APPENDIX H

Hydrology Report

CRC 3208

HYDROLOGY STUDY

Prepared For: Rexhall Company 45640 23rh Street West Lancaster, CA 93536

Project Site: Canyon Country, CA 91387 APN: 2841-018-071

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Section 1.0

PROJECT SUMMARY

1.1 DESIGN PARAMTERS

Reference: Los Angeles County Department of Public Works, Hydrology Manual

Rainfall Isohyet:6.2 in (50yr. - 24hr)Soil Type:20DPA Zone:9

Note: The project is not within FEMA Flood Zone "A". The project is not within County adopted Floodway.

1.2 OVERVIEW OF ANALYSIS PROCEDURES:

Analysis of the storm runoff for both the existing and proposed conditions the same techniques, those being as follows:

- Used LA County HydroCalc Program to determine times of concentration and peak flow rates.
- For both existing and proposed conditions, added up all the peak flow rates from the HydroCalc Program for the Q₂₅ runoff.

1.3 PROJECT PURPOSE AND SCOPE

The existing site APN is 2841-018-071 and is located at the intersection of Diver St. and Triumph Ave. in Canyon Country, CA. The site is about 19.87 acres in size and the easterly half of the site is relatively flat, has many Oak Trees, and is considered an SEA site. The westerly half of the site is hilly with existing natural slopes.

The proposed project proposed a 4 lot subdivision of the site, evenly distributed as best as possible into quarters. At the easterly end of the site there will be two proposed pads, roughly 5,000 sf in size, with access from the east along Tannahill Ave. These pads will be located within the various Oaks; however they are aligned so that the existing Oak Trees are not impacted to the maximum extent possible. At the westerly half of the site, due to the more hilly conditions, the new proposed pads will be built closer to the middle of the site. There will be a new shared driveway from Triumph Ave cutting through a section of the slope where the least amount of grading would be required. This new shared driveway will be centered about the new proposed lot line and then split to each proposed pad. These pads will be roughly 10,000 sf in size. Near each pad there will be a proposed leach field for future buildings, and these too will be located in locations that avoid impacting the Existing Oak trees as much as possible. On the westerly end of the site, there will also be two proposed fill slopes to help balance earthwork quantities onsite. There currently are no proposed buildings onsite.

1.4 EXISTING AND PROPOSED DRAINAGE CONDITIONS

As described above, the existing site is currently an empty lot. The westerly half of the site is hilly with a small portion draining west via surface flow towards Triumph Ave. and then flowing north towards the existing Sand Canyon Creek and eventually draining into the Santa Clara River. At the southeasterly end of the site, runoff from properties to the south enters the site via runoff and then continue sheet flowing north. The rest of the site also sheet flows to the north and exits the site via surface flow. Further downstream this runoff enters the existing Sand Canyon Creek and eventually drains into the Santa Clara River.

In the proposed conditions, the drainage pattern is kept consistent with the existing conditions as much as possible. Runoff from the proposed shared driveway will first flow east following the grades of the road and then once at the pads, the runoff will sheet flow to the north. The pads at the easterly end of the site will also sheet flow to the north and exist the site via surface flow. The runoff from the site then follows the same pattern as the existing conditions and ultimately drains to the Santa Clara River.

1.5 HYDROLOGIC ANALYSIS

To quantify the runoff generated by the site a broader view of the topography had to be taken into account. Since most of the runoff leaving the site comes from offsite, upstream properties to the south, additional area had to be accounted for and made part of this analysis. Additionally, since the site is not a sump location, the 25-year storm is analyzed instead of the 50-year storm. Note, the HydroCalc program requires a 50-year storm Isohyet input and then converts the output runoffs into desired storm events, 25-yr storm in this case.

In the existing conditions of this analysis, the overall area analyzed is about 114 acres (Note: the site is only about 20 acres in size). The overall tributary area is broken up into 3 separate subareas labeled 1A, 2A, and 2B. Subarea 1A is located furthest to the north and consists of majority of the project site. Subareas 2A and 2B are located at the southerly end of the site and will drain into subarea 1A. The table below is a summary of the Hydrologic Parameters of each subarea and their runoff generated in a 25-yr storm.

Subarea	Area (ac)	Flowline (ft)	Slope (ft/ft)	Imp	T_{C} (min)	Q ₂₅ (cfs)	V_{25} (ft ³)
1A	37.09	2022.19	0.119	0.01	17	33.61	119726
2A	38.06	3533.42	0.141	0.01	25	26.32	121563
2B	39.31	3243.10	0.132	0.01	24	27.97	125722
Total	114.46	-	-	0.01	-	87.90	367011

In the proposed conditions, the overall area analyzed is a slightly larger due to the proposed grades of the driveway, roughly 0.09 acres. The overall area is broken up into 7 subareas labeled 1A-1E, and 2A-2B. Subareas labeled as "1" consists of the same area as Existing Conditions 1A, except it's broken up to account for the new proposed pads. Subareas labeled as "2" in the proposed conditions area the same as the subareas labeled as "2" in the existing conditions. The table below is a summary of the proposed hydrologic parameters of the site and their runoff generated in a 25-yr storm.

Subarea	Area (ac)	Flowline (ft)	Slope (ft/ft)	Imp	T_{C} (min)	Q ₂₅ (cfs)	V_{25} (ft ³)
1A	28.94	2022.19	0.119	0.01	17	26.22	93418
1B	1.24	470.22	0.112	0.24	6	2.50	8207
1C	3.80	538.18	0.063	0.11	7	6.54	17964
1D	1.89	486.21	0.021	0.06	8	2.91	7553
1E	1.31	384.28	0.020	0.14	7	2.29	6763
2A	38.06	3533.40	0.141	0.01	25	26.32	121563
2B	39.31	3243.10	0.132	0.01	24	27.97	125722
Total	114.55	-	-	0.02	-	94.75	381189

There will be additional runoff generated during the proposed conditions. The table below compares both the existing and proposed conditions side by side:

	Existing Conditions		Proposed Conditions		Difference				
Subaraa	Area	Q ₂₅	V ₂₅	Area	Q ₂₅	V ₂₅	ΔArea	ΔQ_{25}	ΔV_{25}
Subarea	(ac)	(cfs)	(ft^3)	(ac)	(cfs)	(ft^3)	(ac)	(cfs)	(ft^3)
1	37.09	33.61	119726	37.81	40.45	133904	+0.09	+6.84	+14178
2	77.37	54.29	247285	77.37	54.29	247285	0	0	0
Total	114.46	87.90	367011	114.55	94.74	381189	+0.09	+6.84	+14178

**Legend for the various Tables above:

ac	Area	cfs	Cubic Feet per Second
ft	Feet	ft ³	Cubic Feet
Imp	Imperviousness	Q25	25-year Flow Runoff
Tc	Time of Concentration	V_{25}	25-year Volume Runoff
min	Minutes		

As can be seen from the table above, there will be an additional area of about 0.09ac that leaves the site through the northerly end. With that and the proposed development, there will be an additional Q25 runoff of +6.84 cfs and +14178 ft³. There will also be an increase in imperviousness in the proposed conditions, assuming full imperviousness for the proposed pads, the site imperviousness increases from roughly 1% in the existing conditions to roughly 5% in the proposed conditions.

1.6 CONCLUSION

The proposed site is currently an empty lot that generally sheet flows to the north. The runoff from the site leaves the site via surface flow, drains to Sand Canyon Creek, and ultimately onto the Santa Clara River further downstream. The project proposes to subdivide the existing lot into 4 separate lots, roughly equal in size. These lots will each have a proposed pad with a leach field nearby for future building purposes. The easterly half of the proposed site is located within an SEA site and the proposed pads and leach fields avoid the existing Oak Trees to the maximum extent possible. Drainage in the proposed conditions follows the same pattern as the existing conditions and leaves the site via surface flow at the northerly end of the site. There is an additional 0.09 ac draining to the northerly end with an additional Q25 runoff of 6.84 cfs and 14178 ft³.

Section 2.0

HYDROLOGIC CALCULATIONS (Existing Conditions)

Input Parameters	
Project Name	3208 Ex Q25
Subaroa ID	1 A
	27.00
Aled (dC)	37.09
Flow Path Length (ft)	2022.19
Flow Path Slope (vft/hft)	0.1198
50-yr Rainfall Depth (in)	6.2
Percent Impervious	0.01
Soil Type	20
Design Storm Frequency	25-vr
Fire Factor	0
	Ealco
	1 0150
Output Results	
Modeled (25 vr) Painfall Danth (in)	E 1126
Modeleu (25-yr) Rainian Depth (in)	0.4400
Peak Intensity (In/nr)	1.8272
Undeveloped Runoff Coefficient (Cu)	0.4918
Developed Runoff Coefficient (Cd)	0.4959
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	33.6079
Burned Peak Flow Rate (cfs)	33,6079
24-Hr Clear Runoff Volume (ac-ft)	2 7485
24-Hr Clear Runoff Volume (cu-ft)	110725 8150
	119725.0159
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Innut Parameters	
Project Name	2208 Ev 025
Subaraa ID	3200 EX Q23
	20 00
Alea (ac) Elow Both Longth (ft)	30.00 2522 42
Flow Path Length (It)	0 1 4 1
Flow Path Slope (VIVIII)	0.141
50-yr Rainiair Deptri (in)	0.2
	0.01
Soli Type Design Storm Fraguency	20 25 yr
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	U Foloo
LID	Faise
Output Booulto	
	5 4 4 9 9
Modeled (25-yr) Rainfall Depth (in)	5.4436
Peak Intensity (in/hr)	1.5243
Undeveloped Runoff Coefficient (Cu)	0.4492
Developed Runoff Coefficient (Cd)	0.4538
Time of Concentration (min)	25.0
Clear Peak Flow Rate (cfs)	26.3247
Burned Peak Flow Rate (cfs)	26.3247
24-Hr Clear Runoff Volume (ac-ft)	2.7907
24-Hr Clear Runoff Volume (cu-ft)	121563.1785
30 Hydrograph (3208 Ex 0	Q25: 2A)
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Time (minutes)	

Input Parameters	
Project Name	3208 Ex Q25
Subarea ID	2B
Area (ac)	39.31
Flow Path Length (ft)	3243.1
Flow Path Slope (vft/hft)	0.132
50-vr Rainfall Depth (in)	6.2
Percent Impervious	0.01
Soil Type	20
Design Storm Frequency	25-vr
Fire Factor	$\frac{1}{0}$
LID	False
Output Results	
Modeled (25-yr) Rainfall Depth (in)	5.4436
Peak Intensity (in/hr)	1.5538
Undeveloped Runoff Coefficient (Cu)	0.4534
Developed Runoff Coefficient (Cd)	0.4579
Time of Concentration (min)	24.0
Clear Peak Flow Rate (cfs)	27.9669
Burned Peak Flow Rate (cfs)	27.9669
24-Hr Clear Runoff Volume (ac-ft)	2.8862
24-Hr Clear Runoff Volume (cu-ft)	125722.0046
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Section 2.0

HYDROLOGIC CALCULATIONS (Proposed Conditions)

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Project Name	3208 Prop Q25
Subarea ID	1A
Area (ac)	28.94
Flow Path Length (ft)	2022.19
Flow Path Slope (vft/hft)	0.119
50-vr Rainfall Depth (in)	6.2
Percent Impervious	0.01
Soil Type	20
Design Storm Frequency	25-vr
Fire Factor	0
	False
	1 8156
Output Results	
Modeled (25-yr) Rainfall Denth (in)	5 4436
Peak Intensity (in/hr)	1 8272
Undoveloped Pupeff Coefficient (Cu)	0.4018
Developed Runoff Coefficient (Cd)	0.4910
Time of Concentration (min)	0.4959
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	26.2231
Burned Peak Flow Rate (cfs)	26.2231
24-Hr Clear Runoff Volume (ac-ft)	2.1446
24-Hr Clear Runoff Volume (cu-ft)	93417.7706
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Input Parameters			
Project Name	3208 Prop Q25		
Subarea ID	1B		
Area (ac)	1.24		
Flow Path Length (ft)	470.22		
Flow Path Slope (vft/hft)	0.112		
50-yr Rainfall Depth (in)	6.2		
Percent Impervious	0.24		
Soil Type	20		
Design Storm Frequency	25-vr		
Fire Factor	0		
	False		
Output Results	5 4 400		
Modeled (25-yr) Rainfall Depth (in)	5.4436		
Peak Intensity (in/hr)	2.9811		
Undeveloped Runoff Coefficient (Cu)	0.6049		
Developed Runoff Coefficient (Cd)	0.6757		
Time of Concentration (min)	6.0		
Clear Peak Flow Rate (cfs)	2.4977		
Burned Peak Flow Rate (cfs)	2.4977		
24-Hr Clear Runoff Volume (ac-ft)	0.1884		
24-Hr Clear Runoff Volume (cu-ft)	8207.1067		
Hydrograph (3208 Prop	Q25: 1B)		
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Input Parameters	
Project Name	3208 Prop Q25
Subarea ID	10.
Area (ac)	3.8
Flow Doth Longth (ft)	520 10
Flow Pain Lengin (II)	530.10
Flow Path Slope (vft/nft)	0.063
50-yr Rainfall Depth (in)	6.2
Percent Impervious	0.11
Soil Type	20
Design Storm Frequency	25-vr
Fire Factor	0
	False
	1 0.00
Output Results	
Modeled (25.vr) Painfall Depth (in)	5 1136
Dook Intensity (in/br)	0.7707
Peak Intensity (III/III)	2.1121
Undeveloped Runoff Coefficient (Cu)	0.586
Developed Runoff Coefficient (Cd)	0.6205
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	6.5383
Burned Peak Flow Rate (cfs)	6.5383
24-Hr Clear Runoff Volume (ac-ft)	0 4124
24-Hr Clear Runoff Volume (cu-ft)	17963 5957
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7 Hydrograph (3208 Prop	Q25: 1C)
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Input Parameters	
Project Name	3208 Prop Q25
Subarea ID	1D .
Area (ac)	1.89
Flow Path Length (ft)	486.21
Flow Path Slope (vft/hft)	0.021
50-vr Rainfall Depth (in)	6.2
Percent Impervious	0.06
Soil Type	20
Design Storm Frequency	25-vr
Fire Factor	$\frac{1}{0}$
LID	False
Output Booulto	
	5 4 400
Modeled (25-yr) Rainfall Depth (in)	5.4436
Peak Intensity (in/nr)	2.6041
Undeveloped Runoff Coefficient (Cu)	0.5707
Developed Runoff Coefficient (Cd)	0.5905
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	2.9063
Burned Peak Flow Rate (cfs)	2.9063
24-Hr Clear Runoff Volume (ac-ft)	0.1734
24-Hr Clear Runoff Volume (cu-ft)	7552.8495
3.0 Hydrograph (3208 Prop	Q25: 1D)
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Input Parameters	
Project Name	3208 Prop Q25
Subarea ID	1E
Area (ac)	1.31
Flow Path Length (ft)	384 28
Flow Path Slope (vft/hft)	0.02
50-vr Rainfall Denth (in)	6.2
Percent Impervious	0.2
Soil Typo	20
Donign Storm Fraguenov	20 25 yr
Fire Factor	20-yi
LID	Faise
Output Results	
Modolod (25-yr) Painfall Dopth (in)	5 1136
Dook Intensity (in/br)	0.4400
Peak Intensity (In/III)	2.1121
Undeveloped Runoff Coefficient (Cu)	0.586
Developed Runoff Coefficient (Cd)	0.63
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	2.2882
Burned Peak Flow Rate (cfs)	2.2882
24-Hr Clear Runoff Volume (ac-ft)	0.1553
24-Hr Clear Runoff Volume (cu-ft)	6762.7846
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Input Paramotors	
Project Name	3208 Prop Q25
Subarea ID	2A
Area (ac)	38.06
Flow Path Length (ft)	3533.42
Flow Path Slope (vft/hft)	0.141
50-yr Rainfall Depth (in)	6.2
Percent Impervious	0.01
Soil Type	20
Design Storm Frequency	25-vr
Fire Factor	0
	False
	1 4100
Output Depute	
Modeled (25-yr) Rainfall Depth (in)	5.4436
Peak Intensity (in/hr)	1.5243
Undeveloped Runoff Coefficient (Cu)	0.4492
Developed Runoff Coefficient (Cd)	0.4538
Time of Concentration (min)	25.0
Clear Peak Flow Rate (cfs)	26.3247
Burned Peak Flow Rate (cfs)	26.3247
24-Hr Clear Runoff Volume (ac-ft)	2.7907
24-Hr Clear Runoff Volume (cu-ft)	121563.1785
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Input Parameters	
Project Name	3208 Prop Q25
Subarea ID	2B
Area (ac)	39.31
Flow Path Length (ft)	3243.1
Flow Path Slope (vft/hft)	0 132
50-vr Rainfall Depth (in)	6.2
Percent Impervious	0.01
Soil Type	20
Design Storm Frequency	25-\/r
Fire Factor	0
	False
	1 4150
Output Results	
Modeled (25-vr) Rainfall Depth (in)	5 4436
Peak Intensity (in/hr)	1 5538
Undeveloped Runoff Coefficient (Cu)	0 4534
Developed Runoff Coefficient (Cd)	0 4579
Time of Concentration (min)	24 0
Clear Peak Flow Rate (cfs)	27 9669
Burned Peak Flow Rate (cfs)	27 9669
24-Hr Clear Runoff Volume (ac-ft)	2 8862
24-Hr Clear Runoff Volume (cu-ft)	125722 00/6
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Hydrograph (3208 Prop	Q25: 2B)
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Time (minutes)	

Appendix A

HYDROLOGY MAP



TING CONDITIONS HYDROLOGIC TABLE					
IE (ft)	SLOPE (ft/ft)	IMP	Tc (min)	Q25 (cfs)	V25 (c.f.)
19	0.119	0.01	17	33.61	119726
12	0.141	0.01	25	26.32	121563
0	0.132	0.01	24	27.9 7	125722
	-	0.01	-	87.90	367011



EXISTING CONDITIONS HYDROLOGIC TABLE							
	AREA (nc)	FLOWLINE (1)	BLOPE (NII)	MP	To (min)	Q95 (ch)	V35 (c.f.)
14	37.99	2022.19	0.119	0.01	17	33.01	119726
8	38.65	3633.42	0.141	0.01	25	28.32	121883
28	30.31	3343.10	0.132	0.01	24	27.97	125722
TOTAL	114.46	•	•	0.01	•	87.90	367011



DITIONS HYDROLOGIC TABLE					
PE (89)	MP	Te (min)	Q35 (ch)	V25 (c.f.)	
.119	0.01	17	26.22	89118	
.112	0.34	ſ	2.50	8207	
.083	0.11	7	6.54	17864	
J921	0.05		2.91	7003	
.020	0.14	7	2.39	6763	
.141	0.01	25	26.32	121569	
.132	0.01	*	27.97	125722	
•	0.02	•	94.75	381190	

