APPENDIX G
Hydrologic Investigation

Walnut Creek Habitat & Open Space

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June 14, 2011

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Appendices

1.0 Introduction

The purpose of this work is to evaluate current hydrologic conditions of the Watershed Conservation Authority's (WCA) Walnut Creek Habitat and Open Space property (Figure 1-1). The project site is located north-east of Walnut Creek Park in the City of San Dimas, Los Angeles County, California. The ultimate goal is to create a project that can serve as a model for sustainable as well as multi-beneficial watershed projects. This model will also assist in addressing the open space recreational areas and watershed needs of the Los Angeles Regional Water Quality Control Board (LARWQCB).

A goal of the LARWQCB is to protect water resources within a watershed context. Therefore, a mix of point and nonpoint discharges, ground and surface water interactions, and water quality/water quantity relationships must be considered. These complex relationships present considerable challenges to water resource protection programs. The State and Regional Boards are responding to these challenges with the Watershed Management Initiative (WMI). The WMI is designed to integrate various surface and ground water regulatory programs while promoting cooperative, collaborative efforts within a watershed.

WCA's Walnut Creek Habitat and Open Space project will add to the existing efforts of the LARWQCB. The project is an opportunity to connect with the multitude of projects within the Walnut Creek Community Regional Park along the Walnut Creek, San Gabriel, the Rio Hondo, and the Los Angeles Rivers to the ocean.

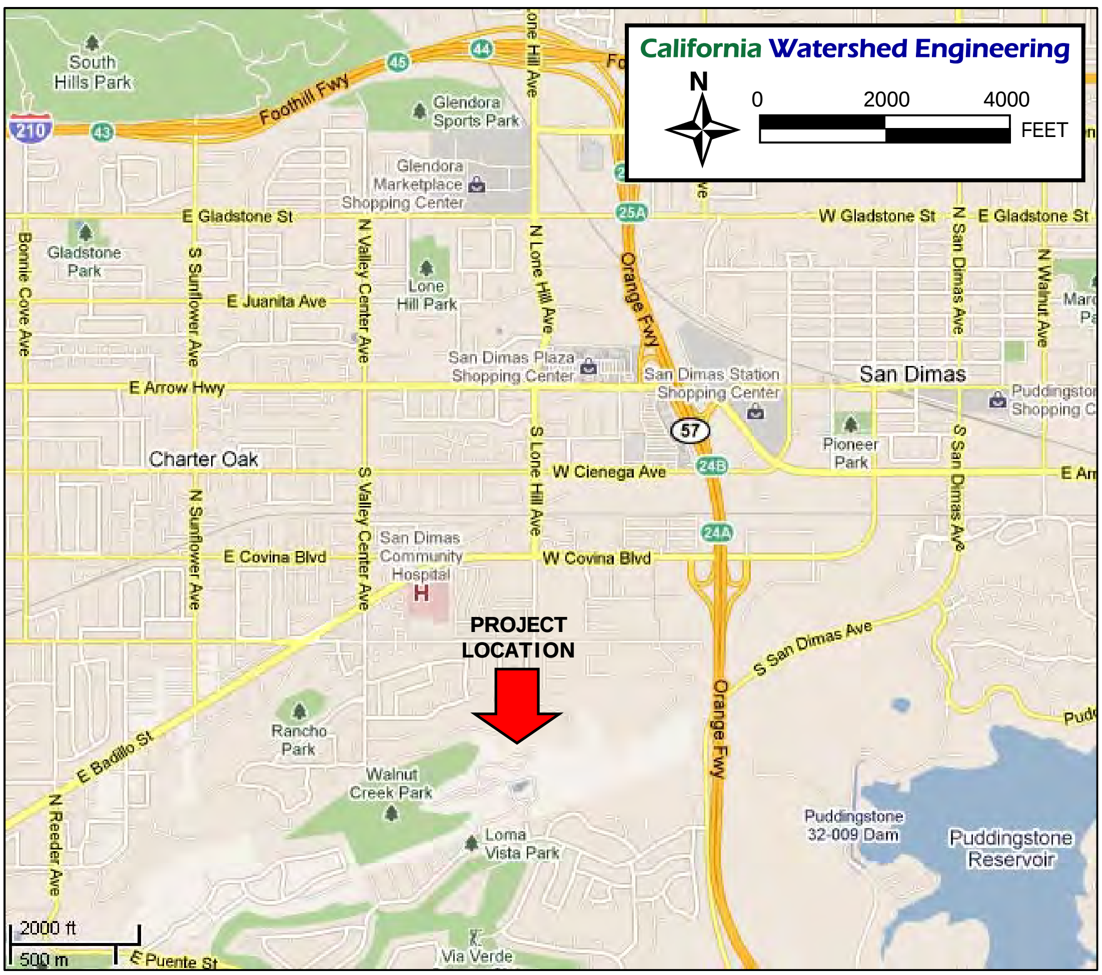

Figure 1-1: Project Location Map

2.0 Watershed Description

A watershed is a basin-like landform defined by highpoints and ridgelines that descend into lower elevations and streams and valleys. In its historical definition, a watershed is the divide between two drainage streams or rivers separating rainfall runoff into one or the other of the basins. In recent years, the term has been applied to mean the entirety of each of the basins, instead of the divide between them.

The project site is located within the Walnut Creek Watershed, a major tributary watershed to the San Gabriel River Watershed.

2.1 San Gabriel River Watershed

The San Gabriel River receives drainage from a large area of eastern Los Angeles County; its headwaters originate in the San Gabriel Mountains. The watershed consists of extensive areas of undisturbed riparian and woodland habitats in its upper reaches. Much of the watershed of the West Fork and East Fork of the river is set aside as a wilderness area; other areas in the upper watershed are subject to heavy recreational use.

The upper watershed also contains a series of flood control dams. Further downstream, towards the middle of the watershed, are large spreading grounds utilized for groundwater recharge. The watershed is hydraulically connected to the Los Angeles River through the Whittier Narrows Reservoir (normally only during high storm flows). The lower part of the river flows through a concrete-lined channel in a heavily urbanized portion of the county before becoming a soft bottom channel once again near the ocean in the City of Long Beach.

Large electrical power poles line the river along the channelized portion; nurseries, small stable areas, and storage facilities are located in these areas.

2.2 Walnut Creek Watershed

Walnut Creek runs just north of the project site and receives drainage from Puddingstone Reservoir and adjacent areas. This section of Walnut Creek ranges in width from five to eight feet, and is approximately four to six inches deep.

Historically, flows within Walnut Creek were momentary. Currently, releases from Puddingstone Reservoir, combined with runoff from water features and landscaping in Raging Waters, create constant channel flow in the creek. Puddingstone Reservoir drains an area of 32.2 square miles that ranges in elevation from 876 feet (267 meters) to 3,690 feet (1,125 meters) as shown in Figure 2-1.

Summary discharge reports (Appendix A) were obtained from the Los Angeles County Department of Public Works (LACDPW) for Walnut Creek below Puddingstone Dam. These reports were obtained from stream gage Station No. F40-R which is located on the east bank about 1,000 feet below Puddingstone Dam near San Dimas (Figure 2-1). The data was retrieved for the months of October 2008 to September 2009, October 2009 to September 2010, and October 2010 to April 2011. The peak discharges for each storm year occurred in February: 365 cfs on February 7, 2009, 202 cfs on February 8, 2010, and the peak discharge for the current storm year (2010 to 2011) has yet to be determined.

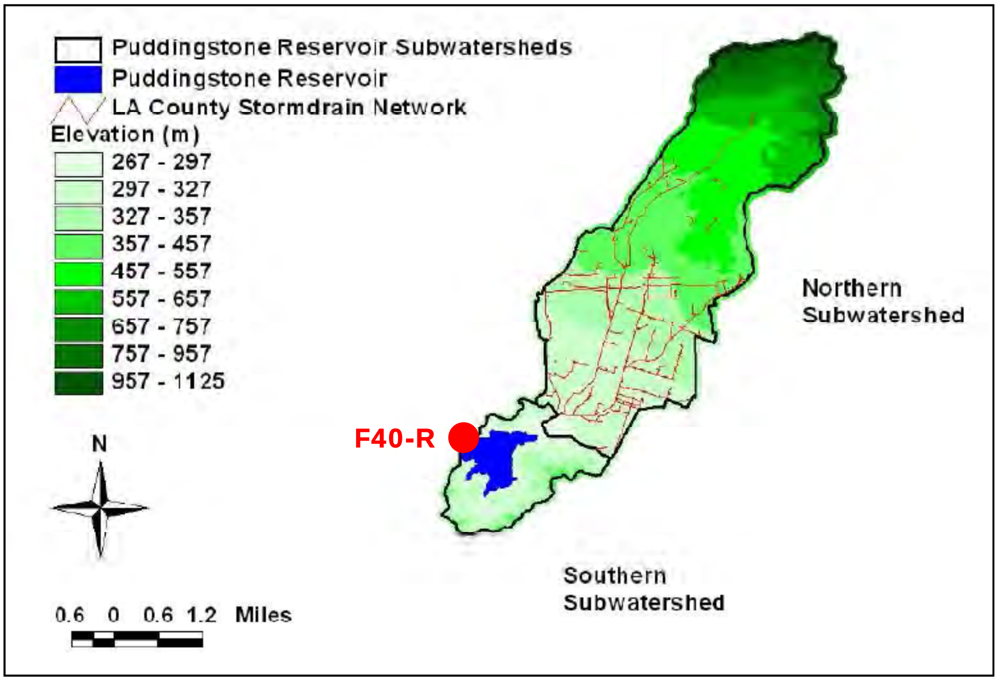

Figure 2-1: Walnut Creek Watershed and Rain Gage Station F40-R

2.3 Puddingstone Dam

Stream flow within Walnut Creek is regulated by Puddingstone Dam. The dam was completed in 1928, and it is now owned and operated by the Los Angeles County Flood Control District. The Puddingstone Dam consists of three rolled earth embankment dams with concrete slope protection on the upstream face. A concrete spillway is located to the east of the main dam. This series of dams retains Puddingstone Reservoir (Figure 2-2), which has a design storage capacity of 17,190 acre-feet. The Puddingstone Dam has a crest elevation of 983.5 feet, but was originally designed to be operated with a normal water surface elevation of 970 feet. However, the State of California Division of Safety of Dams has restricted the maximum normal reservoir elevation to 945 feet, with temporary storage above elevation 945 permitted for flood control only.

Figure 2-2: Puddingstone Reservoir

3.0 Project Site Description

The project site is located within an unincorporated area of the Los Angeles County. The county government serves as the "city" for this area and provides all basic municipal services such as law enforcement, zoning, building permits, libraries, parks, recreational programs, street maintenance, and traffic signals and stop signs.

WCA's Walnut Creek Habitat and Open Space property has a combined total of 60.9 acres of land, 6.9 acres of which are held by the City of San Dimas, adjacent to Lomas Vista Park. WCA recently acquired this property from the Vista Verde San Dimas Avenue Property, LLC, a California limited liability company.

The property is adjacent to the City of San Dimas located in the Eastern Los Angeles County area. It lies west of Interstate 210 and San Dimas Avenue, and just southwest of Walnut Creek Community Regional Park. The residential community of Woodwalk (along Avenida Loma Vista) and its adjoining side streets are south of the WCA property.

Precipitous terrain with the moderate terrain drainages characterizes the eastern portion of the property. This side of the property begins the dry stream that is tributary to Walnut Creek, which is a major tributary to the San Gabriel River. A majority of the property is covered with native vegetation such as oak trees and various scrubs. The previous property owner had constructed several structures that currently remain uninhabited. These structures were used by the Voorhis Schools for Boys.

4.0 Project Site Hydrologic Conditions

The project site's hydrologic conditions are focused on the topography, drainage boundary, and existing drainage structures. A site visit and a review of various reference materials were incorporated as part of the development of the drainage boundary and the location of existing utilities. Using the gathered information, a preliminary hydrology study was conducted.

The site's flow conditions can be explained through various graphic delineations (Appendix B) that detail it's natural and man-made features and include its relative positions and elevations. The community's Flood Insurance Rate Map (FIRM) or Flood Hazard Boundary Map was also reviewed. The FIRM mapping provides various elements including the extent, flooding, and hazards in the given area. Storm drains located within the property primarily receive flow from impervious areas within WCA property.

4.1 Topography

In general, the topography within the proposed project area consists of moderate to steep hillsides sloping in all directions. The ridgelines vary in width, ranging from narrow to broad with a well defined drainage in between each ridge. The project site's south boundary consists of the highest elevations within the WCA property scaling from 905 to 775 feet. Figure 4-1 depicts the profile locations displaying the varying elevations (Figures 4-2 and 4-3), in feet, within the WCA property.

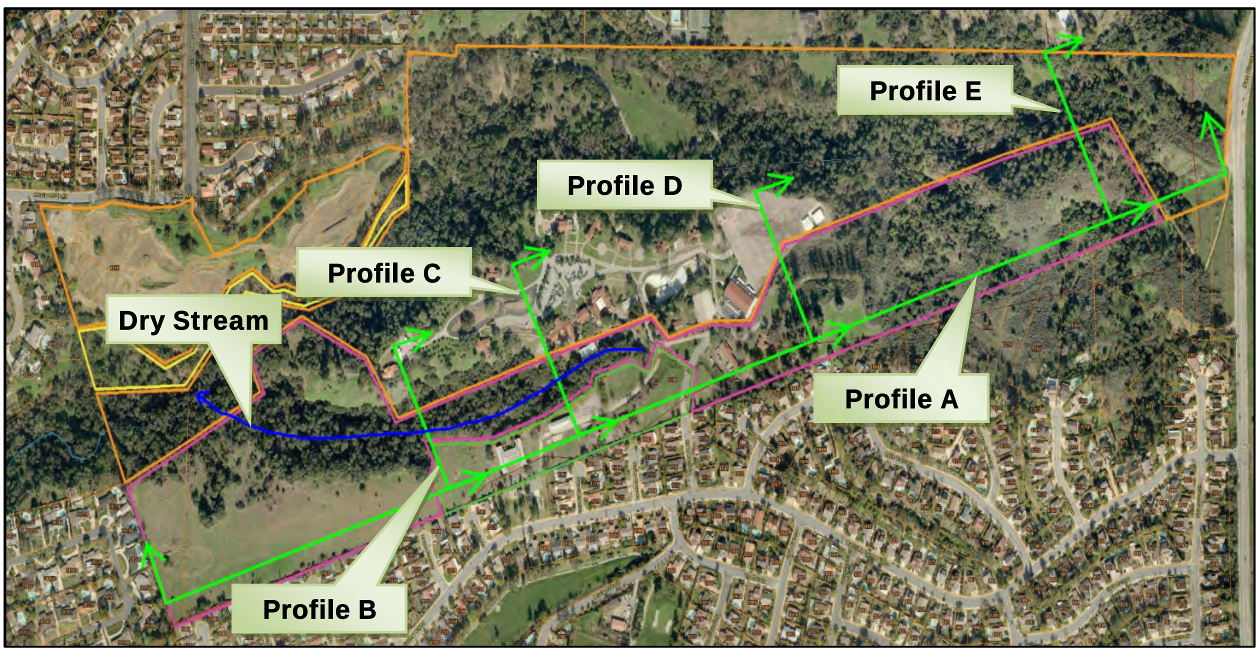

Figure 4-1: Profile Locations

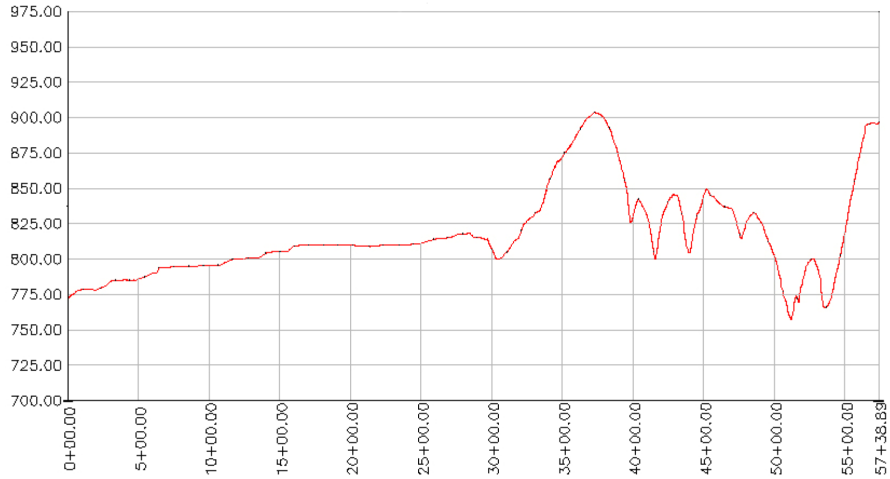

Figure 4-2: Elevation (feet) vs. Stationing of Profile A

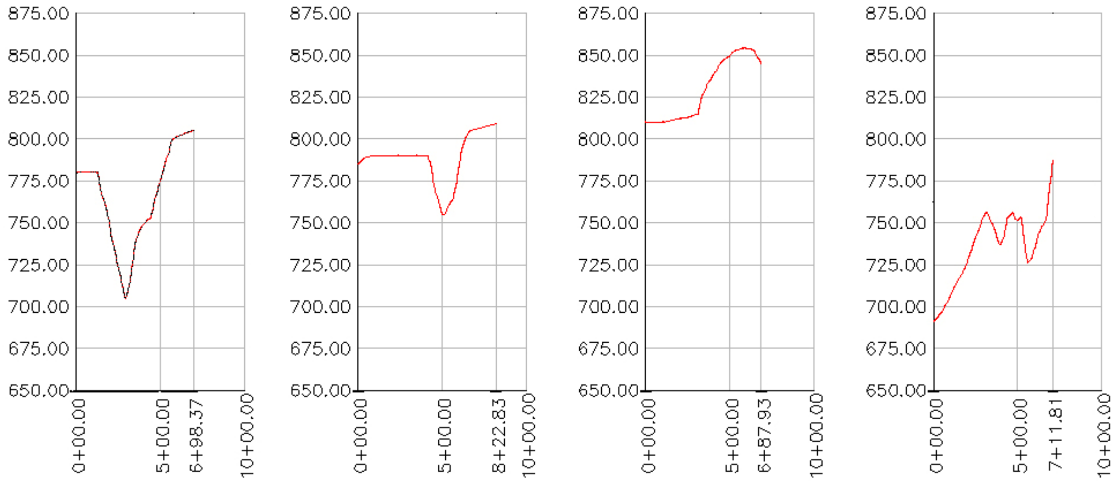

Figure 4-3: Elevation (feet) vs. Stationing of Profiles B, C, D, and E

The meandering dry stream is approximately 2,000 feet long with elevations ranging from 756 to 625 feet (Figure 4-4), giving it an average slope of over six percent throughout its course.

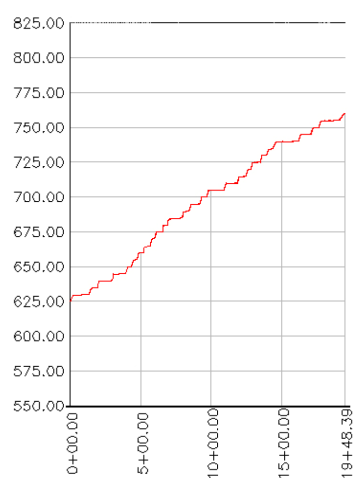

Figure 4-4: Elevation (feet) vs. Stationing of the Dry Stream

4.2 Drainage Boundary

Onsite runoff will flow in the westerly direction into the dry stream tributary to Walnut Creek, which is located between the WCA and Tzu Chi Foundation's (TCF) property. At the present time, the flows from the southern portion of the TCF property are collected in two main storm drains (Section 4.3) that outlet into the dry stream. The dry stream also receives sheet flow runoff from the adjacent San Dimas residential properties, established along Pso Aldeano, Pso Gracia, and Pso Los Gavilanes. The eastern side of the WCA property, entirely undeveloped, drains into Walnut Creek directly.

The following figure (Figure 4-5) depicts a preliminary drainage boundary for the project site. There is approximately 20 acres of tributary area (TCF and San Dimas residential properties) draining onto the WCA's property. The property has been broken down into two subwatersheds, west and east consisting of 57 and 17 acres, respectively.

Figure 4-5: WCA's Walnut Creek Habitat and Open Space Subwatersheds

4.3 Storm Drains

There are two storm drains that confluence into one 48 inch storm drain. One of the drains is a 21 inch storm drain that first joined another set of 15 and 12 inch drainage pipes located at the TCF property. The other storm drain is a 30 inch pipe that is located near the uninhabited Voorhis School for Boys structure, which comes into the 48 inch storm drain. This 48 inch drain outlets to the dry stream that is tributary to Walnut Creek located west of the TCF's most westerly building.

An additional 12 inch storm drain located on the TCF property outlets collects runoff from the main building's quad area. Flows from this pipe comingle with the 48 inch piped mentioned previously. Together the flows are conveyed to Walnut Creek by the dry stream.

See Appendix C for more details.

4.4 Hydrology - Capital Flood

The LACDPW memorandum dated March 31, 1986, General Files No. 2-15.321, established the policy on levels of flood protection. This policy describes digress of flooding and that the Capital Flood should be used for certain conditions and structures. The Capital Flood is the runoff produced by a 50-year frequency design storm falling on a saturated watershed (moisture at field capacity). A 50-year frequency design storm has a probability of 1/50 of being equaled or exceeded in any year. Capital Flood protection also requires burning and bulking which is adding the effects of fire and erosion under certain conditions.

A preliminary hydrology for the Capital Flood event was conducted for this hydrologic investigation. As described in Section 4.2, the WCA's property was broken down into two subwatersheds, labeled west and east. Using preliminary data (see Appendix E for more details), the following flow rates were found:

Table 4-1 Peak Flow Rates

Watershed	Clear Flow (Q)	Burned Flow (Q_{burn})
West	130 cfs	--
East	40 cfs	45 cfs

Note: Only undeveloped subareas with 15% or less imperviousness require burn calculations.

4.5 Flood Zone

Flood zones are geographic areas that the Federal Emergency Management Agency (FEMA) has defined according to a location's varying levels of flood risk. These zones are depicted on a community's FIRM or Flood Hazard Boundary Map. Each zone reflects the severity or type of flooding in the area. The project site is situated in an area designated as Flood Zone X (Figure 4-6). This is an area of minimal flood hazard: it usually is focused on FIRMs above the 500-year flood level. Zone X is the area determined to be outside of the 500-year flood and protected by a levee from the 100-year flood.

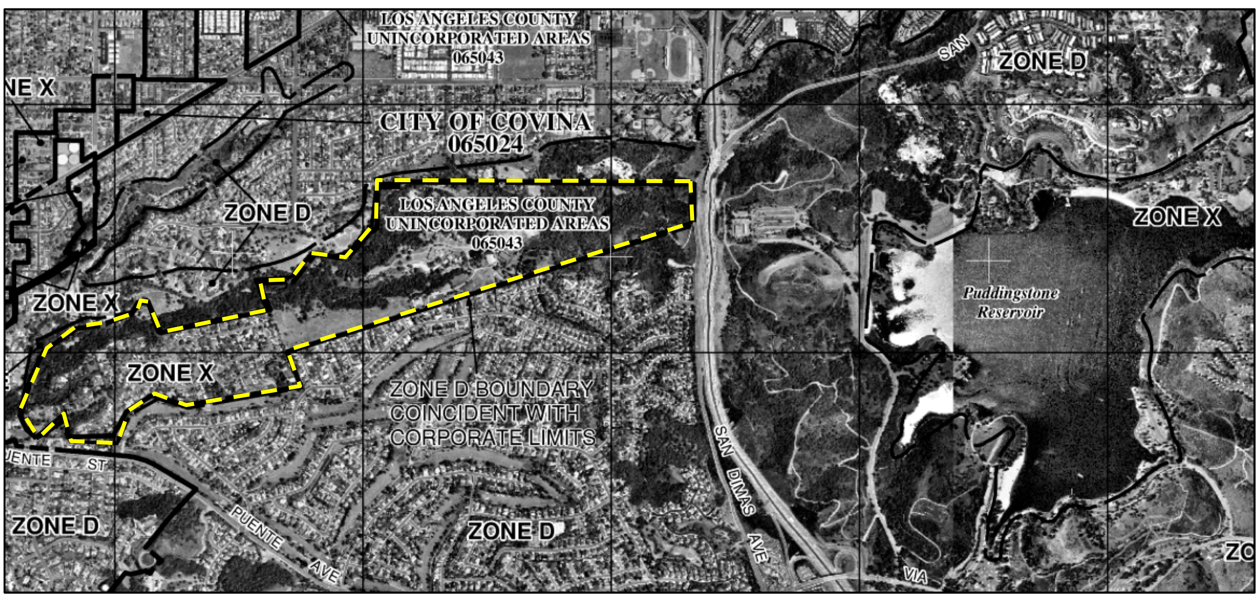

Figure 4-6: FEMA Flood Zone Map

5.0 Project Site Hydrologic Soil Group and Vegetative Cover

The Los Angeles County Hydrology Manual 50-Year 24-Hour Isohyet (Appendix D) was reviewed to determine the type of soil(s) within the vicinity of the project site. Three types of soils were discovered: Handford fine sandy loam, Ramona loam, and soils native to the Upper San Gabriel River.

Hanford fine sandy loam was found in soils immediately north of Walnut Creek and typically located on stream bottoms, floodplains, and alluvial fans. This loam is usually found at elevations of 150 to 3,500 feet with slopes of 0 to 15 percent. The soils are formed in deep, moderately coarse textured alluvium, which is composed of mostly granite and other quartz that bear rocks of similar textures. The climate of the Hanford fine sandy loam is a dry subhumid mesothermal. This includes hot, dry summers and cool, moist winters with an average annual precipitation of 9 to 20 inches. The average annual temperature ranges from 62 to 65 degrees Fahrenheit. Hanford soils are well drained, negligible to low runoff, and have moderately rapid permeability. The combination of these qualities gives the best of all possible growing conditions for most plants.

Ramona loam soil was found along Walnut Creek, and is a member of the fine-loamy, mixed, thermic family of Typic Haploxeralfs. The Ramona soils are nearly level to moderately steep in elevation, and are established on terraces and fans at elevations of 250 to 3,500 feet. They are formed in alluvium derived mostly from granitic and related rock sources. The climate of these soils is dry subhumid mesothermal with warm dry summers and cool moist winters. Its average annual precipitation spans from 10 to 20 inches, and the average annual temperature is 60 to 66 degrees Fahrenheit. Ramona soils are well drained, slow to rapid runoff, and have moderately slow permeability. The well drained Ramona soils are a benefit for vegetative means; however, the slow permeability lessens the rate which air and water move through the soil.

According to the Los Angeles County Hydrology Manual, a portion of the WCA property contains Soil No. 086, which is defined as soils native to Upper San Gabriel River. This type of soil is only found within the San Gabriel River Watershed and provides an infiltration rate of up to 1.5 inches per hour.

The variety of topography, soil types, slope aspects, and water availability creates a range of physical habitats that support numerous plant species. The dominant species is the Southern Coast Live Oak Woodland, which include the Southern California Black Oak and Coastal Sage Scrub (Figure 5-1).

Southern Coast Live Oak

Southern Coast Live Oak is by far the least common of the two varieties of Quercus Agrifolia. It is a wide-topped evergreen tree that can grow as tall as 75 feet with bark that is smooth but becomes dark gray and ridged or furrowed in age.

Southern California Black Oak

California Black Oak is deciduous, hardwood tree with a broad rounded crow from 10-25 meters high. It is the largest mountain oak in the west and surpasses all other California oaks in volume, distribution, and altitudinal range. The trunk bark is dark and covered with small plates. The bright green leaves are distinctly six-lobed ending in one to four bristle-tipped teeth, and the leaves are 7 to 20 cm long. The acorns are 2.5 to 3.5 cm in length and mature in the second year. The nut is deeply set in the cup and the cup is covered with thing, flat and imbricate scales.

Coastal Sage Scrub

Coastal Sage Scrub is a low scrub where most plants are less than six feet tall. These scrubs have multiple woody stems and leaves that are gray, woolly, or sticky. These coastal scrubs are located in dry, steep, rocky, or gravelly slopes less than 3,000 feet elevation.

Figure 5-1: Southern Live Oak (Top-Left), Southern California Black Oak (To-Right), and Coast Sage Scrub (Bottom)

6.0 Project Site Surface Conditions and Land Use

WCA's Walnut Creek Habitat and Open Space is mostly permeable. The site is primarily vacant, undeveloped, and consists of moderate to heavily vegetated canyons and hillsides. There exists former grove areas (some remnant trees present), improved and unimproved roads and several remnant structures of former Voorhis School for Boys and California State Polytechnic University, Pomona campuses.

The Walnut Creek Feasibility Study addresses preliminary post construction conditions and a majority of the WCA property will remain pervious. Further overall goals of the project site are to expand and improve the open space and recreational opportunities for the conservation, restoration, and environmental enhancement of the San Gabriel River Watershed.

Additionally, this area is a critical wildlife corridor for species moving from the west to the open space in Bonelli Regional Park. Bonelli Regional Park is 250 acres of man-made recreational park surrounding the Puddingstone Reservoir.

7.0 Climate and Precipitation

San Dimas, California (located near Pomona and Glendora, California) reaches temperatures ranging from mostly the 50's and 80's. The city is warm during the summer when temperatures tend to be in the high 80's and cool during the winter when temperatures tend to be in the 50's. The warmest month of the year is August with an average maximum temperature of 89 degrees Fahrenheit, while the coldest month of the year is December with an average minimum temperature of 41 degrees Fahrenheit. Temperature variations between night and day tend to be relatively large during the summer with a difference that can reach 30 degrees Fahrenheit, and moderate during the winter with an average difference of 26 degrees Fahrenheit.

Table 7-1 Normal Temperatures

Temp ˚F	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Max	67.6	69.0	69.1	74.1	76.7	82.3	88.7	89.2	86.7	80.2	73.1	68.3	77.1
Mean	54.6	56.3	56.9	60.5	64.1	68.7	73.8	74.2	72.4	66.4	59.3	54.7	63.5
Min	41.5	43.5	44.6	46.9	51.5	55.1	58.8	59.2	58.0	52.6	45.4	41.0	49.8

Note: Information acquired from Pomona Fairplex weather station – 2.75 miles from San Dimas

Table 7-2 Normal Precipitation (Inches)

Month												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
4.12	4.60	3.85	1.07	0.28	0.09	0.02	0.13	0.38	0.67	1.46	2.22	18.89

Note: Information acquired from San Dimas Fire FC95 weather station – 0.56 miles from San Dimas

The average annual precipitation in San Dimas is 18.89 inches. Most of San Dimas rainfall is acquired within the months of November to April (Tables 7-1 and 7-2). The winter months tend to be wetter than the summer months. The wettest month of the year is February with an average rainfall of 4.60 inches. Additional precipitation data is available in LADPW Hydrologic Reports. This data provides a daily rainfall summary for a rain gage (ID 96-C) located near Puddingstone Dam for the 1996 to 2010 rain seasons. The total amount of water for the 1996 to 2010 rain seasons were:

Table 7-3 Total Water (Inches)

1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003
18.47	35.84	7.98	14.22	17.05	6.60	19.99
2003-2004	**2004-2005**	**2005-2006**	**2006-2007**	**2007-2008**	**2008-2009**	**2009-2010**
12.77	44.12	16.25	6.00	16.17	14.59	20.04

Note: http://ladpw.org/wrd/report/index.cfm

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APPENDIX A

Los Angeles County Dept of Public Works USDAY V91 Output 06/08/2011

Summary Report

Site: F40 Walnut Creek Below Puddingstone Dam
USGS #:
Beginning Date: 10/01/2008
Ending Date: 09/30/2009

Daily Mean Discharge in Cubic feet/second Water Year Oct 2008 to Sep 2009

Day	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.34	.14	.02	0	0	0	.05	.24	.27	.29	.55	.48
2	.28	.16	.05	0	0	.01	.06	.25	.27	.31	.47	.57
3	.32	.11	.06	0	0	.01	.05	.25	.27	.37	.42	.44
4	.24	.07	.06	0	0	.06	.07	.24	.27	.36	.44	.47
5	.26	.02	.05	0	.22	.08	.07	.21	.27	.32	.40	.51
6	.21	0	.03	0	.25	.04	.07	.20	.25	.28	.49	.53
7	.19	0	.07	0	246	.02	.11	.20	.25	.29	.35	.44
8	.21	0	.08	0	.07	.04	.11	.22	.24	.30	.33	.54
9	.21	.01	.07	0	.21	.05	.08	.21	.24	.30	.31	.67
10	.16	0	.01	0	.28	.03	.08	.22	.24	.31	.33	.73
11	.07	.01	0	0	203	.02	.08	.25	.24	.31	.42	.65
12	.03	.05	0	0	299	.03	.07	.26	.26	.32	.42	.59
13	.03	.03	0	0	99.8	.02	.05	.26	.27	.32	.41	.63
14	.05	0	0	0	.78	.04	.02	.26	.28	.32	.49	.71
15	.08	0	.18	0	.76	.06	.04	.26	.28	.33	.44	.65
16	.11	.01	0	0	1.01	.03	.07	.27	.25	.33	.43	.71
17	.13	.01	.08	0	1.09	.03	.05	.29	.27	.33	.54	.66
18	.13	0	0	0	1.05	.02	.05	.28	.27	.34	.38	.76
19	.11	0	0	0	1.01	.01	.07	.27	.24	.34	.44	.94
20	.09	0	0	0	.96	.01	.05	.27	.23	.35	.47	.96
21	.19	0	0	0	1.01	.03	.05	.28	.27	.35	.55	.85
22	.09	0	28.8	0	1.07	.07	.06	.28	.24	.35	.66	.80
23	.04	0	49.3	.02	.57	.04	.06	.31	.27	.36	.40	.93
24	.04	0	0	.01	0	.03	.14	.33	.33	.36	.43	1.20
25	.04	0	.02	0	0	.06	.16	.28	.29	.37	.46	.98
26	.05	.16	0	0	0	.04	.17	.27	.28	.37	.49	.97
27	.06	.05	0	0	0	.06	.19	.31	.31	.37	.43	.81
28	.07	.07	0	0	0	.04	.26	.35	.31	.39	.43	.63
29	.04	.04	0	0	------	.02	.24	.38	.28	.48	.34	.54
30	.06	.04	0	0	------	.06	.22	.30	.27	.50	.42	.51
31	.10	------	0	0	------	.06	------	.28	------	.67	.42	------
Total	4.03	0.98	78.88	0.03	858.14	1.12	2.85	8.28	8.01	10.99	13.56	20.86
Mean	.13	.033	2.54	.001	30.6	.036	.095	.27	.27	.35	.44	.70
Max	.34	.16	49.3	.02	299	.08	.26	.38	.33	.67	.66	1.20
Min	.03	0	0	0	0	0	.02	.20	.23	.28	.31	.44
Acre-Ft	8.0	1.9	156	.06	1700	2.2	5.7	16	16	22	27	41

Wtr Year 2009	Total	1007.73	Mean	2.76	Max	299	Min	0	Inst Max	365	Acre-Ft	2000
Cal Year 2008	Total	1962.31	Mean	5.36	Max	158	Min	0	Inst Max	235	Acre-Ft	3890

The Peak is 365 cfs On 02/07/2009

Los Angeles County Dept of Public Works USDAY V91 Output 06/08/2011

Summary Report

Site: F40 Walnut Creek Below Puddingstone Dam
USGS #:
Beginning Date: 10/01/2009
Ending Date: 09/30/2010

Daily Mean Discharge in Cubic feet/second Water Year Oct 2009 to Sep 2010

Day	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.33	.11	.37	.14	2.44	3.09	.26	.52	.70	.75	.68	.55
2	.16	.06	.46	.14	2.26	3.17	.23	.60	.68	.70	.65	.69
3	.16	.07	.35	.15	2.18	3.19	.23	.60	.66	.86	.73	.73
4	.17	.08	.29	.14	2.62	3.19	.26	.64	.58	.98	.55	.71
5	.15	.07	.25	.16	2.78	2.93	.35	.73	.68	.99	.46	.66
6	.15	.07	.27	.18	4.08	2.82	.28	.76	.71	.91	.45	.74
7	.16	.05	.35	.17	2.76	2.77	.27	.76	.77	.81	.47	.80
8	.15	.05	.27	.18	112	3.00	.26	.81	.81	.75	.51	.67
9	.16	17.5	.27	.20	109	3.04	.26	.96	.76	.51	.49	.64
10	.18	22.0	.23	.21	80.3	2.89	.39	.93	.72	.62	.54	.68
11	.18	0	.34	.21	191	2.97	.32	.86	.67	.68	.49	.71
12	.15	1.69	.74	.21	65.8	3.08	.65	.71	.77	.55	.39	.73
13	.16	0	.30	.21	2.61	3.00	.44	.61	.83	.48	.37	.59
14	.22	0	.28	.22	2.78	3.05	.38	.65	.74	.60	.36	.55
15	.16	0	.25	.18	2.70	3.21	.42	.80	.67	.75	.35	.53
16	.14	48.4	.25	.16	2.72	3.46	.44	.97	.75	.79	.40	.50
17	.15	.25	.24	.18	2.68	1.31	.41	.89	.71	.64	.56	.52
18	.16	.26	.24	52.0	2.65	.21	.33	.82	.78	.59	.61	.53
19	.16	.29	.24	179	2.73	.24	.31	.77	.78	.60	.54	.53
20	.21	.32	.25	130	2.68	.29	.34	.64	.68	.57	.51	.43
21	.12	.40	.24	2.14	2.99	.28	.25	.59	.70	.61	.60	.45
22	.13	.40	.23	2.04	3.05	.24	.25	.66	.72	.65	.63	.46
23	.13	.38	.24	2.54	2.85	.27	.35	.68	.70	.59	.66	.44
24	.13	.29	.20	2.57	2.79	.30	.43	.65	.65	.56	.63	.57
25	.11	.27	.18	119	3.08	.27	.37	.56	.70	.54	.62	.68
26	.09	.25	.13	128	3.00	.28	.52	.55	.71	.51	.68	.64
27	.04	.27	.13	2.55	2.89	.29	.70	.61	.56	.50	.64	.81
28	.03	.31	.16	2.61	2.88	.28	.41	.57	.62	.48	.73	.78
29	.01	.36	.18	2.61	------	.27	.31	.58	.81	.52	.72	.90
30	.07	.35	.17	2.49	------	.31	.60	.63	.75	.64	.56	.81
31	.08	------	.15	2.49	------	.27	------	.72	------	.69	.54	------
Total	4.40	94.55	8.25	633.08	622.30	53.97	11.02	21.83	21.37	20.42	17.12	19.03
Mean	.14	3.15	.27	20.4	22.2	1.74	.37	.70	.71	.66	.55	.63
Max	.33	48.4	.74	179	191	3.46	.70	.97	.83	.99	.73	.90
Min	.01	0	.13	.14	2.18	.21	.23	.52	.56	.48	.35	.43
Acre-Ft	8.7	188	16	1260	1230	107	22	43	42	41	34	38

Wtr Year 2010	Total	1527.34	Mean	4.18	Max	191	Min	0	Inst Max	202	Acre-Ft	3030
Cal Year 2009	Total	1031.04	Mean	2.82	Max	299	Min	0	Inst Max	365	Acre-Ft	2050

The Peak is 202 cfs On 02/08/2010

Los Angeles County Dept of Public Works USDAY V91 Output 06/08/2011

Summary Report

Site: F40 Walnut Creek Below Puddingstone Dam
USGS #:
Beginning Date: 10/01/2010
Ending Date: 09/30/2011

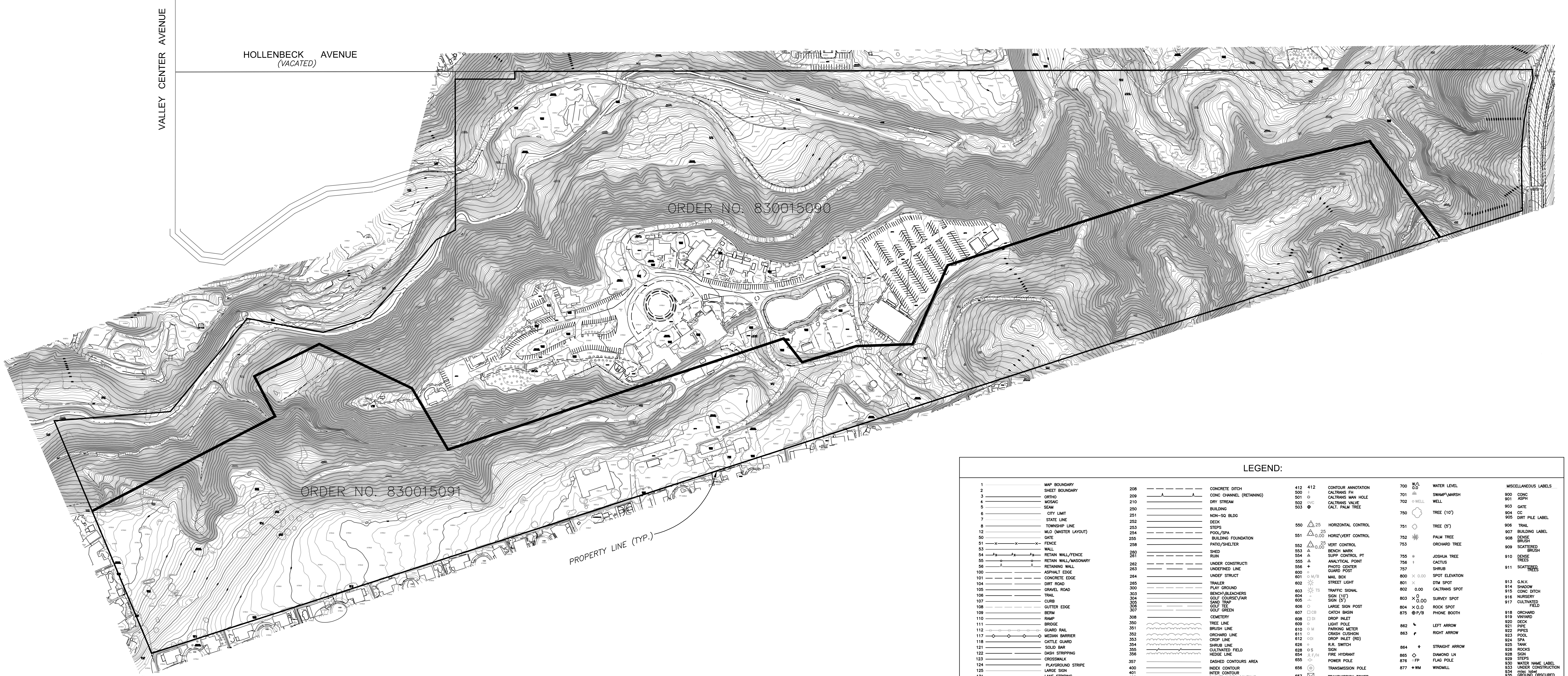
Daily Mean Discharge in Cubic feet/second Water Year Oct 2010 to Sep 2011

Day	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.24	.26	.06	70.9	.08	0	.14					
2	1.35	.28	.07	1.41	.04	0	.15					
3	1.29	.28	.07	1.45	.03	14.4	.13					
4	1.05	.28	.10	23.9	.05	21.5	42.5					
5	.94	.29	.14	50.5	.07	21.4	100					
6	.66	.29	.11	50.3	.11	7.14	99.8					
7	.37	.26	.08	49.9	.09	0	98.5					
8	.33	.36	.07	49.5	.04	15.9	29.4					
9	.33	.23	.10	49.4	.09	8.14	.47					
10	.35	.16	.10	49.5	.07	.09	.57					
11	.30	.17	.07	49.4	.06	.09	32.6					
12	.35	.14	.10	31.2	.05	.11	77.3					
13	.37	.12	.08	0	.03	.14	77.6					
14	.36	.13	.08	0	.11	.15	24.6					
15	.33	.13	.09	.01	97.3	.14	2.33					
16	.28	.13	.17	.01	49.4	.13	2.11					
17	.27	.15	.21	.01	0	.12	2.30					
18	.28	.14	.37	.02	.05	.14						
19	.37	.16	.95	.02	.04	19.6						
20	.29	.22	86.6	.07	.02	112						
21	.32	.19	518	.04	0	1.95						
22	.26	.14	421	.03	0	2.03						
23	.25	.14	937	.04	0	1.90						
24	.25	.12	481	.05	0	1.88						
25	.26	.11	1.71	.03	.03	2.16						
26	.23	.10	1.99	.02	.13	2.09						
27	.24	.09	1.66	.01	0	2.25						
28	.25	.13	1.47	.01	0	14.8						
29	.25	.09	1.32	.02	------	13.9						
30	.25	.05	46.8	.07	------	.11						
31	.26	------	112	.07	------	.12	------		------			------
Total	13.93	5.34	2613.57	477.89	147.89	264.38	590.50					
Mean	.45	.18	84.3	15.4	5.28	8.53	34.7					
Max	1.35	.36	937	70.9	97.3	112	100					
Min	.23	.05	.06	0	0	0	.13					
Acre-Ft	28	11	5180	948	293	524	1170					

Wtr Year 2011 Total 4113.50 Mean 20.7 Max 937 Min 0 Inst Max 970 Acre-Ft 8160
Cal Year 2010 Total 4052.98 Mean 11.1 Max 937 Min .05 Inst Max 970 Acre-Ft 8040

The Peak is Not Determined.

APPENDIX B



LEGEND:

1	MAP BOUNDARY
2	SHEET BOUNDARY
3	ORTHO
4	MOSAIC
5	SEAM
6	CITY LIMIT
7	STATE LINE
8	TOWNSHIP LINE
12	MLO (MASTER LAYOUT)
50	GATE
51	FENCE
53	WALL
54	RETAIN WALL/FENCE
55	RETAIN WALL/MASONARY
56	RETAINING WALL
100	ASPHALT EDGE
101	CONCRETE EDGE
104	DIRT ROAD
105	GRAVEL ROAD
106	TRAIL
107	CURB
108	GUTTER EDGE
109	BERM
110	RAMP
111	BRIDGE
112	GUARD RAIL
117	MEDIAN BARRIER
118	CATTLE GUARD
121	SOLID BAR
122	DASH STRIPPING
123	CROSSWALK
124	PLAYGROUND STRIPE
125	LARGE SIGN
131	LANE STRIPING
132	PARKING STRIPE
133	ASPH ROAD TAX
134	CONC ROAD TAX
135	CURB ROAD TAX
136	GUTTER RD TAX
137	BERM/DIKE TAX
138	COUNTY FOG LINE
139	STATE FOG LINE
150	DROP INLET
152	TRANSMISSION LINE
153	TRANSMISSION TOWER
154	TANK
155	SINGLE PIPE
156	GROUP PIPE
166	MISCELLANIOUS UTILITIES
167	CATCH BASIN
168	POWER LINE
170	LIGHT ARMS
171	TRANSFORMER
172	UTILITY BOX
200	CULVERT
201	HEADWALL
202	DITCH
203	DAM
204	WATER LINE
206	PIER
207	RIPRAP

208	CONCRETE DITCH
209	CONC CHANNEL (RETAINING)
210	DRY STREAM
250	BUILDING
251	NON-SQ BLDG
252	DECK
253	STEPS
254	POOL/SPA
255	BUILDING FOUNDATION
258	PATIO/SHELTER
260	SHED
261	RUIN
262	UNDER CONSTRUCTI
263	UNDEFINED LINE
264	UNDEF STRUCT
265	TRAILER
300	PLAY GROUND
303	BENCH\BLEACHERS
304	GOLF COURSE\FAIR
305	SAND TRAP
306	GOLF TEE
307	GOLF GREEN
308	CEMETERY
350	TREE LINE
351	BRUSH LINE
352	ORCHARD LINE
353	CROP LINE
354	SHRUB LINE
355	CULTIVATED FIELD
356	HEDGE LINE
357	DASHED CONTOURS AREA
400	INDEX CONTOUR
401	INTER CONTOUR
402	DASHED INDEX CONTOUR
403	DASHED INTER CONTOUR
404	INDEX DEP CONTOUR
405	INTER DEP CONTOUR
406	DASH INDEX DEP
407	DASH INTER DEP
410	SUPPLEM CONTOUR
411	DEP SUPPLEM
413	TOE
414	TOP
415	SOFT BREAKLINE
416	HARD BREAKLINE
417	3D HOLE
418	2D HOLE
451	RAILROAD SINGLE
452	RAILROAD PARR
453	PILE
454	CONVEYOR STRUCTURE
462	ROCK OUTCROP
463	DIRT PILE
464	DEBRIS PILE
465	CONSTRUCTION AREA
466	CLIFF

412	412	CONTOUR ANNOTATION
500		CALTRANS FH
501		CALTRANS MAN HOLE
502	VC	CALTRANS VALVE
503		CALT. PALM TREE
550	25	HORIZONTAL CONTROL
551	25 0.00	HORIZ\VERT CONTROL
552	25 0.00	VERT CONTROL
553		BENCH MARK
554		SUPP CONTROL PT
555		ANALYTICAL POINT
556	+	PHOTO CENTER
600		GUARD POST
601	M/B	MAIL BOX
602		STREET LIGHT
603	TS	TRAFFIC SIGNAL
604		SIGN (10')
605		SIGN (5')
606		LARGE SIGN POST
607	CB	CATCH BASIN
608	DI	DROP INLET
609		LIGHT POLE
610	M	PARKING METER
611		CRASH CUSHION
612	DI	DROP INLET (RD)
626		R.R. SWITCH
628	S	SIGN
654	F/H	FIRE HYDRANT
655		POWER POLE
656		TRANSMISSION POLE
657		TRANSMISSION TOWER
658		TRANSFORMER BOX
659		ANCHOR
660		SPEAKER POLE
661	M	METER
662		POST (NO LABEL)
663	U/O	OBSCURED FEATURE
664	U/O	UNDEFINED OBJECT
665	V	VALVE
667	MH	MANHOLE
669		HANDICAP
696	UB	UTILITY BOX
697	SP	STAND PIPE
698		GUYWIRE

700	W/L 0.0	WATER LEVEL
701		SWAMP\MARSH
702	WELL	WELL
750		TREE (10')
751		TREE (5')
752		PALM TREE
753		ORCHARD TREE
755		JOSHUA TREE
756		CACTUS
757		SHRUB
800	× 0.00	SPOT ELEVATION
801	×	DTM SPOT
802	0.00	CALTRANS SPOT
803	× 0 0.00	SURVEY SPOT
804	× 0.0	ROCK SPOT
875	P/B	PHONE BOOTH
862		LEFT ARROW
863		RIGHT ARROW
864		STRAIGHT ARROW
865		DIAMOND LN
876	FP	FLAG POLE
877	WM	WINDMILL

MISCELLANEOUS LABELS

900	CONC
901	ASPH
903	GATE
904	CC
905	DIRT PILE LABEL
906	TRAIL
907	BUILDING LABEL
908	DENSE BRUSH
909	SCATTERED BRUSH
910	DENSE TREES
911	SCATTERED TREES
913	G.N.V.
914	SHADOW
915	CONC DITCH
916	NURSERY
917	CULTIVATED FIELD
918	ORCHARD
919	VINYARD
920	DECK
921	PIPE
922	PIPES
923	POOL
924	SPA
925	TANK
926	ROCKS
928	SIGN
929	STEPS
930	WATER NAME LABEL
933	UNDER CONSTRUCTION
934	misc label
935	GROUND OBSCURED
936	ASPH PARKING
937	DEBRIS
938	DIRT
939	FAIRWAY
940	SAND TRAP
941	GOLF TEE
942	GOLF GREEN
943	PLAYGROUND

PROFESSIONAL LAND SURVEYOR
ROBERT T. KELSOE
EXP. 9-30-09
NO. 6957
STATE OF CALIFORNIA

N

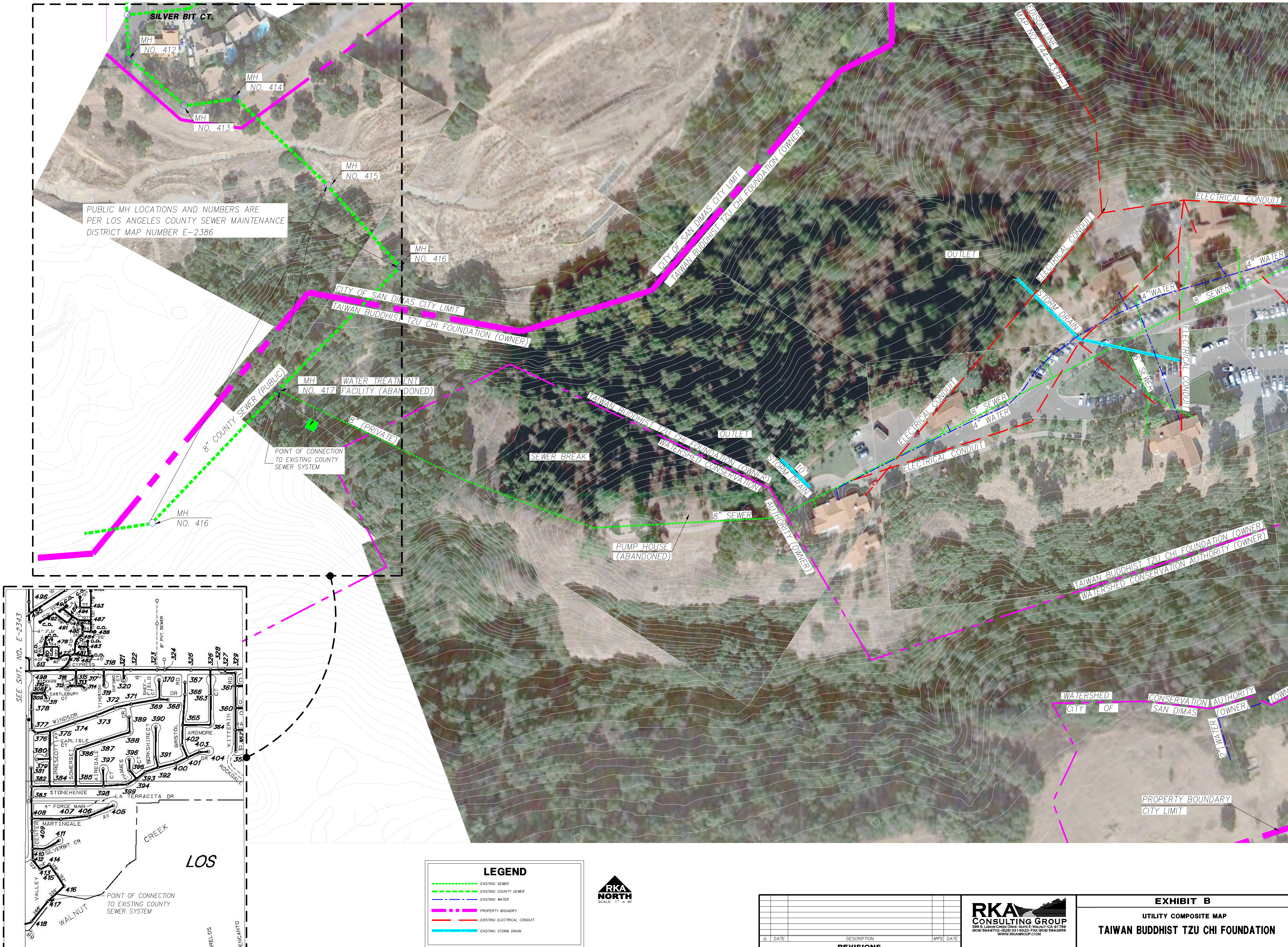
GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

DATE: 9-4-2008 PLOT DATE: 9-4-2008 SCALE: 1" = 200' JOB NO. KAI 08-1933	SHEET: 1 OF 1	KELSOE and associates, inc. land surveying • engineering • g.p.s. 268 N. LINCOLN AVENUE, CORONA, CA 92882 (951)736-0755 • FAX (951)736-8421	COMPOSITE MAP LOTS "A" AND "B" TRACT 10345 IN THE CITY OF SAN DIMAS	REVISIONS NO. DATE DESCRIPTION BY	SURVEYED BY: AS, SB DRAFTED RTK, AM CHECKED RTK

APPENDIX C



LEGEND

- EXISTING SEWER
- EXISTING COUNTY SEWER
- EXISTING WATER
- PROPERTY BOUNDRY
- EXISTING ELECTRICAL CONDUIT
- EXISTING STORM DRAIN

RKA NORTH
SCALE: 1" = 40'

△	DATE	DESCRIPTION	APP'D	DATE

REVISIONS

RKA CONSULTING GROUP
398 S. LEMON CREEK DRIVE · SUITE E · WALNUT · CA · 91789
(909) 594-9702 · (626) 331-8323 · FAX (909) 594-2658
WWW.RKAGROUP.COM

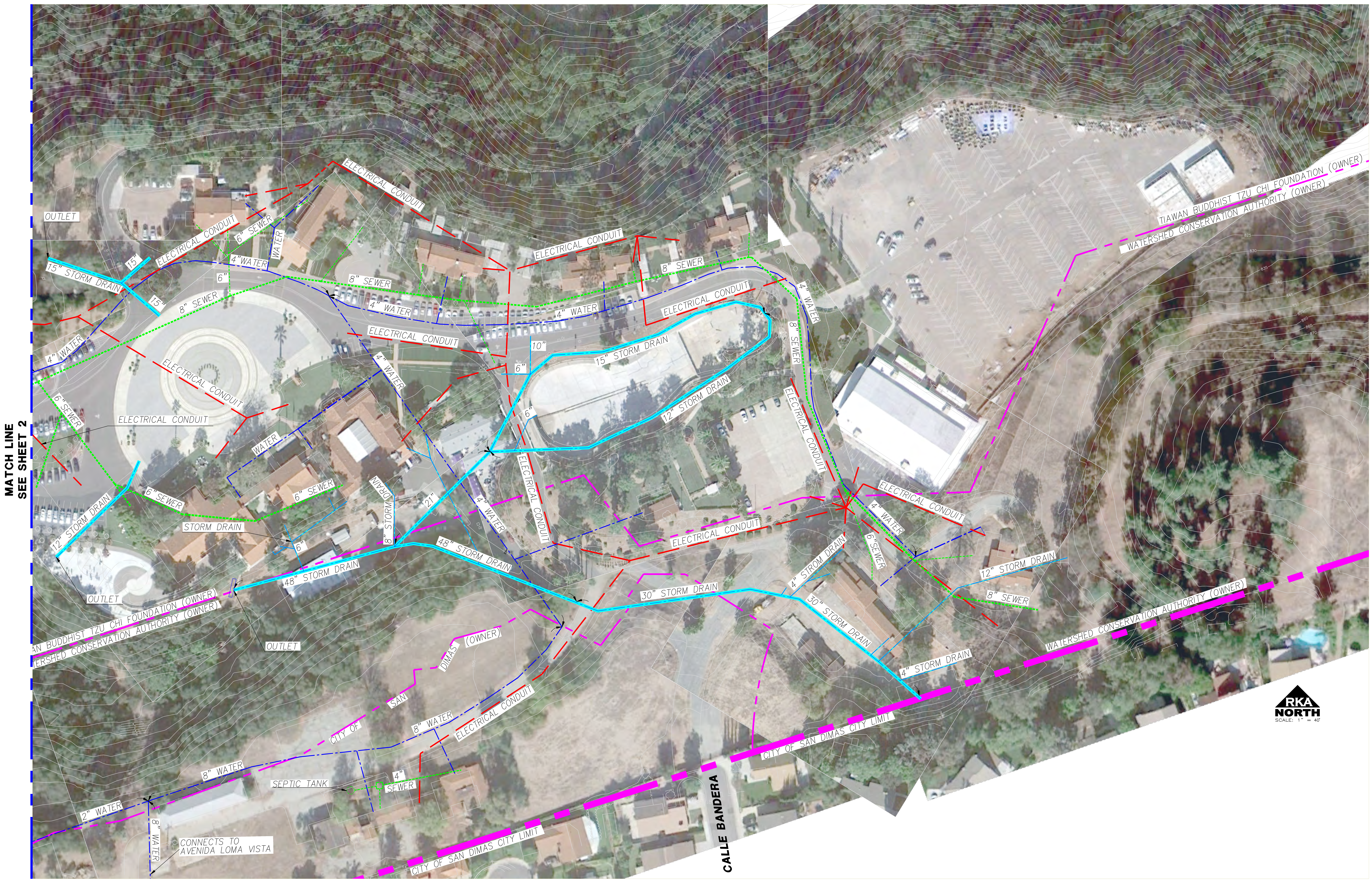
EXHIBIT B

UTILITY COMPOSITE MAP

TAIWAN BUDDHIST TZU CHI FOUNDATION

SHEET 2 OF 3 SHEETS

PLAN SET: TAIWAN BUDDHIST ZHU FOUNDATION
DRAWING DATE: 10/5/10



LEGEND

- SEWER
- COUNTY SEWER
- WATER
- PROPERTY BOUNDRY
- ELECTRICAL CONDUIT
- EXISTING STORM DRAIN

Δ	DATE	DESCRIPTION	APP'D	DATE

REVISIONS

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EXHIBIT C

UTILITY COMPOSITE MAP

TAIWAN BUDDHIST TZU CHI FOUNDATION

SHEET 3 OF 3 SHEETS

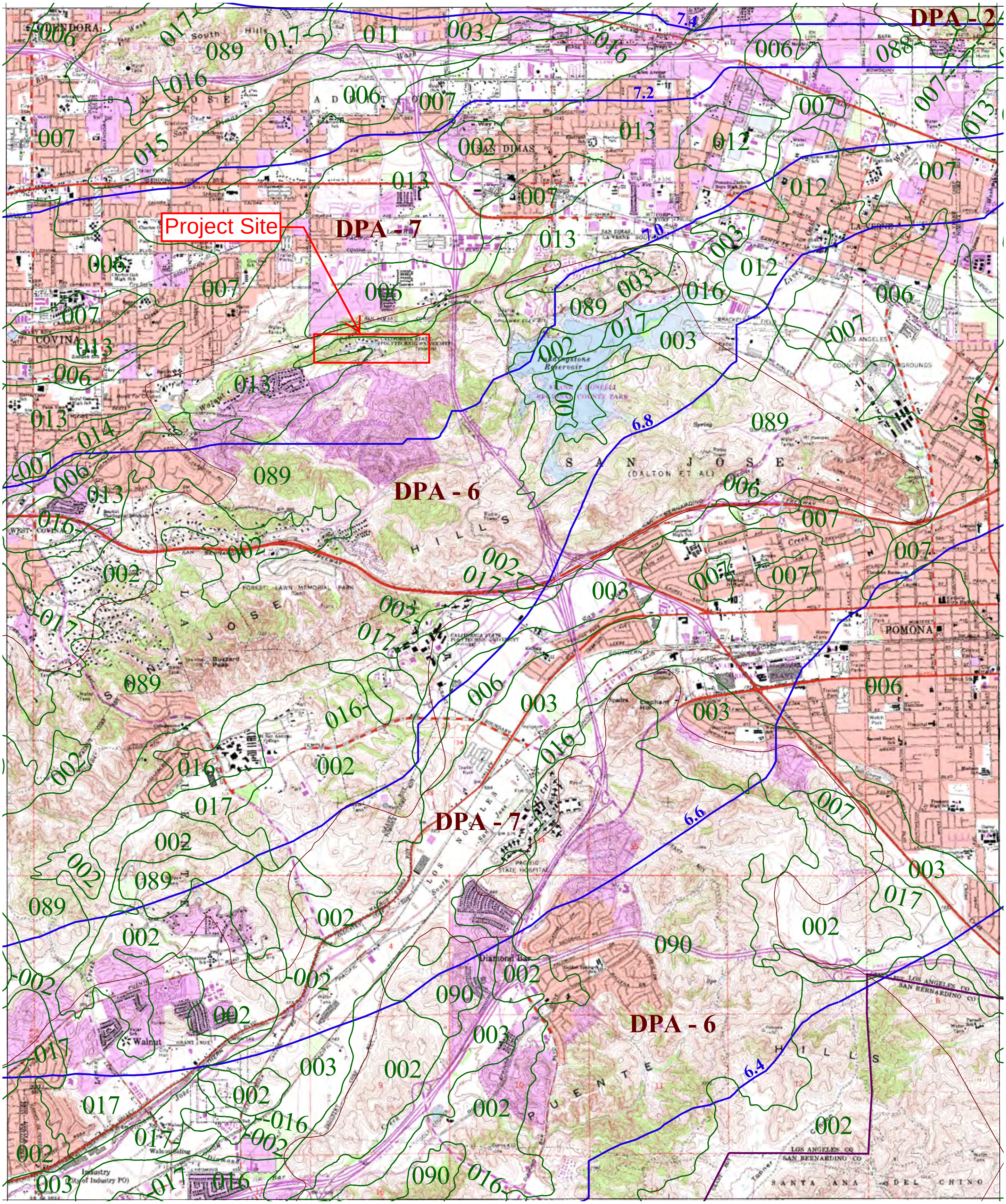
DRAWING DATE: 10/5/10 PLAN SET: TAIWAN BUDDHIST ZHU FOUNDATION JOB NO.: 165576 DESIGN BY: DRAWN BY: C.A.H.

APPENDIX D

34° 07' 30"

GLENDORA 1-H1.32

-117° 52' 30"



BALDWIN PARK 1-H1.21

ONTARIO 1-H1.23

-117° 45' 00"

YORBA LINDA 1-H1.12

34° 00' 00"

016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

SAN DIMAS
50-YEAR 24-HOUR ISOHYET

1-H1.22

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

APPENDIX E

Tc Calculator

Subarea No.	Area (acres)	Imp. %	Frequency	Soil Type	Length	Slope	Isohyet	Fire Factor
West	55.9	0.16	50	13	3200	0.048	7.1	1

Undeveloped subarea coeff. (%imp=0):		Undeveloped subarea coeff. (0<%imp<.21):		Developed subarea coeff. (.21<%imp<.68):		Developed subarea coeff. (.68<%imp<1):	
bo=	-0.507	bo=	-0.507	bo=	-0.507	bo=	-0.507
b1=	-0.519	b1=	-0.519	b1=	-0.519	b1=	-0.519
b2=	0.483	b2=	0.483	b2=	0.483	b2=	0.483
b3=	-0.135	b3=	-0.135	b3=	-0.135	b3=	-0.135

Equation, given parameters above:

Undeveloped subarea coeff. (0<%imp<.21):

bo= -0.507
b1= -0.519
b2= 0.483
b3= -0.135
0 0

Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

Equations for Tc: Tc=(10)^bo*(Cd*I)^b1*(L)^b2*(S)^b3

I1440=Isohyet/24hrs: 0.296
It=I1440*Ix/I1440: 2.535

Qd=Cd*I*A: 125.87
Qb=FF*((1-K)*((1-0.1*imp)*A*I-Qd))+Qd: 130.98
K=0.677*I^(-0.102): 0.62
Cb=FF*((1-K)*(1-Cu))+Cu: 0.93
Cba=(0.9*imp)+(1.0-imp)*Cb: 0.93
Qb=Cba*I*A: 131.12 no rounding

Iterations		Tc estimate:	Tc calc:	Diff:		Cu	Cd	Ix=Cd*I	It
2	RESET	14.91	15.18	0.27	RUN	0.89	0.89	2.250	2.53

Interpolated value for I:	Tc high	Tc low	It/I1440 low	It/I1440 high	Interpolated It/I1440	(1440/Tc)^0.47
	15.00	14.00	8.54	8.83	8.57	8.57

Tolerance (min)
0.5

Use Tc value: 15.00 minutes

Intensity: 2.53 **Cu: 0.89** **Cd: 0.89** **Flow rate: 125.87**

Burned flow rate: n/a

Tc Calculator

Subarea No.	Area (acres)	Imp. %	Frequency	Soil Type	Length	Slope	Isohyet	Fire Factor
East	17	0	50	89	1100	0.046	7.1	1

Undeveloped subarea coeff. (%imp=0):		Undeveloped subarea coeff. (0<%imp<.21):		Developed subarea coeff. (.21<%imp<.68):		Developed subarea coeff. (.68<%imp<1):	
bo=	-0.507	bo=	-0.507	bo=	-0.507	bo=	-0.507
b1=	-0.519	b1=	-0.519	b1=	-0.519	b1=	-0.519
b2=	0.483	b2=	0.483	b2=	0.483	b2=	0.483
b3=	-0.135	b3=	-0.135	b3=	-0.135	b3=	-0.135

Equation, given parameters above:

Undeveloped subarea coeff. (%imp=0):

bo= -0.507
b1= -0.519
b2= 0.483
b3= -0.135
0 0

Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

Equations for Tc: Tc=(10)^bo*(Cd*I)^b1*(L)^b2*(S)^b3

I1440=Isohyet/24hrs: 0.296
It=I1440*Ix/I1440: 3.173

Qd=Cd*I*A: 39.29
Qb=FF*((1-K)*((1-0.1*imp)*A*I-Qd))+Qd: 45.39
K=0.677*I^(-0.102): 0.60
Cb=FF*((1-K)*(1-Cu))+Cu: 0.83
Cba=(0.9*imp)+(1.0-imp)*Cb: 0.83
Qb=Cba*I*A: 45.39 no rounding

Iterations		Tc estimate:	Tc calc:	Diff:		Cu	Cd	Ix=Cd*I	It
2	RESET	9.24	8.99	0.25	RUN	0.72	0.72	2.310	3.21

Interpolated value for I:	Tc high	Tc low	It/I1440 low	It/I1440 high	Interpolated It/I1440	(1440/Tc)^0.47
	10.00	9.00	10.34	10.86	10.73	10.73

Tolerance (min)
0.5

Use Tc value: 9.00 minutes

Intensity: 3.21 **Cu: 0.72** **Cd: 0.72** **Flow rate: 39.29**

Burned flow rate: 45.39