Preliminary Hydro Modification Plan (HMP)

FOR:

Riker Ranch

County of San Diego, CA

J.N. 191-1

Prepared for:

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INTRODUCTION

Hydrograph modification is caused by the increases in the frequency and duration of runoff as a result of watershed development. Increases caused by additional imperious areas and more efficient drainage facilities. The increase can cause or accelerate erosion of streambed and/or banks downstream.

San Diego Hydrology Model (SDHM), Version 1.0, published by Clear Creek Solutions, Inc. on 3-29-2013, was used in this hydro-modification analysis. The Sanvincente.wdm rain fall data was also obtained from Clear Creek Solutions in the analysis of this project. The SDHM software is based on the HSPF software that is within the public domain.

The purpose of the hydrograph modification analysis is to certify that the post-construction hydrologic characteristics of the project simulates the pre-development hydrologic characteristics at the point of compliance (POC). For this project, the POC was established at the most downstream discharge points where the runoff leaves the disturbed site at the mid-point of the westerly boundary, within the existing wetland channel.

For this report, the hydromodification is caused by this development results from the grading of the super pad/driveway. The construction of the homes and the resulting increases in impervious areas (e.g. roof, driveways and hardscaped areas, etc).

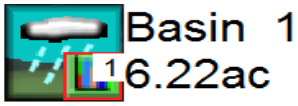
The limits of the HMP analysis are at the project boundary such that the footprint is the same for both the pre and post-development conditions. A slope analysis is conducted for the entire site to determine the slope gradient ranges in the pre-development hydrologic modeling, see the slope analysis exhibit at the end of the HMP analysis.

For the developed (mitigated) model, the majority of the areas within the project boundary will be disturbed for the construction of slopes, pads, driveways and buildings. A slope analysis was performed to determine the slope gradients of the preserved natural areas outside of the development footprint. The land use area within the development footprint is measured from the construction documents. See attached site plan at end of this report for more details.

The landscaped, hardscaped and roof areas for the site is calculated and modeled in the mitigated scenario. An underground concrete vault system is also designed and modeled. Once the models area executed, the program will give a pass/fail assessment to the proposed vault design as to whether the storage and outlet system is adequate to mitigate the proposed home construction such that the disturbed areas within the project boundary – landscaped areas, roof tops and walkways and the roof will not have any additional hydrologic impact to downstream drainage facilities in terms of peak flow and duration.

The rainfall data used in the hydrograph modification analysis is based on the annual gauge data in San Vicente, obtained from a http://www.clearcreeksolutions.com.

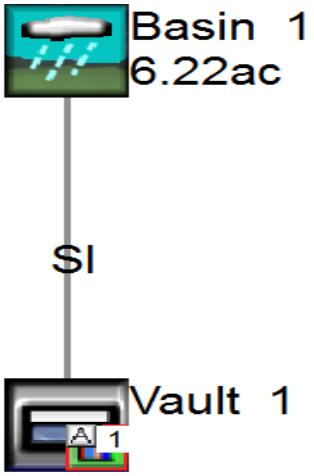
Pre-development schematics



PRE-DEVELOPMENT

LAND COVER	SLOPE	AREA (Ac)
CROP/GRASS/VEGETATION(C-SOIL)	0-5%	1.06
CROP/GRASS/VEGETATION(C-SOIL)	5-10%	2.2
CROP/GRASS/VEGETATION(C-SOIL)	>10%	2.64
IMPERVIOUS (ROOF TOP/PAVING)	FLAT	0.09
IMPERVIOUS (ROOF TOP/PAVING)	MODERATE	0.23
TOTAL		6.22

Post-development schematics



POST-DEVELOPMENT

LAND COVER	SLOPE	AREA (Ac)
CROP/GRASS/VEGETATION(C-SOIL)	0-5%	0.08
CROP/GRASS/VEGETATION(C-SOIL)	5-10%	0.12
CROP/GRASS/VEGETATION(C-SOIL)	>10%	0.08
LANDSCAPE/GRASS (B-SOIL)	0-5%	1.89
LANDSCAPE/GRASS (B-SOIL)	>10%	0.67
IMPERVIOUS (ROOF TOP/PAVING)	FLAT	3.0
IMPERVIOUS (ROOF TOP/PAVING)	MODERATE	0.38
TOTAL		6.22

SDHM2011

PROJECT REPORT

Project Name: 1911hydromodalt
Site Name: Riker Rch, Adlai Road
Site Address:
City : Lakeside,
Report Date: 1/15/2015
Gage : SAN VICE
Data Start : 10/01/1973
Data End : 09/30/2004
Precip Scale: 1.00
Version : 2014/11/03

Low Flow Threshold for POC 1 : 10 Percent of the 2 Year

High Flow Threshold for POC 1: 10 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	Acres
C,Grass,FLAT(0-5%)	1.06
C,Grass,MOD(5-10%)	2.2
C,Grass,STEEP(10-20	2.64
Pervious Total	5.9

Impervious Land Use	Acres
IMPERVIOUS-FLAT	0.09
IMPERVIOUS-MOD	0.23
Impervious Total	0.32
Basin Total	6.22

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Basin 1

Bypass: No

GroundWater: No

Pervious Land Use	Acres
B,Grass,FLAT(0-5%)	1.89
B,Grass,STEEP(10-20	.67
C,Grass,FLAT(0-5%)	.08
C,Grass,STEEP(10-20	.08
C,Grass,MOD(5-10%)	.12
Pervious Total	**2.84**

Impervious Land Use	Acres
IMPERVIOUS-FLAT	3
IMPERVIOUS-MOD	0.38
Impervious Total	**3.38**

Basin Total **6.22**

Element Flows To:

Surface	Interflow	Groundwater
Vault 1	Vault 1	

Name : Vault 1
Width : 21 ft.
Length : 225 ft.
Depth: 5 ft.
Infiltration On
Infiltration rate: 0.4
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft): 73.709
Total Volume Through Riser (ac-ft): 18.167
Total Volume Through Facility (ac-ft): 91.876
Percent Infiltrated: 80.23
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 4.5 ft.
Riser Diameter: 12 in.
Orifice 1 Diameter: 1.55 in. **Elevation:** 2.5 ft.

Element Flows To:

Outlet 1	Outlet 2

Vault Hydraulic Table

Stage(ft)	Area(ac)	Volume(ac-ft)	Discharge(cfs)	Infilt(cfs)

0.0000	0.108	0.000	0.000	0.000
0.0556	0.108	0.006	0.000	0.043
0.1111	0.108	0.012	0.000	0.043
0.1667	0.108	0.018	0.000	0.043
0.2222	0.108	0.024	0.000	0.043
0.2778	0.108	0.030	0.000	0.043
0.3333	0.108	0.036	0.000	0.043
0.3889	0.108	0.042	0.000	0.043
0.4444	0.108	0.048	0.000	0.043
0.5000	0.108	0.054	0.000	0.043
0.5556	0.108	0.060	0.000	0.043
0.6111	0.108	0.066	0.000	0.043
0.6667	0.108	0.072	0.000	0.043
0.7222	0.108	0.078	0.000	0.043
0.7778	0.108	0.084	0.000	0.043
0.8333	0.108	0.090	0.000	0.043
0.8889	0.108	0.096	0.000	0.043
0.9444	0.108	0.102	0.000	0.043
1.0000	0.108	0.108	0.000	0.043
1.0556	0.108	0.114	0.000	0.043
1.1111	0.108	0.120	0.000	0.043
1.1667	0.108	0.126	0.000	0.043
1.2222	0.108	0.132	0.000	0.043
1.2778	0.108	0.138	0.000	0.043
1.3333	0.108	0.144	0.000	0.043
1.3889	0.108	0.150	0.000	0.043
1.4444	0.108	0.156	0.000	0.043
1.5000	0.108	0.162	0.000	0.043
1.5556	0.108	0.168	0.000	0.043
1.6111	0.108	0.174	0.000	0.043
1.6667	0.108	0.180	0.000	0.043
1.7222	0.108	0.186	0.000	0.043
1.7778	0.108	0.192	0.000	0.043
1.8333	0.108	0.198	0.000	0.043
1.8889	0.108	0.204	0.000	0.043
1.9444	0.108	0.210	0.000	0.043
2.0000	0.108	0.216	0.000	0.043
2.0556	0.108	0.223	0.000	0.043
2.1111	0.108	0.229	0.000	0.043
2.1667	0.108	0.235	0.000	0.043
2.2222	0.108	0.241	0.000	0.043
2.2778	0.108	0.247	0.000	0.043
2.3333	0.108	0.253	0.000	0.043
2.3889	0.108	0.259	0.000	0.043
2.4444	0.108	0.265	0.000	0.043
2.5000	0.108	0.271	0.000	0.043
2.5556	0.108	0.277	0.014	0.043
2.6111	0.108	0.283	0.021	0.043
2.6667	0.108	0.289	0.025	0.043
2.7222	0.108	0.295	0.029	0.043
2.7778	0.108	0.301	0.033	0.043
2.8333	0.108	0.307	0.036	0.043
2.8889	0.108	0.313	0.039	0.043
2.9444	0.108	0.319	0.042	0.043
3.0000	0.108	0.325	0.044	0.043
3.0556	0.108	0.331	0.047	0.043
3.1111	0.108	0.337	0.049	0.043

3.1667	0.108	0.343	0.051	0.043
3.2222	0.108	0.349	0.053	0.043
3.2778	0.108	0.355	0.055	0.043
3.3333	0.108	0.361	0.057	0.043
3.3889	0.108	0.367	0.059	0.043
3.4444	0.108	0.373	0.061	0.043
3.5000	0.108	0.379	0.063	0.043
3.5556	0.108	0.385	0.064	0.043
3.6111	0.108	0.391	0.066	0.043
3.6667	0.108	0.397	0.068	0.043
3.7222	0.108	0.403	0.069	0.043
3.7778	0.108	0.409	0.071	0.043
3.8333	0.108	0.415	0.072	0.043
3.8889	0.108	0.421	0.074	0.043
3.9444	0.108	0.427	0.075	0.043
4.0000	0.108	0.433	0.077	0.043
4.0556	0.108	0.439	0.078	0.043
4.1111	0.108	0.445	0.080	0.043
4.1667	0.108	0.452	0.081	0.043
4.2222	0.108	0.458	0.082	0.043
4.2778	0.108	0.464	0.084	0.043
4.3333	0.108	0.470	0.085	0.043
4.3889	0.108	0.476	0.086	0.043
4.4444	0.108	0.482	0.088	0.043
4.5000	0.108	0.488	0.089	0.043
4.5556	0.108	0.494	0.218	0.043
4.6111	0.108	0.500	0.452	0.043
4.6667	0.108	0.506	0.755	0.043
4.7222	0.108	0.512	1.114	0.043
4.7778	0.108	0.518	1.521	0.043
4.8333	0.108	0.524	1.970	0.043
4.8889	0.108	0.530	2.459	0.043
4.9444	0.108	0.536	2.984	0.043
5.0000	0.108	0.542	3.543	0.043
5.0556	0.108	0.548	4.133	0.043
5.1111	0.000	0.000	4.754	0.000

ANALYSIS RESULTS

Predeveloped Landuse Totals for POC #1
Total Pervious Area:5.9
Total Impervious Area:0.32

Mitigated Landuse Totals for POC #1
Total Pervious Area:2.84
Total Impervious Area:3.38

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.76243

5 year	1.67551
10 year	2.068019
25 year	2.834899

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.217734
5 year	0.89773
10 year	1.502256
25 year	2.611023

POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	**Predev**	**Mit**	**Percentage**	**Pass/Fail**
0.0762	554	591	106	Pass
0.0964	418	216	51	Pass
0.1165	339	199	58	Pass
0.1366	284	186	65	Pass
0.1567	244	175	71	Pass
0.1768	213	160	75	Pass
0.1970	198	148	74	Pass
0.2171	180	136	75	Pass
0.2372	169	131	77	Pass
0.2573	157	122	77	Pass
0.2774	153	117	76	Pass
0.2976	146	109	74	Pass
0.3177	139	104	74	Pass
0.3378	134	97	72	Pass
0.3579	129	90	69	Pass
0.3780	126	81	64	Pass
0.3981	120	78	65	Pass
0.4183	116	76	65	Pass
0.4384	111	72	64	Pass
0.4585	108	67	62	Pass
0.4786	106	62	58	Pass
0.4987	104	59	56	Pass
0.5189	101	57	56	Pass
0.5390	99	51	51	Pass
0.5591	95	49	51	Pass
0.5792	92	45	48	Pass
0.5993	86	44	51	Pass
0.6195	83	43	51	Pass
0.6396	77	41	53	Pass
0.6597	72	39	54	Pass
0.6798	71	35	49	Pass
0.6999	66	34	51	Pass
0.7200	63	31	49	Pass
0.7402	58	31	53	Pass
0.7603	52	30	57	Pass
0.7804	48	30	62	Pass
0.8005	46	30	65	Pass

0.8206	46	28	60	Pass
0.8408	45	28	62	Pass
0.8609	43	28	65	Pass
0.8810	43	26	60	Pass
0.9011	42	25	59	Pass
0.9212	40	24	60	Pass
0.9414	40	24	60	Pass
0.9615	40	22	55	Pass
0.9816	39	22	56	Pass
1.0017	39	20	51	Pass
1.0218	38	19	50	Pass
1.0420	37	19	51	Pass
1.0621	36	18	50	Pass
1.0822	32	17	53	Pass
1.1023	31	17	54	Pass
1.1224	31	16	51	Pass
1.1425	30	16	53	Pass
1.1627	27	15	55	Pass
1.1828	26	14	53	Pass
1.2029	26	13	50	Pass
1.2230	24	13	54	Pass
1.2431	23	13	56	Pass
1.2633	22	12	54	Pass
1.2834	22	11	50	Pass
1.3035	21	9	42	Pass
1.3236	19	8	42	Pass
1.3437	18	8	44	Pass
1.3639	17	7	41	Pass
1.3840	17	7	41	Pass
1.4041	17	7	41	Pass
1.4242	17	7	41	Pass
1.4443	17	6	35	Pass
1.4645	17	6	35	Pass
1.4846	17	6	35	Pass
1.5047	16	6	37	Pass
1.5248	16	6	37	Pass
1.5449	15	6	40	Pass
1.5650	14	5	35	Pass
1.5852	14	5	35	Pass
1.6053	13	5	38	Pass
1.6254	13	5	38	Pass
1.6455	12	5	41	Pass
1.6656	11	5	45	Pass
1.6858	11	5	45	Pass
1.7059	10	5	50	Pass
1.7260	10	5	50	Pass
1.7461	8	4	50	Pass
1.7662	7	4	57	Pass
1.7864	7	4	57	Pass
1.8065	6	4	66	Pass
1.8266	6	4	66	Pass
1.8467	6	3	50	Pass
1.8668	6	3	50	Pass
1.8869	5	3	60	Pass
1.9071	4	3	75	Pass
1.9272	4	3	75	Pass
1.9473	3	3	100	Pass

1.9674	3	3	100	Pass
1.9875	3	3	100	Pass
2.0077	3	3	100	Pass
2.0278	3	3	100	Pass
2.0479	3	3	100	Pass
2.0680	3	3	100	Pass

Drawdown Time Results

Pond: Vault 1

Days	Stage(feet)	Percent of Total Run Time
1	3.358	0.4139
2	N/A	0.0003
3	N/A	0.0003
4	N/A	0.0003
5	N/A	0.0003

Maximum Stage: 4.719
Drawdown Time: Exceeds 5 days.

Perlnd and Implnd Changes

No changes have been made.

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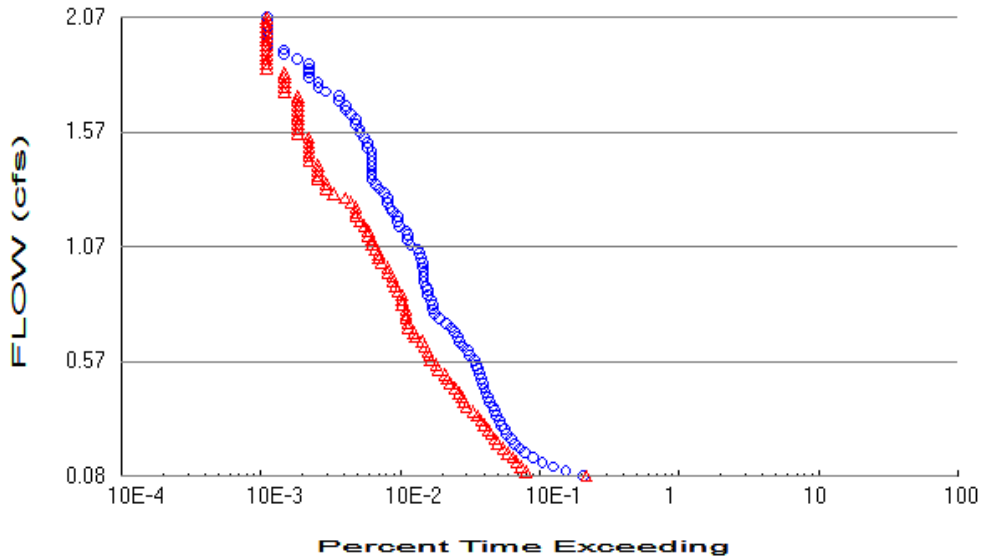
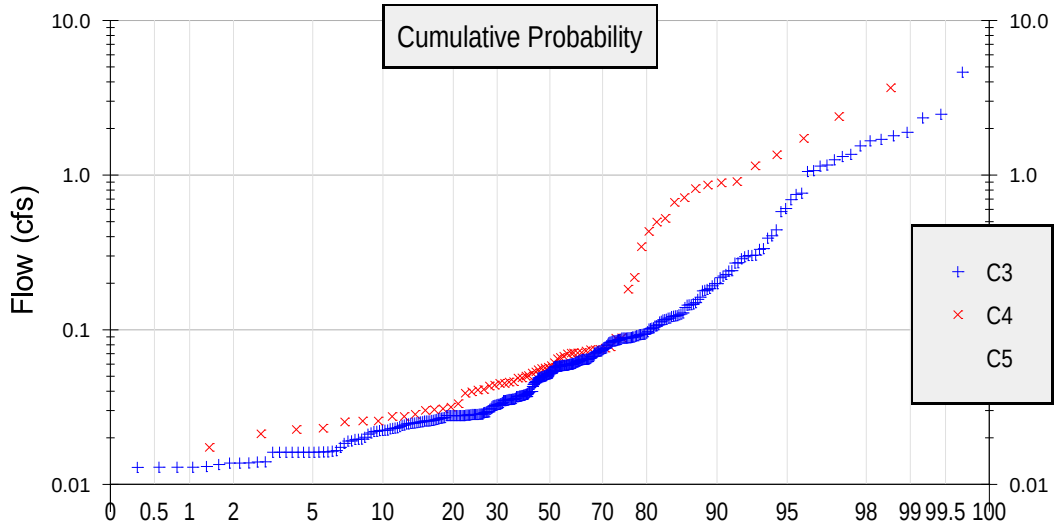


DURATION



FREQUENCY

SUMMARY:

Based on the hydromodification analysis presented in this report, the proposed detention basin and outlet structure will mitigate the post development runoff to be no more than 10% over the pre-development runoff duration and peak flow rate.

	10% Q2	Q2	Q5	Q10
	(CFS)	(CFS)	(CFS)	(CFS)
PRE-DEV	0.08	0.8	1.7	2.1
POST-DEV	0.02	0.2	0.9	1.5

The proposed mitigation measures consist of a 5’ deep concrete vault that provides a total volume of 21520 cf at the riser head. The outlet structure consists of a 4.5’ high 12” diameter riser with a 1.55” diameter orifice at the bottom of the vault.

The proposed mitigation measures for this project will prevent additional hydromodification impacts to downstream facilities in accordance with County of San Diego SUSMP.

SLOPE ANALYSIS: PRE-DEVELOPMENT IMPERVIOUS AREAS

SCALE: 1"= 80'

SLOPE ANALYSIS

NUMBER	COLOR	MIN SLOPE	MAX SLOPE	AREA (AC)
1		0.0%	5.0%	0.09
2		5.0%	10.0%	0.16
3		10.0%	1000.0%	0.07

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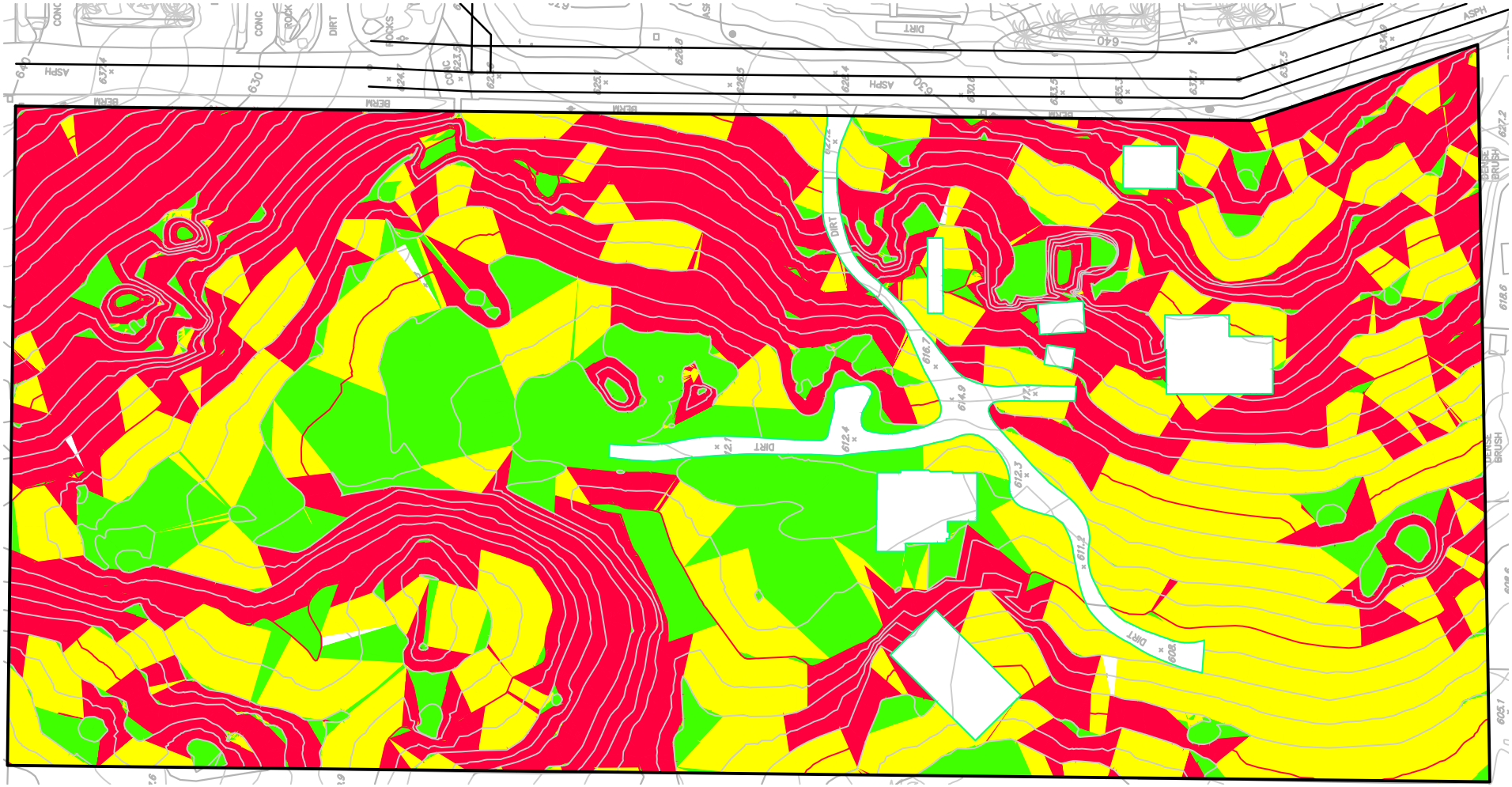
SLOPE ANALYSIS: PRE-DEVELOPMENT PERVIOUS AREAS



SLOPE ANALYSIS

NUMBER	COLOR	MIN SLOPE	MAX SLOPE	AREA (AC)
1		0.0%	5.0%	1.06
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N
SCALE: 1" = 80'

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