Land Use Zoning Districts and Allowed Land Uses

Chapter 82.14.000 of the Development Code provides for greater public safety, promotes public health, and minimizes public and private economic losses due to flood conditions by establishing regulations for development and construction within flood prone areas. The overlays described in Chapter 82.14.000 are applied to areas of special flood hazard identified by FEMA or the Federal Insurance Administration. A project proposed in one of these areas is subject to Flood Hazard Development Review. This review ensures that a proposed project complies with the Development Code regarding flood protection measures and requires the submittal of an elevation certificate completed by a land surveyor, engineer, or architect who is authorized by state or local law to certify elevation information. In areas where no regulatory floodway has been designated, no new construction, substantial improvement, or other development (including fill) is permitted in any flood zone areas designated by FEMA, unless it is demonstrated that the cumulative effect of the proposed development when combined with all other existing and anticipated development will not increase the water surface elevation of the base flood more than 1 foot at any point in the community.

Division 5, Permit Application and Review Procedures

Chapter 85.07.000 of the Development Code provides a process for Flood Hazard Development Review. Section 85.11.030 (Soil Erosion Pollution Prevention and Inspection Required) of Chapter 85.11.000 (Preconstruction Flood Hazard and Soil Erosion Pollution Prevention Inspection) requires a County-approved soil erosion pollution prevention plan prior to issuance of any development permit or authorization of any land-disturbing activity of more than 1 acre.

County of San Bernardino Surface Mining and Reclamation Overlay

The County of San Bernardino Surface Mining and Reclamation Overlay, Chapter 88.03.000 of the San Bernardino County Development Code, was adopted in order to comply with and implement the provisions of SMARA by adopting procedures for reviewing, approving, and/or permitting surface mining operations, reclamation plans, and financial assurances in the unincorporated areas of the county. The overlay sets forth the general procedural, operational, and reclamation requirements that must be complied with, where applicable, by surface mining and production operations in the county. The overlay contains requirements for the content of a reclamation plan, the review procedure, and mining standards. Applicability of the County's SMARA Overlay to California SMARA law and regulation is found in Section 88.03.090(a)(1) and (a)(2), which require reclamation plans to comply with Public Resources Code Sections 2777–2773 and California Code of Regulations Sections 3500–3505 and 3700–3713. In addition, performance standards in Division 3, Section 88.03.090(b), of the San Bernardino County Countywide Development Standards also apply to reclamation plans.

County of San Bernardino General Plan

The General Plan includes policies and programs that are intended to address hydrology and water quality–related issues and to guide future development in a way that lessens hydrologic impacts. For instance, the General Plan requires program review and permitting procedures for proposed land uses that have the potential to introduce hazardous substances. There is also a provision for the inspection of hazardous material handlers and hazardous waste generators. The following General Plan policies and programs that pertain to the proposed project assist in the protection of water quality in the county:

Policy CO 5.1 Because the San Bernardino County Flood Control District is responsible for debris basin construction and maintenance at the base of the mountains, development in these areas will be coordinated with that agency.

Policy CO 5.4 Drainage courses will be kept in their natural condition to the greatest extent feasible to retain habitat, allow some recharge of groundwater basins and resultant savings. The feasibility of retaining features of existing drainage courses will be determined by evaluating the engineering feasibility and overall costs of the improvements to the drainage courses balanced with the extent of the retention of existing habitat and recharge potential.

Programs

1. Seek to retain all natural drainage courses in accordance with the Flood Control Design Policies and Standards where health and safety is not jeopardized.

2. Prohibit the conversion of natural watercourses to culverts, storm drains, or other underground structures except where required to protect public health and safety.

5. When development occurs, maintain the capacity of the existing natural drainage channels where feasible, and flood-proof structures to allow 100-year storm flows to be conveyed through the development without damage to structures.

7. Where technically feasible as part of its efforts to protect residents from flood hazards, require naturalistic drainage improvement where modifications to the natural drainage course are necessary. As an example, channel linings that will allow the re-establishment of vegetation within the channel may be considered over impervious linings (such as concrete). Where revegetation is anticipated, this must be addressed in the channel's hydraulic analysis and the design of downstream culverts.

9. Do not place streams in underground structures where technically feasible, except to serve another public purpose and where burial of the stream is clearly the only means available to safeguard public health and safety.

Policy M/CO 3.1 Utilize open space and drainage easements as well as clustering of new development as stream preservation tools.

Policy M/CO 3.2 Require naturalistic drainage improvements where modifications to the natural streamway are required.

Policy M/CO 3.3 Prohibit exposed concrete drainage structures. Acceptable designs include combinations of earthen landscaped swales, rock rip-rap lined channels or rock-lined concrete channels. Property owners must provide for the maintenance of underground drainage structures.

Policy M/CO 3.6 Minimize the runoff of surface water and establish controls for soil erosion and sedimentation through the following policies:

a. Through the development review process, require replanting of ground cover in denuded areas with vegetation, either indigenous to the area or compatible with the climate and soil characteristics of the region.

b. When development occurs, provide for the retention of natural drainage channels and capacity of the site where feasible.

c. When feasible, require developers, through the development review process, to maintain existing percolation and surface water runoff

3.7.4 IMPACTS AND MITIGATION MEASURES

STANDARDS OF SIGNIFICANCE

The impact analysis provided below is based on the following State CEQA Guidelines Appendix G thresholds of significance, as well as criteria utilized in the General Plan EIR for the evaluation of hydrology and water quality impacts of the General Plan (San Bernardino County 2006, p. IV-87).

1) Violate any water quality standards or waste discharge requirements.
2) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).
3) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site.
4) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.
5) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.
6) Otherwise substantially degrade water quality.
7) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.
8) Place within a 100-year flood hazard area structures that would impede or redirect flood flows.
9) Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of a failure of a levee or dam.
10) Inundation by seiche, tsunami, or mudflow.

The Initial Study prepared for the proposed project (see **EIR Appendix A**) determined that there would be a less than significant impact or no impact related to the following: violation of any water quality standards or waste discharge requirements or otherwise substantially degrade water quality, substantially deplete groundwater supplies or interfere substantially with groundwater recharge, place housing within a 100-year flood hazard area, impede or redirect flood flows, expose persons or structures to inundation by dam or levee failure or seiche, tsunami or mudflow (standards of significance 1, 2, 6, 7, 8, 9, and 10).

The reader is referred to the NOP/IS for a complete analysis of these impact areas. A copy of the NOP/IS, along with comments received during the public review period, is contained in **EIR Appendix A**.

METHODOLOGY

The following impact analysis is based on independent review of project-specific hydrological data, and analyses and findings that have been developed by the project's hydrological consultants.

PROJECT IMPACTS AND MITIGATION MEASURES

Substantially Alter Drainage Pattern (Standards of Significance 3, 4, and 5)

Impact 3.7.1 The project will substantially alter the existing drainage pattern in the quarry area, while maintaining the existing haul road drainage. Quarrying will remove existing vegetation and soils and expose bedrock, thereby potentially increasing the amount of runoff. Overburden and mine waste materials will be placed into existing drainages, creating three sloped fills, and will backfill the lower portion of the White Knob Quarry, thereby increasing the potential for sedimentation and erosion. This would result in a **potentially significant** impact.

Numerous erosion and sedimentation controls currently exist in the mining and stockpile areas and along the haul road to limit runoff, to minimize or prevent erosion, and to promote settling of suspended solids before the runoff leaves the site. Along the haul road, runoff is contained within the roadway by berms. As part of the proposed project, the roadway would be graded to direct runoff into catchment basins. In the quarries, runoff from slopes, benches, roads, and ramps would be directed into the mined-out portion of the quarries or into sediment sumps located near OB-1, OB-2, and OB-3.

Existing and future mining activities would create and/or deepen the pit floors at each of the three quarries, White Knob, Annex, and White Ridge. Stormwater runoff from slopes, benches, roads, and ramps along with any sediment would be directed into the mined-out portion of the quarry or into sediment sumps located down the main haul road in the vicinity of OB-1.

For the White Knob Quarry, the final backfill would be designed to act as a permanent sediment basin for future sediment control by sloping the drainage toward the west into the quarry walls with sufficient capacity to handle potential runoff for a 20-year/1-hour precipitation event. A small berm of approximately 5 feet in height may also be constructed along the 5,575-foot contour if needed. The drainage controls will minimize the potential for off-site transport and would eliminate any potential adverse effect on downstream property.

In the Annex and White Ridge Quarries, the final floor elevation would be lower than the exit roadways, thereby creating infiltration ponds that will be approximately 75 to 95 feet deep, which should be adequate to contain a 20-year/1-hour precipitation event. Stormwater runoff from slopes, benches, roads, and ramps along with any sediment would be directed into the mined-out portion of these quarries or into sediment sumps located down the main haul road in the vicinity of OB-1. Therefore, much of the rainfall in the quarries would infiltrate rather than run off, and sediment will be trapped.

Three main drainages cross the White Knob/White Limestone Ridge Quarries area, while the east–west haul road has 6 Arizona crossings and 14 culverts (see **Figures 2.0-2, 3.7-2,** and **3.7-3**). Stantec analyzed the hydrology for the project and determined that the capacities of the existing hydraulic structures, e.g., sedimentation basins, drainage conveyances, and haul road culverts, with some minor modification to the existing hydraulic structures, were adequate for the predicted 10-year stormwater flow, while most are marginal for a 20-year storm event. Stantec also recommended that the on-site haul road be graded with a 2 percent cross fall, that the road surface be an aggregate base course that is free of calcium carbonate materials, and that the low side of the roadway be determined by which side the next downstream catchment basin is on. These recommendations are included in mitigation measure **MM 3.7.1** item a. Stantec also concluded that the 4-foot-high earthen berms along the haul road are adequate to contain both the 10-year design flow and the 100-year flow within the roadway with over 2 feet of freeboard.

These lower haul road culverts appear to have been provided with outlet riprap protection in accordance with the 1987 Morrison-Knudsen plans. Although Stantec did not have the original specifications for the riprap, both the thickness called out and their field observations indicate it is equivalent to a Caltrans Light Class riprap gradation. The 2011 Stantec report concluded that with the exception of the culverts at Stations 154+20 (Culvert 12), 170+50 (Culvert 13), and 182+00 (Culvert 14), the riprap size provided in the 1987 Morrison-Knudsen plans is adequate. The 2013 Stantec report in Section 2.4 concluded that protection for the 20-year flow requires riprap size greater than what they recommended in their 2011 report for the three culverts at Stations 19+00 (Culvert 2), 54+35 (Culvert 5), and 182+00 (Culvert 14) (see **Table 3.7-5**). In addition, the length of protection downstream of the culvert outlet should be extended for all culverts to provide the length of protection shown in **Table 3.7-5**. These recommendations are included in mitigation measure **MM 3.7.1** item a.

There are eight existing debris basins along the haul road from the quarry site to the drainage near Turnout 64 (see **Figures 3.7-2** and **2.0-2**)**.** The upper four basins don't have overflow spillways and routinely fill up with sediment and debris, fail, and allow debris to flow down to the next basin. The lower four basins between the explosives storage facility and Turnout 64 have spillway structures and have not experienced failure. The sediment debris production calculations (**EIR Appendix G**, Stantec 2011) determined that the upper four quarry area basins have a volume of 3,280 cubic yards, which is less than half of the 7,729 cubic yards of sedimentation predicted from the design 50-year, 24-hour rain event. Improvements to these four basins and the construction of an additional basin, Basin 2, will increase the pond volume to 8,190 cubic yards, which is sufficient to hold the anticipated sedimentation.

The lower four sediment basins between the quarries and Turnout 64 already have adequate holding capacity with a calculated volume of 1,450 cubic yards versus an estimated sedimentation volume of 1,147 cubic yards. Although these lower four sediment basins have adequate capacity, Stantec recommended that an additional basin, Basin 10, be constructed further downhill because of the 1,000-foot distance between Basin 9 and the point where runoff leaves the roadway and flows to the 84-inch culvert (Culvert 14) near Turnout 64 (see **Figure 2.0-2**)**.** This recommendation is included in mitigation measure **MM 3.7.1** item a.

Sediment basins would be monitored, maintained, and excavated as necessary and sediment removed from the sites to an overburden site at the quarry. The basins and captured sediment would be maintained for the life of the quarry. Each basin site requires access, which will support loading and haulage equipment and would meet required federal MSHA safety standards. Access roads and sedimentation basins would be reclaimed as part of the long-term reclamation plan for the mine site. Details of these improvements to the sediment basins are shown in **Figure**

2.0-5 through **2.0-9** and given in Appendix E of the 2011 Stantec report (included in **EIR Appendix G**).

At the end of reclamation, the project would have eight permanent sediment basins. These basins would continue to trap sediment. Following reclamation, the volume of sedimentation from the mined lands should be near the pre-mining condition because the three quarries would trap runoff and associated sediment, which reduces the drainage area, and revegetation would bring the mined lands outside of the quarries back to a native condition. The purpose of the eight permanent sediment basins is discussed briefly below (Omya 2013; EIR Appendix G, Stantec 2011):

- Basin 1: Located at the base of the proposed OB-2 in a confined area with little room for expansion. A concrete spillway would allow overflow of the 10-year design storm without failure of the basin embankment.
- Basin 2: A new basin located in the upper drainage area about 400 feet north of Basin 1 with a designed volume of 960 cubic yards. Note that Basin 1 and Basin 2 would eventually be covered over with overburden during approximately the last 10 years of operations. After that time, stormwater and sediment would be redirected into the permanent sediment basin constructed on the floor of the former White Knob Quarry floor.
- Basin 3: An existing basin along the main haul road near the northwest corner of the White Ridge Quarry. This basin can not be expanded. A concrete spillway would allow overflow of the 10-year design storm.
- Basins 4 and 5: Located adjacent to each other at the east of the proposed OB-1 expansion area. These two basins will be combined into one basin with a concrete spillway from Basin 4 into Basin 5, and a concrete spillway with a 50-foot riprap apron from Basin 5 to the natural drainage to the north. Per Stantec's design, the bottoms of the basins would have a maximum grade of 10 percent and a total volume capacity of 6,380 cubic yards.
- Basins 11 and 12[4]: Future basins to be constructed on the northeast and north side of OB-1 to control potential runoff and sediment off of OB-1. Both would have riprap spillways that discharge into the natural drainages.
- Basin 13[5]: A future basin to be constructed at the toe of OB-3 to handle runoff and sediment from the east side of the White Ridge Quarry. Basin 13 would have a riprap spillway and discharge into the natural eastern drainage. The overburden stockpiles would be constructed with berms near the crest of the fill benches to prevent runoff over the fill slope. Typically, due to the porosity of the overburden, little runoff occurs. Drainage would be directed away from the rims. Riprap, catchment basins, and various energy dissipaters would be placed along the toe of fills as needed to trap sediment and minimize the potential for off-site transport. These drainage controls would be periodically inspected and maintained, as necessary.

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[4] Shown as Sediment Basins OB-A and OB-1B in Omya 2013 and Stantec 2011. These basins were re-numbered to reflect changes in the revised site plan (Figure 2.0-4).

[5] Shown as Sediment Basin OB-3 in Omya 2013 and Stantec 2011. This basin was re-numbered to reflect changes in the revised site plan (Figure 2.0-4).

The on-site haul road within the quarry area from the crusher area to the northeast corner of the project site east of overburden stockpile OB-1 carries stormwater from the southern quarry areas northward. The area where the haul road is located does not have the width to design a separate drainage channel. The Stantec 2011 study determined that the required 4-foot berms on each side (or a hillside slope or eventually the side slope of OB-1), as required for truck safety per the Mine Safety and Health Administration, are adequate to contain the 10-year design flow and the 100-year flow within the roadway with over 2 feet of freeboard. The haul road will be graded with a 2 percent cross fall and berm openings for the sediment catchment basins. Omya is aware that roadway damage may occur during heavy storms, but has adequate on-site equipment and aggregate materials to quickly make repairs.

A large number of energy dissipaters, temporary sediment capture basins, riprap, hay bales, and/or silt fences trap sediment and minimize the potential for off-site transport. Operations also limit surface disturbance to minimum areas, and concurrent reclamation and revegetation would stabilize disturbed pads and slopes.

Boulder rolling and surficial sliding of side-cast overburden material has occurred on the slopes northwest and north of the White Knob Quarry. In the past, the side-casted overburden material on the northwestern slope has been transported downslope during high intensity rainfall events and deposited in the Western Drainage. The Western Drainage eventually drains to Ruby Springs, one of several areas of natural springs that occur along the faulted flank of the San Bernardino Mountains. Since 2003, precautions have been taken and new mining procedures have been implemented to minimize future roll-down. However, because of remaining cliffs, some roll-down would be unavoidable, as it is necessary to continue to mine the ridge down and daylight in order to safely recover the ore. Once the limit of the ore is reached, no additional roll-down or visible changes would occur.

The existing SWPPP and SPCC for Omya's Lucerne Valley operations would continue to cover industrial activities at the White Knob/White Ridge Limestone Quarries until mining ceases. The SWPPP includes specific prohibitions, effluent limitations, stormwater pollution prevention plans, including source identification, practices to reduce pollutants, assessments of pollutant sources, materials inventory, preventative maintenance program, spill prevention and response procedures, general stormwater management practices, training, record keeping, sampling procedures, and monitoring program. The SWPPP would be updated to account for the modification of stormwater control and conveyance features contemplated in the Amended Reclamation Plan. The SWPPP would be updated, if necessary, to address the provisions of the amendment to the General Industrial Storm Water Permit recently adopted by the State Water Resources Control Board.

The White Knob/White Ridge Limestone Quarries utilize a relatively small amount of groundwater during operations. Approximately 2.75 acre-feet of water are used annually for dust suppression in the quarries, overburden placement areas, haul/access roads, and at the crusher. With the increase in production, water usage is expected to increase to approximately 5 acre-feet per year. Therefore, the proposed project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level. No substantial changes are proposed other than that adequate dust control will be maintained. Note that the use of magnesium chloride on roads and other active mine areas and the occurrence of typically wet winter weather reduce the amount of water needed to control dust. Impacts on groundwater supply are discussed in Section 3.8, Utilities and Service Systems, of this DEIR.

Mitigation Measures

MM 3.7.1 The following mitigation measures shall be implemented in addition to requirements contained in the project's SWPPP and SPCC and incorporated into the final Amended Mine and Reclamation Plan:

a. Implement the recommendations for modifications of the project's haul road drainage and sediment control structures given in the September 12, 2013, Stantec technical memorandum and August 2011 Stantec report, White Knob Haul Road Drainage Study and Plan Development, to implement Sections 15, 16, and 17 of the April 20, 2011, Settlement Agreement between Omya and the Bureau of Land Management in sections:

- 2.3 Culvert Flow Calculations (EIR Appendix G, Stantec 2013, p.6);
- 2.4 Culvert Riprap Calculations (EIR Appendix G, Stantec 2013, p. 7);
- 3.1.2, Roadway Grading and Ditch Recommendations (EIR Appendix G, Stantec 2011, p. 3.3);
- 3.2.2, Sediment Catchment Basins Recommendations(EIR Appendix G, Stantec 2011, p. 3.6); and
- 4.0, Right-of-Way Recommendations (EIR Appendix G, Stantec 2011, p. 4.1).

Inclusion of these improvements would ensure that no flow increases to downstream flows during flood events.

b. All quarry areas, overburden fills, and haul roads shall be maintained to minimize erosion and sedimentation.

c. Sedimentation basins shall be inspected regularly, at least once every 30 days during the rainy season, October to April, and following any significant precipitation event, equal to or greater than ½ inch of direct rainfall. Sediment shall be removed and basin function restored as needed.

d. Any sediment removed from basins shall be deposited on the overburden areas or into the White Knob Quarry sedimentation pond. Sediment placed on the overburden areas shall utilize temporary stormwater BMPs to prevent further sediment discharge and shall be revegetated in accordance with the 2013 Amended Reclamation Plan.

e. Basin spillways shall remain in good working condition and repaired as necessary.

f. Areas in haul roads that experience erosion shall be backfilled and rocked to minimize future erosion.

g. Overburden fill slopes and benches shall be inspected regularly, at least once every 30 days during the rainy season, October to April, and following any significant precipitation event, equal to or greater than ½ inch of direct rainfall. If erosion or sedimentation is observed, temporary BMPs shall be utilized on overburden slopes and benches as soon as possible to minimize future erosion.

h. Areas of erosion or sediment deposition in overburden areas shall be permanently remediated as soon as possible, preferably before the next precipitation event. Remediated overburden slopes and benches shall be revegetated and/or armored in accordance with the 2013 Amended Reclamation Plan.

i. Haul road culverts and Arizona crossings shall be inspected regularly at least once every 30 days during the rainy season, October to April, and following any significant precipitation event, equal to or greater than ½ inch of direct rainfall. Culverts and crossing shall be repaired and maintained to allow for proper passage of floodwaters.

j. If any of the haul road culverts are damaged or washed out, they shall be replaced with a culvert that provides a minimal capacity to pass a 20-year storm event without overtopping or excess erosion.

k. The seven procedures that were implemented to minimize boulder roll-down shall continue for the life of the project. These procedures are identified in mitigation measure **MM 3.1.1**. Procedures shall be modified and/or additional measure put in place, as necessary, to achieve minimal boulder roll-down.

Timing/Implementation: *Required to be placed in the final version of the Amended Plan and implemented during mining and reclamation activities*

Enforcement/Monitoring: *County of San Bernardino Land Services Department*

This mitigation measure will ensure that runoff and sedimentation from the mining operation does not cause any significant on- and off-site erosion or flooding impacts. Improvements to project stormwater structures and facilities as recommended by Stantec (2011) will be implemented. The mitigation monitoring measures given above will provide for the timely inspection of project areas and watercourses so that repairs and/or additional best management practices can be implemented to minimize erosion and properly control runoff. Mitigation to prevent excessive sediment load being generated due to slope instability is described in Section 3.5, Geology and Soils, of this Draft EIR. Haul roads, drainage ditches, swales, benches, and sedimentation basins all serve to convey runoff and capture excess sediment and would be inspected, cleared, and maintained as needed, and will be sufficient to convey the 10- and 20-year precipitation events and safely release 100-year flows. Standard procedures and implementation of the measures described in the project's SWPPP and SPCC plans, in addition to the mitigation given above, will prevent or remediate accelerated and damaging on- and off-site erosion or flooding due to the project. Implementation of mitigation measure **MM 3.7.1** would reduce this impact to **less than significant**.