



HYDROMODIFICATION MANAGEMENT STUDY

TM 5489

Golf Green Estates

March 2012

Bonsall, CA

prepared for:

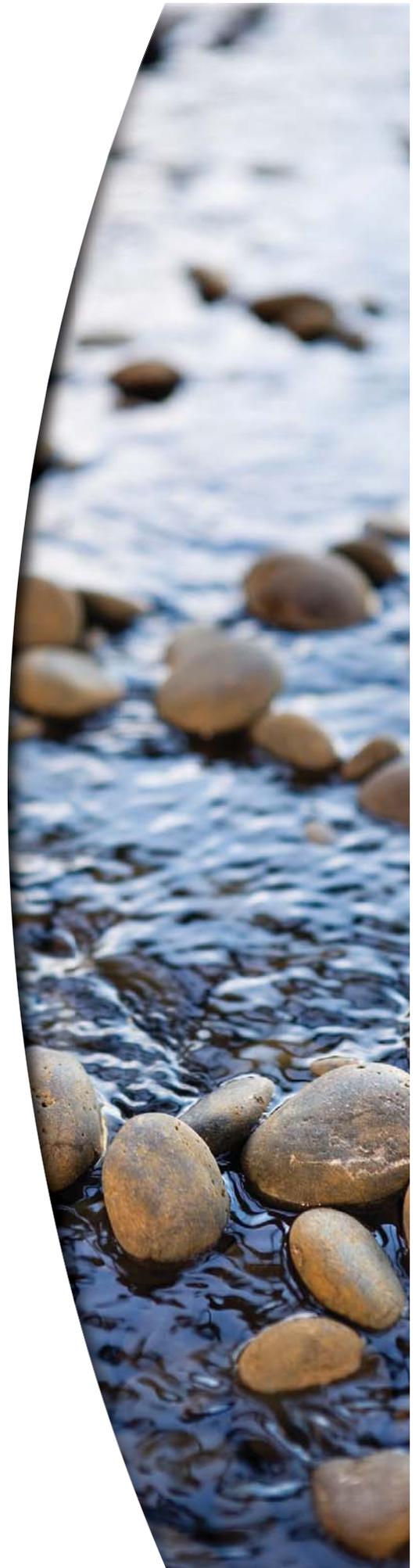
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**PRELIMINARY HYDROMODIFICATION
MANAGEMENT STUDY**

**TM 5489
GOLF GREEN ESTATES
BONSALL, CA**

Prepared By:

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RCE 65697

EXP: 09/30/2013

For

**San Luis Rey Downs Enterprises, LLC
5772 Camino Del Rey
Bonsall, CA 92003**

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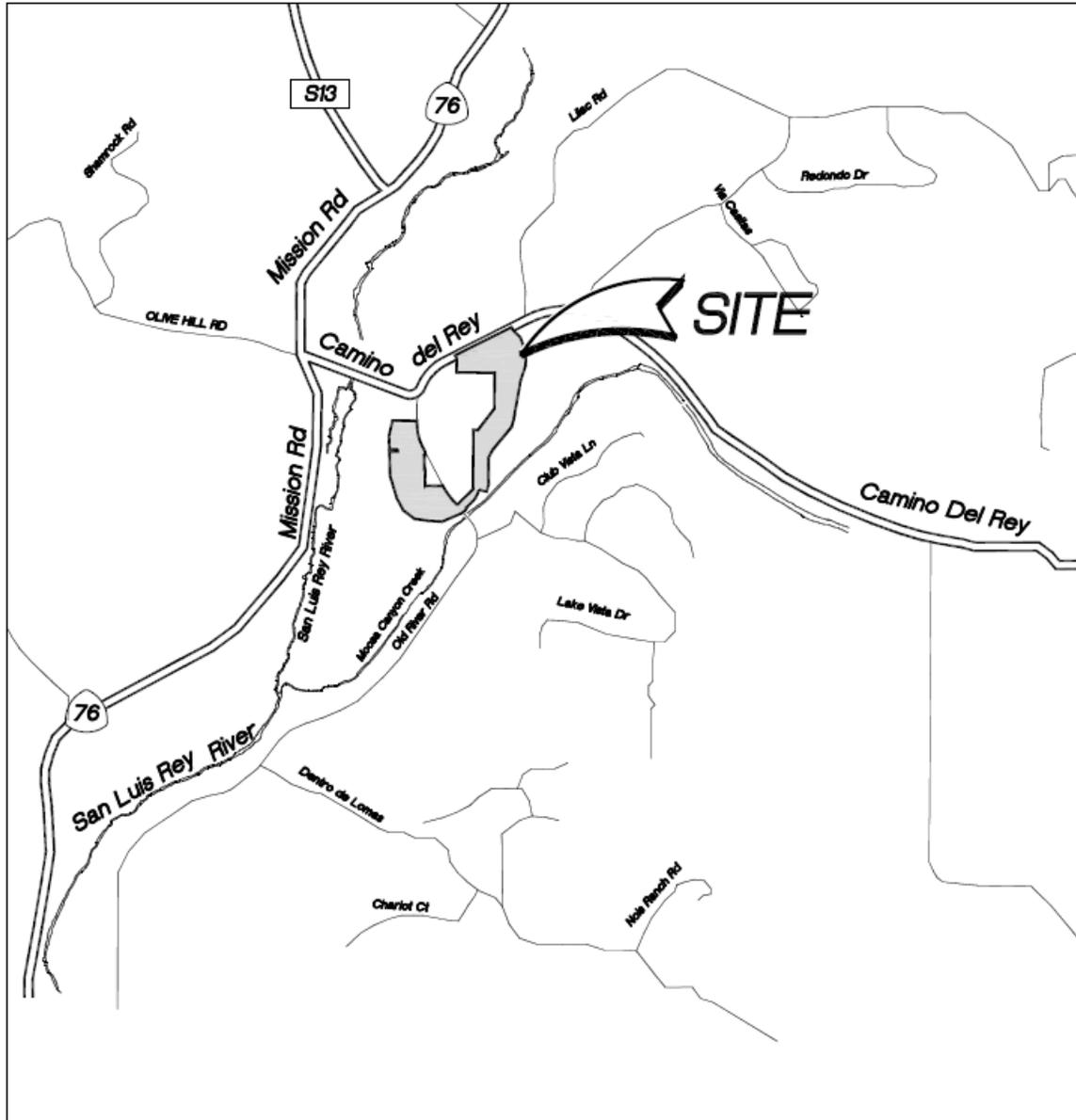


Figure 1 Vicinity Map

1.0 PROJECT DESCRIPTION

This Preliminary Hydromodification Management Study analyzes the hydromodification impacts of the proposed Golf Green Estates project, and has been prepared based on the requirements set forth in the Final Hydromodification Management Plan (HMP) for the County of San Diego, prepared by Brown and Caldwell and dated March 2011.

The purpose of the project is to develop Golf Green Estates, a 29.5 acre residential development consisting of 94 single family homes including access roads, circulation roads, and utilities. A vicinity map for the project is included above as Figure 1. The site is located in Bonsall, California southeast of Highway 76, between Golf Club Drive and Mission Road (east and west limits) and between Old River Road and Camino Del Rey (south and north limits). The site sits on a hill between the San Luis Rey Downs Golf Course and Bonsall Elementary

School. The golf course is bordered by the San Luis Rey River on the west side of the course and Moosa Canyon Creek on the east side.

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

The site currently consists of a natural hillside which slopes up from the San Luis Rey Downs Golf Course to Bonsall Elementary School, which is perched on the top of the hill. Hydrologic soils groups for the project were determined from the US Department of Agriculture's 1973 San Diego County Soil Survey. A map showing the underlying hydrologic soil groups for the project is provided in Appendix 1.

According to the soil survey, the hydrologic soils groups present onsite include Types A, C, and D. Type A soils are present around the perimeter of the site in the flood plains lining Moosa Canyon Creek and the San Luis Rey River. Type A soils exhibit high infiltration rates. Type C soils are present along the westerly side of the existing hill. Type C soils typically allow only limited amounts of infiltration. Type D soils, which typically exhibit very slow infiltration rates, are present on the easterly side of the hill and on the hilltop itself.

2.2 DRAINAGE BASINS

The proposed project will not significantly alter the existing drainage patterns on the site. Due to its location surrounding a hill, the project site is naturally divided into two drainage basins. The northernmost portion of the project, along Camino Del Rey, drains to the golf course on the northwest and then west to the San Luis Rey River. This northerly basin has been identified as Basin 1. Runoff from the project site currently flows north across Camino Del Rey. The northerly portion of Bonsall Elementary School also discharges to Basin 1 through a pipe culvert under Camino Del Rey. From Camino Del Rey to the San Luis Rey River, runoff in Basin 1 generally flows west through grassy swales in the golf course to a culvert which conveys the runoff south under Camino Del Rey. From the culvert, runoff travels west through a riprap lined channel to the San Luis Rey River. Proposed conditions in Basin 1 include the construction of two storm drain crossings under Camino Del Rey to convey runoff from the project and Camino Del Rey to surface flow in the golf course.

The easterly and southerly portions of the project drain south the Moosa Canyon Creek. The southerly basin has been identified for this study as Basin 2. In the existing condition, runoff from the project site, Bonsall Elementary School, and Old River Road discharges to the golf course, where it surface flows into Moosa Canyon Creek. Under the proposed conditions, the project intends to construct four storm drain outfalls to convey runoff from the school, the project site, and Old River Road to the Creek. Basin 2 has been divided into sub-basins 2A through 2D based the areas which are tributary to each storm drain outfall.

A detailed description of the drainage patterns and flows onsite are discussed in the report titled *CEQA Drainage Study for Golf Green Estates* prepared by Fuscoe Engineering, dated December 2010.

2.3 HYDROMODIFICATION APPLICABILITY

This section will discuss possible exemptions listed in the HMP for which the project might qualify. The exemptions are outlined in Figure 6-1 of the HMP. Node 5 of Figure 6-1 identifies possible exemptions

for projects which discharge directly to an exempt system. As described above, the northerly portion of the project (Basin 1) discharges to the San Luis Rey River. Table 6-1 of the HMP identifies the San Luis Rey River as an exempt river reach from the River's outfall to the Pacific Ocean to the upstream limit of Basin Plan subwatershed 903.1. The project falls within subbasin 903.1, and is therefore discharging to the exempt portion of the San Luis Rey River, so Basin 1 potentially qualifies for this exemption. However, this potential exemption hinges on the phrase "directly discharges to an exempt system". Since the storm drain outfalls from the project site are 700-1500' away from the San Luis Rey River itself and runoff from the project site will surface flow through the golf course prior to discharging to the River, we believe the project would not qualify as discharging "directly" to the river. Therefore, for the purposes of this study the determination is made that Basin 1 is not exempt from hydromodification requirements.

The Golf Green Estates project does not qualify for any exemptions listed in the Final Hydromodification Management Plan, and is therefore subject to hydromodification mitigation requirements.

2.4 POINT OF COMPLIANCE

Per Appendix A of the County HMP, the Point of Compliance is defined as "The point at which collected stormwater from a development is delivered from a constructed or modified drainage system into the natural creek receiving water." For the Golf Green Estates project site, this occurs at the points where runoff from the project site will discharge to a natural drainage channel or swales. As described in section 2.2 above, the project is divided into five sub-basins (Basin 1 and Sub-basins 2A-2D), each with separate discharge points. Therefore, the project will have five Points of Compliance, one at each of the discharge points from the sub-basins.

2.5 LOW-FLOW THRESHOLD DETERMINATION

As described above, the receiving waters for the project include surface flow on the San Luis Rey Downs Golf Course, the San Luis Rey River and Moosa Canyon Creek. At this time, a channel assessment on the susceptibility of these receiving channels to erosion has not been performed. Therefore, the low flow threshold corresponding to a highly susceptible channel, $0.1Q_2$, was used.

A channel assessment may be performed during future phases of design. If this is the case, future phases of the design may be based on the low flow thresholds which correspond to the assessed susceptibility.

3.0 METHODOLOGY

The hydromodification analysis for Golf Green Estates 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 Integrated Management Practices (IMPs) to provide water quality treatment and hydromodification mitigation. Depending on the constraints on each individual sub-basin, runoff from the project site will be collected, detained, and treated by either a bioretention basin or an extended detention basin. In large storm events, the bioretention basins and extended detention basins will overflow into the adjacent areas, which are all within the 100-year flood plain.

To size the IMPs, the areas tributary to each IMP were delineated into Drainage Management Areas (DMAs). The DMAs were further broken down based on hydrologic soil group, pre-project cover, proposed cover, and pre-project slope. All of these factors can impact IMP sizing and were therefore separated into distinct DMAs. To distinguish each DMA, the following naming convention was used:

A	I	I	F
Soil Group	Pre-Project Cover	Proposed Cover	Pre-Project Slope
A, C or D	I (Impervious) or P (Pervious)	I (Impervious) or P (Pervious)	F (Flat), M (Moderate), or S (Steep)

For example, a DMA labeled as CPIM has Soil Group C, pervious pre-project cover, impervious proposed cover, and a moderate pre-project slope.

As described in Section 2.1, three soil groups are present onsite. Refer to the Hydrologic Soil Group Exhibit in Appendix 1. Since the project will collect and convey runoff through the site from the existing Bonsall Elementary School, Camino Del Rey, and Old River Road, both pervious and impervious pre-project covers are present. Please refer to the Pre-Project Cover Exhibit in Appendix 1.

The proposed project cover will include the addition of impervious areas from the project's streets and residential development. Since precise building footprints, driveway locations, and hardscape layouts are not known at this time, the impervious area within the proposed residential lots was estimated based on the proposed density. The project proposed a minimum lot size of 6,000 square feet, which corresponds to a density of 7.3 dwelling units per acre. Per Table 3-1 of the San Diego County Hydrology Manual, a density of 7.3 dwelling units per acre corresponds to an impervious percentage of 40%. Therefore, 40% of the single family residential lots were assumed to be impervious, while the remaining 60% was assumed to remain pervious. The proposed streets and pad areas are hatched on the Hydromodification Management Exhibit, which is included in Appendix 3.

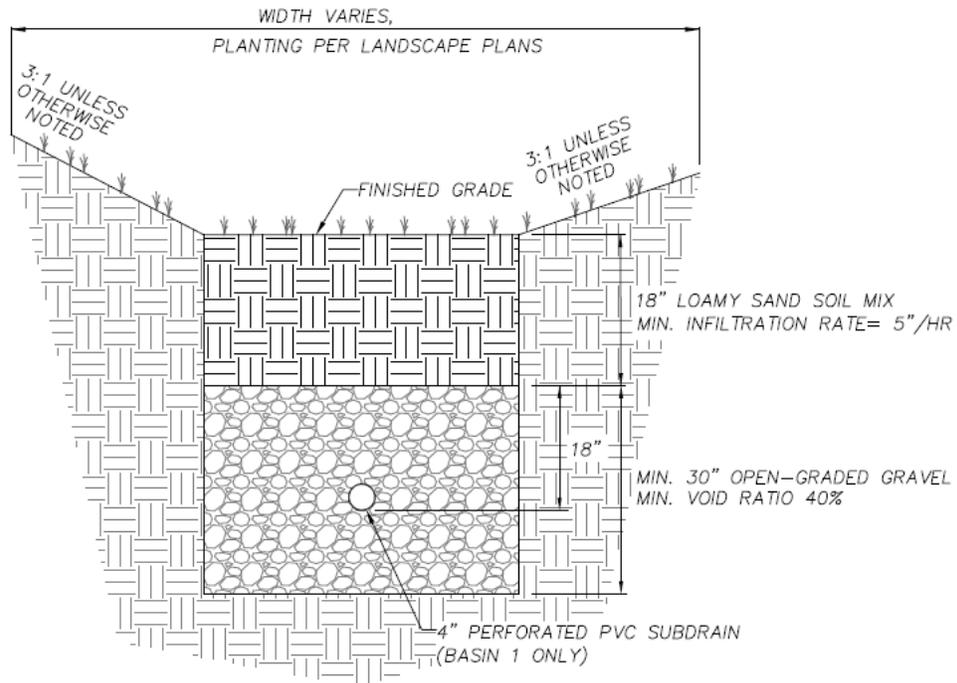
Due to the hillside nature of the site, there are also a range of pre-project slope conditions present, varying from flat (less than 5% slope) to steep (greater than 10% slope). Based on the existing topography of the site, these slope areas were delineated, and separated into DMAs accordingly. Please refer to the Pre-Project Slope Exhibit in Appendix 1. The following table summarizes the area for each DMA.

DMA	BASIN									
	1		2A		2B		2C		2D	
	(sf)	(ac)	(sf)	(ac)	(sf)	(ac)	(sf)	(ac)	(sf)	(ac)
AIIF	6,401	0.15	683	0.02	7,817	0.18	0	0.00	0	0.00
AIIM	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
AIIS	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
APIF	0	0.00	84,802	1.95	49,737	1.14	19,154	0.44	0	0.00
APIM	0	0.00	31,563	0.72	8,691	0.20	22,836	0.52	20,258	0.47
APIS	1,124	0.03	7,866	0.18	1,342	0.03	21,271	0.49	1,718	0.04
APPF	6,783	0.16	85,193	1.96	41,618	0.96	41,536	0.95	19,057	0.44
APPM	0	0.00	37,774	0.87	8,884	0.20	35,818	0.82	32,915	0.76
APPS	1,403	0.03	13,760	0.32	2,142	0.05	48,283	1.11	839	0.02
CIIF	61,288	1.41	33,984	0.78	21,503	0.49	0	0.00	14,811	0.34
CIIM	13,768	0.32	39,336	0.90	37,413	0.86	0	0.00	0	0.00
CIIS	0	0.00	1,307	0.03	0	0.00	0	0.00	0	0.00
CPIF	2,262	0.05	1,721	0.04	243	0.01	1,981	0.05	0	0.00
CPIM	8,963	0.21	1,021	0.02	3,986	0.09	29,750	0.68	0	0.00
CPIS	25,130	0.58	0	0.00	130	0.00	9,336	0.21	16,249	0.37
CPPF	20,744	0.48	12,714	0.29	903	0.02	1,298	0.03	60,897	1.40
CPPM	30,596	0.70	32,901	0.76	25,117	0.58	30,540	0.70	911	0.02
CPPS	62,873	1.44	23,999	0.55	25,610	0.59	10,180	0.23	15,346	0.35
DIIF	150,490	3.45	0	0.00	0	0.00	98,888	2.27	137,368	3.15
DIIM	15,435	0.35	8,919	0.20	0	0.00	0	0.00	0	0.00
DIIS	1,038	0.02	0	0.00	0	0.00	0	0.00	0	0.00
DPIF	13,411	0.31	0	0.00	0	0.00	16,172	0.37	9,573	0.22
DPIM	3,770	0.09	0	0.00	0	0.00	53,256	1.22	4,130	0.09
DPIS	7,209	0.17	0	0.00	0	0.00	21,618	0.50	40,787	0.94
DPPF	45,247	1.04	0	0.00	0	0.00	28,738	0.66	181,601	4.17
DPPM	12,612	0.29	2,270	0.05	0	0.00	45,095	1.04	2,578	0.06
DPPS	18,019	0.41	0	0.00	0	0.00	28,004	0.64	65,389	1.50
TOTAL	508,566	11.68	419,813	9.64	235,137	5.40	563,751	12.94	624,426	14.33

The San Diego Hydromodification Sizing Calculator Version 3.0, 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 basins, either the “LID Sizer” or “Pond Sizer” feature of the Calculator was used. The IMPs were sized for “Treatment + Flow Control”. The project site is located 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, as well as screen capture images of the input data entered into Basin Manager of the Calculator, can be found in Appendix 2.

3.2 BIORETENTION BASINS

For the smaller project basin, Basin 1, a bioretention basin was utilized for storm water treatment and hydromodification flow control. Bioretention is the preferred method of treatment for these sub-basins due to the relatively small amount of project development within these sub-basins, meaning there is sufficient space available for a bioretention basin. The bioretention basin has 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. Due to the lack of underground storm drain to connect to, the overflow outlet will be a weir which will allow high flows to surface flow through the golf course to the receiving waters. 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. In Basin 1, the bioretention basin will be located in an area of Type C soils. This will necessitate a subdrain to be installed within the gravel layer, at a depth of 18” below the soil layer. Please refer to the Typical Bioretention Basin detail below.



TYPICAL DETAIL - BIORETENTION BASIN

NOT TO SCALE

Figure 2 Typical Bioretention Basin

3.3 EXTENDED DETENTION BASINS

For the larger basins on site, which contain most of the proposed development, it was not feasible to provide bioretention basins due to their large footprint. In these cases, extended detention basins will be used to provide water quality treatment and hydromodification flow control. Extended detention basins are proposed for Sub-Basins 2A, 2B, 2C and 2D. Depending on space available, these basins will vary in depth from 3.0' to 5.0'. In Sub-Basins 2A, 2B, the outlet structure will consist of weirs placed across the downstream swale, which will have pipes in them corresponding to the lower and upper orifices determined by the BMP Calculator.

For Sub-Basin 2C and 2D, the outlet structure will consist of a Type G catch basin with orifice holes placed in the side of the structure. The catch basin will be connected to a storm drain pipe which will convey flows from the basin to Moosa Canyon creek. Please refer to Section 4.2 below for details of these outlet structures.

4.0 CALCULATIONS/RESULTS

The sections below summarize the sizing calculations for each onsite IMP. Detailed calculations and BMP Calculator output can be found in Appendix 2. Please refer to the Hydromodification Management Exhibit in Appendix 3 for a graphical depiction of these areas. A CD containing output files from the BMP Calculator is provided in Appendix 4.

4.1 BIORETENTION BASINS

As described above, bioretention basins have been provided for the basins onsite which contain a minor amount of proposed development and where sufficient space is available. In Basin 1, the bioretention basin will collect runoff from the three storm drain outfalls on the north side of Camino Del Rey. High flows will overtop the basin and continue to surface flow across the golf course towards the culvert under Camino Del Rey. Since this bioretention basin is located in an area of Type C soils, a subdrain with orifice control will be provided.

Basin	BMP Calculator Output				IMP Size Provided			
	Area	V1	V2	Orifice Dia.	Area	V1	V2	Orifice Dia.
	(sf)	(cf)	(cf)	(in)	(sf)	(cf)	(cf)	(in)
1	10,010	8,340	5,899	4.0	10,594	8,793	10,594	4.0

4.2 EXTENDED DETENTION BASINS

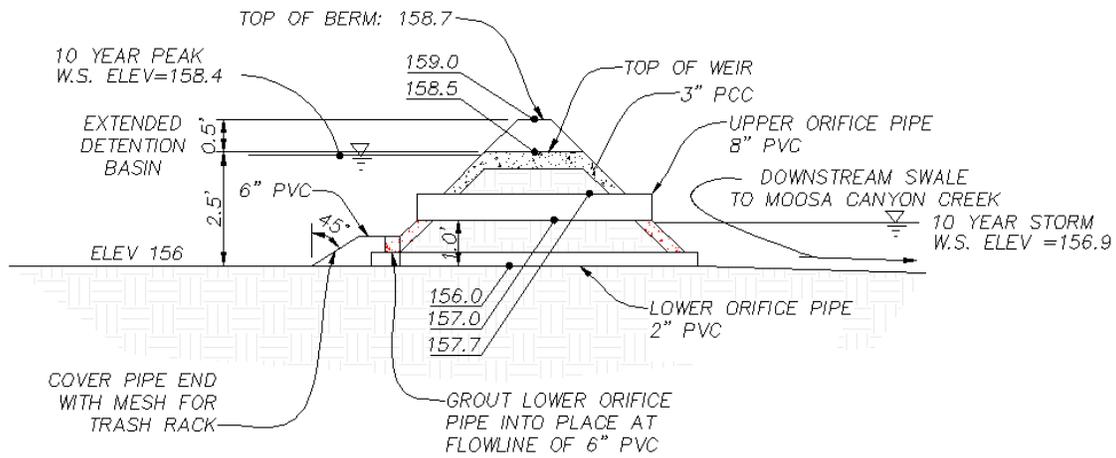
Where bioretention basins would provide an efficient use of space, extended detention basins have been provided for water quality and hydromodification flow control. This is the case in Sub-Basins 2A, 2B, 2C, and 2D which contain the majority of the proposed development. As described above, the extended detention basins were sized using the "Pond Sizer" feature of the BMP Calculator. The tables below summarizes the required and provided area and volume for each extended detention basin.

Extended Detention Basin Details and Minimum Requirements

Basin	Lower Orifice		Upper Orifice		Weir		Depth
	Dia.	Elev.	Dia.	Elev.	Length	Elev.	
	(in)	(ft)	(in)	(ft)	(ft)	(ft)	
2A	2.0	0.0	8.0	1.0	4.0	2.5	3.0
2B	1.0	0.0	8.0	1.0	4.0	2.5	3.0
2C	3.0	0.0	10.0	4.0	8.0	5.0	5.0
2D	4.0	0.0	12.0	1.0	8.0	3.5	4.0

Basin	BMP Calculator Output			IMP Size Provided			Drawdown
	Top A	Bottom A	Volume	Top A	Bottom A	Volume	Time
	(sf)	(sf)	(cf)	(sf)	(sf)	(cf)	(hours)
2A	9,312	6,162	23,212	15,252	10,165	38,005	6.0
2B	6,362	3,814	15,265	8,016	4,840	19,167	7.0
2C	10,036	5,671	39,271	25,300	6,100	77,700	7.0
2D	6,915	3,500	20,831	14,900	7,075	43,650	2.0

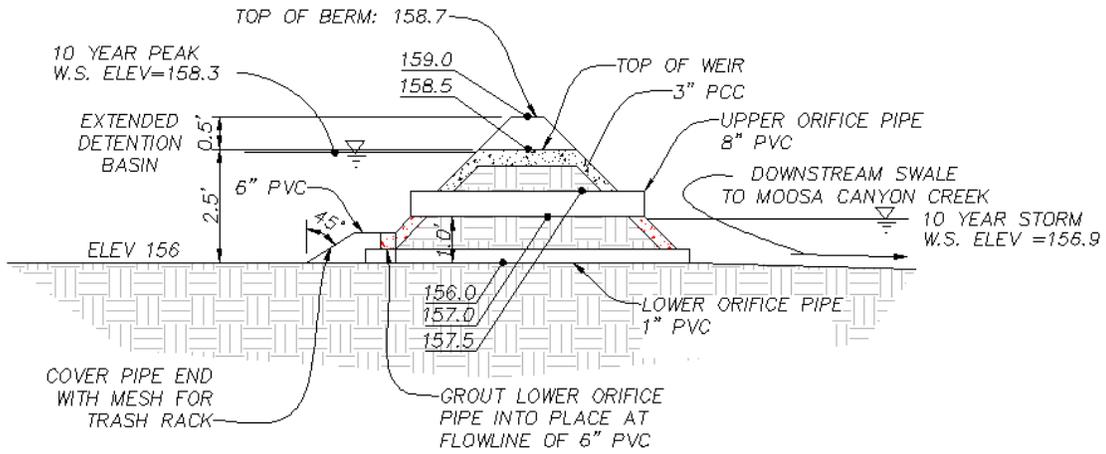
As can be seen above, the drawdown time for each basin is well below the 96 hour maximum allowed for vector control. Figures 3-6 provide details of the outlet structures for the extended detention basins. Due to the proximity of the 10 year flood elevations, each basin was analyzed to ensure it would still work during a 10 year storm. The maximum ponding depths have been annotated in the details below. For more information, see Appendix J of the Drainage Study.



EXTENDED DETENTION BASINS 2A

NOT TO SCALE

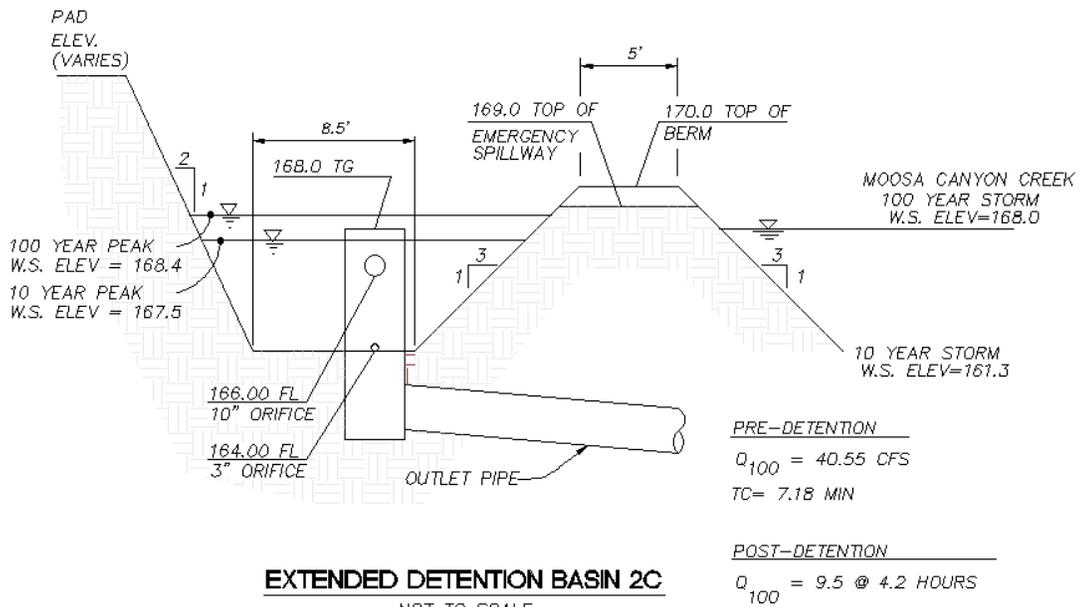
Figure 3



EXTENDED DETENTION BASINS 2B

NOT TO SCALE

Figure 4



EXTENDED DETENTION BASIN 2C

NOT TO SCALE

Figure 5

PRE-DETENTION
 $Q_{100} = 40.55 \text{ CFS}$
 $TC = 7.18 \text{ MIN}$

POST-DETENTION
 $Q_{100} = 9.5 @ 4.2 \text{ HOURS}$

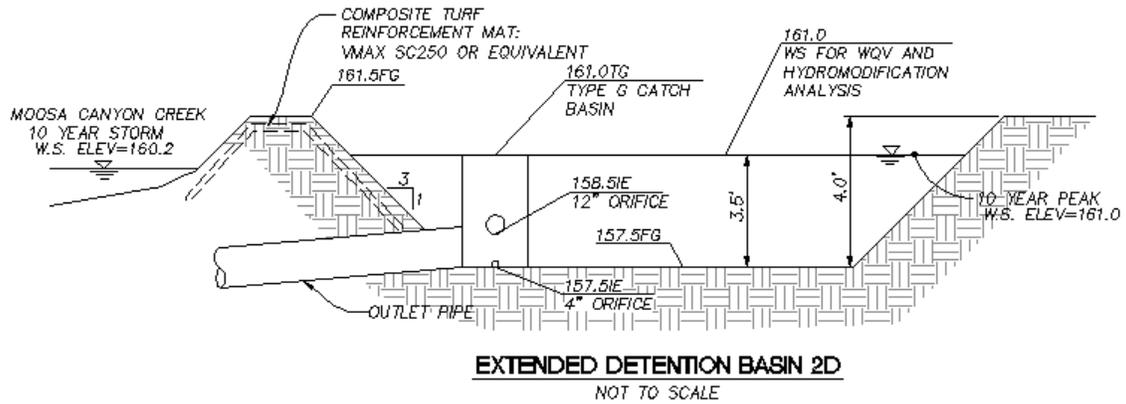


Figure 6

5.0 MAINTENANCE

Maintenance of the proposed bioretention basin will be performed by San Luis Rey Downs Enterprises, LLC. Although it is located in the golf course surrounding the project and not physically on the project property, the golf course is also owned by San Luis Rey Downs Enterprises, LLC and they have agreed to maintain that IMP in perpetuity. The required maintenance of the IMP is summarized below.

The extended detention basins are to fall under the Third Category BMP Maintenance Plan per the County of San Diego SUSMP. Under the authority of County Flood Control, the primary funding mechanism will be a special assessment by inclusion into a watershed specific Community Facility District (CFD) or through the formation of an individual CFD. The assessment will be collected with property tax. Because this primary funding mechanism may require substantial amount of time to establish and collect assessments, a developer fee is required to cover the initial maintenance period of 2 years

For additional information on maintenance of the various storm water IMPs and BMPs, please refer to the *Major Stormwater Management Plan for TM 5489 Golf Green Estates*.

TREATMENT CONTROL BMP	RESPONSIBLE PARTY	MINIMUM MAINTENANCE FREQUENCY	UNIT/ANNUAL MAINTENANCE COSTS
BIORETENTION BASIN	San Luis Rey Downs Enterprises, LLC	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	County of San Diego Flood Control	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 Golf Greens Estates project will satisfy the requirements of the Final Hydromodification Management Plan. This will be achieved through the use of bioretention basins and extended detention basins 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. Maintenance of the bioretention basin will be performed by San Luis Rey Downs Enterprises, LLC. The extended detention basins will be maintained by County of San Diego Flood Control. Please refer to the *Major Stormwater Management Plan* and the *CEQA Drainage Study* for further information regarding the water quality and hydrology aspects of the proposed project.

7.0 APPENDICES

- Appendix 1 Drainage Management Area and Hydromodification Management Exhibit*
- Appendix 2 BMP Sizing Calculations*
- Appendix 3 CD with BMP Calculator Output Files*

Appendix 1

Drainage Management Area and Hydromodification Management Exhibit

BIORETENTION BASIN DETAILS & REQUIREMENTS

Basin	BMP Calculator Output				IMP Size Provided			
	Area (sf)	V1 (cf)	V2 (cf)	Orifice Dia. (in)	Area (sf)	V1 (cf)	V2 (cf)	Orifice Dia. (in)
1	10,009	8,339	5,898	4	10,594	8,793	10,594	4

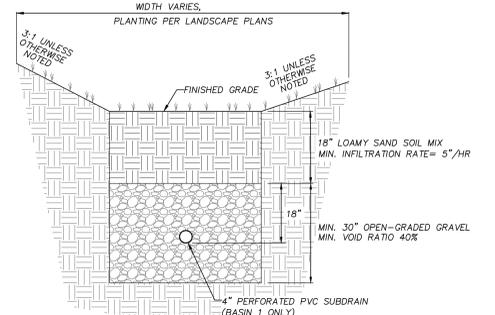
EXTENDED DETENTION BASIN DETAILS & REQUIREMENTS

Basin	Lower Orifice		Upper Orifice		Weir		Depth (ft)
	Dia. (in)	Elev. (ft)	Dia. (in)	Elev. (ft)	Length (ft)	Elev. (ft)	
2A	2.0	0.0	8.0	1.0	4.0	2.5	3.0
2B	1.0	0.0	8.0	1.0	4.0	2.5	3.0
2C	3.0	0.0	10.0	4.0	8.0	5.0	5.0
2D	4.0	0.0	12.0	1.0	8.0	3.5	4.0

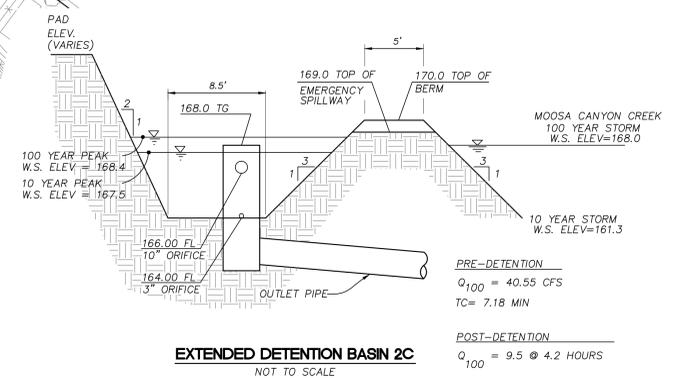
Basin	BMP Calculator Output		IMP Size Provided		Drawdown Time (hours)		
	Top A Volume (sf)	Bottom A Volume (sf)	Top A Volume (sf)	Bottom A Volume (sf)			
2A	9,312	6,162	23,212	15,252	10,165	38,005	6.0
2B	6,362	3,814	15,265	8,016	4,940	19,167	7.0
2C	10,036	3,671	39,271	23,330	6,100	77,700	7.0
2D	6,915	3,900	20,831	14,900	7,075	43,650	2.0

LEGEND

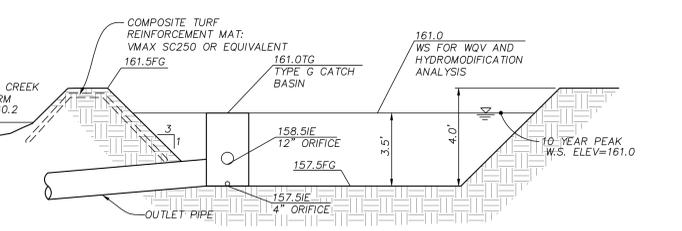
- PROPERTY LINE
- PROPOSED LOT LINE
- RIGHT-OF-WAY
- EXISTING CONTOUR
- EXISTING STORM DRAIN
- PROPOSED CONTOUR
- PROPOSED STORM DRAIN
- PROPOSED PAVEMENT
- PROPOSED LOTS (40% IMPERVIOUS)
- BASIN BOUNDARY
- POINT OF COMPLIANCE
- EXTENDED DETENTION BASIN
- BIORETENTION BASIN



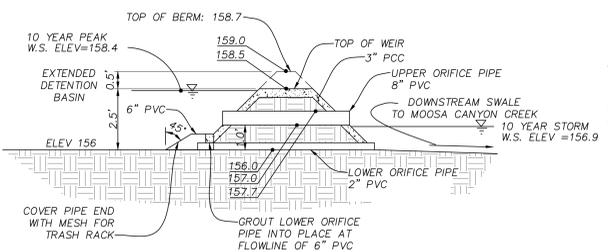
TYPICAL DETAIL - BIORETENTION BASIN
NOT TO SCALE



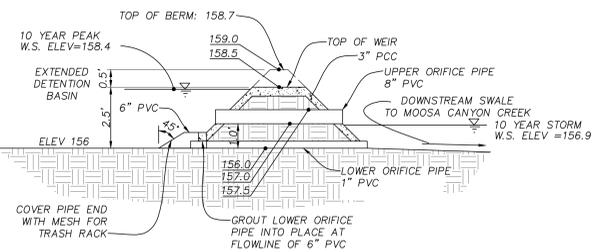
EXTENDED DETENTION BASIN 2C
NOT TO SCALE



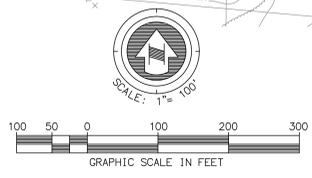
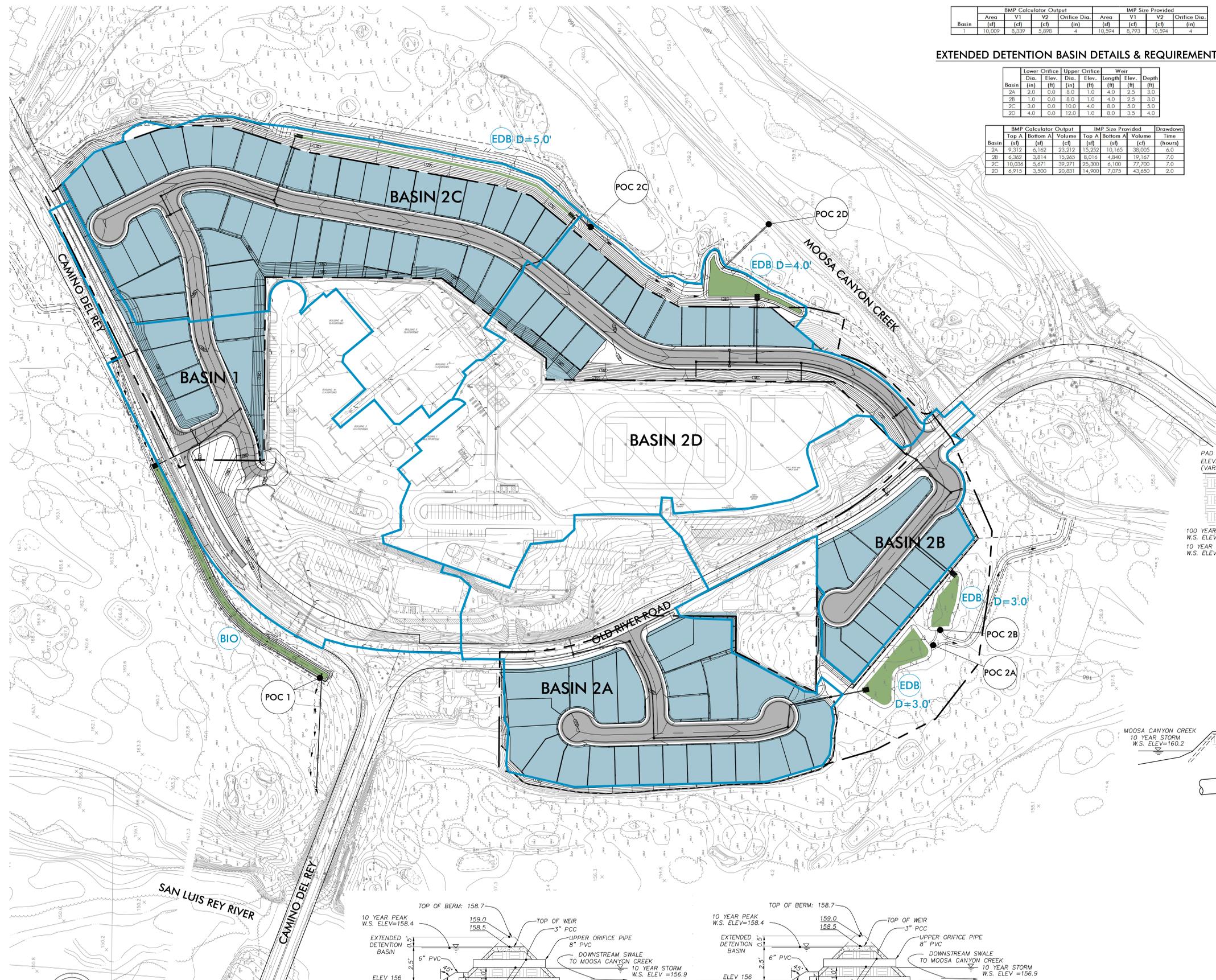
EXTENDED DETENTION BASIN 2D
NOT TO SCALE



EXTENDED DETENTION BASINS 2A
NOT TO SCALE



EXTENDED DETENTION BASINS 2B
NOT TO SCALE



GOLF GREEN ESTATES
HYDROMODIFICATION MANAGEMENT EXHIBIT
COUNTY OF SAN DIEGO, CA

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 • fax 858.597.0335
www.fuscoe.com

PROJECT NUMBER: 02518-002-02
DATE: 3/9/12

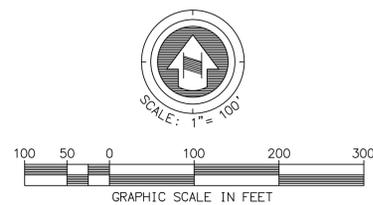


LEGEND

BASIN BOUNDARY 
 SOIL TYPE BOUNDARY 

SOIL PER 1973 SURVEY **TuB A**
 HYDROLOGIC SOIL TYPE

SOIL TYPE PER US DEPT OF AGRICULTURE SOIL SURVEY OF SAN DIEGO COUNTY, 1973	
TuB:	TUJUNGA SAND, 0-5% SLOPE, SOIL GROUP A
FaD2:	FALLBROOK SANDY LOAM, 9-15% ERODED, SOIL GROUP C
PeC2:	PLACENTIA SANDY LOAM, 5-9% ERODED, SOIL GROUP D
PeD2:	PLACENTIA SANDY LOAM, 9-15% SOIL GROUP D



**GOLF GREEN ESTATES
 SOIL GROUP EXHIBIT
 COUNTY OF SAN DIEGO, CA**



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PROJECT NUMBER: 02518-002-02
 DATE: 4/6/12

Appendix 2

BMP Sizing Calculations

Golf Green Estates
 Hydromodification Management Study
 February 2012

Bioretention Basin Sizing

Basin	BMP Calculator Output				IMP Size Provided			
	Area	V1	V2	Orifice Dia.	Area	V1	V2	Orifice Dia.
	(sf)	(cf)	(cf)	(in)	(sf)	(cf)	(cf)	(in)
1	10,009	8,339	5,898	4	10,594	8,793	10,594	4

Golf Green Estates
Hydromodification Management Study
February 2012

Extended Detention Basin Sizing

Basin	Lower Orifice		Upper Orifice		Weir		Depth (ft)	BMP Calculator Output			IMP Size Provided			Drawdown
	Dia.	Elev.	Dia.	Elev.	Length	Elev.		Top A	Bottom A	Volume	Top A	Bottom A	Volume	Time
	(in)	(ft)	(in)	(ft)	(ft)	(ft)		(sf)	(sf)	(cf)	(sf)	(sf)	(cf)	(hours)
2A	2.0	0.0	8.0	1.0	4.0	2.5	3.0	9,312	6,162	23,212	15,252	10,165	38,005	6.0
2B	1.0	0.0	8.0	1.0	4.0	2.5	3.0	6,362	3,814	15,265	8,016	4,840	19,167	7.0
2C	3.0	0.0	10.0	4.0	8.0	5.0	5.0	10,036	5,671	39,271	25,300	6,100	77,700	7.0
2D	4.0	0.0	12.0	1.0	8.0	3.5	4.0	6,915	3,500	20,831	14,900	7,075	43,650	2.0

Hydromodification Management Study
 Golf Green Estates
 February 2012

BMP Sizing Calculator Screen Captures

Basin Manager – Project

Result View

Define Drainage Basins Basin: **Basin 2B** Project: **Golf Green Estates**

Start Project Basin POC Export

Manage Your Projects

Create a new Project by clicking the New button and scroll down to view entry. Alternatively, select an existing Project from table and view properties below. Click Edit button to change Project properties then press Save to commit changes.

New Edit Save Delete

Name
Golf Green Estates

Name: Golf Green Estates Description:

Applicant: San Luis Rey Downs Enterprises Street: Camino Del Rey

Parcel (APN): Jurisdiction: County of San Diego City: Bonsall, CA

Hydrological Unit: San Luis Rey

Basin Manager – Define Drainage Basin 1

Result View

Define Drainage Basins Basin: **Basin 1** Project: **Golf Green Estates**

Start Project Basin POC Export

Manage Your Basins

Create a new Basin by clicking the New button and scroll down to view entry. Alternatively, select an existing Basin from table and view properties below. Click Edit button to change Basin properties then press Save to commit changes.

New Edit Save Delete

Name
Basin 2C
Basin 2B
Basin 2D
Basin 1

Description: Basin 1 Point of Compliance: BMP Outlet

Design Goal: Treatment + Flow Control Project Basin Area (ac): 11.68

Rainfall Basin: Oceanside Mean Annual Precipitation (in): 13.3

Basin Manager – POC - Drainage Basin 1

Result View

Define Drainage Basins Basin: **Basin 1** Project: **Golf Green Estates**

Start Project Basin **POC** Export

Manage Your Point of Compliance (POC)

Analyze the receiving water at the 'Point of Compliance' by completing this form. Click Edit and enter the appropriate fields, then click the Update button to calculate the critical flow and low-flow threshold condition. Finally, click Save to commit the changes.

Channel Susceptibility: **HIGH**

Low Flow Threshold: **0.1Q2**

Cancel Save Update

Channel Assessed: **No**

Watershed Area (ac): **0.00**

Vertical Susceptibility: Select...

Lateral Susceptibility: Select...

Material: Select...

Roughness: **0.000**

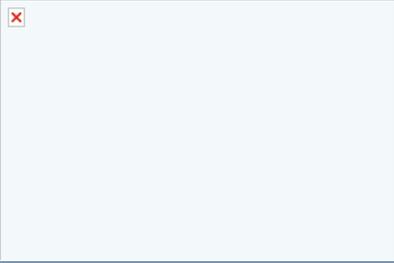
Channel Top Width (ft): **0.0**

Channel Bottom Width (ft): **0.0**

Channel Height (ft): **0.0**

Channel Slope: **0.000**

Large View



Size LID Facility – DMA - Drainage Basin 1

Result View

Size LID Facility Basin: **Basin 1** Project: **Golf Green Estates**

Start DMA **LID** Report Export

Manage Your DMA's

Create a new DMA by clicking the New button and scroll down to view entry. Alternatively, select an existing DMA from table and view properties below. Click Edit button to change DMA properties then press Save to commit changes.

New Edit Save Delete

DMA ID	Description
14929	AJF
14930	APIS
14932	APPF
14934	APPS

DMA Type: **Drains to LID** Drainage Area (ac): **0.15**

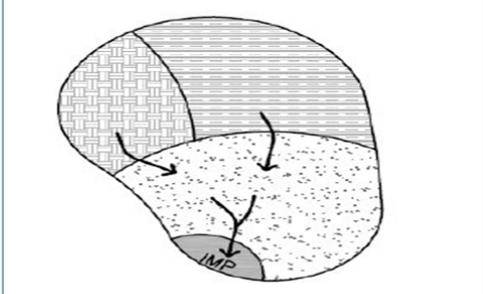
BMP ID: **BMP 1** Drain To DMA ID: **N/A**

Drainage Soil: **Type A (low runoff - sandy soils)** Pre-Project Cover: **Impervious (Pre)**

Post Surface: **Concrete or asphalt** Pre-Project Slope: **Flat - slope (less 5%)**

Messages:

Large View



Size LID Facility – LID – Drainage Basin 1

Result View

Size LID Facility Basin: **Basin 1** Project: **Golf Green Estates**

Start DMA **LID** Report Export

Manage Your LID's

Create a new LID by clicking the New button and scroll down to view new entry. Alternatively select an existing LID from the table and view properties below. Click the Edit button to change LID properties and press SAVE to update the calculations.

BMP ID	Description
BMP 1	Basin 1 Bioretention

New Edit Save Delete

LID Type: **Bioretention** Flow Threshold (cfs): **0.433**

Drainage Area (ac): **11.69**

Minimum Area (sqft): **10009.6** Proposed Area (sqft): **10593.5**

Minimum Volume V1 (cft): **8339.8** Proposed Volume V1 (cft): **8792.6**

Minimum Volume V2 (cft): **5898.6** Proposed Volume V2 (cft): **10593.5**

Maximum Orifice Size (in): **4.0** Proposed Orifice Size (in): **4.0**

Messages: Total DMA and LID area (Proposed) exceeds project basin area. Review and update DMA and/or LID areas accordingly.

Large View

Basin Manager – Define Drainage Basin 2A

Result View

Define Drainage Basins Basin: **Basin 2A** Project: **Golf Green Estates**

Start Project **Basin** POC Export

Manage Your Basins

Create a new Basin by clicking the New button and scroll down to view entry. Alternatively, select an existing Basin from table and view properties below. Click Edit button to change Basin properties then press Save to commit changes.

Name
Basin 2B
Basin 2D
Basin 1
Basin 2A

New Edit Save Delete

Description: **Basin 2A** Point of Compliance: **Discharge from Storm Drain**

Design Goal: **Treatment + Flow Control** Project Basin Area (ac): **9.64**

Rainfall Basin: **Oceanside** Mean Annual Precipitation (in): **13.3**

Basin Manager – POC - Define Drainage Basin 2A

Result View

Define Drainage Basins

Basin: **Basin 2A**

Project: **Golf Green Estates**

Start
Project
Basin
POC
Export

Manage Your Point of Compliance (POC)

Analyze the receiving water at the 'Point of Compliance' by completing this form. Click Edit and enter the appropriate fields, then click the Update button to calculate the critical flow and low-flow threshold condition. Finally, click Save to commit the changes.

Channel Susceptibility:

Low Flow Threshold:

Channel Assessed:

Watershed Area (ac):

Vertical Susceptibility:

Lateral Susceptibility:

Material:

Roughness:

Channel Top Width (ft):

Channel Bottom Width (ft):

Channel Height (ft):

Channel Slope:

Large View

X

Cancel **Save** **Update**

Size Pond Facility – DMA – Drainage Basin 2A

Result View

Size Pond Facility

Basin: **Basin 2A**

Project: **Golf Green Estates**

Start
DMA
Pond
Report
Export

Manage Your DMA's

Create a new DMA by clicking the New button and scroll down to view entry. Alternatively, select an existing DMA from table and view properties below. Click Edit button to change DMA properties then press Save to commit changes.

New

Edit

Save

Delete

DMA ID	Description
14959	AIF
14960	APIF
14962	APIM
14963	APIS

DMA Type:

Drainage Area (ac):

Drainage Soil:

Slope:

Pre-Project Cover:

Post-Project Cover:

Messages:

Large View

Size Pond Facility – Pond Sizer – Drainage Basin 2A

Result View

Size Pond Facility
Basin: **Basin 2A**
Project: **Golf Green Estates**

Start
DMA
Pond
Report
Export

Manage Your Scenarios

Create a new scenario by clicking the New button and scroll down to view entry. Alternatively, select an existing scenario from table and view properties below. Click Edit button to change scenario properties then press SAVE to update the calculations.

New
Edit
Save
Delete

Scenario	Description
Design A	EDB 2A

Example Layout

Pond Soil Type: Type A (low runoff - sandy soils)

Side Slope 1 (H:1): 3.00

Side Slope 2 (H:1): 3.00

Depth (ft): 3.0

Lower Orifice Invert (ft): 156.00

Upper Orifice Invert (ft): 157.00

Weir Invert (ft): 158.50

Weir Length (ft): 4.0

Low Flow Threshold (cfs): 0.176

Upper Flow Threshold (cfs): 4.627

Drainage Area (ac): 9.64

Calculate Orifice Size: Calculate

Calculate Pond Size: Calculate

Lower Maximum Orifice Size (in): 2.0

Upper Maximum Orifice Size (in): 8.0

Top Area (sqft): 9312

Bottom Area (sqft): 6162

Volume (cft): 23212.3

Drawdown Time (hrs): 7.0

Percent Drained (96 hrs): 100.0

Sizing FAILED. Pond size is not 'converging' on an optimum size. Possible causes include: 1) post-project flows are much greater than pre-project flows, 2) lower outflow orifice is too small resulting in excessive storage needs, or 3) lower orifice is too large exceeding downstream low flow thresholds. Please review the pre/post project flows and orifice sizes. (Iterations: 50) **** Drawdown PASSED. Drawdown time (7 hrs) < 96 hrs. ****

Basin Manager – Define Drainage Basin 2B

Result View

Define Drainage Basins
Basin: **Basin 2B**
Project: **Golf Green Estates**

Start
Project
Basin
POC
Export

Manage Your Basins

Create a new Basin by clicking the New button and scroll down to view entry. Alternatively, select an existing Basin from table and view properties below. Click Edit button to change Basin properties then press Save to commit changes.

New
Edit
Save
Delete

Name
Basin 2C
Basin 2B
Basin 2D
Basin 1

Description: Basin 2B

Design Goal: Treatment + Flow Control

Rainfall Basin: Oceanside

Point of Compliance: BMP Outlet

Project Basin Area (ac): 5.40

Mean Annual Precipitation (in): 13.3

Basin Manager – POC - Drainage Basin 2B

Result View

Define Drainage Basins Basin: **Basin 2B** Project: **Golf Green Estates**

Start | Project | Basin | **POC** | Export

Manage Your Point of Compliance (POC)

Analyze the receiving water at the 'Point of Compliance' by completing this form. Click Edit and enter the appropriate fields, then click the Update button to calculate the critical flow and low-flow threshold condition. Finally, click Save to commit the changes.

Channel Susceptibility: **HIGH**
 Low Flow Threshold: **0.1Q2**

Cancel Save Update

Channel Assessed: **No** Vertical Susceptibility: **Select...**
 Watershed Area (ac): **0.00** Lateral Susceptibility: **Select...**

Material: **Select...**
 Roughness: **0.000**
 Channel Top Width (ft): **0.0**
 Channel Bottom Width (ft): **0.0**
 Channel Height (ft): **0.0**
 Channel Slope: **0.000**

Large View

Size Pond Facility – DMA – Drainage Basin 2B

Result View

Size Pond Facility Basin: **Basin 2B** Project: **Golf Green Estates**

Start | **DMA** | Pond | Report | Export

Manage Your DMA's

Create a new DMA by clicking the New button and scroll down to view entry. Alternatively, select an existing DMA from table and view properties below. Click Edit button to change DMA properties then press Save to commit changes.

New Edit Save Delete

DMA ID	Description
12964	AIF
12965	APIF
12966	APIM
12967	APIS

Define DMA Properties

DMA Type: **Drains to Pond** Drainage Area (ac): **0.18**

Drainage Soil: **Type A (low runoff - sandy soils)** Pre-Project Cover: **Impervious (Pre)**
 Slope: **Flat - slope (less 5%)** Post-Project Cover: **Impervious (Post)**

Messages:

DMA Layout Large View

Size Pond Facility – Pond Sizer – Drainage Basin 2B

Result View

Size Pond Facility Basin: **Basin 2B** Project: **Golf Green Estates**

Start DMA **Pond** Report Export

Manage Your Scenarios

Create a new scenario by clicking the New button and scroll down to view entry. Alternatively, select an existing scenario from table and view properties below. Click Edit button to change scenario properties then press SAVE to update the calculations.

New Cancel Save Delete

Scenario	Description
Design A	EDB 2B

Example Layout

Pond Soil Type: **Type A (low runoff - sandy soils)**

Side Slope 1 (H:1): **3.00**

Side Slope 2 (H:1): **3.00**

Depth (ft): **3.0**

Lower Orifice Invert (ft): **156.00**

Upper Orifice Invert (ft): **157.00**

Weir Invert (ft): **158.50**

Weir Length (ft): **4.0**

Low Flow Threshold (cfs): **0.123**

Upper Flow Threshold (cfs): **2.882**

Drainage Area (ac): **5.41**

Calculate Orifice Size: **Calculate**

Calculate Pond Size: **Calculate**

Lower Maximum Orifice Size (in): **1.0**

Upper Maximum Orifice Size (in): **8.0**

Top Area (sqft): **6362**

Bottom Area (sqft): **3814**

Volume (cft): **15265.2**

Drawdown Time (hrs): **7.0**

Percent Drained (96 hrs): **100.0**

Sizing PASSED. Post-project mitigated flow-duration and flow-frequency meet the pre-project conditions. (Iterations: 5) ****
Drawdown PASSED. Drawdown time (7 hrs) < 96 hrs. ****

Basin Manager – Define Drainage Basin 2C

Result View

Define Drainage Basins Basin: **Basin 2C** Project: **Golf Green Estates**

Start Project **Basin** POC Export

Manage Your Basins

Create a new Basin by clicking the New button and scroll down to view entry. Alternatively, select an existing Basin from table and view properties below. Click Edit button to change Basin properties then press Save to commit changes.

New Edit Save Delete

Name
Basin 2C
Basin 2B
Basin 2D
Basin 1

Description: **Basin 2C**

Design Goal: **Treatment + Flow Control**

Rainfall Basin: **Oceanside**

Point of Compliance: **BMP Outlet**

Project Basin Area (ac): **12.94**

Mean Annual Precipitation (in): **13.3**

Size Pond Facility – Pond Sizer – Drainage Basin 2C

Result View

Size Pond Facility

Basin: **Basin 2C**

Project: **Golf Green Estates**

Start
DMA
Pond
Report
Export

Manage Your Scenarios

Create a new scenario by clicking the New button and scroll down to view entry. Alternatively, select an existing scenario from table and view properties below. Click Edit button to change scenario properties then press SAVE to update the calculations.

New
Edit
Save
Delete

Scenario	Description
Design A	EDB 2C

Example Layout

Pond Soil Type: Type A (low runoff - sandy soils)

Side Slope 1 (H:1): 2.00

Side Slope 2 (H:1): 3.00

Depth (ft): 5.0

Lower Orifice Invert (ft): 164.00

Upper Orifice Invert (ft): 166.00

Weir Invert (ft): 168.00

Weir Length (ft): 8.0

Low Flow Threshold (cfs): 0.299

Upper Flow Threshold (cfs): 6.722

Drainage Area (ac): 12.93

Calculate Orifice Size: Calculate

Calculate Pond Size: Calculate

Lower Maximum Orifice Size (in): 3.0

Upper Maximum Orifice Size (in): 10.0

Top Area (sqft): 10036

Bottom Area (sqft): 5671

Volume (cft): 39270.8

Drawdown Time (hrs): 7.0

Percent Drained (96 hrs): 100.0

Sizing PASSED. Post-project mitigated flow-duration and flow-frequency meet the pre-project conditions. (Iterations: 2) ****

Drawdown PASSED. Drawdown time (7 hrs) < 96 hrs. ****

Basin Manager – Define Drainage Basin 2D

Result View

Define Drainage Basins

Basin: **Basin 2D**

Project: **Golf Green Estates**

Start
Project
Basin
POC
Export

Manage Your Basins

Create a new Basin by clicking the New button and scroll down to view entry. Alternatively, select an existing Basin from table and view properties below. Click Edit button to change Basin properties then press Save to commit changes.

New
Edit
Save
Delete

Name
Basin 2C
Basin 2B
Basin 2D
Basin 1

Description: Basin 2D

Design Goal: Treatment + Flow Control

Rainfall Basin: Oceanside

Point of Compliance: BMP Outlet

Project Basin Area (ac): 14.33

Mean Annual Precipitation (in): 13.3

Basin Manager – POC - Drainage Basin 2D

Result View

Define Drainage Basins

Basin: **Basin 2D**

Project: **Golf Green Estates**

Start
Project
Basin
POC
Export

Manage Your Point of Compliance (POC)

Analyze the receiving water at the 'Point of Compliance' by completing this form. Click Edit and enter the appropriate fields, then click the Update button to calculate the critical flow and low-flow threshold condition. Finally, click Save to commit the changes.

Channel Susceptibility: HIGH

Low Flow Threshold: 0.1Q2

Cancel
Save
Update

Channel Assessed: No

Watershed Area (ac): 0.00

Vertical Susceptibility: Select...

Lateral Susceptibility: Select...

Material: Select...

Roughness: 0.000

Channel Top Width (ft): 0.0

Channel Bottom Width (ft): 0.0

Channel Height (ft): 0.0

Channel Slope: 0.000

Large View

X

Size Pond Facility – DMA – Drainage Basin 2D

Result View

Size Pond Facility

Basin: **Basin 2D**

Project: **Golf Green Estates**

Start
DMA
Pond
Report
Export

Manage Your DMA's

Create a new DMA by clicking the New button and scroll down to view entry. Alternatively, select an existing DMA from table and view properties below. Click Edit button to change DMA properties then press Save to commit changes.

New

Edit

Save

Delete

DMA ID	Description
12980	APM
12981	APIS
12982	APPF
12983	APPM

Define DMA Properties

DMA Type: Drains to Pond

Drainage Soil: Type D (high runoff - clay soils)

Slope: Steep (greater 10%)

Messages:

Drainage Area (ac): 1.50

Pre-Project Cover: Pervious (Pre)

Post-Project Cover: Pervious (Post)

DMA Layout Large View

Size Pond Facility – Pond Sizer – Drainage Basin 2D

Result View

Size Pond Facility

Basin: **Basin 2D**

Project: **Golf Green Estates**

Start
DMA
Pond
Report
Export

Manage Your Scenarios

Create a new scenario by clicking the New button and scroll down to view entry. Alternatively, select an existing scenario from table and view properties below. Click Edit button to change scenario properties then press SAVE to update the calculations.

New
Edit
Save
Delete

Scenario	Description
Design A	EDB 2D

Example Layout

Pond Soil Type: Type A (low runoff - sandy soils)

Side Slope 1 (H:1): 3.00

Side Slope 2 (H:1): 3.00

Depth (ft): 4.0

Lower Orifice Invert (ft): 157.50

Upper Orifice Invert (ft): 158.50

Weir Invert (ft): 161.00

Weir Length (ft): 8.0

Low Flow Threshold (cfs): 0.384

Upper Flow Threshold (cfs): 8.208

Drainage Area (ac): 14.34

Calculate Orifice Size: Calculate

Calculate Pond Size: Calculate

Lower Maximum Orifice Size (in): 4.0

Upper Maximum Orifice Size (in): 12.0

Top Area (sqft): 6915

Bottom Area (sqft): 3500

Volume (cft): 20831.4

Drawdown Time (hrs): 2.0

Percent Drained (96 hrs): 100.0

Sizing PASSED. Post-project mitigated flow-duration and flow-frequency meet the pre-project conditions. (Iterations: 1) *****

Drawdown PASSED. Drawdown time (2 hrs) < 96 hrs. *****

Project Summary

Project Name	Golf Green Estates
Project Applicant	San Luis Rey Downs Enterprises
Jurisdiction	County of San Diego
Parcel (APN)	
Hydrologic Unit	San Luis Rey

Compliance Basin Summary

Basin Name:	Basin 1
Receiving Water:	BMP Outlet
Rainfall Basin	Oceanside
Mean Annual Precipitation (inches)	13.3
Project Basin Area (acres):	11.68
Watershed Area (acres):	0.00
SCCWRP Lateral Channel Susceptibility (H, M, L):	
SCCWRP Vertical Channel Susceptibility (H, M, L):	
Overall Channel Susceptibility (H, M, L):	HIGH
Lower Flow Threshold (% of 2-Year Flow):	0.1

Drainage Management Area Summary

ID	Type	BMP ID	Description	Area (ac)	Pre-Project Cover	Post Surface Type	Drainage Soil	Slope
14929	Drains to LID	BMP 1	AIIF	0.15	Impervious (Pre)	Concrete or asphalt	Type A (low runoff - sandy soi...	Flat - slope (less ...
14930	Drains to LID	BMP 1	APIS	0.03	Pervious (Pre)	Concrete or asphalt	Type A (low runoff - sandy soi...	Steep (greater 10%)
14932	Drains to LID	BMP 1	APPF	0.16	Pervious (Pre)	Landscaping	Type A (low runoff - sandy soi...	Flat - slope (less ...
14934	Drains to LID	BMP 1	APPS	0.03	Pervious (Pre)	Landscaping	Type A (low runoff - sandy soi...	Steep (greater 10%)
14937	Drains to LID	BMP 1	CIIM	0.32	Impervious (Pre)	Concrete or asphalt	Type C (slow infiltration)	Moderate (5 - 10%)
14938	Drains to LID	BMP 1	CIIF	1.41	Impervious (Pre)	Concrete or asphalt	Type C (slow infiltration)	Flat - slope (less ...
14940	Drains to LID	BMP 1	CPIF	0.05	Pervious (Pre)	Concrete or asphalt	Type C (slow infiltration)	Flat - slope (less ...

14941	Drains to LID	BMP 1	CPIM	0.21	Pervious (Pre)	Concrete or asphalt	Type C (slow infiltration)	Moderate (5 - 10%)
14942	Drains to LID	BMP 1	CPIS	0.58	Pervious (Pre)	Concrete or asphalt	Type C (slow infiltration)	Steep (greater 10%)
14943	Drains to LID	BMP 1	CPPF	0.48	Pervious (Pre)	Landscaping	Type C (slow infiltration)	Flat - slope (less ...
14944	Drains to LID	BMP 1	CPPM	0.7	Pervious (Pre)	Landscaping	Type C (slow infiltration)	Moderate (5 - 10%)
14945	Drains to LID	BMP 1	CPPS	1.44	Pervious (Pre)	Landscaping	Type C (slow infiltration)	Steep (greater 10%)
14946	Drains to LID	BMP 1	DIIF	3.45	Impervious (Pre)	Concrete or asphalt	Type D (high runoff - clay soi...	Flat - slope (less ...
14947	Drains to LID	BMP 1	DIIM	0.35	Impervious (Pre)	Concrete or asphalt	Type D (high runoff - clay soi...	Moderate (5 - 10%)
14948	Drains to LID	BMP 1	DIIS	0.02	Impervious (Pre)	Concrete or asphalt	Type D (high runoff - clay soi...	Steep (greater 10%)
14949	Drains to LID	BMP 1	DPIM	0.09	Pervious (Pre)	Concrete or asphalt	Type D (high runoff - clay soi...	Moderate (5 - 10%)
14950	Drains to LID	BMP 1	DPIF	0.31	Pervious (Pre)	Concrete or asphalt	Type D (high runoff - clay soi...	Flat - slope (less ...
14951	Drains to LID	BMP 1	DPIS	0.17	Pervious (Pre)	Concrete or asphalt	Type D (high runoff - clay soi...	Steep (greater 10%)
14952	Drains to LID	BMP 1	DPPF	1.04	Pervious (Pre)	Landscaping	Type D (high runoff - clay soi...	Flat - slope (less ...
14953	Drains to LID	BMP 1	DPPM	0.29	Pervious (Pre)	Landscaping	Type D (high runoff - clay soi...	Moderate (5 - 10%)
14954	Drains to LID	BMP 1	DPPS	0.41	Pervious (Pre)	Landscaping	Type D (high runoff - clay soi...	Steep (greater 10%)

LID Facility Summary

BMP ID	Type	Description	Plan Area (sqft)	Volume 1(cft)	Volume 2(cft)	Orifice Flow (cfs)	Orifice Size (inch)
BMP 1	Bioretention	Basin 1 Bioretention	10009	8339	5898	0.433	4.00

Project Summary

Project Name	Golf Green Estates
Project Applicant	San Luis Rey Downs Enterprises
Jurisdiction	County of San Diego
Parcel (APN)	
Hydrologic Unit	San Luis Rey

Compliance Basin Summary

Basin Name:	Basin 2A
Receiving Water:	Discharge from Storm Drain
Rainfall Basin	Oceanside
Mean Annual Precipitation (inches)	13.3
Project Basin Area (acres):	9.64
Watershed Area (acres):	0.00
SCCWRP Lateral Channel Susceptibility (H, M, L):	
SCCWRP Vertical Channel Susceptibility (H, M, L):	
Overall Channel Susceptibility (H, M, L):	HIGH
Lower Flow Threshold (% of 2-Year Flow):	0.1

Drainage Management Area Summary

ID	Type	BMP ID	Description	Area (ac)	Pre-Project Cover	Post Surface Type	Drainage Soil	Slope
14959	Drains to Pond	BMP 1	AIIF	0.02	Impervious (Pre)		Type A (low runoff - sandy soi...	Flat - slope (less ...
14960	Drains to Pond	BMP 1	APIF	1.95	Pervious (Pre)		Type A (low runoff - sandy soi...	Flat - slope (less ...
14962	Drains to Pond	BMP 1	APIM	0.72	Pervious (Pre)		Type A (low runoff - sandy soi...	Moderate (5 - 10%)
14963	Drains to Pond	BMP 1	APIS	0.18	Pervious (Pre)		Type A (low runoff - sandy soi...	Steep (greater 10%)
14964	Drains to Pond	BMP 1	APPF	1.96	Pervious (Pre)		Type A (low runoff - sandy soi...	Flat - slope (less ...
14965	Drains to Pond	BMP 1	APPM	0.87	Pervious (Pre)		Type A (low runoff - sandy soi...	Moderate (5 - 10%)
14966	Drains to Pond	BMP 1	APPS	0.32	Pervious (Pre)		Type A (low runoff - sandy soi...	Steep (greater 10%)
14967	Drains to Pond	BMP 1	CIIF	0.78	Impervious (Pre)		Type C (slow infiltration)	Flat - slope (less ...
14968	Drains to Pond	BMP 1	CIIM	0.9	Impervious (Pre)		Type C (slow infiltration)	Moderate (5 - 10%)
14969	Drains to Pond	BMP 1	CIIS	0.03	Impervious (Pre)		Type C (slow infiltration)	Steep (greater 10%)
14970	Drains to Pond	BMP 1	CPIF	0.04	Pervious (Pre)		Type C (slow infiltration)	Flat - slope (less ...
14971	Drains to Pond	BMP 1	CPIM	0.02	Pervious (Pre)		Type C (slow infiltration)	Moderate (5 - 10%)
14972	Drains to Pond	BMP 1	CPPF	0.29	Pervious (Pre)		Type C (slow infiltration)	Flat - slope (less ...

14973	Drains to Pond	BMP 1	CPPM	0.76	Pervious (Pre)		Type C (slow infiltration)	Moderate (5 - 10%)
14974	Drains to Pond	BMP 1	CPPS	0.55	Pervious (Pre)		Type C (slow infiltration)	Steep (greater 10%)
14975	Drains to Pond	BMP 1	DIIM	0.2	Impervious (Pre)		Type D (high runoff - clay soi...	Moderate (5 - 10%)
14976	Drains to Pond	BMP 1	DPPM	0.05	Pervious (Pre)		Type D (high runoff - clay soi...	Moderate (5 - 10%)

Pond Facility Summary

Scenario	Description	Bottom Area (sqft)	Top Area (sqft)	Depth (ft)	Volume (cft)	Low Orifice (in)	Low Invert (ft)	High Orifice (in)	High Invert (ft)	Weir Length (ft)	Weir Invert (ft)	Facility Soil	Drawdown (hrs)
Design A	EDB 2A	6162	9312	3	23212.3	2.00	156.00	8.00	157.00	4.00	158.5	A	7.00

Project Summary

Project Name	Golf Green Estates
Project Applicant	San Luis Rey Downs Enterprises
Jurisdiction	County of San Diego
Parcel (APN)	
Hydrologic Unit	San Luis Rey

Compliance Basin Summary

Basin Name:	Basin 2B
Receiving Water:	BMP Outlet
Rainfall Basin	Oceanside
Mean Annual Precipitation (inches)	13.3
Project Basin Area (acres):	5.40
Watershed Area (acres):	0.00
SCCWRP Lateral Channel Susceptibility (H, M, L):	
SCCWRP Vertical Channel Susceptibility (H, M, L):	
Overall Channel Susceptibility (H, M, L):	HIGH
Lower Flow Threshold (% of 2-Year Flow):	0.1

Drainage Management Area Summary

ID	Type	BMP ID	Description	Area (ac)	Pre-Project Cover	Post Surface Type	Drainage Soil	Slope
12964	Drains to Pond	BMP 1	AIIF	0.18	Impervious (Pre)		Type A (low runoff - sandy soi...	Flat - slope (less ...
12965	Drains to Pond	BMP 1	APIF	1.14	Pervious (Pre)		Type A (low runoff - sandy soi...	Flat - slope (less ...
12966	Drains to Pond	BMP 1	APIM	0.2	Pervious (Pre)		Type A (low runoff - sandy soi...	Moderate (5 - 10%)
12967	Drains to Pond	BMP 1	APIS	0.03	Pervious (Pre)		Type A (low runoff - sandy soi...	Steep (greater 10%)
12968	Drains to Pond	BMP 1	APPF	0.96	Pervious (Pre)		Type A (low runoff - sandy soi...	Flat - slope (less ...
12969	Drains to Pond	BMP 1	APPM	0.2	Pervious (Pre)		Type A (low runoff - sandy soi...	Moderate (5 - 10%)
12970	Drains to Pond	BMP 1	APPS	0.05	Pervious (Pre)		Type A (low runoff - sandy soi...	Steep (greater 10%)
12971	Drains to Pond	BMP 1	CIIF	0.49	Impervious (Pre)		Type C (slow infiltration)	Flat - slope (less ...
12972	Drains to Pond	BMP 1	CIIM	0.86	Impervious (Pre)		Type C (slow infiltration)	Moderate (5 - 10%)
12973	Drains to Pond	BMP 1	CPIF	0.01	Pervious (Pre)		Type C (slow infiltration)	Flat - slope (less ...
12974	Drains to Pond	BMP 1	CPIM	0.09	Pervious (Pre)		Type C (slow infiltration)	Moderate (5 - 10%)
12975	Drains to Pond	BMP 1	CPIS	0.01	Pervious (Pre)		Type C (slow infiltration)	Steep (greater 10%)
12976	Drains to Pond	BMP 1	CPPF	0.02	Pervious (Pre)		Type C (slow infiltration)	Flat - slope (less ...

12977	Drains to Pond	BMP 1	CPPM	0.58	Pervious (Pre)	Type C (slow infiltration)	Moderate (5 - 10%)
12978	Drains to Pond	BMP 1	CPPS	0.59	Pervious (Pre)	Type C (slow infiltration)	Steep (greater 10%)

Pond Facility Summary

Scenario	Description	Bottom Area (sqft)	Top Area (sqft)	Depth (ft)	Volume (cft)	Low Orifice (in)	Low Invert (ft)	High Orifice (in)	High Invert (ft)	Weir Length (ft)	Weir Invert (ft)	Facility Soil	Drawdown (hrs)
Design A	EDB 2B	3814	6362	3	15265.2	1.00	156.00	8.00	157.00	4.00	158.5	A	7.00

Project Summary

Project Name	Golf Green Estates
Project Applicant	San Luis Rey Downs Enterprises
Jurisdiction	County of San Diego
Parcel (APN)	
Hydrologic Unit	San Luis Rey

Compliance Basin Summary

Basin Name:	Basin 2C
Receiving Water:	BMP Outlet
Rainfall Basin	Oceanside
Mean Annual Precipitation (inches)	13.3
Project Basin Area (acres):	12.94
Watershed Area (acres):	0.00
SCCWRP Lateral Channel Susceptibility (H, M, L):	
SCCWRP Vertical Channel Susceptibility (H, M, L):	
Overall Channel Susceptibility (H, M, L):	HIGH
Lower Flow Threshold (% of 2-Year Flow):	0.1

Drainage Management Area Summary

ID	Type	BMP ID	Description	Area (ac)	Pre-Project Cover	Post Surface Type	Drainage Soil	Slope
12915	Drains to Pond	BMP 1	1-APIF	0.44	Pervious (Pre)		Type A (low runoff - sandy soi...	Flat - slope (less ...
12916	Drains to Pond	BMP 1	1-APIM	0.52	Pervious (Pre)		Type A (low runoff - sandy soi...	Moderate (5 - 10%)
12917	Drains to Pond	BMP 1	1-APIS	0.49	Pervious (Pre)		Type A (low runoff - sandy soi...	Steep (greater 10%)
12918	Drains to Pond	BMP 1	1-APPF	0.95	Pervious (Pre)		Type A (low runoff - sandy soi...	Flat - slope (less ...
12919	Drains to Pond	BMP 1	1-APPM	0.82	Pervious (Pre)		Type A (low runoff - sandy soi...	Moderate (5 - 10%)
12920	Drains to Pond	BMP 1	1-APPS	1.11	Pervious (Pre)		Type A (low runoff - sandy soi...	Steep (greater 10%)
12921	Drains to Pond	BMP 1	1-CPIF	0.05	Pervious (Pre)		Type C (slow infiltration)	Flat - slope (less ...
12922	Drains to Pond	BMP 1	1-CPIM	0.68	Pervious (Pre)		Type C (slow infiltration)	Moderate (5 - 10%)
12923	Drains to Pond	BMP 1	1-CPIS	0.21	Pervious (Pre)		Type C (slow infiltration)	Steep (greater 10%)
12924	Drains to Pond	BMP 1	1-CPPF	0.03	Pervious (Pre)		Type C (slow infiltration)	Flat - slope (less ...
12925	Drains to Pond	BMP 1	1-CPPM	0.7	Pervious (Pre)		Type C (slow infiltration)	Moderate (5 - 10%)
12926	Drains to Pond	BMP 1	1-CPPS	0.23	Pervious (Pre)		Type C (slow infiltration)	Steep (greater 10%)
12927	Drains to Pond	BMP 1	1-DIIF	2.27	Impervious (Pre)		Type D (high runoff - clay soi...	Flat - slope (less ...

12928	Drains to Pond	BMP 1	1-DPIF	0.37	Pervious (Pre)		Type D (high runoff - clay soi...	Flat - slope (less ...
12929	Drains to Pond	BMP 1	1-DPIM	1.22	Pervious (Pre)		Type D (high runoff - clay soi...	Moderate (5 - 10%)
12930	Drains to Pond	BMP 1	1-DPIS	0.5	Pervious (Pre)		Type D (high runoff - clay soi...	Steep (greater 10%)
12931	Drains to Pond	BMP 1	1-DPPF	0.66	Pervious (Pre)		Type D (high runoff - clay soi...	Flat - slope (less ...
12932	Drains to Pond	BMP 1	1-DPPM	1.04	Pervious (Pre)		Type D (high runoff - clay soi...	Moderate (5 - 10%)
12933	Drains to Pond	BMP 1	1-DPPS	0.64	Pervious (Pre)		Type D (high runoff - clay soi...	Steep (greater 10%)

Pond Facility Summary

Scenario	Description	Bottom Area (sqft)	Top Area (sqft)	Depth (ft)	Volume (cft)	Low Orifice (in)	Low Invert (ft)	High Orifice (in)	High Invert (ft)	Weir Length (ft)	Weir Invert (ft)	Facility Soil	Drawdown (hrs)
Design A	EDB 2C	5671	10036	5	39270.8	3.00	164.00	10.00	166.00	8.00	168.00	A	7.00

Project Summary

Project Name	Golf Green Estates
Project Applicant	San Luis Rey Downs Enterprises
Jurisdiction	County of San Diego
Parcel (APN)	
Hydrologic Unit	San Luis Rey

Compliance Basin Summary

Basin Name:	Basin 2D
Receiving Water:	BMP Outlet
Rainfall Basin	Oceanside
Mean Annual Precipitation (inches)	13.3
Project Basin Area (acres):	14.33
Watershed Area (acres):	0.00
SCCWRP Lateral Channel Susceptibility (H, M, L):	
SCCWRP Vertical Channel Susceptibility (H, M, L):	
Overall Channel Susceptibility (H, M, L):	HIGH
Lower Flow Threshold (% of 2-Year Flow):	0.1

Drainage Management Area Summary

ID	Type	BMP ID	Description	Area (ac)	Pre-Project Cover	Post Surface Type	Drainage Soil	Slope
12980	Drains to Pond	BMP 1	APIM	0.47	Pervious (Pre)		Type A (low runoff - sandy soi...	Moderate (5 - 10%)
12981	Drains to Pond	BMP 1	APIS	0.04	Pervious (Pre)		Type A (low runoff - sandy soi...	Steep (greater 10%)
12982	Drains to Pond	BMP 1	APPF	0.44	Pervious (Pre)		Type A (low runoff - sandy soi...	Flat - slope (less ...
12983	Drains to Pond	BMP 1	APPM	0.76	Pervious (Pre)		Type A (low runoff - sandy soi...	Moderate (5 - 10%)
12984	Drains to Pond	BMP 1	APPS	0.02	Pervious (Pre)		Type A (low runoff - sandy soi...	Steep (greater 10%)
12985	Drains to Pond	BMP 1	CIIF	0.34	Impervious (Pre)		Type C (slow infiltration)	Flat - slope (less ...
12986	Drains to Pond	BMP 1	CPIS	0.37	Pervious (Pre)		Type C (slow infiltration)	Steep (greater 10%)
12987	Drains to Pond	BMP 1	CPPF	1.4	Pervious (Pre)		Type C (slow infiltration)	Flat - slope (less ...
12988	Drains to Pond	BMP 1	CPPM	0.02	Pervious (Pre)		Type C (slow infiltration)	Moderate (5 - 10%)
12989	Drains to Pond	BMP 1	CPPS	0.35	Pervious (Pre)		Type C (slow infiltration)	Steep (greater 10%)
12990	Drains to Pond	BMP 1	DIIF	3.15	Impervious (Pre)		Type D (high runoff - clay soi...	Flat - slope (less ...
12991	Drains to Pond	BMP 1	DPIF	0.22	Pervious (Pre)		Type D (high runoff - clay soi...	Flat - slope (less ...
							Type D (high runoff - clay	

12992	Drains to Pond	BMP 1	DPIM	0.09	Pervious (Pre)		soi...	Moderate (5 - 10%)
12993	Drains to Pond	BMP 1	DPIS	0.94	Pervious (Pre)		Type D (high runoff - clay soi...	Steep (greater 10%)
12994	Drains to Pond	BMP 1	DPPF	4.17	Pervious (Pre)		Type D (high runoff - clay soi...	Flat - slope (less ...
12995	Drains to Pond	BMP 1	DPPM	0.06	Pervious (Pre)		Type D (high runoff - clay soi...	Moderate (5 - 10%)
12996	Drains to Pond	BMP 1	DPPS	1.5	Pervious (Pre)		Type D (high runoff - clay soi...	Steep (greater 10%)

Pond Facility Summary

Scenario	Description	Bottom Area (sqft)	Top Area (sqft)	Depth (ft)	Volume (cft)	Low Orifice (in)	Low Invert (ft)	High Orifice (in)	High Invert (ft)	Weir Length (ft)	Weir Invert (ft)	Facility Soil	Drawdown (hrs)
Design A	EDB 2D	3500	6915	4	20831.4	4.00	157.5	12.00	158.5	8.00	161.00	A	2.00

Appendix 3

CD with BMP Calculator Output Files
