FUSCOE ENGINEERING

HYDROMODIFICATION MANAGEMENT STUDY

Valiano

PDS2013-SP-13-001, PDS2013-GPA-13-011, PDS2013-STP-13-003, PDS2013-TM-5575, PDS2013-REZ-13-001, PDS2013-ER-12-08-002

MARCH 2015

County of San Diego, CA

prepared for:

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PRELIMINARY HYDROMODIFICATION MANAGEMENT STUDY

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COUNTY OF SAN DIEGO, CA

Prepared By:

3/18/15

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March 2015

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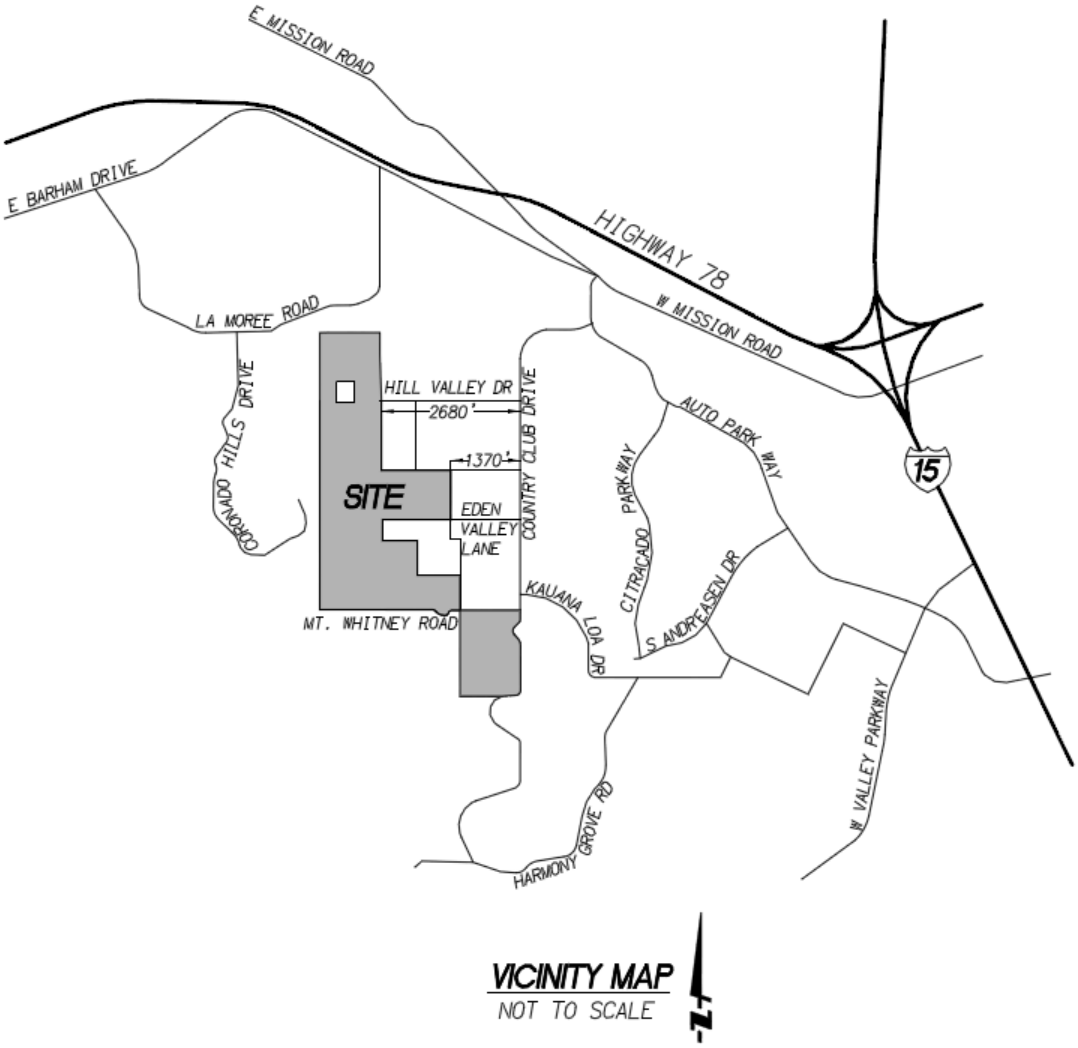


Figure 1 Vicinity Map

1.0 PROJECT DESCRIPTION

This Preliminary Hydromodification Management Study analyzes and proposes mitigation for the hydromodification impacts of the Valiano project. This Study is required per the 2012 Edition of the County of San Diego's Standard Urban Stormwater Management Plan (SUSMP) and the 2007 San Diego Regional Water Quality Control Board's municipal stormwater NPDES permit to San Diego area municipal Copermitees. Although municipal stormwater permit has been updated per Regional Water Quality Control Board Order Number R9-2013-001, per Provision E.3.d of that order, the project is subject to the requirements of the 2012 SUSMP until the County's BMP Design Manual update is complete.

The Valiano project proposes to construct 326 single family dwelling units on 6 parcels with a cumulative area of 239 acres in the County of San Diego, California. The existing site consists of flat and mountainous terrain and is located on the southwestern corner of Country Club Drive and Hill Valley Drive. The site is located in the unincorporated community of "Eden Valley", primarily comprised

of single family residential and equestrian land uses. Reference the Vicinity Map in Figure 1 for a detailed map of the project site.

Private streets within the project consist of one main road that traverses the westerly portion of the project from North to South, and numerous private streets that provide access to the lots within each neighborhood. The two primary access points to the project will be from Eden Valley Lane and Mt. Whitney Road. The southeasterly portion of the project is accessed via private roads from Country Club Drive and Mt. Whitney Road.

2.0 SITE INFORMATION

The following sections summarize the site conditions which relate to drainage and hydromodification, including the geotechnical conditions, drainage basins, and the low flow threshold determination.

2.1 GEOTECHNICAL CONDITIONS

Geotechnical investigations were prepared for the project site by Geocon, dated September 12, 2012 and December 12, 2012. The surficial site soils encountered include undocumented fill, topsoil, colluvium, alluvium, and Terrace Deposits. These were underlain by formational materials consisting of the Santiago Formation, granitic rock, and metamorphic rock. The formational materials were generally encountered at depths of 1-15' below the ground surface. To determine the Hydrologic Soils Group for the project, data from the Natural Resources Conservation Service (NRCS) was utilized. A Custom Soil Resource Report prepared by the NRCS is provided in Appendix 1 for reference. According to NRCS data, Hydrologic Soil Groups B, C, and D are present within the project. In order to conservatively size the hydromodification mitigation facilities and in consideration of the shallow bedrock with is present under much of the developed area, Hydrologic Soil Group D is assumed for the entire project.

Due to the presence of Group C and D soils and shallow bedrock under much of the developed portions of the project, infiltration-based Integrated Management Practices (IMPs) are not feasible for the project site.

2.2 DRAINAGE BASINS

Due to the hillside nature of the site, runoff from the project site splits into several major drainage basins. These basins are delineated in the Existing Hydrology Exhibit in Appendix 2. The major drainage basins are then divided into smaller Drainage Management Areas (DMAs) for purposes of sizing the hydromodification mitigation facilities.

Basin A encompasses the southwesterly corner of the project site, and includes offsite areas to the west of the project. Flows in this basin drain to the south in a natural drainage channel. This channel continues south through agricultural and undeveloped land, including multiple agricultural ponds, before discharging to Escondido Creek south of the project site. For hydromodification calculations, the developed portion of Basin A has been identified as DMA 1.

Basin B consists of the south-central and southeasterly portions of the project site. Basin B includes offsite areas to the west of the project boundary and areas adjacent to the southeasterly portion of the project. Runoff from this basin is collected a natural channel which runs roughly southeasterly through the site, and exits the site near the southeasterly corner. From there, the channel runs south to a confluence point with Basin A and eventually to Escondido Creek. Like Basin A, runoff from Basin B flows through agricultural and undeveloped land, including agricultural ponds, on its path to Escondido Creek. For hydromodification calculations, the developed portions of Basin B have been identified as

DMAs 2A through 2F for the upper portions of Basin B, and DMAs 5A through 5D for the lower portions.

Basin C originates near the high point of the mountains to the west of the project site, and flows easterly through the central portion of the project site. Runoff from Basin C exits the project site at the easterly property line in the central portion of the site. From there, it flows southeasterly to a confluence with Basin B, and then ultimately to Escondido Creek. Basin C consists of undeveloped, agricultural, and residential land. Runoff in Basin C travels primarily through natural and unlined channels, with culverts at road crossings downstream of the project site. For hydromodification calculations, the developed portions of Basin C have been identified as DMAs 3A through 3D.

Basin D encompasses the northerly portion of the project site, and drains in an easterly direction. After exiting the project site, runoff flows in a southeasterly direction to an offsite confluence with flows from Basin C, and ultimately to Escondido Creek. For hydromodification calculations, the developed portions of Basin D have been identified as DMAs 4A and 4B.

2.3 LOW FLOW THRESHOLD DETERMINATION

An assessment of the susceptibility of the receiving channels to erosion was not performed for this project at this time. Therefore, the low flow threshold corresponding to a highly susceptible channel, $0.1Q_2$, was used.

A channel assessment may be preformed during future phases of design. Due to the alluvial nature of the soils downstream of the project site, it is difficult to anticipate what the erosion susceptibility of the receiving channels would be should a channel assessment be performed. If a channel assessment is performed at a future date, future phases of the design would be based on the low flow thresholds which correspond to the determined erosion susceptibility.

3.0 METHODOLOGY

The hydromodification analysis for Valiano has been done in accordance with the Final Hydromodification Management Plan, dated March 2011.

3.1 DRAINAGE MANAGEMENT STRATEGY

The drainage management strategy for the project utilizes multifunction IMPs to provide water quality treatment, hydromodification mitigation, and peak detention for the developed portions of the site. Points of Compliance (POCs) have been identified where the proposed storm drain system will discharge to the surrounding natural drainage courses. If the project proposes to increase un-mitigated post-development flows to a POC, a storm water management Best Management Practice (BMP) was then designed to mitigate the impacts of the increase. The BMPs then discharge to the natural drainage courses. Where an BMP discharges to a natural drainage course, appropriately sized energy dissipation will be provided. Energy dissipation facilities will be sized at the time of final engineering.

Due to the project's location on the hills bordering a valley, the site accepts runoff from the adjacent hills to the west. There is also a good deal of open space which will be preserved within the project, as well as graded slopes which will have no impervious area. Where possible, the offsite drainages and onsite pervious areas will be provided with separate drainage systems, which will prevent the mingling of runoff from these areas with runoff from the developed areas of the site. Thus, these areas will function as self-treating areas which will contain less than 5% impervious areas. The self-treating areas of the site are identified on the Hydromodification Management Exhibit in Appendix 5. For the Hill Valley Road emergency access route, permeable pavements will be used to make this a self-treating area as well.

To size the BMPs, the area tributary to each BMP was delineated into a Drainage Management Area (DMA). Refer to the Hydromodification Management Exhibit in Appendix 5 for the location of each POC, IMP, and DMA. The DMAs were divided further into proposed impervious areas, such as roofs and pavement, and proposed pervious areas, including landscape and slopes.
The majority of the developed portions of the project, including the streets and the residential pads, were assumed to be 70% impervious. This is a conservative assumption, which is a higher percent impervious than is typically assigned to the density of the proposed residential lots. Such a conservative percent imperviousness is assumed at this preliminary stage to ensure that the IMPs will be adequately sized as the project evolves. As more information on the proposed residential units is known, such as building footprints, driveway widths, etc, it may be possible to lower this assumed percent imperviousness and reduce the size of the IMPs accordingly.

The large pad in DMA 2F is proposed to be utilized as a park and/or recreation area. Therefore a lower impervious percentage of 50% was used for this DMA. A community park is proposed within DMA 5D. This park was also assumed to be 50% impervious. Where large proposed slopes or other undeveloped areas are present within a DMA, these areas were excluded from the imperviousness calculations.

The following table lists the areas, soil type, and pre-project slopes for each DMA.

DMA	Pre-Project Cover	Post-Project Cover	Soil Type	Slope	Area (ac)
1	Pervious	Pervious	D	Steep	0.84
	Pervious	Impervious	D	Steep	1.95
2A	Pervious	Pervious	D	Steep	1.51
	Pervious	Impervious	D	Steep	1.94
2B	Pervious	Pervious	D	Steep	1.87
	Pervious	Impervious	D	Steep	3.61
2C	Pervious	Pervious	D	Steep	5.59
	Pervious	Impervious	D	Steep	6.68
2D	Pervious	Pervious	D	Steep	1.03
	Pervious	Impervious	D	Steep	1.20
2E	Pervious	Pervious	D	Steep	2.56
	Pervious	Impervious	D	Steep	3.71
2F	Pervious	Pervious	D	Steep	0.94
	Pervious	Impervious	D	Steep	0.94
3A	Pervious	Pervious	D	Steep	1.53
	Pervious	Impervious	D	Steep	2.44
3B	Pervious	Pervious	D	Steep	5.34
	Pervious	Impervious	D	Steep	5.17
3C	Pervious	Pervious	D	Steep	3.46
	Pervious	Impervious	D	Steep	4.54
3D	Pervious	Pervious	D	Moderate	4.09
	Pervious	Impervious	D	Moderate	7.99
4A	Pervious	Pervious	D	Steep	2.18
	Pervious	Impervious	D	Steep	3.75
4B	Pervious	Pervious	D	Steep	1.09
	Pervious	Impervious	D	Steep	1.57
5A	Pervious	Pervious	D	Steep	2.49
	Pervious	Impervious	D	Steep	5.46

5B	Pervious	Pervious	D	Steep	1.45
	Pervious	Impervious	D	Steep	3.39
5C	Pervious	Pervious	D	Flat	1.14
	Pervious	Impervious	D	Flat	2.65
5D	Pervious	Pervious	D	Moderate	1.88
	Pervious	Impervious	D	Moderate	1.97
MW1	Pervious	Impervious	D	Moderate	0.33
	Impervious	Impervious	D	Moderate	0.34
MW2	Pervious	Impervious	D	Moderate	0.37
	Impervious	Impervious	D	Moderate	0.48
CC1	Pervious	Impervious	D	Flat	0.08

For the majority of the project, extended detention basins were chosen as the preferred IMP for their small footprint and ability to function for peak storm detention as well. In DMAs 2F, MW1, MW2, and CC1 however, bioretention basins were chosen. For DMA 2F, a bioretention basin is more appropriate for the proposed park/recreation area use than an extended detention basin, and will be incorporated into the landscaping of the park/recreation area during final design. DMAs MW1, MW2 and CC1 encompass the offsite street improvements to Mount Whitney Road and Country Club Drive. Bioretention basins were selected for these areas due to their relatively small size.

The San Diego Hydromodification Sizing Calculator, developed by Brown and Caldwell, was utilized to size the IMPs. Depending on whether a particular sub-basin is draining to a bioretention basin or extended detention basin, either the "LID Sizer" or "Pond Sizer" feature of the Calculator was used. The IMPs were sized for "Treatment + Flow Control". The soil type was assumed to be Type D, and the project lies within the Oceanside rainfall basin. On the "Point of Compliance" tab, the option for no channel assessment was chosen, so that the low-flow threshold for the project will be $0.1Q_2$. The output from the Calculator can be found in Appendix 3. Since the Brown and Caldwell calculator was taken offline before designing CC1, it was sized via the sizing factors found in the County SUSMP dated August 2012.

3.2 EXTENDED DETENTION BASINS

As mentioned in Section 3.1, for the majority of the project, extended detention basins have been chosen to provide water quality treatment, hydromodification flow control, and peak detention. To provide a higher level of water quality treatment, a bioretention layer has been incorporated into the extended detention basin design. Depending on space available and detention requirements, these basins will vary in depth from 3.0' to 5.0'. Generally, the extended detention basins will have an outlet structure consisting of an elevated Type G catch basin, with orifice openings in the side of the catch basin corresponding to the upper orifice determined by the BMP Calculator. The bioretention layer will have a subdrain with an orifice where the subdrain enters the catch basin. This subdrain orifice will be sized to allow the same flow rate as the lower orifice determined by the BMP Calculator. Orifice calculations can be found in Appendix 3. The catch basin grate will function as the weir outlet. The catch basins will be connected to a storm drain pipe which will convey flows from the basins to a headwall and energy dissipation facility at the POC.

3.3 BIORETENTION BASINS

As mentioned above, bioretention basins have been proposed in four DMAs. Bioretention is the preferred method of treatment for these DMAs due to the relatively small amount of impervious development within the DMAs, and in the case of DMA 2F the ability of the bioretention basin to be incorporated into the landscaping design of the park/recreation area. The bioretention basins have been designed in accordance with the HMP and the Countywide Model SUSMP. The bioretention basins will be depressed to allow for 10" of surface ponding and 2" of freeboard over the overflow

outlet. The overflow outlet will be a grated catch basin, which will be connected to a storm drain pipe which will outlet to the POC with a headwall and energy dissipater. Below the surface ponding, 18" of engineered soil will be provided as a growing media. This will be underlain by 30" of an open-graded gravel with 40% void space. A subdrain will be installed within the gravel layer, at a depth of 18" below the soil layer. The subdrain will be connected to the grated catch basin, and will be fitted with an end cap with drilled orifice corresponding to the orifice size determined by the BMP Calculator. Please refer to the Typical Bioretention Basin detail below.

Basin CC1 differs from the other bioretention basins in that there is no storm drain system available to connect to. The perforated pipe subdrain will be excluded. Instead of a grated inlet, runoff will be allowed to overtop and continue downstream when ponding becomes greater than 10".

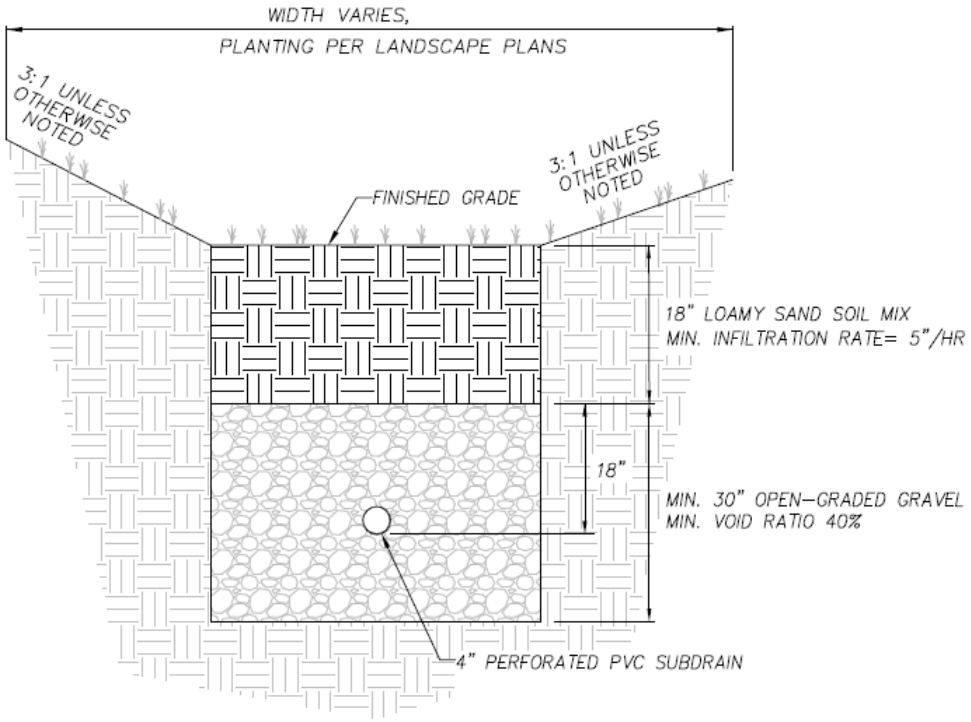


Figure 2 Typical Bioretention Basin

4.0 CALCULATIONS/RESULTS

The sections below summarize the sizing calculations for each onsite IMP. BMP Calculator output can be found in Appendix 3. Please refer to the Hydromodification Management Exhibit in Appendix 5 for a graphical depiction of these areas. A CD containing output files from the BMP Calculator is provided in Appendix 3.

4.1 EXTENDED DETENTION BASINS

As described above, the extended detention basins were sized using the "Pond Sizer" feature of the BMP Calculator. The tables below summarize the required and provided area and volume for each extended detention basin.

	Subdrain Orifice		Upper Orifice		Weir		
	Dia.	Elev.	Dia.	Elev.	Length	Elev.	Depth
Basin	(in)	(ft)	(in)	(ft)	(ft)	(ft)	(ft)
1	1.4	-2.5	6	2	10.6	4	5
2A	1.3	-2.5	7	1.5	10.6	3	4
2B	1.8	-2.5	10	2	10.6	3	4
2C	2.6	-2.75	12	1.75	10.6	3	4
2D	1.0	-2.5	7	1	10.6	2	3
2E	1.8	-2.5	11	2	10.6	3	4
3A	1.7	-2.5	9	1	10.6	2	3
3B	2.5	-4.5	15	1.5	10.6	3	4
3C	2.1	-3.5	12	1.75	10.6	3	4
3D	2.2	-2.5	14	2	10.6	3	4
4A	1.8	-2.75	11	1.75	10.6	3	4
4B	1.6	-2.5	9	0.5	10.6	1	2
5A	1.8	-2.5	9	1.5	10.6	3	4
5B	1.8	-2.5	10	2	10.6	3	4
5C	1.3	-2.5	12	1.5	10.6	2.5	3
5D	1.3	-2.75	6	2	10.6	3	4

	BMP Calculator Output			IMP Size Provided			Drawdown
	Bottom A	Top A	Volume	Bottom A	Top A	Volume	Time
Basin	(sf)	(sf)	(cf)	(sf)	(sf)	(cf)	(hours)
1	3,375	6,096	23,684	3,897	7,316	28,033	39
2A	3,750	5,965	19,431	6,037	9,196	30,466	36
2B	5,000	8,129	27,258	5,634	9,198	29,664	35
2C	10,000	13,456	46,912	10,936	16,334	54,540	27
2D	3,750	5,363	13,671	4,135	5,950	15,128	42
2E	6,500	9,335	31,672	7,010	10,102	34,224	41
3A	6,000	8,003	21,005	6,594	9,149	23,615	27
3B	7,250	10,230	34,961	7,325	11,362	37,374	18
3C	6,500	9,335	31,672	7,202	10,679	35,762	25
3D	20,000	24,781	98,005	22,060	29,509	103,138	78
4A	5,750	8,432	28,365	6,159	9,034	30,386	34
4B	8,000	9,495	17,495	8,153	9,823	17,976	24
5A	16,000	20,303	72,607	17,846	24,462	84,616	82
5B	5,156	7,710	25,733	5,319	9,657	29,952	33
5C	9,250	11,702	31,428	9,484	12,322	32,709	87
5D	4,750	7,211	23,923	4,888	7,411	24,598	52

As can be seen above, the drawdown time for each basin is below the 96 hour maximum allowed for vector control. Figures in Appendix 4 provide details of the outlet structures for the extended detention basins. For more information on the peak detention aspects of the extended detention basins, please refer to the Preliminary Drainage Study.

4.2 BIORETENTION BASINS

As described in Section 3.3, a bioretention basin has been provided in DMAs 2F, MW1, MW2 and CC1. A subdrain with orifice control will be provided in these basins with the exception of CC1. The table below summarizes the required and provided area, volume, and orifice diameter for the bioretention basin. The dimensions and location of the bioretention basin are schematic, and will be finalized during final design of the park/recreation area.

	BMP Calculator Output				IMP Size Provided			
	Area	V1	V2	Orifice Dia.	Area	V1	V2	Orifice Dia.
Basin	(sf)	(cf)	(cf)	(in)	(sf)	(cf)	(cf)	(in)
2F	2,927	2,441	1,756	1.0	3,196	2,653	1,918	1.0
MW1	1,868	1,556	1,121	0.8	1,894	1,572	1,136	0.8
MW2	2,095	1,745	1,257	0.9	2,105	1,747	1,263	0.9
CC1	449	374	269	-	450	510	450	-

5.0 MAINTENANCE

Maintenance of the proposed BMPs will be performed by the Valiano homeowner's association. Until the formation of the homeowner's association, The Eden Hills Project Owner, LLC or the current owner of the property will be responsible for maintenance. The required maintenance of the BMPs is summarized in the table below. Please refer to the Major Storm Water Management Plan for Valiano for further information on maintenance of the BMPs.

TREATMENT CONTROL BMP	RESPONSIBLE PARTY	MINIMUM MAINTENANCE FREQUENCY	UNIT/ANNUAL MAINTENANCE COSTS
BIORETENTION BASIN	To-be-formed Valiano homeowner's assocation	Regular landscape maintenance with semiannual inspections. Vegetation should be left to a minimum of a 4"-6" height in order to facilitate pollutants filtration and removal within the area. Water should not be allowed to pond; if this occurs, maintenance consisting of minor re-grading may be required. Soils may need to be replaced after 5-10 years.	Included in Normal Landscape Maintenance
EXTENDED DETENTION BASINS	To-be-formed Valiano homeowner's assocation	Regular landscape maintenance with monthly inspections during the rainy season. Remove sediment, trash and debris. Ensure that the orifices, overflow inlets, and storm drain pipes remain clear of obstructions.	$4330 each

6.0 SUMMARY AND CONCLUSIONS

The hydromodification mitigation measures proposed for the Valiano project will satisfy the requirements of the Final Hydromodification Management Plan. In portions of the project where discharges will increase, this will be achieved through the use of extended detention basin and bioretention BMPs which will reduce runoff flows and durations from the developed areas of the project to below pre-project levels for the flow range of $0.1Q_2$ to Q_{10}. The IMPs have been designed using the San Diego Hydromodification Sizing Calculator. Proper energy dissipation will also be provided where necessary, and will be sized as part of final engineering. Maintenance of the BMPs will be performed by the Valiano homeowner's association. Please refer to the Major Storm Water Management Plan and Preliminary Drainage Study for further information regarding the water quality and peak detention aspects of the proposed BMPs.

7.0 APPENDICES

Appendix 1 *Custom Soils Resource Report*

Appendix 2 *Existing Hydrology Exhibit*

Appendix 3 *BMP Sizing Calculator Output*

Appendix 4 *Outlet Structure Details*

Appendix 5 *Hydromodification Management Exhibit*

Appendix 1

Custom Soil Resource Report

United States Department of Agriculture

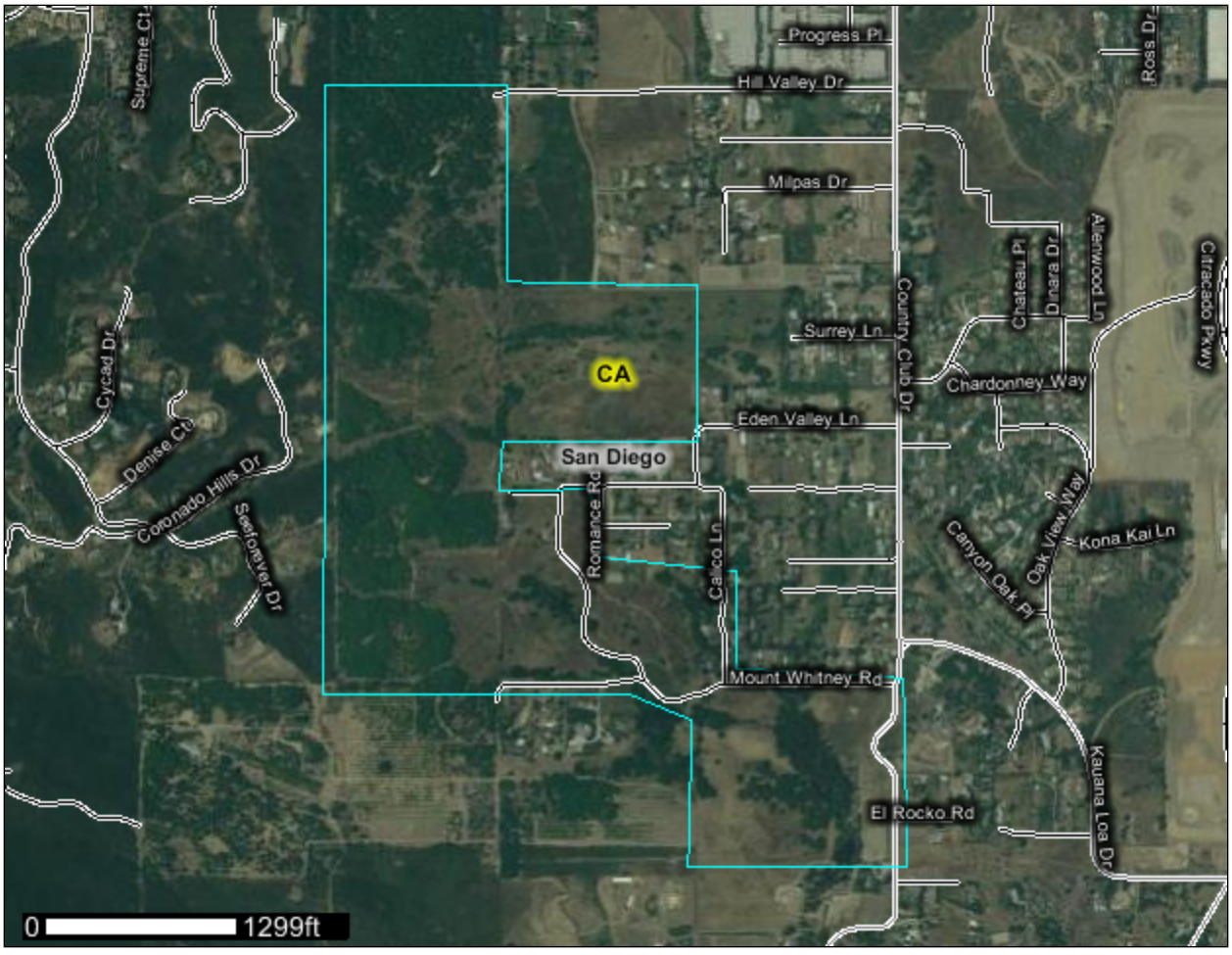
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for San Diego County Area, California

Valiano



February 7, 2013

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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Contents

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

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

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

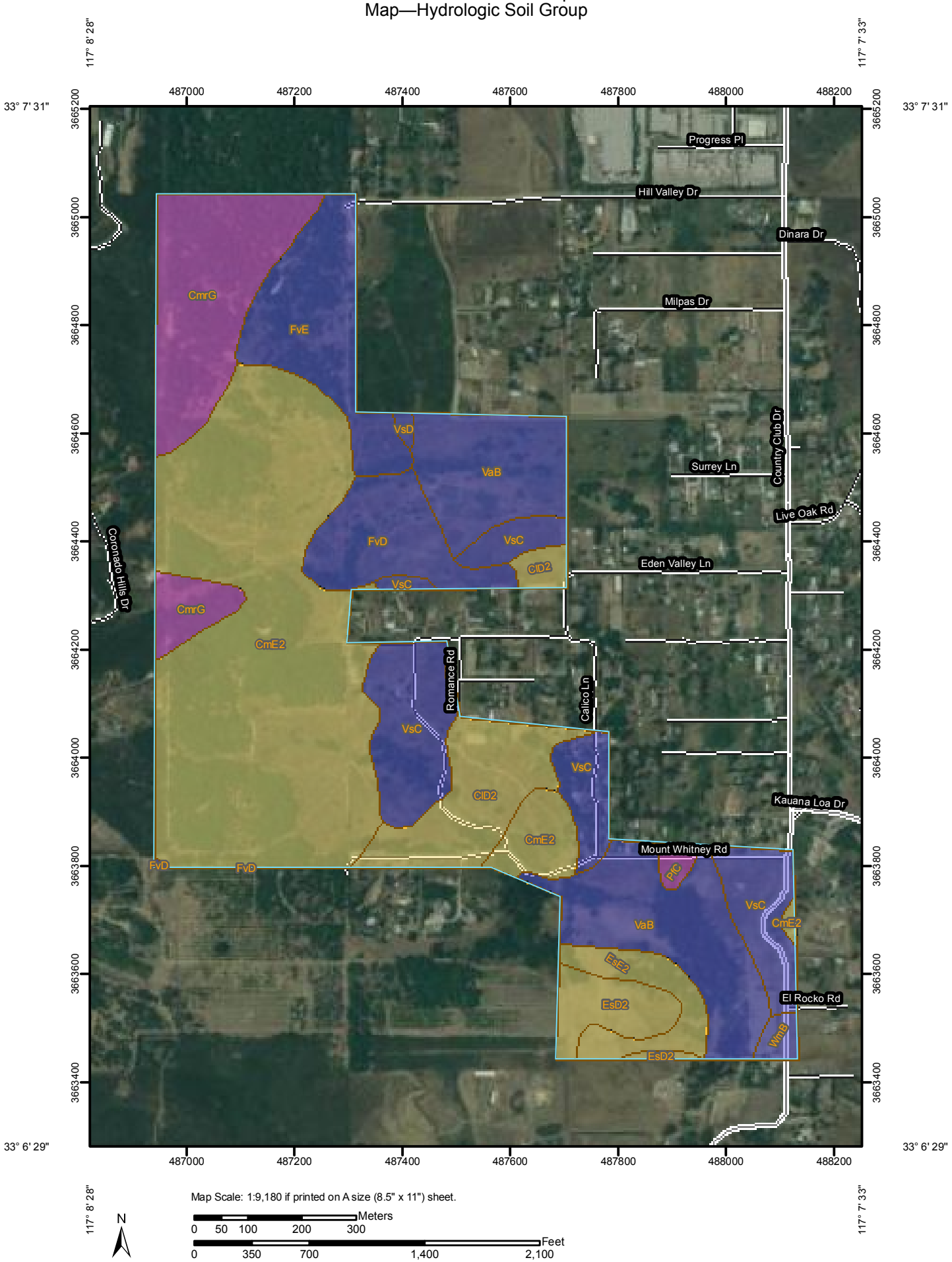
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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

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

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Custom Soil Resource Report
Map—Hydrologic Soil Group



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:9,180 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 6, Dec 17, 2007

Date(s) aerial images were photographed: 6/7/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
ClD2	Cieneba coarse sandy loam, 5 to 15 percent slopes, erod ed	C	15.7	7.0%
CmE2	Cieneba rocky coarse sandy loam, 9 to 30 percent slopes , eroded	C	80.3	35.5%
CmrG	Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes	D	24.6	10.9%
EsD2	Escondido very fine sandy loam, 9 to 15 percent slopes, eroded	C	6.5	2.9%
EsE2	Escondido very fine sandy loam, 15 to 30 percent slopes , eroded	C	6.6	2.9%
FvD	Fallbrook-Vista sandy loams, 9 to 15 percent slopes	B	12.0	5.3%
FvE	Fallbrook-Vista sandy loams, 15 to 30 percent slopes	B	16.9	7.5%
PfC	Placentia sandy loam, thick surface, 2 to 9 percent slo pes	D	1.2	0.5%
VaB	Visalia sandy loam, 2 to 5 percent slopes	B	33.2	14.7%
VsC	Vista coarse sandy loam, 5 to 9 percent slopes	B	27.1	12.0%
VsD	Vista coarse sandy loam, 9 to 15 percent slopes	B	0.4	0.2%
WmB	Wyman loam, 2 to 5 percent slopes	B	1.5	0.7%
Totals for Area of Interest			**226.1**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix 2

Existing Hydrology Exhibit