APPENDIX G

Hydrologic Assessment Report and Groundwater Impact Assessment

Hydrologic Assessment Report

FUSCOE
ENGINEERING

HYDROLOGIC ASSESSMENT REPORT

BRASADA

San Dimas, California

Prepared For
NJD, LTD.
26152 Oroville Place
Laguna Hills, CA 92653

Prepared By
Fuscoe Engineering, Inc.
16795 Von Karman, Suite 100
Irvine, California 92606
949.474.1960
www.fuscoe.com

Project Manager:
Trevor Dodson, P.E.

Date Prepared: June 15, 2009
Date Revised: August 25, 2009
Date Revised: July 9, 2010

Job Number: 349.04.01

full circle thinking®

BRASADA

HYDROLOGIC ASSESSMENT REPORT

City of San Dimas
County of Los Angeles, CA

Prepared for:

NJD Limited
26152 Oroville Place
Laguna Hills, CA 92653

By:

FUSCOE ENGINEERING, INC.
16795 Von Karman, Suite 100
Irvine, CA 92606

Project No. 349.04.01

May 12, 2008
Revised: June 12, 2009
Revised: July 9, 2010

TABLE OF CONTENTS

Section Page

1.0 INTRODUCTION 1
1.1 PURPOSE OF STUDY 1
1.2 PROJECT AND SITE DESCRIPTION 1
1.2.1 LOCATION 1
1.2.2 EXISTING SITE FEATURES 2
1.2.3 PROPOSED DEVELOPMENT 2
2.0 PROJECT WATERSHED 2
2.0.1 PROPOSED DRAINAGE PLAN 2
2.0.2 DEBRIS BASINS 3
2.0.3 WATER QUALITY BASINS 3
2.0.4 FLOODPLAIN MAPPING 6
3.0 HYDROLOGY ASSESSMENT 8
3.0.1 METHODOLOGY 8
3.1 CONCLUSIONS 10
3.1.1 PROPOSED WATERSHED SUMMARY 12
4.0 REFERENCES 13
5.0 TECHNICAL APPENDICES 14

FIGURES

Figure 1 Vicinity Map 4
Figure 2 Watershed Map 5
Figure 3 FIRM Panel 7
Figure 4 Existing Drainage Vicinity Topography 9

TABLES

Table 3.1 Summary of existing hydrology conditions for off site drainage areas 10
Table 3.2 Existing hydrology conditions for each watershed 10
Table 3.3 Summary of existing and proposed drainage areas for each watershed 11
Table 3.4 Summary of existing peak flow rate and runoff volume 11
Table 3.5 Summary of proposed peak flow rate and runoff volume w/o detention 12
Table 3.6 Summary of proposed peak flow rate and runoff volume with detention 12

1.0 INTRODUCTION

1.1 PURPOSE OF STUDY

The purpose of this Hydrologic Assessment Report is to assess storm water runoff and flood control impacts associated with the proposed Brasada development project. The project has the potential to alter the existing drainage courses, modify the impervious surface area makeup and create the possibility for potential sources of runoff contamination. The report is organized into the following sections:

- Section 1: Identifies the framework and objectives for the Hydrologic Assessment Report
- Section 2: Provides background regarding the project watershed and associated drainage conditions.
- Section 3: Identifies the existing and proposed hydrologic conditions with respect to the project watershed along with the associated flood control and drainage impacts.

This report concentrates on the hydrologic issues associated with the project. Project design features will be implemented to reduce the potential impacts to the watershed due to storm flows and surface water quality. The effect of the development on groundwater, geotechnical issues and biology are not included in the scope of this report.

1.2 PROJECT AND SITE DESCRIPTION

1.2.1 LOCATION

The proposed Brasada project site is a 318 acre parcel located in the City of San Dimas, CA. The project site is bounded by open space within the City of Glendora on the west, the Angeles National Forest to the north, open space within the City of San Dimas to the east and residential lots north of Maverick Drive and Dalepark Drive to the south.

Drainage is to the San Gabriel River Watershed. The San Gabriel River Watershed is located in the eastern portion of Los Angeles County. It is bounded by the San Gabriel Mountains to the north, most of San Bernardino/Orange County to the east, the division of the Los Angeles River from the San Gabriel River to the west, and the Pacific Ocean to the south. The watershed is composed of approximately 640 square miles of land spanning 35 cities. Landuses within the watershed consist of 26% residential, 15% commercial,50%rural and 9% other.

The watershed drains into the San Gabriel River from the San Gabriel Mountains flowing 58 miles south until its confluence with the Pacific Ocean. Major tributaries to the San Gabriel River include Walnut Creek, San Jose Creek, Coyote Creek, and numerous storm drains entering from the 19 cities that the San Gabriel River passes through. Channel flows pass through different sections in the San Gabriel River, diverting from the riverbed into four different spreading grounds, held behind several rubber dams for controlled flow

and ground water recharge, and controlled through 10 miles of concrete channel bottom from below Whittier Narrows Dam to past Coyote Creek.

1.2.2 EXISTING SITE FEATURES

Within the project boundary there are three named canyons that will be referenced throughout this report. Each of these canyons is a sub watershed that drains the project site. Shay Canyon and Shuler Canyon drain in a southerly direction and Wildwood Canyon drains in a westerly direction. Under existing conditions, the majority of the project site is undeveloped open space with some equestrian uses. Adjacent land uses include open space to the east and west, the Angeles National Forest to the north and single family residential to the south. Storm water runoff ultimately discharges into the San Dimas Wash and then to reach 4 of the San Gabriel River in the Lower San Gabriel Valley between Santa Fe Dam and Whittier Narrows Dam.

1.2.3 PROPOSED DEVELOPMENT

The proposed project includes the development of approximately 80 acres of the 318 acre project site for residential uses. The Shuler Canyon portion of the site will drain to a storm drain system located within the City of San Dimas on Cataract Avenue. This system drains through the golf course to the west. The Shay Canyon portion of the site will continue to drain southerly to an existing storm drain system in San Dimas Avenue. The northerly portion of the site will drain overland toward the City of Glendora via Wildwood Canyon. The proposed project includes a previously entitled tract, Tract 62872, at the mouth of Shuler Canyon. This project proposed a detention basin with an outlet in Cataract Avenue to the golf course. (See Appendix G) However, this project was not constructed. The Brasada development will install a detention basin in the same vicinity as the one proposed with Tract 62872 and this basin will also detain runoff from the Brasada development. The Brasada project consists of 61 single family home sites with a minimum of 1-acre lots and appurtenant roads, utilities, and debris basins.

2.0 PROJECT WATERSHED

2.0.1 PROPOSED DRAINAGE PLAN

The objective of the proposed drainage plan is to design the on site storm drain system and other drainage features in a manner to neutralize any adverse effects induced by the project in storm runoff quantity and quality. No major changes to the drainage patterns are proposed as compared to existing conditions in the three sub watersheds. However, some minor adjustments to the sub watershed boundaries have been made to facilitate the project design. The proposed drainage facilities are described below for each sub watershed.

- **Shay Canyon:** No development or drainage facilities are proposed for this watershed. Currently this canyon flows southerly to San Dimas Avenue via sheet flow. Storm flows enter an existing storm drain system south of Prairie Avenue.

- **Shuler Canyon:** Development of a portion of this canyon is proposed and a system of streets, catch basins, culverts and existing canyon channels will convey flow to a proposed detention basin at the southerly end of the canyon. The outlet of this basin will connect to the existing storm drain system in Cataract Avenue as previously proposed with Tract 62872 (see appendix G).

- **Wildwood Canyon:** Development of a portion of this canyon is also proposed and a system of streets, catch basins, culverts and existing canyon channels will convey flow to a proposed detention basin on the westerly edge of development. The outlet of this basin will flow into existing Wildwood Canyon and continue westerly.

2.0.2 DEBRIS BASINS

The project is within a Debris Potential Area. Therefore, debris basins will be constructed above home sites exposed to flow from off-site areas upstream. In some cases these basins will be combined debris and detention basins. In these cases the basin will be designed to handle the sum of the volume from debris and storm flow. (See Appendix E)

2.0.3 WATER QUALITY BASINS

Water Quality basins will be constructed for treatment of runoff prior to releasing the flow down stream of the project. Bio-filtration basins or bio-cells will be provided for first flush treatment from the proposed development. The topography of the site precludes the use of swales, being much too steep for any effective treatment. Infiltration basins would not be feasible due to the topography and the proximity of fill slopes. The proposed bio-filtation basins will be lined and have a drainage system beneath filtration media to take the filtered storm water to the existing natural drainage system.

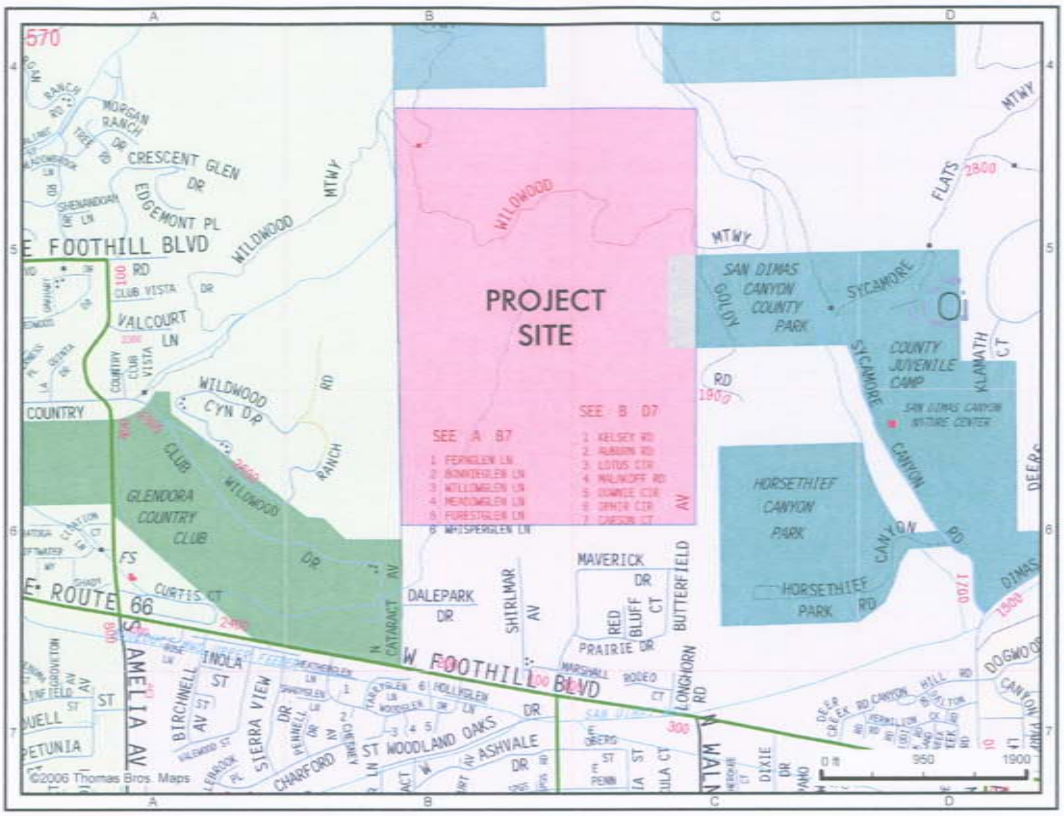


Figure 1 Vicinity Map

Figure 2 San Gabriel River Watershed Map

2.0.4 FLOODPLAIN MAPPING

The National Flood Insurance Act (1968) established the National Flood Insurance Program, which is based on the minimal requirements for flood plain management and is designed to minimize flood damage within Special Flood Hazard Areas. The Federal Emergency Management Agency (FEMA) is the agency, which administrates the National Flood Insurance Program. Special Flood Hazard Areas (SFHA) are defined as areas that have a 1% chance of flooding within a given year. This is also referred to as the 100-year flood. Flood Insurance Rate Maps (FIRMs) were developed to identify areas of flood hazards within a community.

According to the Flood Insurance Rate Map (FIRM) catalog, there is a FIRM produced by FEMA for the project site:

MAP Number: 06037C144SF

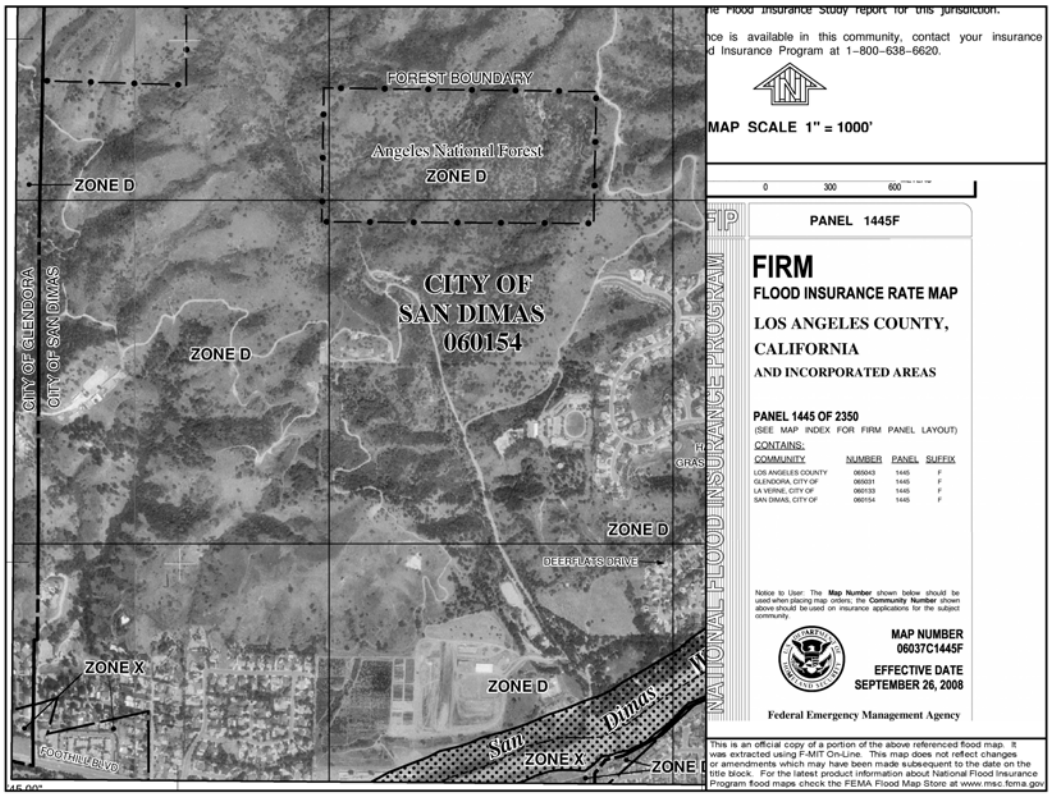
Effective Date: September 26, 2008

Figure 3 shows the flood zones designated for the Brasada project site. The complete site is located within Zone D. Zone D is defined by FEMA as follows:

> Areas with possible but undetermined flood hazards. No flood Hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.

Figure 3 FIRM Panel

FIRMette
0601540001C



3.0 HYDROLOGY ASSESSMENT

The purpose of this hydrology analysis to assess the potential hydrologic impacts in the project watershed as a result of the proposed development. In general, the proposed change in land uses and flow patterns will alter impervious surfaces and runoff potential within the project site. This affects the downstream runoff from the watershed. As a result of the increase in impervious surfaces as compared to existing conditions, an increase in peak flow runoff and volume of runoff may occur. The increased storm runoff in either volume or peak discharge could potentially cause flooding issues downstream from the project. A comprehensive modeling study is necessary to quantify the difference in hydrologic response of the projects watershed between the existing and proposed conditions.

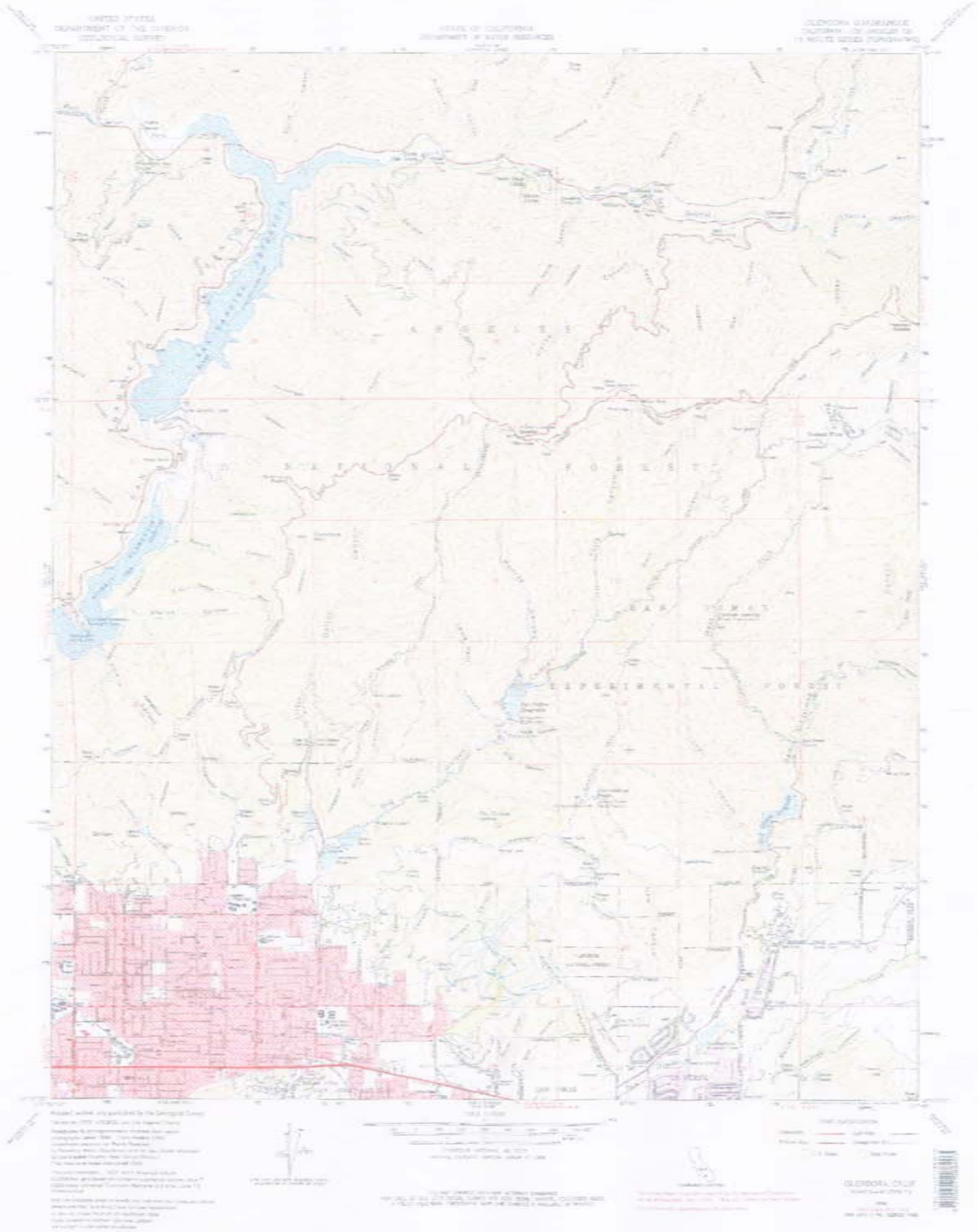
For the purposes of this study, the modeling procedures specified in the Los Angeles County Hydrology Manual, January 2006 Edition, were used for modeling analyses. As recommended in the Hydrology Manual, a 50 year return frequency design storm was used for design of storm drain facilities. The project site is within a Debris Potential Area. Storm flows will be bulked to account for debris flow as recommended in the Los Angeles County Sedimentation Manual.

3.0.1 METHODOLOGY

The Modified Rational Method, as outlined in the Hydrology Manual, was used to determine the pre-development and post-development storm flows from the three watersheds within the project area. The purpose of the existing condition evaluation is to establish a baseline for comparing the post-development Project conditions with the pre-development conditions. Hydrographs for each watershed were also developed for pre-development and post-development conditions. These hydrographs were developed using Los Angeles County recommended routing program, F0601. Detention calculations were prepared using HydroCad to determine the sizing of detention basins and outlet works for Shuler and Wildwood Canyons. Flows were detained to the extent necessary to limit storm flows to existing levels or below.

Figure 4 Existing Drainage Vicinity Topography

USGS Glendora Quadrangle



3.1 CONCLUSIONS

The following section summarizes the analysis results of the existing and proposed conditions for peak flow runoff rates and volumes for each of the watersheds within the project.

EXISTING HYDROLOGY CONDITIONS OFF-SITE WATERS ENTERING THE SITE		
Sub-Area ID[1]	**Off-site Drainage Area**	**50-Year Peak Flow Rate (Q_{50}, cfs)**
1-OS	38.95	87
2-OS	12.36	28
3-OS	36.04	81
4-OS	3.09	7
5-OS	2.87	6
6-OS	3.03	7
7-OS	30.76	70
Total	**127.10**	**286 cfs**

1 Refer to Appendix C for locations of sub-drainage areas
cfs cubic feet per second OS-offsite.

Table 3.1 Summary of existing hydrology conditions for off-site drainage areas

Table 3.1 summarizes areas and flows that enter the project site from upstream portions of canyons. Under existing conditions, there are seven points of entry into the site for off-site flows. Area entering the project site comprise 127.1 acres which generates 286 cfs which must be accepted and conveyed through the project site.

EXISTING HYDROLOGY CONDITIONS FOR EACH WATERSHED		
Watershed	**Drainage Area**	**50-Year Peak Flow Rate (Q_{50}, cfs)**
Shay Canyon	68.49 acres	180 cfs
Shuler Canyon	147.94 acres	304 cfs
Wildwood Canyon	190.03 acres	414 cfs
Total	**400.96 acres**	**898 cfs**

See Appendix C for locations of sub-drainage areas
cfs cubic feet per second

Table 3.2 Summary of existing areas and peak flow rates for each watershed
Detailed calculations are provided in Appendix A.

Table 3.2 summarizes the existing drainage area and peak flow rate for each watershed. There are three watersheds within the project site. The complete drainage area comprised of the project site and upstream tributary area is 400.96 acres and generates 898 cfs under undeveloped conditions.

EXISTING AND PROPOSED DRAINAGE AREAS FOR EACH WATERSHED		
Watershed	**Existing Drainage Area**	**Proposed Drainage Area**
Shay Canyon	68.49 acres	70.95 Acres
Shuler Canyon	147.94 acres	148.69 Acres
Wildwood Canyon	190.03 acres	186.82 Acres
Total	**400.96 acres**	**400.96 Acres**
See Area Calculations Appendix A		

Table 3.3 Summary of existing and proposed drainage areas for each watershed

Table 3.3 summarizes changes in area to each watershed due to proposed development. Slight changes to each watershed area due to development configuration have been made. As shown, the overall project watershed area remains the same before and after development.

EXISTING PEAK Q AND RUNOFF VOLUME FOR EACH WATERSHED		
Watershed	**Existing 50 Yr Peak Q**	**Existing Runoff Volume**
Shay Canyon	180 cfs	14.9 Ac-Ft
Shuler Canyon	304 cfs	32.4 Ac-Ft
Wildwood Canyon	414 cfs	44.4 Ac-Ft
Total	**898 cfs**	**91.7 Ac-Ft**
See Existing Hydrology Appendix A		

Table 3.4 Summary of existing peak flow rate and runoff volume

Table 3.4 summarizes the existing peak 50 year runoff rate and volume for each watershed.

PROPOSED PEAK Q AND RUNOFF VOLUME FOR EACH WATERSHED WITHOUT DETENTION		
Watershed	**Proposed Peak 50 Yr Q**	**Proposed Runoff Volume**
Shay Canyon	184 cfs	15.2 Ac-Ft
Shuler Canyon	286 cfs	36.6Ac-Ft
Wildwood Canyon	435 cfs	48.2 Ac-Ft
Total	**905 cfs**	**100.0 Ac-Ft**
See Proposed Hydrology Appendix B		

Table 3.5 Summary of proposed peak flow rate and runoff volume without detention

Table 3.5 summarizes the proposed peak 50 year runoff rate and volume before any detention is accounted for. As shown, the proposed peak runoff is less than existing in Shuler Canyon. This is due to the configuration of development within this watershed. Even though some factors tend to increase flow after development, other factors such as street alignment and slopes increase the time of concentration and therefore decrease the peak runoff rate.

PROPOSED PEAK Q AND RUNOFF VOLUME FOR EACH WATERSHED WITH DETENTION		
Watershed	**Proposed Peak 50 Yr Q**	**Proposed Runoff Volume**
Shay Canyon	184 cfs	15.2 Ac-Ft
Shuler Canyon	66 cfs	36.6Ac-Ft
Wildwood Canyon	388 cfs	48.2 Ac-Ft
Total	**638 cfs**	**100.0 Ac-Ft**
See Detention Calculations Appendix F		

Table 3.6 Summary of proposed peak flow rate and runoff volume with detention

Table 3.6 summarizes the proposed peak 50 year runoff rate and volume after detention is accounted for. As shown, the overall project will decrease the peak flow rate by 260 cfs when compared to existing flow.

3.1.1 PROPOSED WATERSHED SUMMARY

The following is a summary of conditions for each watershed within the project.

- **Shay Canyon:** No development is proposed for this watershed. However, the area of the watershed is increased by 2.46 acres due to configuration of adjacent development in Shuler Canyon. The corresponding 50 year runoff rate is increased by 4 cfs, approximately 2%. This slight increase in runoff rate is negligible and will not adversely affect downstream conditions within this watershed.

- **Shuler Canyon:** Development of a portion of this watershed is proposed and a system of streets, catch basins, culverts and existing canyon channels will convey flow to a proposed detention/debris basin at the southerly end of the canyon. The outlet of this basin will connect to the existing storm drain system in Cataract Avenue as previously proposed with Tract 62872 (see appendix G). As shown in tables 3.4 and 3.6, the flow rate from this watershed is significantly reduced from 304 cfs to 66 cfs, a 78% reduction. Flow rates within the existing canyon channels upstream of the detention basin are also reduced due to configuration of development. The existing 42" storm drain system in Cataract Avenue flowing to the golf course will remain and function as designed due to the significant reduction in flow from Shuler Canyon. This system was designed for 93 cfs (see appendix H)

- **Wildwood Canyon:** Development of a portion of this watershed is proposed and a system of streets, catch basins, culverts and existing canyon channels will convey flow to a proposed detention basin on the westerly edge of development. The outlet of this basin will flow to Wildwood canyon and the flow will continue westerly in the canyon. As shown in tables 3.4 and 3.6, the flow rate from this watershed is reduced from 414 cfs to 388 cfs, a 6% reduction. Flow rates within the side channels contributing to Wildwood Canyon are also reduced due to configuration of development.

4.0 REFERENCES

County of Los Angeles 2006 Hydrology / Sedimentation Manuals.

5.0 TECHNICAL APPENDICES

Appendix A Modified Rational Method Hydrology Study: Existing Condition

Appendix B Modified Rational Method Hydrology Study: Proposed Condition

Appendix C Existing Hydrology Map & Off Site Area Map (map pocket)

Appendix D Proposed Hydrology Map (map pocket)

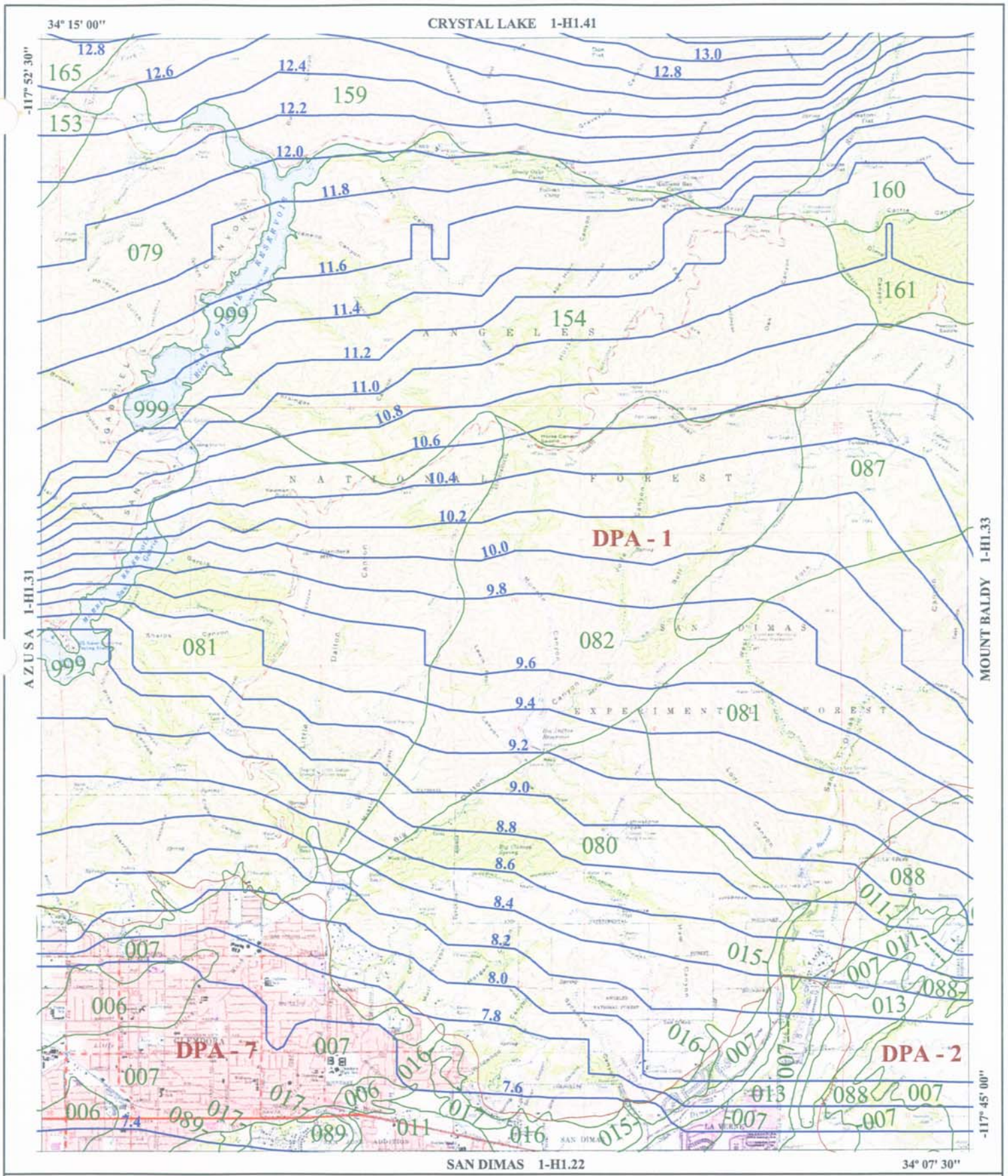
Appendix E Debris calculations

Appendix F Detention Basin calculations

Appendix G Preliminary Drainage Study and Hydraulic Calculations for Tract No. 62872, August 10, 2006

Appendix H Bud Wheeler Drainage Study (Includes Capacity of Existing Catch Basins), January 24, 2001

Appendix A



016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

N S E W

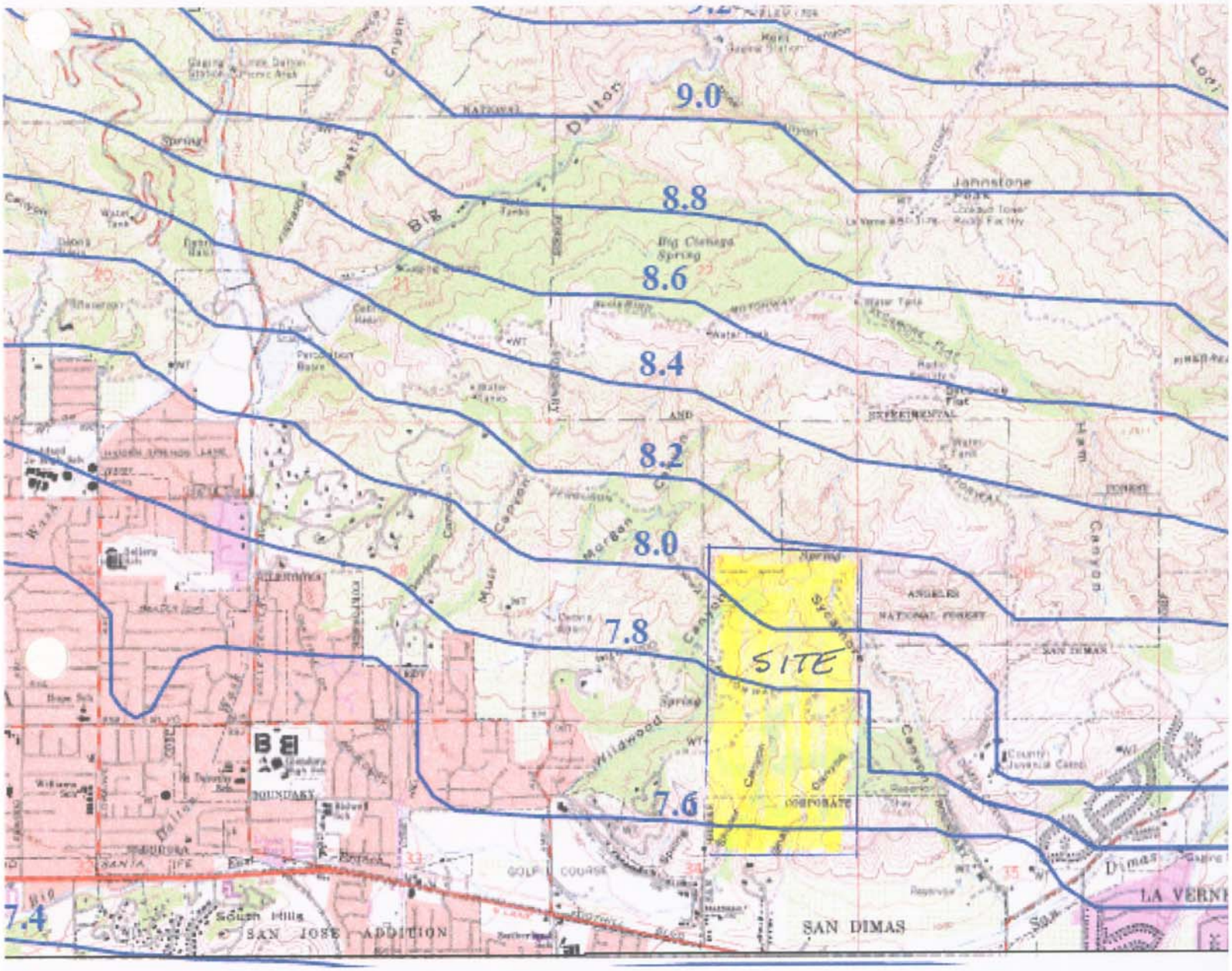
1 0 1 2 Miles

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

GLENDORA
50-YEAR 24-HOUR ISOHYET

1-H1.32

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works



SAN DIMAS 1-H1.22

1 0 1 2 Miles

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

NCHES OF
AINFALL

GLENDORA
50-YEAR 24-HOUR ISOHYET

Brasada Drainage Areas

Existing

Shay Canyon

Area	Acres
1a	32.24
2a	36.25
Total	68.49

Shuler Canyon

Area	Acres
1a	34.64
2b	35.17
4a	29.04
5a	49.09
Toatal	147.94

Wildwood Canyon

Area	Acres
1a	38.95
2a	31.72
3a	46.56
4a	30.35
5a	42.45
Total	190.03
Total Existing	**406.46**

Proposed

Shay Canyon

Area	Acres
1a	34.7
2a	36.25
Total	70.95

Shuler Canyon

Area	Acres
1a	8.42
2a	11.44
4a	9.29
5b	8.7
6b	15.91
7b	10.69
9a	19.94
10a	25.84
11c	5.83
12c	17.03
14a	10.3
15a	5.3
Toatal	148.69

Wildwood Canyon

Area	Acres
1a	38.95
2a	31.72
3a	44.1
4a	20.3
5a	5.9
6b	29.1
7b	5.25
8b	11.5
Total	186.82
Total Proposed	**406.46**

SHAY CANYON EXISTING TC CALCULATIOR INPUT

Project	Subarea	Area	%imp	Frequency	Soil Type	Length	Slope	Isohyet	Fire Factor
Shay	1a	32.24	0.01	50	80	1718	0.247	7.7	0.71
Shay	2a	36.25	0.01	50	80	1212	0.086	7.6	0.71

SHULER CANYON
EXISTING TC CALCULATOR INPUT

Project	Subarea	Area	%imp	Frequency	Soil Type	Length	Slope	Isohyet	Fire Factor
Shuler	1a	34.64	0.01	50	80	2246	0.234	7.8	0.71
Shuler	2b	35.17	0.01	50	80	2766	0.190	7.8	0.71
Shuler	4a	29.04	0.01	50	80	883	0.067	7.7	0.71
Shuler	5a	49.09	0.01	50	80	1950	0.058	7.6	0.71

WILDWOOD CANYON
EXISTING TC CALCULATOR INPUT

Project	Subarea	Area	%imp	Frequency	Soil Type	Length	Slope	Isohyet	Fire Factor
Wildwood	1a	38.95	0.01	50	80	2502	0.259	8.3	0.71
Wildwood	2a	31.72	0.01	50	80	1781	0.221	8	0.71
Wildwood	3a	46.56	0.01	50	80	737	0.100	7.9	0.71
Wildwood	4a	30.35	0.01	50	80	2895	0.173	8	0.71
Wildwood	5a	42.45	0.01	50	80	2750	0.234	7.8	0.71

SHAY CANYON
EXISTING HYDROLOGY
TC CALCULATOR

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Tc Equatio	Fire Factor	Burned flow rate (cfs)	Volume (acre-ft)
Shay	1a	32.24	0.01	50	80	1718	0.247	7.7	9	3.49	0.7	0.7	78.76	Tc=(10)^-0	0.71	88.41	4.19
Shay	2a	36.25	0.01	50	80	1212	0.086	7.6	8	3.64	0.71	0.71	93.68	Tc=(10)^-0	0.71	104.69	4.69

SHULER CANYON
EXISTING HYDROLOGY
TC CALCULATOR

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Tc Equatio	Fire Factor	Burned flow rate (cfs)	Volume (acre-ft)
Shuler	1a	34.64	0.01	50	80	2246	0.234	7.8	10	3.36	0.7	0.7	81.47	Tc=(10)^-0	0.71	91.4	4.55
Shuler	2b	35.17	0.01	50	80	2766	0.19	7.8	12	3.08	0.68	0.68	73.66	Tc=(10)^-0	0.71	83.39	4.67
Shuler	4a	29.04	0.01	50	80	883	0.067	7.7	7	3.92	0.73	0.73	83.1	Tc=(10)^-0	0.71	92.04	3.84
Shuler	5a	49.09	0.01	50	80	1950	0.058	7.6	12	3	0.67	0.67	98.67	Tc=(10)^-0	0.71	112.25	6.27

WILDWOOD CANYON
EXISTING HYDROLOGY
TC CALCULATOR

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Tc Equatio	Fire Factor	Burned flow rate (cfs)	Volume (acre-ft)
Wildwood	1a	38.95	0.01	50	80	2502	0.259	8.3	10	3.58	0.71	0.71	99	Tc=(10)^-0	0.71	110.61	5.64
Wildwood	2a	31.72	0.01	50	80	1781	0.221	8	9	3.62	0.71	0.71	81.53	Tc=(10)^-0	0.71	91.1	4.38
Wildwood	3a	46.56	0.01	50	80	737	0.1	7.9	6	4.33	0.74	0.74	149.19	Tc=(10)^-0	0.71	164.65	6.21
Wildwood	4a	30.35	0.01	50	80	2895	0.173	8	12	3.16	0.68	0.68	65.22	Tc=(10)^-0	0.71	73.86	4.2
Wildwood	5a	42.45	0.01	50	80	2750	0.234	7.8	12	3.08	0.68	0.68	88.91	Tc=(10)^-0	0.71	100.65	5.64

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\CIVILD\sgr_soilx_71.dat

SHAY CANYON EXISTING

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
4904	1A	32.2	89.50	32.2	89.50	1	1718.	.24700	.00	.00	0.	280	9	A39	.01
4904	2A	36.3	103.86	68.5	180.57	1	1212.	.08600	.00	.00	0.	280	8	A38	.01

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

SHAY CANYON EXISTING

HYDROGRAPH AT 4904 2A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	3.22	200	3.35	300	3.53	400	3.73
500	3.97	600	4.28	700	4.67	800	5.18	900	5.94
1000	7.20	1050	10.32	1100	16.59	1110	22.52	1120	27.88
1130	34.99	1131	35.67	1132	36.37	1133	37.29	1134	38.42
1135	39.55	1136	40.74	1137	42.47	1138	44.24	1139	45.95
1140	47.58	1141	50.01	1142	52.29	1143	54.62	1144	57.27
1145	60.95	1146	65.01	1147	68.83	1148	73.52	1149	87.32
1150	101.86	1151	118.20	1152	138.09	1153	158.35	1154	168.49
1155	176.64	1156	180.57	1157	169.06	1158	155.03	1159	138.75
1160	119.28	1161	97.27	1162	84.24	1163	72.34	1164	61.45
1165	52.10	1166	44.87	1167	39.23	1168	35.14	1169	31.84
1170	29.28	1171	27.12	1172	25.20	1173	23.48	1174	22.14
1175	20.95	1176	19.67	1177	18.85	1178	17.93	1179	17.06
1180	16.41	1181	15.80	1182	15.03	1183	14.48	1184	14.00
1185	13.54	1186	13.08	1187	12.63	1188	12.19	1189	11.77
1190	11.55	1191	11.16	1192	10.77	1193	10.37	1194	9.99
1195	9.83	1196	9.48	1197	9.20	1198	8.98	1199	8.83
1200	8.61	1201	8.47	1202	8.28	1203	8.09	1204	7.99
1205	7.90	1206	7.75	1207	7.60	1208	7.54	1209	7.41
1210	7.36	1211	7.31	1212	7.19	1213	7.14	1214	7.02
1215	6.98	1216	6.94	1217	6.90	1218	6.80	1219	6.77
1220	6.67	1221	6.64	1222	6.61	1223	6.59	1224	6.49
1225	6.39	1226	6.45	1227	6.35	1228	6.33	1229	6.23
1230	6.28	1231	6.18	1232	6.15	1233	6.13	1234	6.03
1235	6.01	1236	5.99	1237	5.97	1238	5.87	1239	5.85
1240	5.84	1241	5.82	1242	5.80	1243	5.71	1244	5.69
1245	5.67	1246	5.66	1247	5.57	1248	5.55	1249	5.53
1250	5.44	1251	5.51	1252	5.49	1253	5.41	1254	5.39
1255	5.38	1256	5.37	1257	5.28	1258	5.34	1259	5.25
1260	5.24	1261	5.22	1262	5.21	1263	5.20	1264	5.11
1265	5.18	1266	5.09	1267	5.07	1268	5.06	1269	5.05
1270	4.97	1271	4.96	1272	5.02	1273	4.94	1274	4.92
1275	4.91	1276	4.83	1277	4.89	1278	4.88	1279	4.87
1280	4.79	1281	4.78	1282	4.77	1283	4.76	1284	4.75
1285	4.67	1286	4.66	1287	4.64	1288	4.63	1289	4.63
1290	4.62	1291	4.61	1292	4.60	1293	4.59	1294	4.58

1295	4.57	1296	4.56	1297	4.55	1298	4.47	1299	4.45
1300	4.44	1310	4.34	1320	4.17	1330	4.10	1340	3.93
1350	3.88	1360	3.77	1370	3.68	1380	3.62	1390	3.52
1400	3.43	1420	3.36	1440	3.24	1460	1.53	1500	1.53

TOTAL VOLUME THIS HYDROGRAPH = 14.92(Ac.Ft)

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\CIVILD\sgr_soilx_71.dat
SHULER CANYON EXISTING

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
4904	1A	34.6	91.36	34.6	91.36	1	2246.	.23400	.00	.00	0.	280	10	A39	.01
4904	2B	35.2	83.26	35.2	83.26	1	2766.	.19000	.00	.00	0.	280	12	A39	.01
4904	3AB	35.2	76.07	69.8	159.25	0	0.	.00000	.00	.00	0.	280	0	A39	.00
4904	4A	29.0	89.07	98.8	205.08	1	883.	.06700	.00	.00	0.	280	7	A38	.01
4904	5A	49.1	112.43	147.9	304.27	1	1950.	.05800	.00	.00	0.	280	12	A38	.01

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

SHULER CANYON EXISTING

HYDROGRAPH AT 4904 5A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	6.94	200	7.20	300	7.60	400	8.02
500	8.54	600	9.18	700	10.01	800	11.10	900	12.69
1000	15.34	1050	21.34	1100	34.34	1110	43.08	1120	53.83
1130	68.02	1131	69.78	1132	71.54	1133	73.07	1134	74.81
1135	76.65	1136	78.62	1137	81.08	1138	83.64	1139	86.57
1140	89.43	1141	93.18	1142	97.00	1143	100.68	1144	104.85
1145	110.23	1146	115.91	1147	122.13	1148	129.19	1149	145.07
1150	162.54	1151	183.44	1152	208.50	1153	235.05	1154	254.42
1155	273.12	1156	289.53	1157	300.16	1158	304.27	1159	302.94
1160	296.55	1161	276.69	1162	255.72	1163	235.36	1164	214.42
1165	192.78	1166	178.54	1167	164.40	1168	150.22	1169	136.57
1170	123.88	1171	112.00	1172	101.34	1173	92.01	1174	83.93
1175	76.86	1176	70.68	1177	65.44	1178	60.82	1179	56.78
1180	53.23	1181	50.17	1182	47.23	1183	44.72	1184	42.52
1185	40.64	1186	38.72	1187	36.93	1188	35.48	1189	33.98
1190	32.71	1191	31.53	1192	30.26	1193	29.26	1194	28.33
1195	27.41	1196	26.52	1197	25.50	1198	24.69	1199	24.08
1200	23.36	1201	22.81	1202	22.18	1203	21.63	1204	21.18
1205	20.68	1206	20.19	1207	19.74	1208	19.31	1209	18.99
1210	18.62	1211	18.25	1212	17.97	1213	17.64	1214	17.33
1215	17.10	1216	16.82	1217	16.61	1218	16.35	1219	16.18
1220	15.95	1221	15.80	1222	15.58	1223	15.43	1224	15.23
1225	15.04	1226	14.99	1227	14.80	1228	14.62	1229	14.46
1230	14.44	1231	14.28	1232	14.19	1233	14.04	1234	13.97
1235	13.83	1236	13.75	1237	13.68	1238	13.53	1239	13.47
1240	13.40	1241	13.32	1242	13.18	1243	13.05	1244	12.99
1245	12.93	1246	12.87	1247	12.74	1248	12.68	1249	12.62
1250	12.49	1251	12.43	1252	12.37	1253	12.25	1254	12.20
1255	12.16	1256	12.11	1257	12.00	1258	11.95	1259	11.91

1260	11.86	1261	11.75	1262	11.77	1263	11.66	1264	11.55
1265	11.59	1266	11.48	1267	11.44	1268	11.40	1269	11.37
1270	11.26	1271	11.22	1272	11.18	1273	11.14	1274	11.03
1275	11.00	1276	10.96	1277	10.93	1278	10.90	1279	10.85
1280	10.75	1281	10.73	1282	10.70	1283	10.67	1284	10.57
1285	10.54	1286	10.51	1287	10.48	1288	10.44	1289	10.34
1290	10.30	1291	10.27	1292	10.24	1293	10.22	1294	10.19
1295	10.17	1296	10.14	1297	10.12	1298	10.03	1299	10.01
1300	9.99	1310	9.67	1320	9.27	1330	9.06	1340	8.75
1350	8.55	1360	8.34	1370	8.12	1380	7.98	1390	7.79
1400	7.58	1420	7.34	1440	7.11	1460	4.67	1500	4.67

TOTAL VOLUME THIS HYDROGRAPH = 32.38(Ac.Ft)

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\CIVILD\sgr_soilx_71.dat
WILDWOOD CANYON EXISTING

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM RAIN ZONE	DAY 4 PCT IMPV
4904	1A	39.0	112.52	39.0	112.52	1	2502.	.25900	.00	.00	0.	280	10	A42	.01
4904	2A	31.7	90.72	70.7	183.73	1	1781.	.22100	.00	.00	0.	280	9	A40	.01
4904	3A	46.6	166.74	117.3	281.15	1	737.	.10000	.00	.00	0.	280	6	A40	.01
4904	4A	30.4	74.22	147.7	348.00	1	2895.	.17300	.00	.00	0.	280	12	A40	.01
4904	5A	42.5	103.76	190.2	413.99	1	2750.	.23400	.00	.00	0.	280	12	A40	.01

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

WILDWOOD CANYON EXISTING

HYDROGRAPH AT 4904 5A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	9.39	200	9.71	300	10.24	400	10.80
500	11.50	600	12.36	700	13.43	800	14.91	900	17.02
1000	20.51	1050	29.07	1100	46.81	1110	56.38	1120	69.76
1130	88.09	1131	90.31	1132	92.55	1133	94.70	1134	96.91
1135	99.23	1136	101.63	1137	104.50	1138	107.51	1139	110.87
1140	114.26	1141	118.75	1142	123.31	1143	127.92	1144	132.74
1145	138.72	1146	145.23	1147	152.14	1148	159.73	1149	175.70
1150	192.84	1151	211.26	1152	232.78	1153	258.76	1154	283.16
1155	312.70	1156	346.01	1157	376.84	1158	400.19	1159	412.33
1160	413.99	1161	399.47	1162	379.09	1163	354.57	1164	326.77
1165	298.97	1166	277.56	1167	256.92	1168	236.83	1169	217.94
1170	200.93	1171	185.37	1172	171.10	1173	157.89	1174	145.84
1175	134.91	1176	125.03	1177	115.88	1178	107.71	1179	100.33
1180	93.67	1181	87.82	1182	82.58	1183	77.72	1184	73.43
1185	69.62	1186	65.98	1187	62.67	1188	59.58	1189	56.99
1190	54.58	1191	52.34	1192	50.13	1193	48.12	1194	46.36
1195	44.70	1196	43.13	1197	41.58	1198	40.25	1199	38.97
1200	37.89	1201	36.71	1202	35.59	1203	34.43	1204	33.52
1205	32.60	1206	31.73	1207	30.89	1208	30.14	1209	29.39
1210	28.70	1211	28.10	1212	27.48	1213	26.96	1214	26.46
1215	26.03	1216	25.57	1217	25.18	1218	24.75	1219	24.40
1220	24.01	1221	23.63	1222	23.32	1223	22.96	1224	22.62
1225	22.34	1226	22.07	1227	21.75	1228	21.50	1229	21.20
1230	20.97	1231	20.69	1232	20.42	1233	20.27	1234	20.02
1235	19.77	1236	19.67	1237	19.45	1238	19.24	1239	19.10
1240	18.96	1241	18.82	1242	18.63	1243	18.50	1244	18.37
1245	18.19	1246	18.08	1247	17.97	1248	17.81	1249	17.71
1250	17.62	1251	17.52	1252	17.31	1253	17.22	1254	17.13
1255	17.04	1256	16.95	1257	16.81	1258	16.72	1259	16.64

1260	16.50	1261	16.43	1262	16.35	1263	16.22	1264	16.20
1265	16.07	1266	15.99	1267	15.92	1268	15.80	1269	15.79
1270	15.66	1271	15.60	1272	15.53	1273	15.41	1274	15.35
1275	15.29	1276	15.23	1277	15.17	1278	15.06	1279	15.01
1280	14.95	1281	14.84	1282	14.84	1283	14.73	1284	14.67
1285	14.62	1286	14.57	1287	14.51	1288	14.41	1289	14.36
1290	14.31	1291	14.27	1292	14.22	1293	14.18	1294	14.08
1295	14.03	1296	13.98	1297	13.94	1298	13.84	1299	13.80
1300	13.75	1310	13.28	1320	12.80	1330	12.47	1340	12.07
1350	11.79	1360	11.49	1370	11.13	1380	10.93	1390	10.62
1400	10.42	1420	10.03	1440	9.70	1460	7.32	1500	7.32

TOTAL VOLUME THIS HYDROGRAPH = 44.39(Ac.Ft)

Appendix B

SHAY CANYON
PROPOSED HYDROLOGY
TC CALCULATOR INPUT

Project	Subarea	Area	%imp	Frequency	Soil Type	Length	Slope	Isohyet	Fire Factor
Shay	1a	34.7	0.01	50	80	1718	0.247	7.7	0.71
Shay	2a	36.25	0.01	50	80	1212	0.086	7.6	0.71

SHULER CANYON
PROPOSED HYDROLOGY
TC CALCULATOR INPUT

Project	Subarea	Area	%imp	Frequency	Soil Type	Length	Slope	Isohyet	Fire Factor
Shuler	1a	8.42	0.01	50	80	750	0.500	8	0.71
Shuler	2a	11.44	0.01	50	80	800	0.410	7.9	0.71
Shuler	4a	9.29	0.01	50	80	830	0.110	7.7	0.71
Shuler	5b	8.7	0.3	50	80	1500	0.050	7.8	0
Shuler	6b	15.91	0.01	50	80	1400	0.285	7.7	0.71
Shuler	7b	10.69	0.01	50	80	1200	0.090	7.6	0.71
Shuler	9a	19.94	0.01	50	80	940	0.063	7.6	0.71
Shuler	10a	25.84	0.01	50	80	700	0.068	7.7	0.71
Shuler	11c	5.83	0.3	50	80	1150	0.023	7.7	0
Shuler	12c	17.03	0.3	50	80	1000	0.003	7.6	0
Shuler	14a	10.3	0.21	50	80	600	0.003	7.6	0
Shuler	15a	5.3	0.21	50	80	700	0.070	7.6	0

WILDWOOD CANYON
PROPOSED HYDROLOGY
TC CALCULATOR INPUT

Project	Subarea	Area	%imp	Frequency	Soil Type	Length	Slope	Isohyet	Fire Factor
Wildwood	1a	38.95	0.01	50	80	2502	0.259	8.3	0.71
Wildwood	2a	31.72	0.01	50	80	1781	0.221	8	0.71
Wildwood	3a	44.1	0.01	50	80	1050	0.110	7.9	0.71
Wildwood	4a	20.3	0.01	50	80	2020	0.297	8	0.71
Wildwood	5a	5.9	0.1	50	80	566	0.088	7.8	0.71
Wildwood	6b	29.1	0.3	50	80	1300	0.290	7.7	0
Wildwood	7b	5.25	0.3	50	80	900	0.042	7.7	0
Wildwood	8b	11.5	0.3	50	80	1600	0.035	7.7	0

SHAY CANYON
PROPOSED HYDROLOGY
TC CALCULATOR RESULTS

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Tc Equatio	Fire Factor	Burned flow rate (cfs)	Volume (acre-ft)
Shay	1a	34.7	0.01	50	80	1718	0.247	7.7	9	3.49	0.7	0.7	84.77	Tc=(10)^-0	0.71	95.16	4.51
Shay	2a	36.25	0.01	50	80	1212	0.086	7.6	8	3.64	0.71	0.71	93.68	Tc=(10)^-0	0.71	104.69	4.69

SHULER CANYON
PROPOSED HYDROLOGY
TC CALCULATOR RESULTS

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Tc Equatio	Fire Factor	Burned flow rate (cfs)	Volume (acre-ft)
Shuler	1a	8.42	0.01	50	80	750	0.5	8	5	4.77	0.76	0.76	30.52	Tc=(10)^-0	0.71	33.41	1.16
Shuler	2a	11.44	0.01	50	80	800	0.41	7.9	5	4.71	0.76	0.76	40.95	Tc=(10)^-0	0.71	44.81	1.54
Shuler	4a	9.29	0.01	50	80	830	0.11	7.7	6	4.22	0.74	0.74	29.01	Tc=(10)^-0	0.71	32.01	1.19
Shuler	5b	8.7	0.3	50	80	1500	0.05	7.8	10	3.36	0.7	0.76	22.22	Tc=(10)^-0	0	n/a	2.28
Shuler	6b	15.91	0.01	50	80	1400	0.285	7.7	7	3.92	0.73	0.73	45.53	Tc=(10)^-0	0.71	50.42	2.1
Shuler	7b	10.69	0.01	50	80	1200	0.09	7.6	8	3.64	0.71	0.71	27.63	Tc=(10)^-0	0.71	30.87	1.38
Shuler	9a	19.94	0.01	50	80	940	0.063	7.6	7	3.87	0.73	0.73	56.33	Tc=(10)^-0	0.71	62.38	2.58
Shuler	10a	25.84	0.01	50	80	700	0.068	7.7	6	4.22	0.74	0.74	80.69	Tc=(10)^-0	0.71	89.02	3.32
Shuler	11c	5.83	0.3	50	80	1150	0.023	7.7	10	3.32	0.69	0.75	14.52	Tc=(10)^-0	0	n/a	1.5
Shuler	12c	17.03	0.3	50	80	1000	0.0033	7.6	13	2.89	0.66	0.73	35.93	Tc=(10)^-0	0	n/a	4.35
Shuler	14a	10.3	0.21	50	80	600	0.003	7.6	10	3.27	0.69	0.73	24.59	Tc=(10)^-0	0	n/a	2.21
Shuler	15a	5.3	0.21	50	80	700	0.07	7.6	6	4.16	0.74	0.77	16.98	Tc=(10)^-0	0	n/a	1.14

WILDWOOD CANYON
PROPOSED HYDROLOGY
TC CALCULATOR RESULTS

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Tc Equatio	Fire Factor	Burned flow rate (cfs)	Volume (acre-ft)
Wildwood	1a	38.95	0.01	50	80	2502	0.259	8.3	10	3.58	0.71	0.71	99	Tc=(10)^-0	0.71	110.61	5.64
Wildwood	2a	31.72	0.01	50	80	1781	0.221	8	9	3.62	0.71	0.71	81.53	Tc=(10)^-0	0.71	91.1	4.38
Wildwood	3a	44.1	0.01	50	80	1050	0.11	7.9	7	4.02	0.73	0.73	129.42	Tc=(10)^-0	0.71	143.39	6.06
Wildwood	4a	20.3	0.01	50	80	2020	0.297	8	9	3.62	0.71	0.71	52.18	Tc=(10)^-0	0.71	58.3	2.8
Wildwood	5a	5.9	0.1	50	80	566	0.088	7.8	5	4.65	0.76	0.77	21.12	Tc=(10)^-0	0.71	22.93	1.02
Wildwood	6b	29.1	0.3	50	80	1300	0.29	7.7	7	3.92	0.73	0.78	88.98	Tc=(10)^-0	0	n/a	7.61
Wildwood	7b	5.25	0.3	50	80	900	0.042	7.7	7	3.92	0.73	0.78	16.05	Tc=(10)^-0	0	n/a	1.37
Wildwood	8b	11.5	0.3	50	80	1600	0.035	7.7	11	3.17	0.68	0.75	27.34	Tc=(10)^-0	0	n/a	2.96

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\CIVILD\sgr_soilx_71.dat

SHAY CANYON PROPOSED

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
4904	1A	34.7	93.38	34.7	93.38	1	1718.	.24700	.00	.00	0.	280	9	A38	.01
4904	2A	36.3	103.86	71.0	184.42	1	1212.	.08600	.00	.00	0.	280	8	A38	.01

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

SHAY CANYON PROPOSED

HYDROGRAPH AT 4904 2A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	3.29	200	3.42	300	3.61	400	3.82
500	4.07	600	4.38	700	4.78	800	5.31	900	6.07
1000	7.37	1050	10.43	1100	16.80	1110	22.81	1120	28.34
1130	35.66	1131	36.35	1132	37.07	1133	38.00	1134	39.15
1135	40.28	1136	41.45	1137	43.16	1138	44.94	1139	46.69
1140	48.34	1141	50.80	1142	53.12	1143	55.50	1144	58.23
1145	62.02	1146	66.18	1147	70.08	1148	74.86	1149	88.78
1150	103.41	1151	120.01	1152	140.37	1153	161.12	1154	171.81
1155	180.36	1156	184.42	1157	172.90	1158	158.79	1159	142.32
1160	122.47	1161	100.02	1162	86.55	1163	74.17	1164	62.84
1165	53.16	1166	45.75	1167	40.00	1168	35.82	1169	32.43
1170	29.80	1171	27.60	1172	25.64	1173	23.88	1174	22.55
1175	21.35	1176	20.04	1177	19.19	1178	18.24	1179	17.34
1180	16.66	1181	16.02	1182	15.23	1183	14.66	1184	14.15
1185	13.66	1186	13.19	1187	12.73	1188	12.29	1189	11.87
1190	11.65	1191	11.24	1192	10.85	1193	10.46	1194	10.09
1195	9.93	1196	9.59	1197	9.32	1198	9.10	1199	8.96
1200	8.75	1201	8.63	1202	8.43	1203	8.24	1204	8.14
1205	8.06	1206	7.91	1207	7.76	1208	7.70	1209	7.56
1210	7.51	1211	7.47	1212	7.34	1213	7.30	1214	7.18
1215	7.14	1216	7.10	1217	7.07	1218	6.96	1219	6.93
1220	6.82	1221	6.79	1222	6.77	1223	6.75	1224	6.65
1225	6.54	1226	6.59	1227	6.49	1228	6.47	1229	6.37
1230	6.42	1231	6.32	1232	6.29	1233	6.27	1234	6.17
1235	6.15	1236	6.13	1237	6.11	1238	6.02	1239	6.00
1240	5.98	1241	5.96	1242	5.94	1243	5.85	1244	5.83
1245	5.81	1246	5.80	1247	5.71	1248	5.69	1249	5.67
1250	5.58	1251	5.64	1252	5.63	1253	5.53	1254	5.52
1255	5.50	1256	5.48	1257	5.39	1258	5.46	1259	5.37

1260	5.35	1261	5.34	1262	5.33	1263	5.31	1264	5.23
1265	5.29	1266	5.20	1267	5.19	1268	5.18	1269	5.17
1270	5.09	1271	5.08	1272	5.14	1273	5.05	1274	5.05
1275	5.03	1276	4.94	1277	5.00	1278	5.00	1279	4.99
1280	4.90	1281	4.89	1282	4.88	1283	4.87	1284	4.86
1285	4.78	1286	4.77	1287	4.76	1288	4.75	1289	4.74
1290	4.73	1291	4.72	1292	4.71	1293	4.69	1294	4.68
1295	4.67	1296	4.67	1297	4.66	1298	4.58	1299	4.58
1300	4.57	1310	4.47	1320	4.27	1330	4.20	1340	4.02
1350	3.96	1360	3.86	1370	3.76	1380	3.71	1390	3.62
1400	3.52	1420	3.42	1440	3.31	1460	1.61	1500	1.61

TOTAL VOLUME THIS HYDROGRAPH = 15.23(Ac.Ft)

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\CIVILD\sgr_soilx_71.dat
SHULER CANYON PROPOSED

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
4904	1A	8.4	33.62	8.4	33.62	1	750.	.50000	.00	.00	0.	280	5	A40	.01
4904	2A	11.4	45.62	19.8	73.05	1	800.	.41000	.00	.00	0.	280	5	A40	.01
4904	3A	.0	.00	19.8	69.65	4	1200.	.20000	5.00	.00	0.	280	5	A40	.00
4904	4A	9.3	31.58	29.1	94.17	1	830.	.11000	.00	.00	0.	280	6	A38	.10
4904	5B	8.7	23.95	8.7	23.95	3	1500.	.05000	.00	.00	0.	280	10	A39	.30
4904	6B	15.9	48.84	24.6	64.08	1	1400.	.28500	.00	.00	0.	280	7	A38	.01
4904	7B	10.7	30.61	35.3	88.27	1	1200.	.09000	.00	.00	0.	280	8	A38	.01
4904	8AB	35.3	81.42	64.4	164.72	0	0.	.00000	.00	.00	0.	280	0	A38	.00
4904	9A	19.9	61.12	84.3	202.43	1	940.	.06300	.00	.00	0.	280	7	A38	.01
4904	10A	25.8	86.80	110.1	221.95	1	700.	.06800	.00	.00	0.	280	6	A38	.01
4904	11C	5.8	15.48	5.8	15.48	3	1150.	.02300	.00	.00	0.	280	10	A38	.30
4904	12C	17.0	45.37	22.8	54.60	3	1000.	.02300	.00	.00	0.	280	10	A38	.30
4904	13AC	22.8	53.09	132.9	273.00	0	0.	.00000	.00	.00	0.	280	0	A38	.00
4904	14A	10.3	26.68	143.2	293.60	2	600.	.00300	.00	.00	0.	280	10	A38	.10
4904	15A	5.3	18.20	148.5	285.70	3	700.	.07000	.00	.00	0.	280	6	A38	.21

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

SHULER CANYON PROPOSED

HYDROGRAPH AT 4904 15A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	8.26	200	8.50	300	8.96	400	9.45
500	10.05	600	10.79	700	11.74	800	12.99	900	14.78
1000	17.75	1050	22.76	1100	34.68	1110	39.82	1120	48.34
1130	60.64	1131	62.01	1132	63.40	1133	64.84	1134	66.36
1135	67.92	1136	69.52	1137	71.24	1138	73.03	1139	74.91
1140	76.85	1141	79.12	1142	81.56	1143	84.10	1144	86.88
1145	90.14	1146	93.74	1147	97.42	1148	101.53	1149	108.05
1150	115.23	1151	122.97	1152	132.19	1153	144.02	1154	157.46
1155	173.02	1156	192.60	1157	214.71	1158	236.38	1159	254.43
1160	269.77	1161	280.33	1162	285.57	1163	285.70	1164	281.22
1165	272.52	1166	260.41	1167	246.18	1168	230.50	1169	214.42
1170	198.63	1171	183.54	1172	169.49	1173	156.39	1174	144.57
1175	133.80	1176	124.07	1177	115.36	1178	107.54	1179	100.50
1180	94.14	1181	88.40	1182	83.18	1183	78.43	1184	74.10
1185	70.19	1186	66.58	1187	63.31	1188	60.31	1189	57.45
1190	54.81	1191	52.32	1192	50.01	1193	48.00	1194	46.05
1195	44.27	1196	42.56	1197	40.97	1198	39.55	1199	38.21
1200	36.92	1201	35.73	1202	34.62	1203	33.63	1204	32.67
1205	31.74	1206	30.87	1207	30.03	1208	29.25	1209	28.50
1210	27.78	1211	27.11	1212	26.48	1213	25.87	1214	25.28
1215	24.73	1216	24.22	1217	23.74	1218	23.26	1219	22.86
1220	22.49	1221	22.13	1222	21.77	1223	21.43	1224	21.12
1225	20.79	1226	20.52	1227	20.22	1228	19.95	1229	19.67
1230	19.45	1231	19.21	1232	18.96	1233	18.74	1234	18.54
1235	18.34	1236	18.13	1237	17.95	1238	17.77	1239	17.62
1240	17.47	1241	17.32	1242	17.18	1243	17.02	1244	16.89
1245	16.76	1246	16.63	1247	16.49	1248	16.37	1249	16.27
1250	16.14	1251	16.03	1252	15.92	1253	15.81	1254	15.70
1255	15.58	1256	15.50	1257	15.38	1258	15.28	1259	15.19

1260	15.10	1261	15.01	1262	14.92	1263	14.83	1264	14.73
1265	14.67	1266	14.57	1267	14.50	1268	14.42	1269	14.35
1270	14.28	1271	14.18	1272	14.14	1273	14.07	1274	13.98
1275	13.91	1276	13.84	1277	13.79	1278	13.71	1279	13.64
1280	13.58	1281	13.51	1282	13.45	1283	13.37	1284	13.31
1285	13.25	1286	13.19	1287	13.13	1288	13.08	1289	13.02
1290	12.97	1291	12.91	1292	12.86	1293	12.80	1294	12.75
1295	12.69	1296	12.64	1297	12.59	1298	12.52	1299	12.47
1300	12.43	1310	12.00	1320	11.60	1330	11.22	1340	10.86
1350	10.55	1360	10.26	1370	10.00	1380	9.78	1390	9.56
1400	9.35	1420	8.97	1440	8.65	1460	7.90	1500	7.90

TOTAL VOLUME THIS HYDROGRAPH = 36.56(Ac.Ft)

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\CIVILD\sgr_soilx_71.dat
WILDWOOD CANYON PROPOSED

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
4904	1A	39.0	112.52	39.0	112.52	1	2502.	.25900	.00	.00	0.	280	10	A42	.01
4904	2A	31.7	90.72	70.7	183.73	1	1781.	.22100	.00	.00	0.	280	9	A40	.01
4904	3A	44.1	144.07	114.8	272.42	1	1050.	.11000	.00	.00	0.	280	7	A40	.01
4904	4A	20.3	58.10	135.1	319.23	1	2020.	.29700	.00	.00	0.	280	9	A40	.01
4904	5A	5.9	23.09	141.0	315.11	1	566.	.08800	.00	.00	0.	280	5	A39	.10
4904	6B	29.1	95.26	29.1	95.26	3	1300.	.29000	.00	.00	0.	280	7	A39	.30
4904	7B	5.3	17.35	34.4	110.45	3	900.	.04200	.00	.00	0.	280	7	A39	.30

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
4904	8B	11.5	29.96	45.9	134.61	3	1600.	.03500	.00	.00	0.	280	11	A39	.30
4904	9AB	45.9	124.05	186.9	435.09	0	0.	.00000	.00	.00	0.	280	0	A39	.00

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

HYDROGRAPH AT 4904 8B STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	3.67	200	3.83	300	4.03	400	4.26
500	4.53	600	4.87	700	5.31	800	5.88	900	6.75
1000	8.15	1050	10.76	1100	15.36	1110	18.95	1120	23.17
1130	27.81	1131	28.37	1132	28.85	1133	29.43	1134	30.10
1135	30.74	1136	31.45	1137	32.42	1138	33.49	1139	34.67
1140	35.96	1141	37.51	1142	39.10	1143	40.63	1144	42.17
1145	44.16	1146	46.44	1147	48.87	1148	51.52	1149	56.90
1150	63.03	1151	70.81	1152	81.49	1153	95.52	1154	109.11
1155	122.01	1156	131.17	1157	134.61	1158	131.58	1159	123.04
1160	108.60	1161	92.76	1162	76.97	1163	62.32	1164	49.97
1165	42.22	1166	36.62	1167	32.52	1168	29.41	1169	27.01
1170	25.05	1171	23.46	1172	22.04	1173	20.91	1174	19.94
1175	19.05	1176	18.20	1177	17.47	1178	16.79	1179	16.21
1180	15.68	1181	15.14	1182	14.69	1183	14.32	1184	13.92
1185	13.52	1186	13.13	1187	12.79	1188	12.44	1189	12.15
1190	11.83	1191	11.56	1192	11.30	1193	11.05	1194	10.76
1195	10.53	1196	10.31	1197	10.08	1198	9.86	1199	9.70
1200	9.49	1201	9.32	1202	9.17	1203	9.03	1204	8.94
1205	8.83	1206	8.73	1207	8.66	1208	8.56	1209	8.46
1210	8.36	1211	8.25	1212	8.18	1213	8.09	1214	8.03
1215	7.95	1216	7.89	1217	7.84	1218	7.76	1219	7.68
1220	7.64	1221	7.60	1222	7.54	1223	7.51	1224	7.45
1225	7.41	1226	7.34	1227	7.29	1228	7.22	1229	7.14
1230	7.12	1231	7.05	1232	6.98	1233	6.95	1234	6.91
1235	6.87	1236	6.81	1237	6.78	1238	6.71	1239	6.68
1240	6.66	1241	6.60	1242	6.57	1243	6.54	1244	6.51
1245	6.45	1246	6.42	1247	6.39	1248	6.33	1249	6.31
1250	6.29	1251	6.27	1252	6.26	1253	6.20	1254	6.18
1255	6.16	1256	6.10	1257	6.08	1258	6.03	1259	6.03
1260	6.01	1261	5.96	1262	5.94	1263	5.88	1264	5.89

1265	5.84	1266	5.82	1267	5.80	1268	5.75	1269	5.77
1270	5.72	1271	5.71	1272	5.69	1273	5.63	1274	5.64
1275	5.59	1276	5.57	1277	5.53	1278	5.54	1279	5.53
1280	5.49	1281	5.47	1282	5.42	1283	5.43	1284	5.41
1285	5.37	1286	5.35	1287	5.33	1288	5.31	1289	5.28
1290	5.26	1291	5.25	1292	5.23	1293	5.22	1294	5.17
1295	5.15	1296	5.12	1297	5.10	1298	5.08	1299	5.06
1300	5.05	1310	4.95	1320	4.79	1330	4.67	1340	4.52
1350	4.42	1360	4.33	1370	4.22	1380	4.09	1390	4.03
1400	3.95	1420	3.84	1440	3.70	1460	2.75	1500	2.75

TOTAL VOLUME THIS HYDROGRAPH = 14.76(Ac.Ft)

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

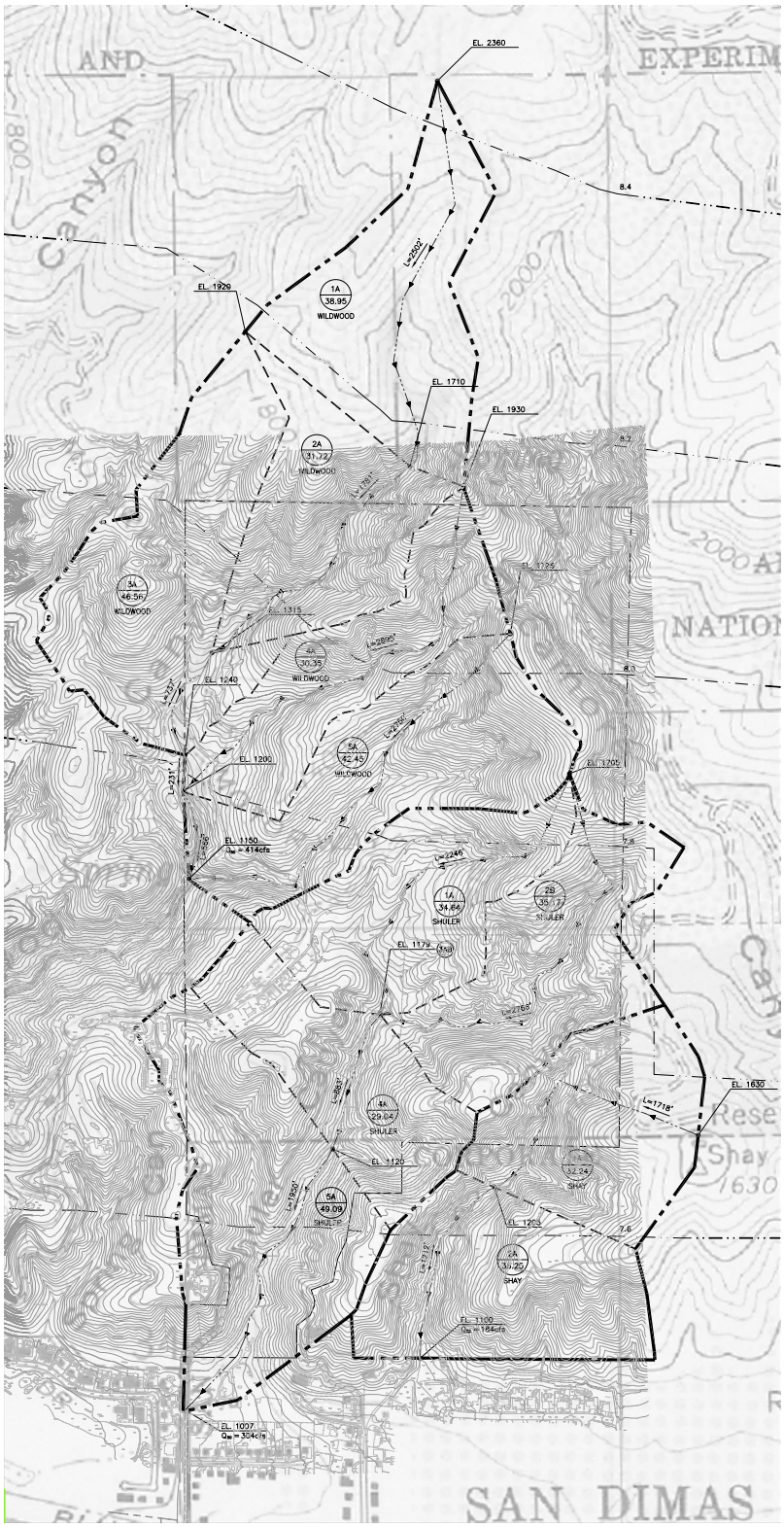
HYDROGRAPH AT 4904 9A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	10.71	200	11.07	300	11.67	400	12.30
500	13.10	600	14.06	700	15.30	800	16.94	900	19.35
1000	23.28	1050	31.38	1100	48.85	1110	56.62	1120	70.38
1130	88.07	1131	89.95	1132	91.85	1133	93.85	1134	95.92
1135	98.10	1136	100.39	1137	102.79	1138	105.36	1139	108.15
1140	111.19	1141	114.58	1142	118.41	1143	122.64	1144	127.20
1145	132.13	1146	137.53	1147	143.50	1148	150.10	1149	157.80
1150	167.69	1151	180.48	1152	197.02	1153	219.10	1154	247.78
1155	282.28	1156	321.03	1157	360.83	1158	396.35	1159	422.31
1160	435.09	1161	433.51	1162	419.35	1163	396.02	1164	367.34
1165	337.06	1166	308.17	1167	281.96	1168	258.07	1169	236.53
1170	216.83	1171	199.00	1172	182.92	1173	168.29	1174	155.03
1175	143.00	1176	132.17	1177	122.42	1178	113.66	1179	105.81
1180	98.84	1181	92.60	1182	87.05	1183	82.12	1184	77.66
1185	73.57	1186	69.88	1187	66.60	1188	63.74	1189	61.01

1190	58.47	1191	56.15	1192	54.04	1193	52.13	1194	50.30
1195	48.58	1196	46.98	1197	45.56	1198	44.20	1199	42.89
1200	41.63	1201	40.43	1202	39.29	1203	38.21	1204	37.17
1205	36.18	1206	35.23	1207	34.33	1208	33.49	1209	32.71
1210	31.99	1211	31.32	1212	30.72	1213	30.17	1214	29.67
1215	29.18	1216	28.70	1217	28.24	1218	27.81	1219	27.40
1220	27.00	1221	26.62	1222	26.26	1223	25.90	1224	25.56
1225	25.24	1226	24.93	1227	24.62	1228	24.33	1229	24.05
1230	23.78	1231	23.51	1232	23.26	1233	23.00	1234	22.76
1235	22.54	1236	22.34	1237	22.13	1238	21.94	1239	21.75
1240	21.57	1241	21.39	1242	21.21	1243	21.04	1244	20.88
1245	20.73	1246	20.58	1247	20.44	1248	20.31	1249	20.18
1250	20.04	1251	19.91	1252	19.79	1253	19.66	1254	19.55
1255	19.44	1256	19.33	1257	19.21	1258	19.10	1259	18.99
1260	18.88	1261	18.78	1262	18.68	1263	18.57	1264	18.48
1265	18.38	1266	18.28	1267	18.18	1268	18.09	1269	17.99
1270	17.89	1271	17.80	1272	17.71	1273	17.63	1274	17.55
1275	17.47	1276	17.39	1277	17.31	1278	17.23	1279	17.15
1280	17.08	1281	17.00	1282	16.92	1283	16.85	1284	16.77
1285	16.70	1286	16.63	1287	16.56	1288	16.49	1289	16.42
1290	16.35	1291	16.28	1292	16.21	1293	16.15	1294	16.08
1295	16.02	1296	15.95	1297	15.89	1298	15.83	1299	15.77
1300	15.71	1310	15.16	1320	14.68	1330	14.23	1340	13.82
1350	13.44	1360	13.11	1370	12.79	1380	12.45	1390	12.15
1400	11.90	1420	11.48	1440	11.10	1460	10.71	1500	10.71

TOTAL VOLUME THIS HYDROGRAPH = 48.17(Ac.Ft)

Appendix C



LEGEND

- EXISTING MAJOR WATERSHED BOUNDARY
- EXISTING SUB DRAINAGE AREA BOUNDARY
- EXISTING FLOW PATH
- SHAY — WATERSHED
- DIRECTION OF FLOW
- C17 — DRAINAGE AREA DESIGNATION
- 70.21 — ACRES
- 340 — NODE DESIGNATION
- L=300' — LENGTH OF EXISTING FLOW PATH
- Q_{100} — CALCULATED 50-YEAR STORM RUNOFF

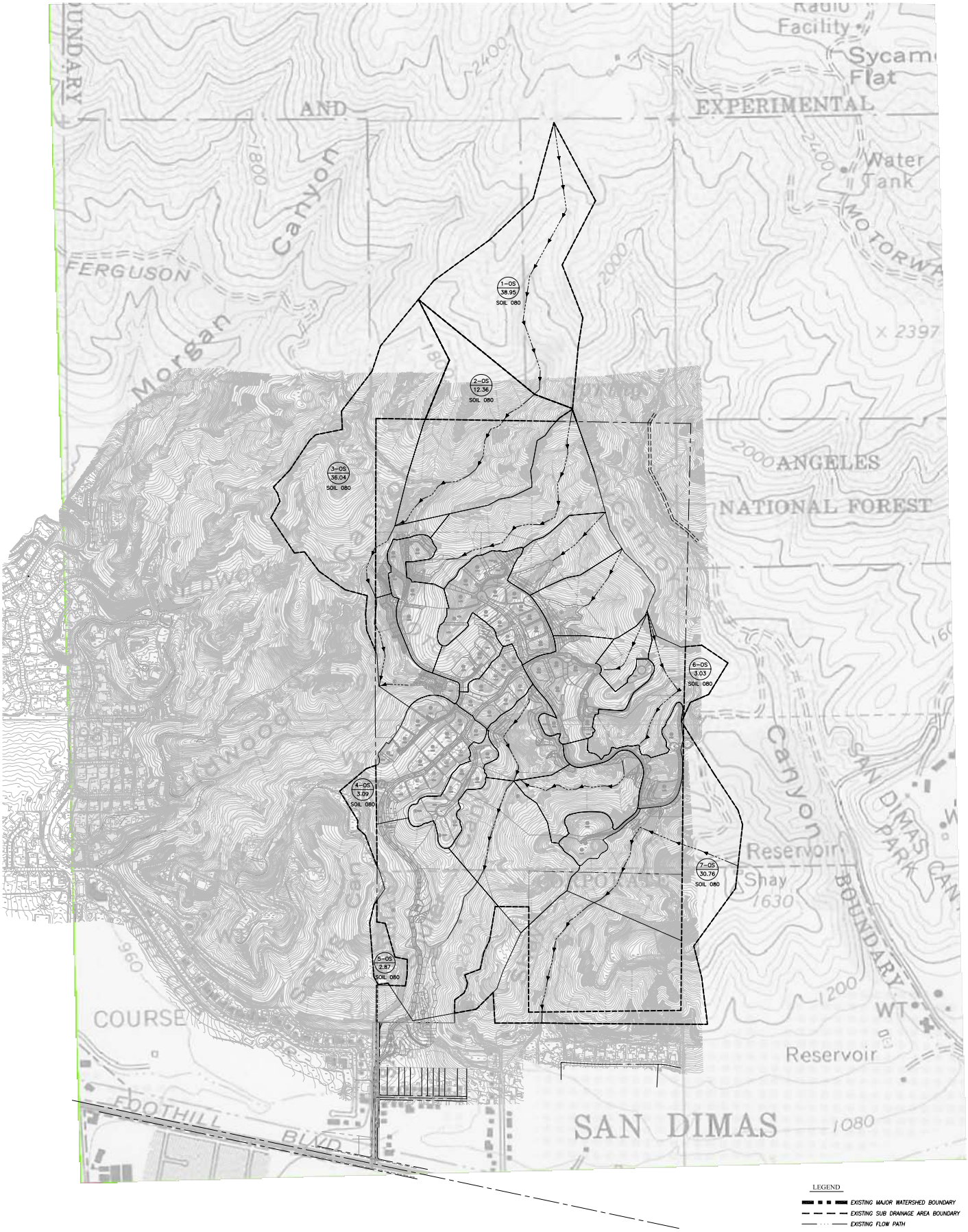
NOTE: ALL SOIL TYPE 80

NORTH
SCALE: 1"=300'

FUSCOE ENGINEERING
16795 Von Karman, Suite 100
Irvine, California 92606
tel 949.474.1960 ■ fax 949.474.5315
www.fuscoe.com

DATE: JULY 9, 2010	EXISTING DRAINAGE HYDROLOGY MAP BRASADA TENTATIVE TRACT NO. 70583	SHEET 1 of 1

Z:\Projects\3404\04\Dwg_Fin Cabinet\Reports\Hydrology\3404-04-EXhyd-map.dwg 07/12/2010 1:00 PM Plotted by: Noel Mateo



LEGEND

- EXISTING MAJOR WATERSHED BOUNDARY
- EXISTING SUB DRAINAGE AREA BOUNDARY
- EXISTING FLOW PATH
- DIRECTION OF FLOW
- C17 — DRAINAGE AREA DESIGNATION
- 70.21 — ACRES
- 340 — NODE DESIGNATION
- L=300' — LENGTH OF EXISTING FLOW PATH
- Q_{50} — CALCULATED 50-YEAR STORM RUNOFF

NORTH

SCALE: 1"=300'

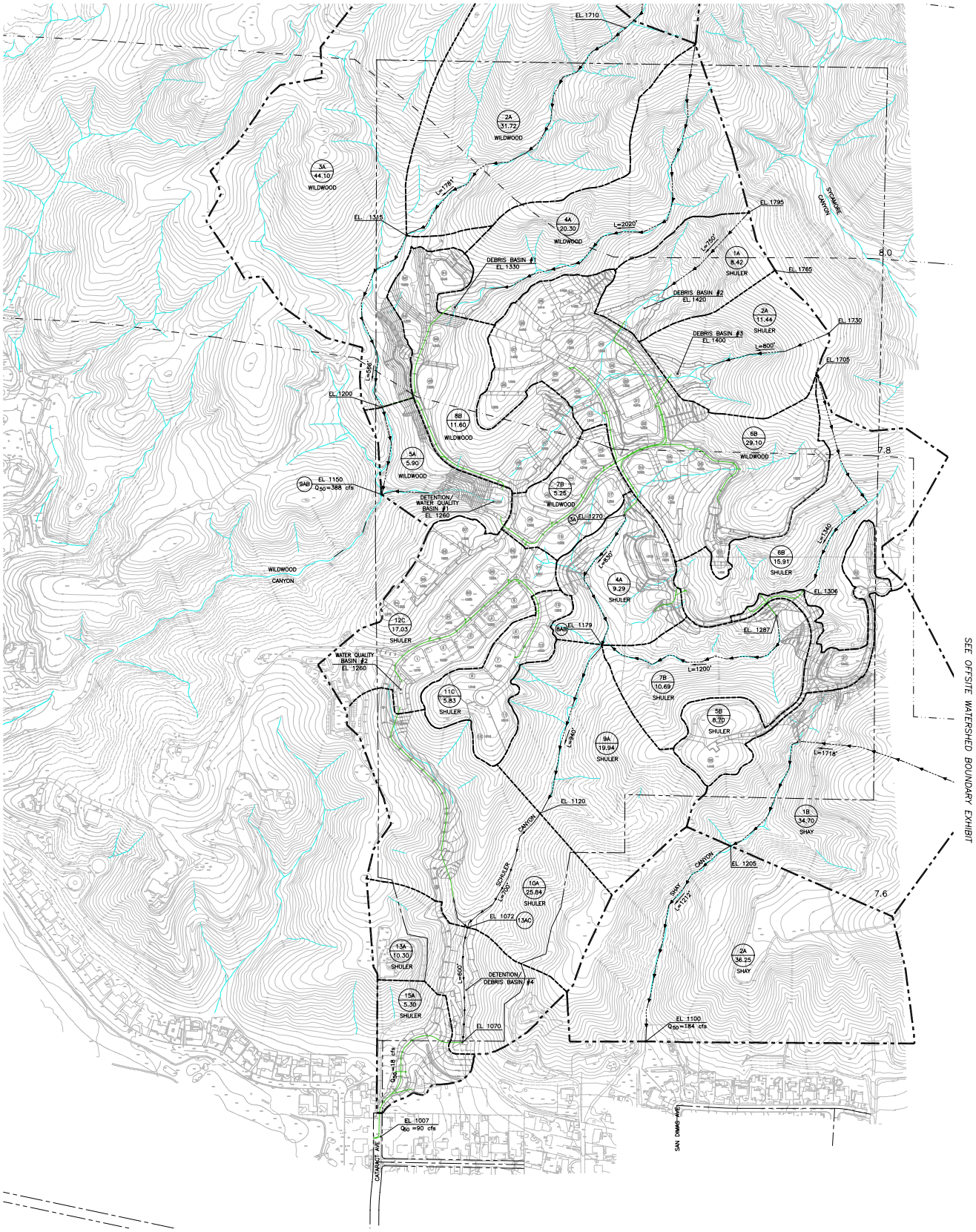
DATE: JULY 12, 2010

OFFSITE WATERSHED BOUNDARY
BRASADA
TENTATIVE TRACT NO. 70583

SHEET 1 of 1

Appendix D

SEE OFFSITE WATERSHED BOUNDARY EXHIBIT



SEE OFFSITE WATERSHED BOUNDARY EXHIBIT

LEGEND

- MAJOR WATERSHED BOUNDARY
- DRAINAGE SUBAREA BOUNDARY
- EXISTING STREAM / NATURAL FLOWPATH
- DIRECTION OF FLOW
- C17 / 70.21 — DRAINAGE AREA DESIGNATION / AREA (ACRES)
- 1B — NODE DESIGNATION
- L=300' — LENGTH OF EXISTING FLOW PATH
- Q_{50} — CALCULATED 50-YEAR STORM RUNOFF
- SHAY — WATERSHED
- 7.8 — 50 YEAR 24 HR ISOHYET
- EL 1700 — ELEVATION OF POINT SHOWN

NOTE: ALL SOIL TYPE: 80

NORTH
SCALE: 1"=200'

FUSCOE ENGINEERING
16795 Von Karman, Suite 100
Irvine, California 92606
tel 949.474.1960 ▼ fax 949.474.5315
www.fuscoe.com

DATE: JULY 12, 2010

PROPOSED HYDROLOGY MAP
TENTATIVE TRACT NO. 70583
BRASADA
SAN DIMAS, CALIFORNIA

SHEET 1 of 1

Appendix E

DEBRIS BASIN CALCULATIONS:

Project is within Debris Production Rate Zone 1 per hydrologic map
Debris Production Rate for DPA Zone 1=120,000 cy/sq mi
(per L.A. County Sedimentation Manual 2006)

Debris Basin #1:

DPA Zone 1
Tributary Area = 20.81 acres = 0.033 sq. miles
Debris Production Rate = 120,000 c.y.
Design Debris Event = 120,000 c.y. x 0.033 sq. mile = 3,960 c.y.

Debris Basin #2:

DPA Zone 1
Tributary Area = 9 acres = 0.014 sq. miles
Debris Production Rate = 120,000 c.y.
Design Debris Event = 120,000 c.y. x 0.014 sq. mile = 1,680 c.y.

Debris Basin #3:

DPA Zone 1 Tributary Area = 12.14 acres = 0.02 sq. miles
Debris Production Rate = 120,000 c.y.
Design Debris Event = 120,000 c.y. x 0.02 sq. mile = 2,400 c.y.

Debris Basin #4:

DPA Zone 1
Tributary Area = 92.36 acres = 0.144 sq. miles
Debris Production Rate = 120,000 c.y.
Design Debris Event = 120,000 c.y. x 0.144 sq. mile =17,280 c.y.