PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ATTACHMENT 1

BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 1a	Storm Water Pollutant Control Worksheet Calculations -Worksheet B.3-1 (Required) -Worksheet B.1-1 (Required) -Worksheet B.4-1 (if applicable) -Worksheet B.4-2 (if applicable) -Worksheet B.5-1 (if applicable) -Worksheet B.5-2 (if applicable) -Worksheet B.5-3 (if applicable) -Worksheet B.6-1 (if applicable) -Summary Worksheet (optional)	☒ Included
Attachment 1b	Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs) Refer to Appendices C and D of the BMP Design Manual to complete Form I-8.	☐ Included ☒ Not included because the majority of the project will use harvest and use BMPs, while a portion of Country Club Drive street runoff will be treated by two modular wetland systems.
Attachment 1c	DMA Exhibit (Required) See DMA Exhibit Checklist on the back of this Attachment cover sheet.	☒ Included
Attachment 1d	Individual Structural BMP DMA Mapbook (Required) -Place each map on 8.5"x11" paper. -Show at a minimum the DMA, Structural BMP, and any existing hydrologic features within the DMA.	☒ Included

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ATTACHMENT 1a

STORMWATER POLLUTANT CONTROL CALCULATIONS

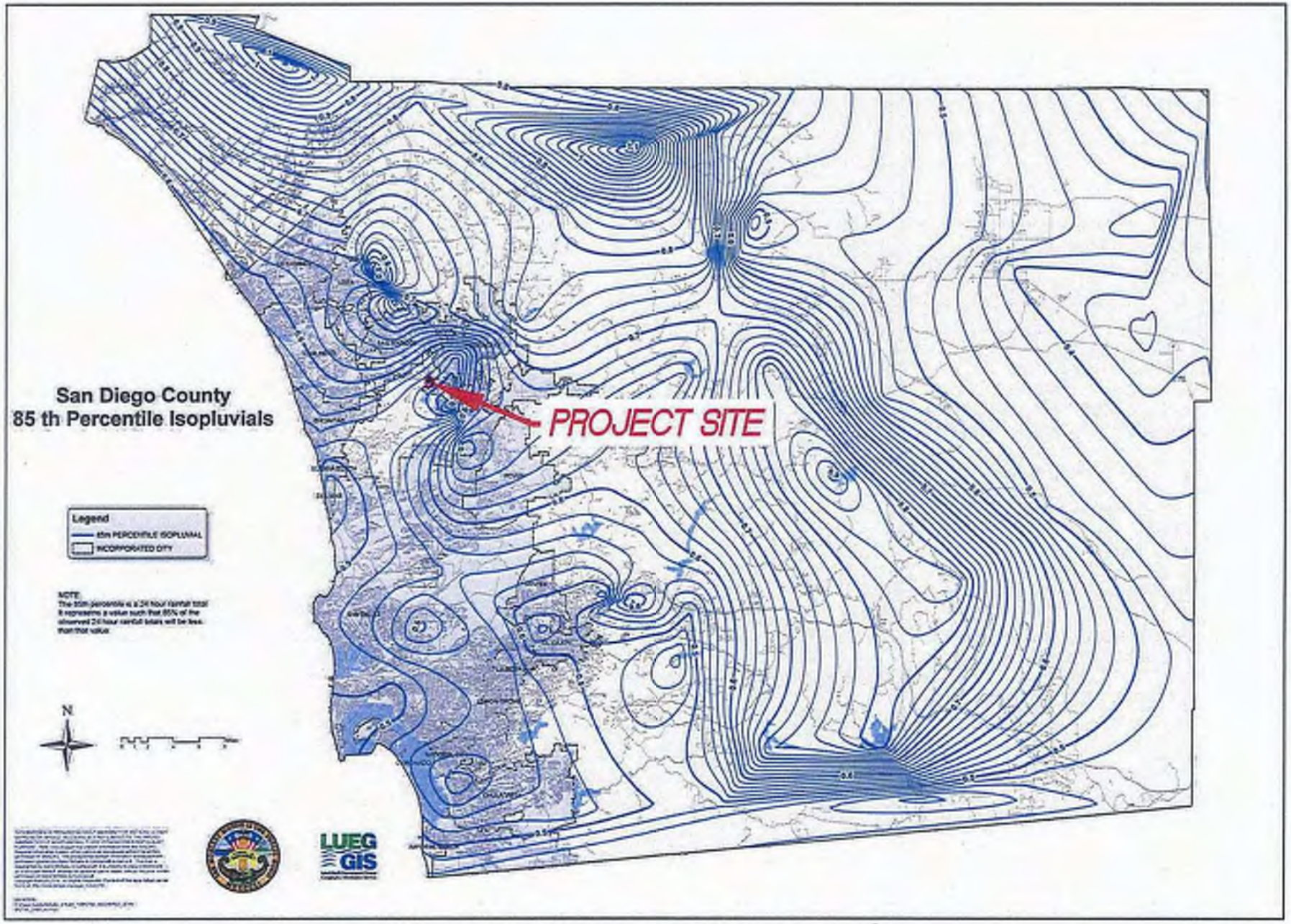

Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

Automated Worksheet B.3-1: Project-Scale BMP Feasibility Analysis (V1.3)

Category	#	Description	Value	Units
Capture & Use Inputs	0	Design Capture Volume for Entire Project Site	84,463	cubic-feet
	1	Proposed Development Type	Residential	unitless
	2	Number of Residents or Employees at Proposed Development	1,296	#
	3	Total Planted Area within Development	1,187,881	sq-ft
	4	Water Use Category for Proposed Planted Areas	Low	unitless
Infiltration Inputs	5	Is Average Site Design Infiltration Rate ≤0.500 Inches per Hour?	Yes	yes/no
	6	Is Average Site Design Infiltration Rate ≤0.010 Inches per Hour?	Yes	yes/no
	7	Is Infiltration of the Full DCV Anticipated to Produce Negative Impacts?	No	yes/no
	8	Is Infiltration of Any Volume Anticipated to Produce Negative Impacts?	No	yes/no
Calculations	9	36-Hour Toilet Use Per Resident or Employee	1.86	cubic-feet
	10	Subtotal: Anticipated 36 Hour Toilet Use	2,417	cubic-feet
	11	Anticipated 1 Acre Landscape Use Over 36 Hours	52.14	cubic-feet
	12	Subtotal: Anticipated Landscape Use Over 36 Hours	1,422	cubic-feet
	13	Total Anticipated Use Over 36 Hours	3,839	cubic-feet
	14	Total Anticipated Use / Design Capture Volume	0.05	cubic-feet
	15	Are Full Capture and Use Techniques Feasible for this Project?	No	unitless
	16	Is Full Retention Feasible for this Project?	No	yes/no
	17	Is Partial Retention Feasible for this Project?	No	yes/no
Result	18	Feasibility Category	5	1, 2, 3, 4, 5

Worksheet B.3-1 General Notes:

A. Applicants may use this worksheet to determine the types of structural BMPs that are acceptable for implementation at their project site (as required in Section 5 of the BMPDM). User input should be provided for yellow shaded cells, values for all other cells will be automatically generated. Projects demonstrating feasibility or potential feasibility via this worksheet are encouraged to incorporate capture and use features in their project.

B. Negative impacts associated with retention may include geotechnical, groundwater, water balance, or other issues identified by a geotechnical engineer and substantiated through completion of Form I-8.

C. Feasibility Category 1: Applicant must implement capture & use, retention, and/or infiltration elements for the entire DCV.

D. Feasibility Category 2: Applicant must implement capture & use elements for the entire DCV.

E. Feasibility Category 3: Applicant must implement retention and/or infiltration elements for all DMAs with Design Infiltration Rates greater than 0.50 in/hr.

F. Feasibility Category 4: Applicant must implement standard unlined biofiltration BMPs sized at ≥3% of the effective impervious tributary area for all DMAs with Design Infiltration Rates of 0.011 to 0.50 in/hr. Applicants may be permitted to implement lined BMPs, reduced size BMPs, and/or specialized biofiltration BMPs provided additional criteria identified in "Supplemental Retention Criteria for Non-Standard Biofiltration BMPs" are satisfied.

G. Feasibility Category 5: Applicant must implement standard lined biofiltration BMPs sized at ≥3% of the effective impervious tributary area for all DMAs with Design Infiltration Rates of 0.010 in/hr or less. Applicants may also be permitted to implement reduced size and/or specialized biofiltration BMPs provided additional criteria identified in "Supplemental Retention Criteria for Non-Standard Biofiltration BMPs" are satisfied.

H. PDPs participating in an offsite alternative compliance program are not held to the feasibility categories presented herein.

Automated Worksheet B.1-1: Calculation of Design Capture Volume (V1.3)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
Standard Drainage Basin Inputs	0	Drainage Basin ID or Name	North (Hydromod/Detention) Basin Vault	South (Hydromod/Detention) Basin Vault	MWS #1	MWS #2							unitless
	1	Basin Drains to the Following BMP Type	Retention	Retention	Biofiltration (specialized)	Biofiltration (specialized)							unitless
	2	85th Percentile 24-hr Storm Depth	0.52	0.52	0.52	0.52							inches
	3	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	0.000	0.000							in/hr
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	1,208,354	392,040	23,150	28,356							sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)	963,112	223,463	5,554	10,397							sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)	1,038,906										sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)	327,571										sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	11	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	Yes	Yes	No	No	No	No	No	No	res/no
	12	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)											sq-ft
	13	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	14	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	15	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	16	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
	17	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
	18	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	19	Number of Tree Wells Proposed per SD-A			3	4							#
	20	Average Mature Tree Canopy Diameter			5	5							ft
	21	Number of Rain Barrels Proposed per SD-E											#
	22	Average Rain Barrel Size											gal
Treatment Train Inputs & Calculations	23	Does BMP Overflow to Stormwater Features in Downstream Drainage?	No	No	No	No	No	No	No	No	No	No	unitless
	24	Identify Downstream Drainage Basin Providing Treatment in Series											unitless
	25	Percent of Upstream Flows Directed to Downstream Dispersion Areas											percent
	26	Upstream Impervious Surfaces Directed to Dispersion Area (Ci=0.90)	0	0	0	0	0	0	0	0	0	0	cubic-feet
	27	Upstream Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	0	0	0	0	0	0	0	0	0	0	cubic-feet
Initial Runoff Factor Calculation	28	Total Tributary Area	3,537,943	615,503	30,704	38,753	0	0	0	0	0	0	sq-ft
	29	Initial Runoff Factor for Standard Drainage Areas	0.48	0.68	0.79	0.74	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	30	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	31	Initial Weighted Runoff Factor	0.48	0.68	0.79	0.74	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	32	Initial Design Capture Volume	73,589	18,137	1,051	1,243	0	0	0	0	0	0	cubic-feet
Dispersion Area Adjustments	33	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	34	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	35	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	36	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	37	Runoff Factor After Dispersion Techniques	0.48	0.68	0.79	0.74	n/a	n/a	n/a	n/a	n/a	n/a	unitless
	38	Design Capture Volume After Dispersion Techniques	73,589	18,137	1,051	1,243	0	0	0	0	0	0	cubic-feet
Tree & Barrel Adjustments	39	Total Tree Well Volume Reduction	0	0	30	40	0	0	0	0	0	0	cubic-feet
	40	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	41	Final Adjusted Runoff Factor	0.48	0.68	0.77	0.72	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	42	Final Effective Tributary Area	1,698,213	418,542	23,642	27,902	0	0	0	0	0	0	sq-ft
	43	Initial Design Capture Volume Retained by Site Design Elements	0	0	30	40	0	0	0	0	0	0	cubic-feet
	44	Final Design Capture Volume Tributary to BMP	73,589	18,137	1,021	1,203	0	0	0	0	0	0	cubic-feet

Worksheet B.1-1 General Notes:

A. Applicants may use this worksheet to calculate design capture volumes for up to 10 drainage areas User input must be provided for yellow shaded cells, values for all other cells will be automatically generated, errors/notifications will be highlighted in red and summarized below. Upon completion of this worksheet, proceed to the appropriate BMP Sizing worksheet(s).

Automated Worksheet B.4-1: Sizing Retention BMPs (V1.3)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
BMP Inputs	0	Drainage Basin ID or Name	North (Hydromod/Detention) Basin Vault	South (Hydromod/Detention) Basin Vault	-	-	-	-	-	-	-	-	unitless
	1	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	-	-	-	-	-	-	-	-	in/hr
	2	Design Capture Volume Tributary to BMP	73,589	18,137	-	-	-	-	-	-	-	-	cubic-feet
	3	Is Retention BMP Vegetated or Non-Vegetated?	Vegetated	Vegetated									unitless
	4	Provided Surface Area	28,073	10,340									sq-ft
	5	Provided Surface Ponding Depth	30.5	20									inches
	6	Provided Soil Media Thickness	0	0									inches
	7	Provided Gravel Storage Thickness	0	0									inches
Infiltration Calculations	8	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet
	9	Soil Media Pore Space	0.25	0.25	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	10	Gravel Pore Space	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	11	Effective Depth of Retention Storage	30.5	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	inches
	12	Drawdown Time for Surface Ponding (Post-Storm)	>24	>24	0	0	0	0	0	0	0	0	hours
	13	Drawdown Time for Entire Basin (Including 6 Hour Storm)	>120	>120	0	0	0	0	0	0	0	0	hours
	14	Volume Retained by BMP	71,352	17,233	0	0	0	0	0	0	0	0	cubic-feet
	15	Fraction of DCV Retained	0.97	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	16	Percentage of Performance Requirement Satisfied	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	17	Fraction of DCV Retained (normalized to 36-hr drawdown)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	18	This BMP Overflows to the Following Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
Result	19	**Deficit of Effectively Treated Stormwater**	-73,589	-18,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	cubic-feet

Worksheet B.4-1 General Notes:

A. Applicants may use this worksheet to size Infiltration, Bioretention, and/or Permeable Pavement BMPs (INF-1, INF-2, INF-3) for up to 10 basins. User input must be provided for yellow shaded cells, values for blue cells are automatically populated based on user inputs from previous worksheets, values for all other cells will be automatically generated, errors/notifications will be highlighted in red/orange and summarized below. BMPs fully satisfying the pollutant control performance standards will have a deficit treated volume of zero and be highlighted in green.

Attention!

-Vegetated BMPs must have a surface ponding drawdown time of 24 hours or less. Drawdown times over 24 hours may be permitted at the discretion of County staff if certified by a landscape architect or agronomist.
-All BMPs must have a surface ponding drawdown time of 96 hours or less. Please adjust ponding depth accordingly.
-Retention BMPs incorporating vegetation must provide at least 18 inches of soil media.
-Retention BMPs must have a Design Infiltration Rate that is greater than zero. Please revise the specified rate or consider implementing a biofiltration element.
-Retention BMPs must draw down within 120 hours in order to determine the percentage of performance requirement that is provided.
-This BMP does not fully satisfy the performance standards for pollutant control and must be supplemented with flow-thru treatment and an offsite alternative compliance project.

NOTE: REFER TO REUSE CALCULATIONS.

THIS FORM IS NOT SET UP TO DO RETENTION CALCS VIA REUSE (ONLY THROUGH INFILTRATION). THEREFORE, THE SPREADSHEET ERRONEOUSLY STATES THAT THERE IS A DEFICIT IN RETAINED STORMWATER, BUT THIS IS INCORRECT BECAUSE THE WATER IS REUSED AND THEREFORE RETAINED.

Automated Worksheet B.5-2: Sizing Specialized Biofiltration BMPs (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
BMP Inputs	0	Drainage Basin ID or Name	-	-	MWS #1	MWS #2	-	-	-	-	-	-	sq-ft
	1	Design Infiltration Rate Recommended by Geotechnical Engineer	-	-	0.000	0.000	-	-	-	-	-	-	in/hr
	2	Effective Tributary Area	-	-	23,642	27,902	-	-	-	-	-	-	sq-ft
	3	Minimum Biofiltration Footprint Sizing Factor	-	-	-	-	-	-	-	-	-	-	ratio
	4	Design Capture Volume Tributary to BMP	-	-	1,021	1,203	-	-	-	-	-	-	cubic-feet
	5	Is Biofiltration Basin Impermeably Lined or Unlined?			Lined	Lined							yes/no
	6	Provided Biofiltration BMP Surface Area			60	76							sq-ft
	7	Provided Surface Ponding Depth			0	0							inches
	8	Provided Soil Media Thickness			20	20							inches
	9	Provided Depth of Gravel Above Underdrain Invert			0	0							inches
	10	Diameter of Underdrain or Hydromod Orifice (Select Smallest)			4.00	4.00							inches
	11	Provided Depth of Gravel Below the Underdrain			0	0							inches
Retention Calculations	12	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet
	13	Soil Media Pore Space Available for Retention	0.05	0.05	0.10	0.10	0.05	0.05	0.05	0.05	0.05	0.05	unitless
	14	Gravel Pore Space Available for Retention	0.40	0.40	0.48	0.48	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	15	Effective Retention Depth	0.00	0.00	2.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	16	Calculated Retention Storage Drawdown (Including 6 Hr Storm)	0	0	120	120	0	0	0	0	0	0	hours
	17	Volume Retained by BMP	0	0	10	13	0	0	0	0	0	0	cubic-feet
	18	Fraction of DCV Retained	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	19	Portion of Retention Performance Standard Satisfied	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	20	Fraction of DCV Retained (normalized to 36-hr drawdown)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	21	Design Capture Volume Remaining for Biofiltration	0	0	1,021	1,203	0	0	0	0	0	0	cubic-feet
Biofiltration Calculations	22	Max Hydromod Flow Rate through Underdrain	n/a	n/a	0.5146	0.5146	n/a	n/a	n/a	n/a	n/a	n/a	CFS
	23	Max Soil Filtration Rate Allowed by Underdrain Orifice	n/a	n/a	370.53	292.52	n/a	n/a	n/a	n/a	n/a	n/a	in/hr
	24	Soil Media Filtration Rate per Specifications	5.00	5.00	96.00	96.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	25	Soil Media Filtration Rate to be used for Sizing	5.00	5.00	96.00	96.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	26	Depth Biofiltered Over 6 Hour Storm	30.00	30.00	576.00	576.00	30.00	30.00	30.00	30.00	30.00	30.00	inches
	27	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless
	28	Effective Depth of Biofiltration Storage	0.00	0.00	4.00	4.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	29	Drawdown Time for Surface Ponding	0	0	0	0	0	0	0	0	0	0	hours
	30	Drawdown Time for Effective Biofiltration Depth	0	0	0	0	0	0	0	0	0	0	hours
	31	Total Depth Biofiltered	30.00	30.00	580.00	580.00	30.00	30.00	30.00	30.00	30.00	30.00	inches
	32	Option 1 - Biofilter 1.50 DCV: Target Volume	0	0	1,532	1,805	0	0	0	0	0	0	cubic-feet
	33	Option 1 - Provided Biofiltration Volume	0	0	1,532	1,805	0	0	0	0	0	0	cubic-feet
	34	Option 2 - Store 0.75 DCV: Target Volume	0	0	766	902	0	0	0	0	0	0	cubic-feet
	35	Option 2 - Provided Storage Volume	0	0	20	25	0	0	0	0	0	0	cubic-feet
	36	Portion of Biofiltration Performance Standard Satisfied	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
Result	37	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	-	-	Yes	Yes	-	-	-	-	-	-	yes/no
	38	Overall Portion of Performance Standard Satisfied	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	39	This BMP Overflows to the Following Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
	40	**Deficit of Effectively Treated Stormwater**	**n/a**	**n/a**	**0**	**0**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	cubic-feet

Worksheet B.5-2 General Notes:

A. Applicants may use this worksheet to size lined or unlined Specialized Biofiltration BMPs (BF-3) for up to 10 basins. Note that applicants proposing specialized biofiltration BMPs must satisfy minimum annual retention criteria and provide documentation demonstrating compliance with all Appendix F criteria. User input must be provided for yellow shaded cells, values for blue cells are automatically populated based on user inputs from previous worksheets, values for all other cells will be automatically generated, errors/notifications will be highlighted in red/orange and summarized below. BMPs fully satisfying the pollutant control performance standards will have a deficit treated volume of zero and be highlighted in green.

PROJECT DESIGN CONSULTANTS

PLANNING | LANDSCAPE ARCHITECTURE
ENGINEERING | SURVEY

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PROJECT HGVS
SUBJECT SOIL MEDIA FILTRATION RATE

PAGE : ____ OF ____ JOB NO. : ____
DRAWN BY : ____ DATE : 12/29/16
CHECKED BY : ____ DATE : ____

PER MODULAR WETLAND UNIT STANDARD DETAILS (ATTACHMENT 5), THE WETLAND MEDIA LOADING RATE = 1.0 GPM/SF

$$\rightarrow \frac{1\ \text{GPM}}{\text{SF}} \left(\frac{1\ \text{CFS}}{448\ \text{GPM}}\right) = 0.002232\ \text{FT/S} \left(\frac{12\ \text{IN}}{1\ \text{FT}}\right)\left(\frac{3600\ \text{S}}{1\ \text{HR}}\right)$$

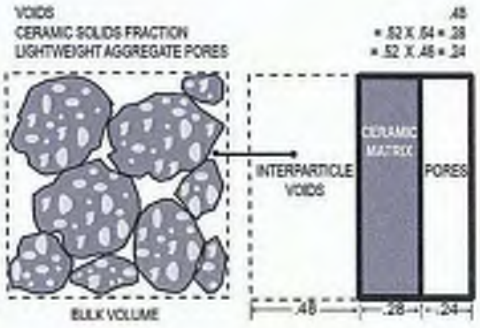
$$= \boxed{96\ \text{IN/HR}}$$

REFER TO MODULAR WETLANDS CALCULATION SHEET FOR EVAPOTRANSPIRATION INSIDE THE MODULAR WETLAND LINEAR.

MODULAR WETLANDS

CALCULATION SHEET FOR EVAPOTRANSPIRATION INSIDE THE MODULAR WETLAND SYSTEM LINEAR

The Modular Wetland System Linear is a biofiltration system utilizing a highly porous bioretention media bed capable of maximizing pollutant removal and reducing volume through evapotranspiration. The media used in the system, known as WetlandMedia, is composed of a non-organic material mix which has a large percentage of interparticle and internal pore space:



Porosity:

- Interparticle Void Percentage = 0.48
- Internal Pore Space (inside particles) = 0.24
- Total Void Space Percentage = 0.72

Benefits:

- Physically Inert
- Greater Surface Area & Porosity
- Excellent Hydraulic Conductivity
- Reduced Weight
- Employs Ion Exchange
- Absorbs High Levels of Moisture for Better Plant Propagation
- Lightweight
- Contains various oxides for removal of dissolved pollutants

Calculating Evapotranspiration:

Several studies have been performed to calculate the amount of evapotranspiration from the biofiltration system. It has been found that it is a function of the moisture holding capacity of the material and it's relation to the "welting point". Much of this work has been done by Geosyntec. In 2016, the City of San Diego released the new "Storm Water Standards Manual" and "Part 1: BMP Design

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Manual – Appendices". The manual and appendices was prepared by Geosyntec Consultants and Michael Baker International.

Page G-23 of the above referenced manual provides the following method of calculating the amount of evapotranspiration that can occur within the soil layer of biofiltration systems:

> *This process layer is typically composed of an amended soil or compost mix. Water that infiltrates into this component is stored in the soil void space and is available for evapotranspiration via plant roots or can percolate into the storage layer below. The following parameters are used:*
>
> - *Thickness: This parameter represents the depth of the amended soil layer.*
> - *Porosity: Ratio of pore space volume to soil volume.*
> - *Field Capacity: Pore water volume ratio after the soil has been drained.*
> - *Wilting Point: Pore water volume ratio after the soil has been dried.*
> - *Conductivity: This represents the saturated hydraulic conductivity.*
> - *Conductivity Slope: Rate at which conductivity decreases with decreasing soil moisture content.*
> - *Suction Head: This represents the capillary tension of water in the soil.*
> - *Porosity, conductivity and suction head values as a function of soil texture were included in Table G.1-5. The flow of water through partially saturated soil is less than under fully saturated conditions. The SWMM program accounts for this reduced hydraulic conductivity to predict the rate at which infiltrated water moves through a layer of unsaturated soil when modeling groundwater or LID controls. The conductivity slope is a dimensionless curve-fitting parameter that relates the partially saturated hydraulic conductivity to the soil moisture content.*

The Modular Wetland System Linear has the following parameters related to evapotranspiration as described above:

- Thickness: 20"
- Porosity (interparticle + internal): 0.72
- Field Capacity: 0.24 (50% of interparticle void space at 0.48 due to capillary tension + 100% of internal void space at 0.24 = (50% x 0.48) + (100% x 0.24)): 0.48
- Welting Point: 0.1 (standard from Manual based on field research done by Geosyntec)
- Conductivity: > 395 in/hr

The following diagram taken from the San Diego Manual illustrates soil saturation, field capacity and permanent wilting point:

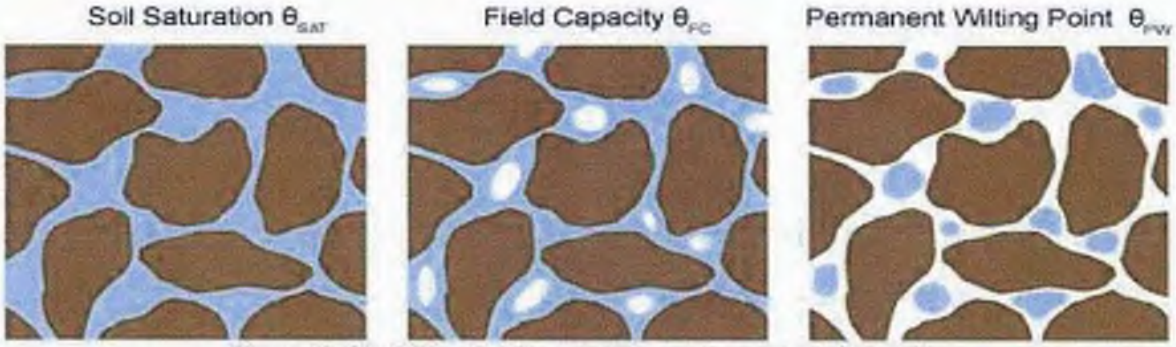

Figure G.1-4: Soil saturation, field capacity, and wilting point

The following worksheet can be used to calculate the amount of volume reduction provided through the process of evapotranspiration in the Modular Wetland System Linear:

Sizing Method of Evapotranspiration Losses in Biofiltration BMPs			
Project Name			
Model #			
Media Volume Calculations			
1	Media bed width	0	ft
2	Media bed length	0	ft
3	Media bed height	0	ft
4	Total media volume [Line 1 x 2 x 3]	0	cu ft
Evapotranspiration Calculations			
5	Porosity	0.72	
6	Field Capacity	0.48	
7	Welting Point	0.1	
8	Water Storage Capacity [Line 4 x Line 5]	0.0	cu ft
9	Field Capacity - Welting Point [Line 6 - Line 7]	0.38	
10	Total Evapotranspiration [Line 4 x Line 9]	0.0	cu ft

This worksheet and supporting data can be used and can be included in your technical report. If you have any questions please call us at 760-433-7640 or email us at info@modularwetlands.com

Summary of Stormwater Pollutant Control Calculations (V1.3)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
General Info	0	Drainage Basin ID or Name	North (Hydromod/Detention) Basin Vault	South (Hydromod/Detention) Basin Vault	MWS #1	MWS #2	-	-	-	-	-	-	unitless
	1	85th Percentile Storm Depth	0.52	0.52	0.52	0.52	-	-	-	-	-	-	inches
	2	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	0.000	0.000	-	-	-	-	-	-	in/hr
	3	Total Tributary Area	3,537,943	615,503	30,704	38,753	-	-	-	-	-	-	sq-ft
	4	85th Percentile Storm Volume (Rainfall Volume)	153,311	26,672	1,331	1,679	-	-	-	-	-	-	cubic-feet
Initial DCV	5	Initial Weighted Runoff Factor	0.48	0.68	0.79	0.74	-	-	-	-	-	-	unitless
	6	Initial Design Capture Volume	73,589	18,137	1,051	1,243	-	-	-	-	-	-	cubic-feet
Site Design Volume Reductions	7	Dispersion Area Reductions	0	0	0	0	-	-	-	-	-	-	cubic-feet
	8	Tree Well and Rain Barrel Reductions	0	0	30	40	-	-	-	-	-	-	cubic-feet
BMP Volume Reductions	9	Effective Area Tributary to BMP	1,698,213	418,542	23,642	27,902	-	-	-	-	-	-	square feet
	10	Final Design Capture Volume Tributary to BMP	73,589	18,137	1,021	1,203	-	-	-	-	-	-	cubic-feet
	11	Basin Drains to the Following BMP Type	Retention	Retention	Biofiltration (specialized)	Biofiltration (specialized)	-	-	-	-	-	-	unitless
	12	Volume Retained by BMP (normalized to 36 hour drawdown)	0	0	0	0	-	-	-	-	-	-	cubic-feet
Total Volume Reductions	13	Total Fraction of Initial DCV Retained within DMA	0.00	0.00	0.03	0.03	-	-	-	-	-	-	fraction
	14	Percent of Average Annual Runoff Retention Provided	0.0%	0.0%	4.6%	4.6%	-	-	-	-	-	-	%
	15	Percent of Average Annual Runoff Retention Required	4.5%	4.5%	4.5%	4.5%	-	-	-	-	-	-	%
Performance Standard	16	Percent of Pollution Control Standard Satisfied	0.0%	0.0%	100.0%	100.0%	-	-	-	-	-	-	%
Treatment Train	17	Discharges to Secondary Treatment in Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
	18	Impervious Surface Area Still Requiring Treatment	1,886,903	465,047	0	0	-	-	-	-	-	-	square feet
	19	Impervious Surfaces Directed to Downstream Dispersion Area	-	-	-	-	-	-	-	-	-	-	square feet
	20	Impervious Surfaces Not Directed to Downstream Dispersion Area	-	-	-	-	-	-	-	-	-	-	square feet
Result	21	Deficit of Effectively Treated Stormwater	-73,589	-18,137	0	0	-	-	-	-	-	-	cubic-feet

Summary Notes:

All fields in this summary worksheet are populated based on peevious user inputs. If applicable, drainage basin elements that require revisions and/or supplemental information outside the scope of these worksheets are highlighted in orange and summairzed in the red text below. If all drainage basins achieve full compliance without a need for supplemental information, a green message will appear below.

Attention!

-Use of specialized biofiltration BMPs is supported by these worksheets but must be supplemented with information demonstrating satisfaction of all criteria in Appendix F of the BMPDM.
-Requirements for minimum annual retention are not satisfied at the drainage area level. Incorporate additional retention features or demonstrate minimum retention criteria is satisfied as the project-level-scale.
-Performance standards for onsite pollutant control are not satisfied. The applicant must implement onsite flow-thru BMPs per Worksheet B.6-1 and an offsite alternative compliance project to mitigate for the deficit of effectively treated stormwater.

Modular Wetland BMP Sizing Summary

BMP ID	DMA ID	Tributary Area (Ac.)	Q_{wq}(cfs)	1.5xQ_{wq}	Proposed Unit Model	Treatment Capacity (cfs)
Modular Wetland Unit # 1	3	0.70	0.102	0.153	MWS-L-4-15	0.175
Modular Wetland Unit # 2	4	0.89	0.130	0.195	MWS-L-4-19	0.237

C= 0.73 (This is a composite runoff factor per Section B.1 and B.2 of the County BMP Design Manual)

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PROJECT HGVS
SUBJECT Detention Vault Cross Section
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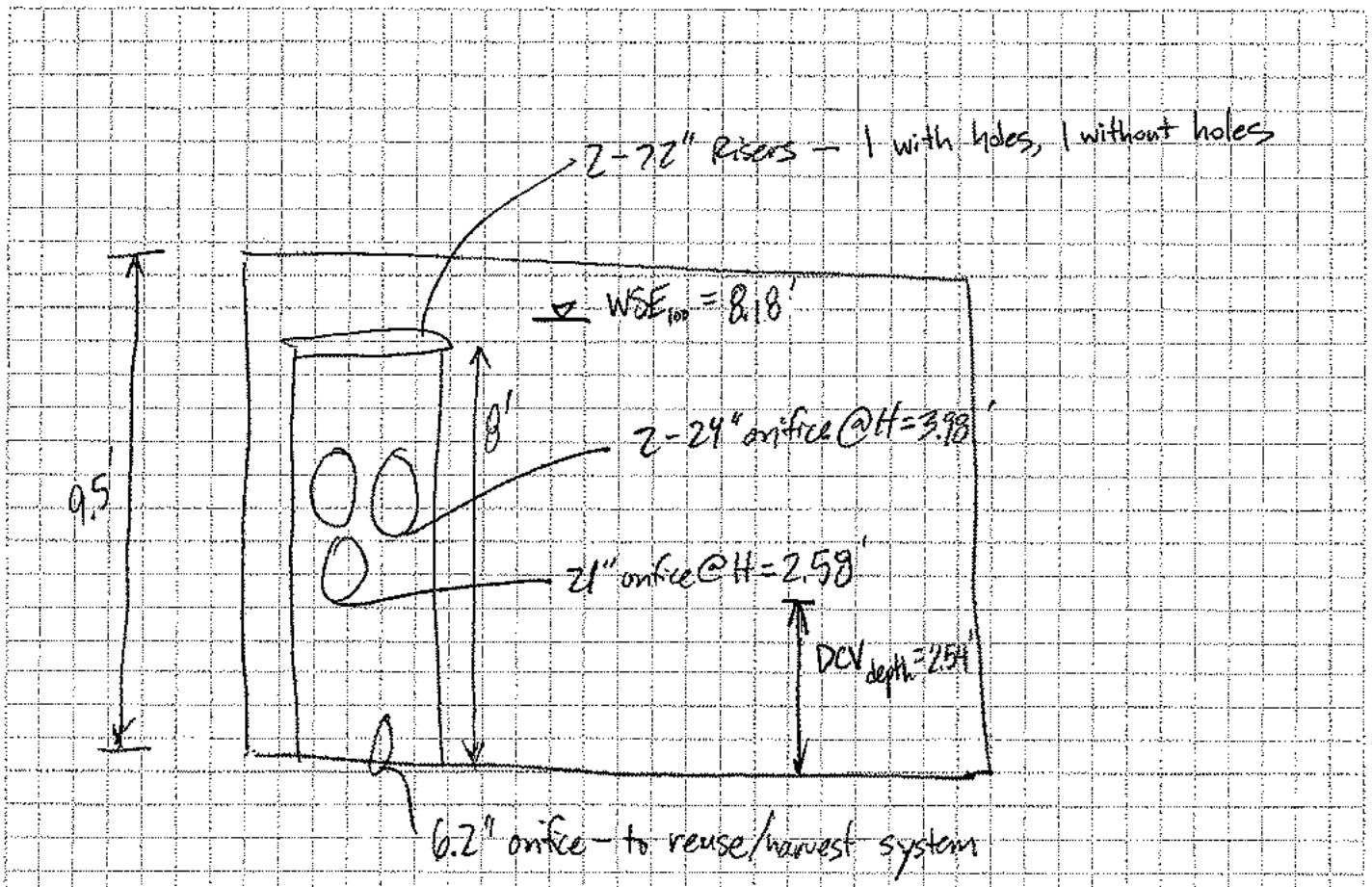
DRAWN BY : CP DATE : 1/16/16
CHECKED BY : _____ DATE : _____



NORTH BASIN

NTS

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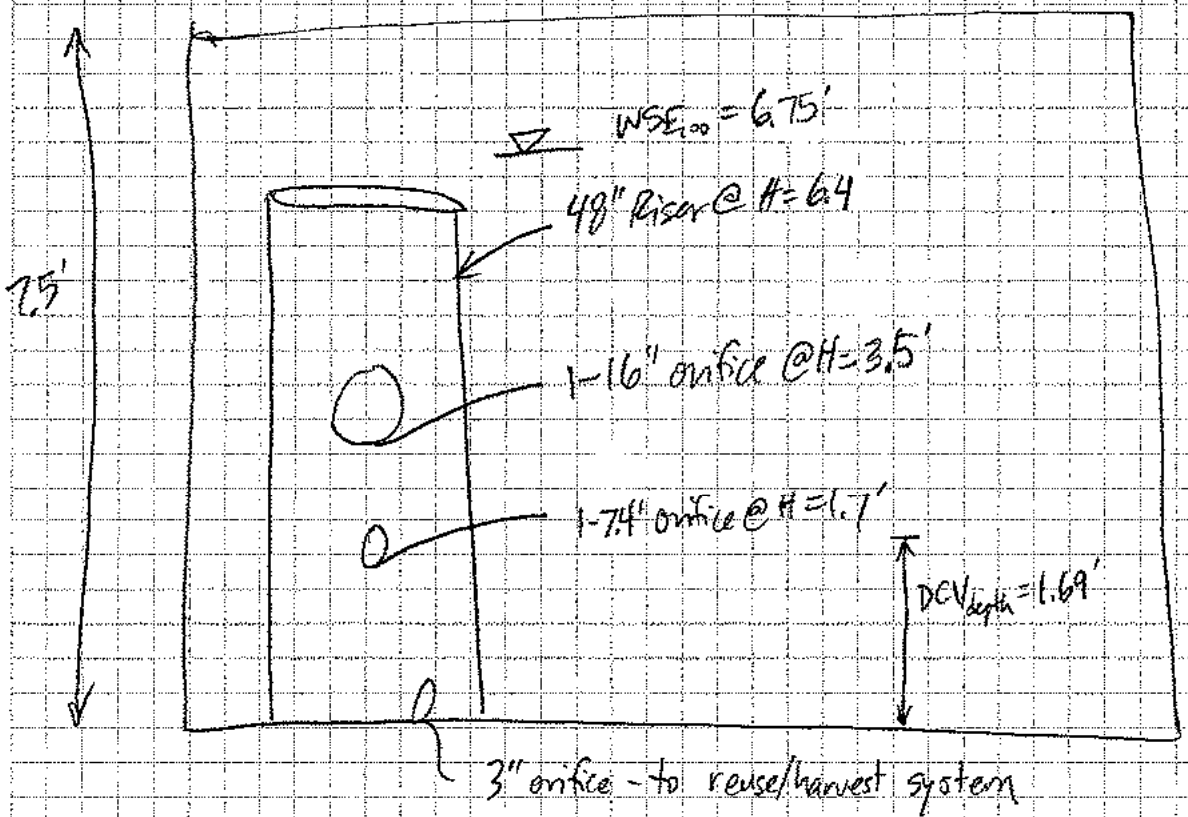

SOUTH BASIN

NTS

85th Percenile depth (in)= 0.52

Basin Water Quality Volume-based Sizing for Detention and Hydromod and Pollutant Control

Basin Sizing Approach

																C=	0.9	0.1
Extended Detention Basin	Drainage Area (ac)	Street Impervious Area (AC)	Pad Impervious Area (AC)	A Soils, Landscape Flat (AC)	C Soils, Landscape Flat (AC)	D Soils, Landscape Flat (AC)	A Soils, Landscape Steep (AC)	C Soils, Landscape Steep (AC)	D Soils, Landscape Steep (AC)	C Soils, Natural Landscape Flat (AC)	D Soils, Natural Landscape Flat (AC)	C Soils, Natural Landscape Mod (AC)	D Soils, Natural Landscape Mod (AC)	C Soils, Natural Landscape Steep (AC)	D Soils, Natural Landscape Steep (AC)	Total Impervious Area (AC)	A Soils, Landscaped Total (ac)
North, POC #1	81.22	11.81	15.93	0.01	9.03			13.06	0.01	0.44	0.07	0.65	0.06	22.76	7.39	27.74	0.01
South, POC #2	14.13	2.41	6.59		2.70	0.42		1.37	0.64							9.00	0.00
Country Club, POC #2 bypass	1.59	1.22	0	0.22	0.15											1.22	0.22

Notes:

1) C_{WQ}=Composite runoff factor per Section B.1 and B.2 of BMP Design Manual

2) WQ Vol=WQ 85th Percentile depth* C_{WQ}* Area

3) Drawdown calculation with integration of orifice equation

0.23	0.3	0.1	0.23	0.3													
C Soils, Landscaped Total (ac)	D Soils, Landscaped Total (ac)	A Soils, Natural Total (ac)	C Soils, Natural Total (ac)	D Soils, Natural Total (ac)	C_{WQ} [1]	WQ Volume (AF) [2]	Area of basin (SF)	Area of basin (AF)	Modeled L (square)	WQ depth	Avg Qorif for 36hr drawdown of DCV (cfs)	Lower Orifice D (in)	Q initial Orifice (cfs)	Q initial Orifice (gpm)	WQ Volume Drawdown (hours) [3]	Low flow threshold (LFT) criteria	LFT (cfs)
22.09	0.01	0.00	23.85	7.52	0.47	1.64	28073.19	0.644	167.55	2.54	0.55	6.2	1.29	577.23	22.1	0.5Q2	8.1
4.07	1.06	0.00	0.00	0.00	0.66	0.41	10339.9	0.24	101.69	1.69	0.14	3	0.25	110.84	28.6	0.5Q2	1.43
0.15	0.00	0.00	0.00	0.00	0.73	0.05											

E.20 BF-3 Proprietary Biofiltration Systems

The purpose of this fact sheet is to help explain the potential role of proprietary BMPs in meeting biofiltration requirements, when full retention of the DCV is not feasible. The fact sheet does not describe design criteria like the other fact sheets in this appendix because this information varies by BMP product model.

Criteria for Use of a Proprietary BMP as a Biofiltration BMP

A proprietary BMP may be acceptable as a "biofiltration BMP" under the following conditions:

(1) The BMP meets the minimum design criteria listed in Appendix F, including the selection criteria (i.e. only allowed in No Infiltration Condition and where site-specific documentation demonstrates that the use of larger footprint biofiltration BMPs (i.e. 3 %) would be infeasible) and the pollutant treatment performance standard in Appendix F.1;

(2) The BMP is designed and maintained in a manner consistent with its performance certifications (See explanation in Appendix F.2); and

(3) The BMP is acceptable at the discretion of County staff. While the County has no obligation to accept the use of any proposed proprietary flow-thru BMP, applicants will be provided a written explanation describing the rationale for the rejection of any proposed devices.

Guidance for Sizing a Proprietary BMP as a Biofiltration BMP

Proprietary biofiltration BMPs must meet the same sizing guidance as non-proprietary BMPs. Sizing is typically based on capturing and treating 1.50 times the DCV not reliably retained. Guidance for sizing biofiltration BMPs to comply with requirements of this manual is provided in Appendix F.2.

Table F.1-2: Performance Standards for Technology Acceptance Protocol-Ecology Certification

Performance Goal	Influent Range	Criteria
Basic Treatment	20 – 100 mg/L TSS	Effluent goal ≤ 20 mg/L TSS
	100 – 200 mg/L TSS	≥ 80% TSS removal
	>200 mg/L TSS	> 80% TSS removal
Enhanced (Dissolved Metals) Treatment	Dissolved copper 0.005 – 0.02 mg/L	Must meet basic treatment goal and better than basic treatment currently defined as >30% dissolved copper removal
	Dissolved zinc 0.02 – 0.3 mg/L	Must meet basic treatment goal and better than basic treatment currently defined as >60% dissolved zinc removal
Phosphorous Treatment	Total phosphorous 0.1 – 0.5 mg/L	Must meet basic treatment goal and exhibit ≥50% total phosphorous removal
Oil Treatment	Total petroleum hydrocarbon > 10 mg/L	No ongoing or recurring visible sheen in effluent Daily average effluent Total petroleum hydrocarbon concentration < 10 mg/L Maximum effluent Total petroleum hydrocarbon concentration for a 15 mg/L for a discrete (grab) sample
Pretreatment	50 – 100 mg/L TSS	≤ 50 mg/L TSS
	≥ 200 mg/L TSS	≥ 50% TSS removal

F.2 Guidance on Sizing and Design of Non-Standard Biofiltration BMPs

This section explains the general process for design and sizing of non-standard biofiltration BMPs. This section assumes that the BMPs have been selected based on the criteria in Section F.1.

F.2.1 Guidance on Design per Conditions of Certification/Verification

The biofiltration standard and checklist in this appendix requires that "the BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification." Practically, what this means is that the BMP is used in the same way in which it was tested and certified. For example, it is not acceptable for a BMP of a given size to be certified/verified with a 100 gallon per minute treatment rate and be applied at a 150 gallon per minute treatment rate in a design.

Certifications or verifications issued by the Washington Technology Acceptance Protocol-Ecology program and the Technology Acceptance Reciprocity Partnership or New Jersey Corporation for Advance Testing programs are typically accompanied by a set of guidelines regarding appropriate design and maintenance conditions that would be consistent with the certification/verification. It is common for these approvals to specify the specific model of BMP, design capacity for given unit sizes, type of media that is the basis for approval, and/or other parameter. The applicant must demonstrate conclusively that the proposed application of the BMP is consistent with these criteria.

For alternate non-proprietary systems that do not have a Technology Acceptance Protocol-Ecology / Technology Acceptance Reciprocity Partnership / New Jersey Corporation for Advance Testing certification (but which still must provide quantitative data per Appendix F.1), it must be demonstrate that the configuration and design proposed for the project is reasonably consistent with the configuration and design under which the BMP was tested to demonstrate compliance with Appendix F.1.

F.2.2 Sizing of Flow-Based Biofiltration BMP

This sizing method is only available when the BMP meets the pollutant treatment performance standard in Appendix F.1.

Proprietary biofiltration BMPs are typically designed as a flow-based BMPs (i.e., a constant treatment capacity with negligible storage volume). Additionally, proprietary biofiltration is only acceptable if no infiltration is feasible and where site-specific documentation demonstrates that the use of larger footprint biofiltration BMPs would be infeasible or if the proprietary biofiltration BMP is supplemented with a downstream retention BMP that achieves volume reduction equivalent to a non-proprietary BMP sized in accordance with Worksheet B.5-1. The applicable sizing method for biofiltration is therefore reduced to: Treat 1.5 times the DCV.

The following steps should be followed to demonstrate that the system is sized to treat 1.5 times the DCV.

1. Calculate the flow rate required to meet the pollutant treatment performance standard without scaling for the 1.5 factor. Options include either:
    - Calculate the runoff flow rate from a 0.2 inch per hour uniform intensity precipitation event (See methodology Appendix B.6.3), or
    - Conduct a continuous simulation analysis to compute the size required to capture and treat 80 percent of average annual runoff; for small catchments, 5-minute precipitation data should be used to account for short time of concentration. Nearest rain gage with 5-minute precipitation data is allowed for this analysis.
2. Multiply the flow rate from Step 1 by 1.5 to compute the design flow rate for the biofiltration system.
3. Based on the conditions of certification/verification (discussed above), establish the design

capacity, as a flow rate, of a given sized unit.

4. Demonstrates that an appropriate unit size and number of units is provided to provide a flow rate that meets the required flow rate from Step 2.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

April 2014

GENERAL USE LEVEL DESIGNATION FOR BASIC, ENHANCED, AND PHOSPHORUS TREATMENT

For the

MWS-Linear Modular Wetland

Ecology's Decision:

Based on Modular Wetland Systems, Inc. application submissions, including the Technical Evaluation Report, dated April 1, 2014, Ecology hereby issues the following use level designation:

1. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Basic treatment
   - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.
2. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Phosphorus treatment
   - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.
3. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Enhanced treatment
   - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.
4. Ecology approves monitoring for the MWS - Linear Modular Wetland Stormwater Treatment System units for Basic, Phosphorus, and Enhanced treatment at the hydraulic

loading rate listed above. Designers shall calculate the water quality design flow rates using the following procedures:

- Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.
- Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
- Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.

5. These use level designations have no expiration date but may be revoked or amended by Ecology, and are subject to the conditions specified below.

Ecology's Conditions of Use:

Applicants shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain the MWS – Linear Modular Wetland Stormwater Treatment System units, in accordance with Modular Wetland Systems, Inc. applicable manuals and documents and the Ecology Decision.
2. Each site plan must undergo Modular Wetland Systems, Inc. review and approval before site installation. This ensures that site grading and slope are appropriate for use of a MWS – Linear Modular Wetland Stormwater Treatment System unit.
3. MWS – Linear Modular Wetland Stormwater Treatment System media shall conform to the specifications submitted to, and approved by, Ecology.
4. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured filter treatment device.

- Typically, Modular Wetland Systems, Inc. designs MWS - Linear Modular Wetland systems for a target prefilter media life of 6 to 12 months.
- Indications of the need for maintenance include effluent flow decreasing to below the design flow rate or decrease in treatment below required levels.
- Owners/operators must inspect MWS - Linear Modular Wetland systems for a minimum of twelve months from the start of post-construction operation to determine site-specific maintenance schedules and requirements. You must conduct inspections monthly during the wet season, and every other month during the dry season. (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to SWMMEW, the wet season in eastern Washington is October 1 to June 30). After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.

- Conduct inspections by qualified personnel, follow manufacturer's guidelines, and use methods capable of determining either a decrease in treated effluent flowrate and/or a decrease in pollutant removal ability.
- When inspections are performed, the following findings typically serve as maintenance triggers:
  - Standing water remains in the vault between rain events, or
  - Bypass occurs during storms smaller than the design storm.
  - If excessive floatables (trash and debris) are present (but no standing water or excessive sedimentation), perform a minor maintenance consisting of gross solids removal, not prefilter media replacement.
  - Additional data collection will be used to create a correlation between pretreatment chamber sediment depth and pre-filter clogging (see *Issues to be Addressed by the Company* section below).

6. Discharges from the MWS – Linear Modular Wetland Stormwater Treatment System units shall not cause or contribute to water quality standards violations in receiving waters.

Applicant:	Modular Wetland Systems, Inc.
Applicant's Address:	*PO. Box 869* *Oceanside, CA 92054*

Application Documents:

- *Original Application for Conditional Use Level Designation*, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., January 2011
- *Quality Assurance Project Plan*: Modular Wetland system – Linear Treatment System performance Monitoring Project, draft, January 2011.
- *Revised Application for Conditional Use Level Designation*, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., May 2011
- *Memorandum: Modular Wetland System-Linear GULD Application Supplementary Data, April 2014*
- *Technical Evaluation Report: Modular Wetland System Stormwater Treatment System Performance Monitoring, April 2014.*

Applicant's Use Level Request:

General use level designation as a Basic, Enhanced, and Phosphorus treatment device in accordance with Ecology's Guidance for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol – Ecology (TAPE) January 2011 Revision.

Applicant's Performance Claims:

- The MWS – Linear Modular wetland is capable of removing a minimum of 80-percent of TSS from stormwater with influent concentrations between 100 and 200 mg/l.

- The MWS – Linear Modular wetland is capable of removing a minimum of 50-percent of Total Phosphorus from stormwater with influent concentrations between 0.1 and 0.5 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 30-percent of dissolved Copper from stormwater with influent concentrations between 0.005 and 0.020 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 60-percent of dissolved Zinc from stormwater with influent concentrations between 0.02 and 0.30 mg/l.

Ecology Recommendations:

- Modular Wetland Systems, Inc. has shown Ecology, through laboratory and field-testing, that the MWS - Linear Modular Wetland Stormwater Treatment System filter system is capable of attaining Ecology's Basic, Total pbosphorus, and Enhanced treatment goals.

Findings of Fact:

Laboratory Testing

The MWS-Linear Modular wetland has the:

- Capability to remove 99 percent of total suspended solids (using Sil-Co-Sil 106) in a quarter-scale model with influent concentrations of 270 mg/L.
- Capability to remove 91 percent of total suspended solids (using Sil-Co-Sil 106) in laboratory conditions with influent concentrations of 84.6 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 93 percent of dissolved Copper in a quarter-scale model with influent concentrations of 0.757 mg/L.
- Capability to remove 79 percent of dissolved Copper in laboratory conditions witb influent concentrations of 0.567 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 80.5-percent of dissolved Zinc in a quarter-scale model with influent concentrations of 0.95 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 78-percent of dissolved Zinc in laboratory conditions with influent concentrations of 0.75 mg/L at a flow rate of 3.0 gpm per square foot of media.

Field Testing

- Modular Wetland Systems, Inc. conducted monitoring of an MWS-Linear (Model # MWS-L-4-13) from April 2012 through May 2013, at a transportation maintenance facility in Portland, Oregon. The manufacturer collected flow-weighted composite samples of the system's influent and effluent during 28 separate storm events. The system treated approximately 75 percent of the runoff from 53.5 inches of rainfall during the monitoring period. The applicant sized the system at 1 gpm/sq ft. (wetland media) and 3gpm/sq ft. (prefilter).

- Influent TSS concentrations for qualifying sampled storm events ranged from 20 to 339 mg/L. Average TSS removal for influent concentrations greater than 100 mg/L (n=7) averaged 85 percent. For influent concentrations in the range of 20-100 mg/L (n=18), the upper 95 percent confidence interval about the mean effluent concentration was 12.8 mg/L.
- Total phosphorus removal for 17 events with influent TP concentrations in the range of 0.1 to 0.5 mg/L averaged 65 percent. A bootstrap estimate of the lower 95 percent confidence limit (LCL95) of the mean total phosphorus reduction was 58 percent.
- The lower 95 percent confidence limit of the mean percent removal was 60.5 percent for dissolved zinc for influent concentrations in the range of 0.02 to 0.3 mg/L (n=11). The lower 95 percent confidence limit of the mean percent removal was 32.5 percent for dissolved copper for influent concentrations in the range of 0.005 to 0.02 mg/L (n=14) at flow rates up to 28 gpm (design flow rate 41 gpm). Laboratory test data augmented the data set, showing dissolved copper removal at the design flow rate of 41 gpm (93 percent reduction in influent dissolved copper of 0.757 mg/L).

Issues to be addressed by the Company:

1. Modular Wetland Systems, Inc. should collect maintenance and inspection data for the first year on all installations in the Northwest in order to assess standard maintenance requirements for various land uses in the region. Modular Wetland Systems, Inc. should use these data to establish required maintenance cycles.
2. Modular Wetland Systems, Inc. should collect pre-treatment chamber sediment depth data for the first year of operation for all installations in the Northwest. Modular Wetland Systems, Inc. will use these data to create a correlation between sediment depth and pre-filter clogging.

Technology Description:
Download at http://www.modularwetlands.com/

Contact Information:

Applicant: Greg Kent
Modular Wetland Systems, Inc.
P.O. Box 869
Oceanside, CA 92054
gkent@biocleanenvironmental.net

Applicant website: http://www.modularwetlands.com/

Ecology web link: http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html

Ecology: Douglas C. Howie, P.E.
Department of Ecology
Water Quality Program
(360) 407-6444
douglas.howie@ecy.wa.gov

Revision History

Date	Revision
June 2011	Original use-level-designation document
September 2012	Revised dates for TER and expiration
January 2013	Modified Design Storm Description, added Revision Table, added maintenance discussion, modified format in accordance with Ecology standard
December 2013	Updated name of Applicant
April 2014	Approved GULD designation for Basic, Phosphorus, and Enhanced treatment

E.6 SD-A Tree Wells

MS4 Permit Category
Site Design
Manual Category
Site Design
Applicable Performance Standard
Site Design
Primary Benefits
Volume Reduction

Tree Wells (Source: County of San Diego LID Manual – EOA, Inc.)

Description

Trees planted to intercept rainfall and runoff can be used as storm water management measures that provide additional benefits beyond those typically associated with trees, including energy conservation, air quality improvement, and aesthetic enhancement. Typical storm water management benefits associated with trees include:

- **Interception of rainfall** – tree surfaces (roots, foliage, bark, and branches) intercept, evaporate, store, or convey precipitation to the soil before it reaches surrounding impervious surfaces
- **Reduced erosion** – trees protect denuded area by intercepting or reducing the velocity of rain drops as they fall through the tree canopy
- **Increased infiltration** – soil conditions created by roots and fallen leaves promote infiltration
- **Treatment of storm water** – trees provide treatment through uptake of nutrients and other storm water pollutants (phytoremediation) and support of other biological processes that break down pollutants

Typical tree well system components include:

- Trees of the appropriate species for site conditions and constraints
- Available soil media reservoir volume based on mature tree size, soil type, water availability, surrounding land uses, and project goals

- Optional suspended pavement design to provide structural support for adjacent pavement without requiring compaction of underlying layers
- Optional root barrier devices as needed; a root barrier is a device installed in the ground, between a tree and the sidewalk, intended to guide roots down and away from the sidewalk in order to prevent sidewalk lifting from tree roots.
- Optional tree grates; to be considered to maximize available space for pedestrian circulation and to protect tree roots from compaction related to pedestrian circulation; tree grates are typically made up of porous material that will allow the runoff to soak through.
- Optional shallow surface depression for ponding of excess runoff
- Optional planter box drain

Design Adaptations for Project Goals

Site design BMP to provide incidental treatment. Tree wells primarily function as site design BMPs for incidental treatment. Benefits from tree wells are accounted for by adjustment factors presented in Appendix B.2. This credit can apply to non-tree wells also (that meet the same criteria).

Design Criteria and Considerations

Tree wells must meet the following design criteria and considerations. Deviations from the below criteria may be approved at the discretion of the County staff if it is determined to be appropriate:

	Siting and Design	*Intent/Rationale*
☐	**Tree species** is appropriately chosen for the development (private or public). For public rights-of-ways, local planning guidelines and zoning provisions for the permissible species and placement of trees are consulted. A list of trees appropriate for site design that can be used by all county municipalities are provided in Appendix E.25	Proper tree placement and species selection minimizes problems such as pavement damage by surface roots and poor growth.
☐	**Tree well placement**: ensure area is graded; and the well is located so that full amount of DCV reduction drains to the well.	Minimizes short-circuiting of run off and assures DCV reductions are retained onsite.

Siting and Design	*Intent/Rationale*
☐ **Location of trees planted along public streets** follows guidance on green infrastructure (Appendix K). Vehicle and pedestrian line of sight and clear recovery zones are considered in tree selection and placement. Unless exemption is granted by County staff the following minimum tree separation distance is followed	Roadway safety for both vehicular and pedestrian traffic is a key consideration for placement along public streets.

Improvement	Minimum distance to tree well
Traffic Signal, Stop sign	20 feet
Underground Utility lines (except sewer)	5 feet
Sewer Lines	10 feet
Above ground utility structures (Transformers, Hydrants, Utility poles, etc.)	10 feet
Driveways	10 feet
Intersections (intersecting curb lines of two streets)	25 feet

☐	**Underground utilities and overhead wires** are considered in the design and avoided or circumvented. Underground utilities are routed around or through the planter in suspended pavement applications. All underground utilities are protected from water and root penetration.	Tree growth can damage utilities and overhead wires resulting in service interruptions. Protecting utilities routed through the planter prevents damage and service interruptions. Refer to Section 6.6 of the Green Streets Design Criteria in Appendix K for guidelines regarding utility placement and potential conflict with BMP facilities.

Siting and Design		*Intent/Rationale*
☐	**Suspended pavement** design was developed where appropriate to minimize soil compaction and improve infiltration and filtration capabilities. Suspended pavement was constructed with an approved structural cell.	Suspended pavement designs provide structural support without compaction of the underlying layers, thereby promoting tree growth. Recommended structural cells include poured in place concrete columns, Silva Cells manufactured by Deeproot Green Infrastructures and Stratacell and Stratavault systems manufactured by Citygreen Systems.
☐	A minimum soil volume of 2 cubic feet per square foot of canopy projection area is provided for each tree. Canopy projection area is the ground area beneath the tree, measured at the drip line.	The minimum soil volume ensures that there is adequate storage volume to allow for unrestricted evapotranspiration and infiltration. A lower amount of soil volume may be allowed at the discretion of County staff if certified by a landscape architect or agronomist. The retention credit from the tree is directly proportional to the soil volume provided for the tree.
☐	DCV from the tributary area draining to the tree is equal to or greater than the tree credit volume	The minimum tributary area ensures that the tree receives enough runoff to fully utilize the infiltration and evapotranspiration potential provided. In cases where the minimum tributary area is not provided, the tree credit volume must be reduced proportionately to the actual tributary area.

Siting and Design		*Intent/Rationale*
	Inlet opening to the tree that is at least 18 inches wide.	Design requirement to ensure that the runoff from the tributary area does not bypass the BMP.
☐	A minimum 2 inch drop in grade from the inlet to the finish grade of the tree.	Different inlet openings and drops in grade may be allowed at the discretion of County staff if calculations are shown that the diversion flow rate (Appendix B.1.2) from the tributary area can be conveyed to the tree. In cases where the inlet capacity is limiting the amount of runoff draining to the tree, the tree credit volume must be reduced proportionately.
	Grated inlets are allowed for pedestrian circulation. Grates need to be ADA compliant and have sufficient slip resistance.	

Conceptual Design and Sizing Approach for Site Design

1. Determine the areas where tree wells can be used in the site design to achieve incidental treatment. Tree wells reduce runoff volumes from the site. Refer to Appendix B.2. Document the proposed tree locations in the SWQMP.

2. When trees are proposed as a storm water pollutant control BMP, applicant must complete feasibility analysis in Appendix C and D and submit detailed calculations for the DCV treated by trees. Document the proposed tree locations, feasibility analysis and sizing calculations in the SWQMP. The following calculations should be performed and the smallest of the three should be used as the volume treated by trees:

    a. Delineate the DMA (tributary area) to the tree and calculate the associated DCV.

    b. Calculate the required diversion flow rate using Appendix B.1.2 and size the inlet required to covey this flow rate to the tree. If the proposed inlet cannot convey the diversion flow rate for the entire tributary area, then the DCV that enters the tree should be proportionally reduced.

        i. For example, 0.5 acre drains to the tree and the associated DCV is 820 ft^3. The required diversion flow rate is 0.10 ft^3/s, but only an inlet that can divert 0.05 ft^3/s could be installed.

        ii. Then the effective DCV draining to the tree = 820 ft^3 * (0.05/0.10) = 420 ft^3

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PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ATTACHMENT 1c

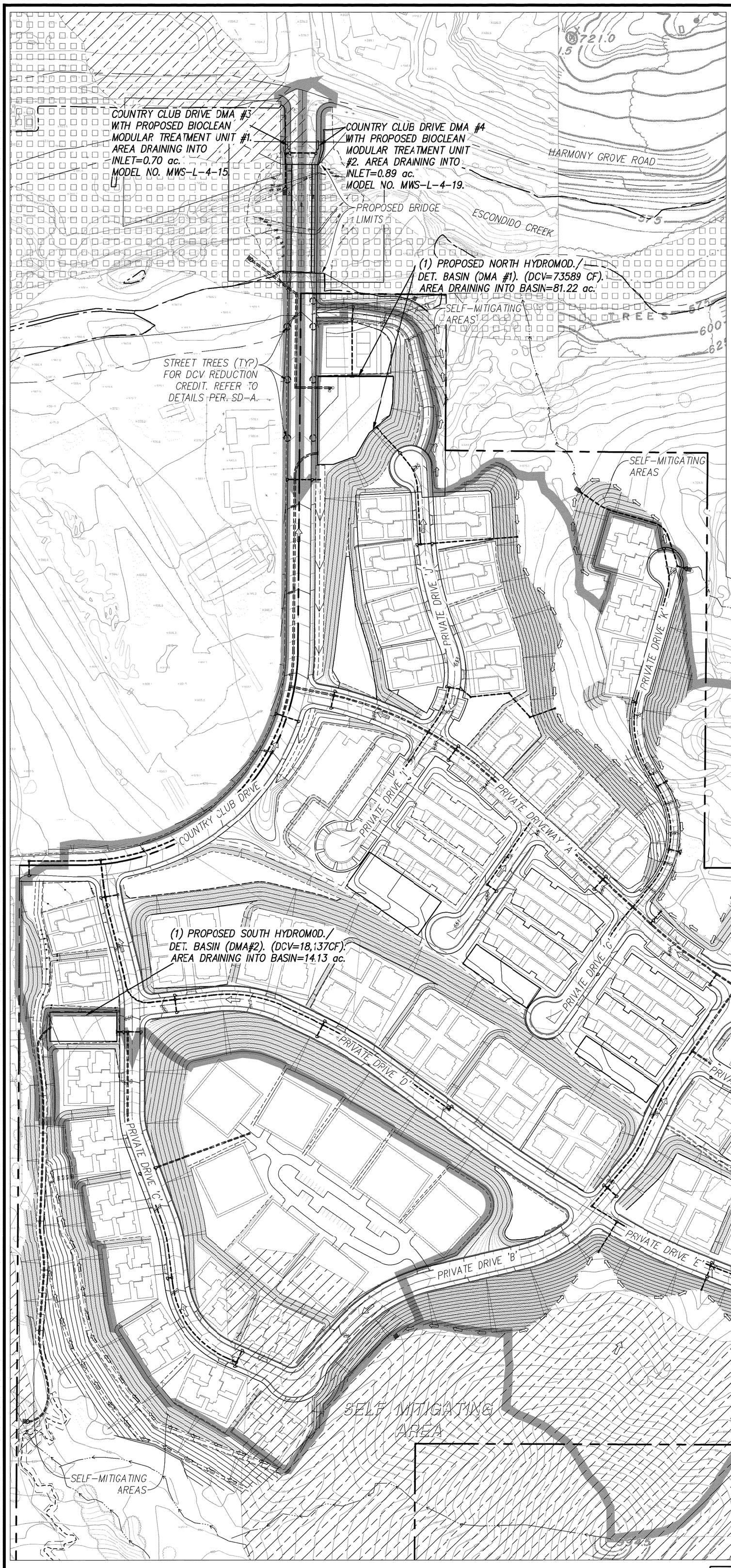
DMA EXHIBIT

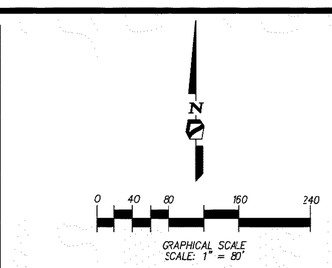
PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Use this checklist to ensure the required information has been included on the DMA Exhibit:

The DMA Exhibit must identify:

- ☒ Underlying hydrologic soil group
- ☒ Approximate depth to groundwater
- ☒ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☐ Critical coarse sediment yield areas to be protected
- ☒ Existing topography and impervious areas
- ☒ Existing and proposed site drainage network and connections to drainage offsite
- ☐ Proposed demolition
- ☒ Proposed grading
- ☒ Proposed impervious features
- ☒ Proposed design features and surface treatments used to minimize imperviousness
- ☒ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
- ☐ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Step 3.5)
- ☒ Structural BMPs (identify location, structural BMP ID#, type of BMP, and size/detail)





LEGEND

- PROJECT BOUNDARY
- DRANAGE SUBAREA TO BMP
- DRANAGE FLOWPATH
- DRANAGE DIRECTION
- SOIL TYPE A (OTHER UNHATCHED AREAS WITHIN DRAINAGE BOUNDARY ARE SOIL TYPE C)
- SOIL TYPE D (OTHER UNHATCHED AREAS WITHIN DRAINAGE BOUNDARY ARE SOIL TYPE C)
- STREET TREE (PER OCV REDUCTION CREDIT)

DMA TABLE

DMA ID	DMA TYPE	ACREAGE	BMP ID
1	DRAINS TO HARVEST AND REUSE/ HYDROMODIFICATION/DETENTION VAULT	81.22	NORTH HYDROMOD./DET. BASIN
2	DRAINS TO HARVEST AND REUSE/ HYDROMODIFICATION/DETENTION VAULT	14.13	SOUTH HYDROMOD./DET. BASIN
3	DRAINS TO PROPRIETARY BMP	0.70	MWS #1
4	DRAINS TO PROPRIETARY BMP	0.89	MWS #2

BMP NOTES:

1. SITE DESIGN BMPS INCLUDE:
   - 4.3.1: MAINTAIN NATURAL DRAINAGE PATHWAYS AND HYDROLOGIC FEATURES
   - 4.3.2: CONSERVE NATURAL AREAS, SOILS, AND VEGETATION
   - 4.3.3: MINIMIZE IMPERVIOUS AREA
   - 4.3.4: MINIMIZE SOIL COMPACTION
   - 4.3.5: IMPERVIOUS AREA DISPERSION
   - 4.3.7: LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES
   - 4.3.8: HARVESTING AND USING PRECPITATION
2. SOURCE CONTROL BMPS INCLUDE:
   - 4.2.1: PREVENTION OF ILLICIT DISCHARGES INTO THE MS4
   - 4.2.2: STORM DRAIN STENCILING OR SIGNAGE
   - 4.2.4: PROTECT OUTDOOR MATERIALS STORAGE AREAS FROM RAINFALL, RUN-ON, RUNOFF, AND WIND DISPERSAL
   - 4.2.5: PROTECT TRASH STORAGE AREAS FROM RAINFALL, RUN-ON, RUNOFF, AND WIND DISPERSAL
   - 4.2.6: ADDITIONAL BMPS BASED ON POTENTIAL SOURCES OF RUNOFF POLLUTANTS (REFER TO SHEET 18 OF THE SWQMP FOR MORE INFORMATION)

GENERAL NOTES:

1. RUNOFF FROM THE DEVELOPED AREA AS SHOWN ON THE EXHIBIT WILL BE TREATED USING HARVEST AND REUSE/HYDROMODIFICATION BASINS, WHICH WILL ALLOW FOR REMOVAL OF POLLUTANTS THAT WILL THEN BE CONVEYED INTO THE PROPOSED STORM DRAIN BEFORE DISCHARGING TOWARDS ESCONDIDO CREEK. (2) BIOCLEAN MODULAR WETLAND UNITS WILL BE USED TO TREAT RUNOFF FLOWING DOWNSTREAM ON COUNTRY CLUB DRIVE TOWARDS HARMONY GROVE ROAD.
2. FOR THE CRITICAL COARSE SEDIMENT YIELD AREAS (CCSYA) REFER TO THE CCSYA EXHIBIT IN ATTACHMENT 2C OF THE SWQMP.
3. SIGNS AND PROHIBITIVE LANGUAGE AND/OR GRAPHICAL ICONS, WHICH PROHIBIT ILLEGAL DUMPING, WILL BE PLACED AT PUBLIC ACCESS POINTS ALONG THE OPEN SPACE WITHIN THE PROJECT AREA.
4. ONLY PEST CONTROL PROFESSIONALS WILL BE USED FOR THE APPLICATION OF PESTICIDES WITHIN HOA MAINTAINED AREAS.
5. HOA MAINTAINED LANDSCAPE AREAS WILL BE DEVELOPED TO INCLUDE EFFICIENT IRRIGATION AND PLANT SELECTION TO PROTECT WATER QUALITY BY MEANS OF WATER CONSERVATION, CANOPY INTERCEPTION, AND PEST RESISTANCE. FLOW REDUCERS AND SHUTOFF VALVES TRIGGERED BY PRESSURE DROP WILL BE USED TO CONTROL WATER LOSS FROM BROKEN SPRINKLER HEADS OR LINES. STEPS WILL BE TAKEN TO PREVENT IRRIGATION DURING AND AFTER PRECIPITATION. FERTILIZERS AND PESTICIDES WILL NOT BE APPLIED WITHIN TWO DAYS OF PREDICTED RAINFALL EVENTS.
6. MISCELLANEOUS WATER WILL NOT BE ALLOWED TO ENTER THE STORM DRAIN SYSTEM; IT SHALL BE DISCHARGED TO LANDSCAPING OR TO THE SEWER AS APPROPRIATE. BUILDING MATERIALS WILL BE SELECTED FOR WATER QUALITY PROTECTION.
7. SLOPES DISTURBED BY CONSTRUCTION ACTIVITIES WILL BE REVEGETATED AND STABILIZED AS SOON AS POSSIBLE. CONCENTRATED RUNOFF SHALL BE DIRECTED AWAY FROM SLOPES AND TEMPORARY EROSION CONTROL MEASURES WILL BE USED TO ALLOW PERMANENT VEGETATION TIME TO GET ESTABLISHED. TO THE MAXIMUM EXTENT POSSIBLE, THE PERMANENT VEGETATION WILL BE NATIVE VEGETATION WITH VARIABLE ROOT DEPTHS, REQUIRING MINIMAL IRRIGATION, SELECTED FOR EROSION CONTROL AND COMPATIBILITY WITH THE SURROUNDING ECOSYSTEM.
8. EDUCATIONAL MATERIALS ON STORMWATER ISSUES, SIMPLE WAYS TO PREVENT STORMWATER POLLUTION AND HOW TO CONTROL PESTS USING NON-TOXIC MATERIALS (INTEGRATED PEST MANAGEMENT PRINCIPLES), WILL BE MADE AVAILABLE TO HOME OWNERS & MAINTENANCE PERSONNEL.
9. GARAGES WILL PROVIDE COVERED PARKING AND REDUCE POLLUTION INTRODUCTION FROM PARKED VEHICLES WITHIN THE RESIDENTIAL DEVELOPMENT.
10. STREETS HAVE BEEN DESIGNED TO MEET MINIMUM WIDTH REQUIREMENTS.
11. TO THE MAXIMUM EXTENT PRACTICABLE, DRAINAGE FROM ROOFTOPS AND OTHER IMPERVIOUS AREAS WILL BE DIRECTED TO LANDSCAPED OR VEGETATED AREAS PRIOR TO DISCHARGING TO THE STORM DRAIN SYSTEM.
12. SIGNIFICANT PORTION OF PROPERTY WILL BE PRESERVED AS OPEN SPACE, CONSISTING OF ENVIRONMENTALLY SENSITIVE HILLSIDES, ANNUAL GRASSES, BRUSH, AND NATURAL DRAINAGE CHANNELS.
13. MAINTENANCE OF THE HYDROMOD BASINS WILL BE THE RESPONSIBILITY OF THE HARMONY GROVE VILLAGE SOUTH HOA. THE MAINTENANCE OF THE MODULAR WETLAND UNITS WILL BE THE RESPONSIBILITY OF THE COUNTY OF SAN DIEGO.
14. ALL DRAINAGE AND WATER QUALITY FEATURES WITHIN THIS DEVELOPMENT AND OUTSIDE THE PUBLIC RIGHT-OF-WAY WILL BE PRIVATE AND PRIVATELY MAINTAINED.
15. DEPTH TO GROUNDWATER IS 16 FEET PER UPDATED GEOTECHNICAL REPORT FOR HARMONY GROVE VILLAGE SOUTH PREPARED BY GEOCON INC., DATED FEBRUARY 3, 2015.

SELF-MITIGATING DMA NOTES:

SELF-MITIGATING DMAs (SECTION 5.2.1 OF BMP DESIGN MANUAL):

- VEGETATION IN THE NATURAL OR LANDSCAPED AREA IS NATIVE AND/OR NON-NATIVE/NON-INVASIVE DROUGHT TOLERANT SPECIES THAT DO NOT REQUIRE REGULAR APPLICATION OF FERTILIZERS AND PESTICIDES.
- SOILS ARE UNDISTURBED NATIVE TOPSOIL, OR DISTURBED SOILS THAT HAVE BEEN AMENDED AND AERATED TO PROMOTE WATER RETENTION CHARACTERISTICS EQUIVALENT TO UNDISTURBED NATIVE TOPSOIL.
- THE INCIDENTAL IMPERVIOUS AREAS ARE LESS THAN 5 PERCENT OF THE SELF-MITIGATING AREA.
- IMPERVIOUS AREA WITHIN THE SELF-MITIGATED AREA SHOULD NOT BE HYDRAULICALLY CONNECTED TO OTHER IMPERVIOUS AREAS UNLESS IT IS A STORM WATER CONVEYANCE SYSTEM (SUCH AS A BROW DITCH).
- THE SELF-MITIGATING AREA IS HYDRAULICALLY SEPARATE FROM DMAS THAT CONTAIN PERMANENT STORM WATER POLLUTANT CONTROL BMPS.

SCALE:	1"=80'
JOB #:	4095.01
CREATED:	01/18/16

PREPARED BY:

PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Engineering | Survey
701 B Street, Suite 800
San Diego, CA 92101
619.235.6471 Tel
619.234.0349 Fax

COUNTY TO SAN DIEGO

HARMONY GROVE VILLAGE SOUTH

PROPOSED CONDITIONS
DRAINAGE MANAGEMENT AREAS

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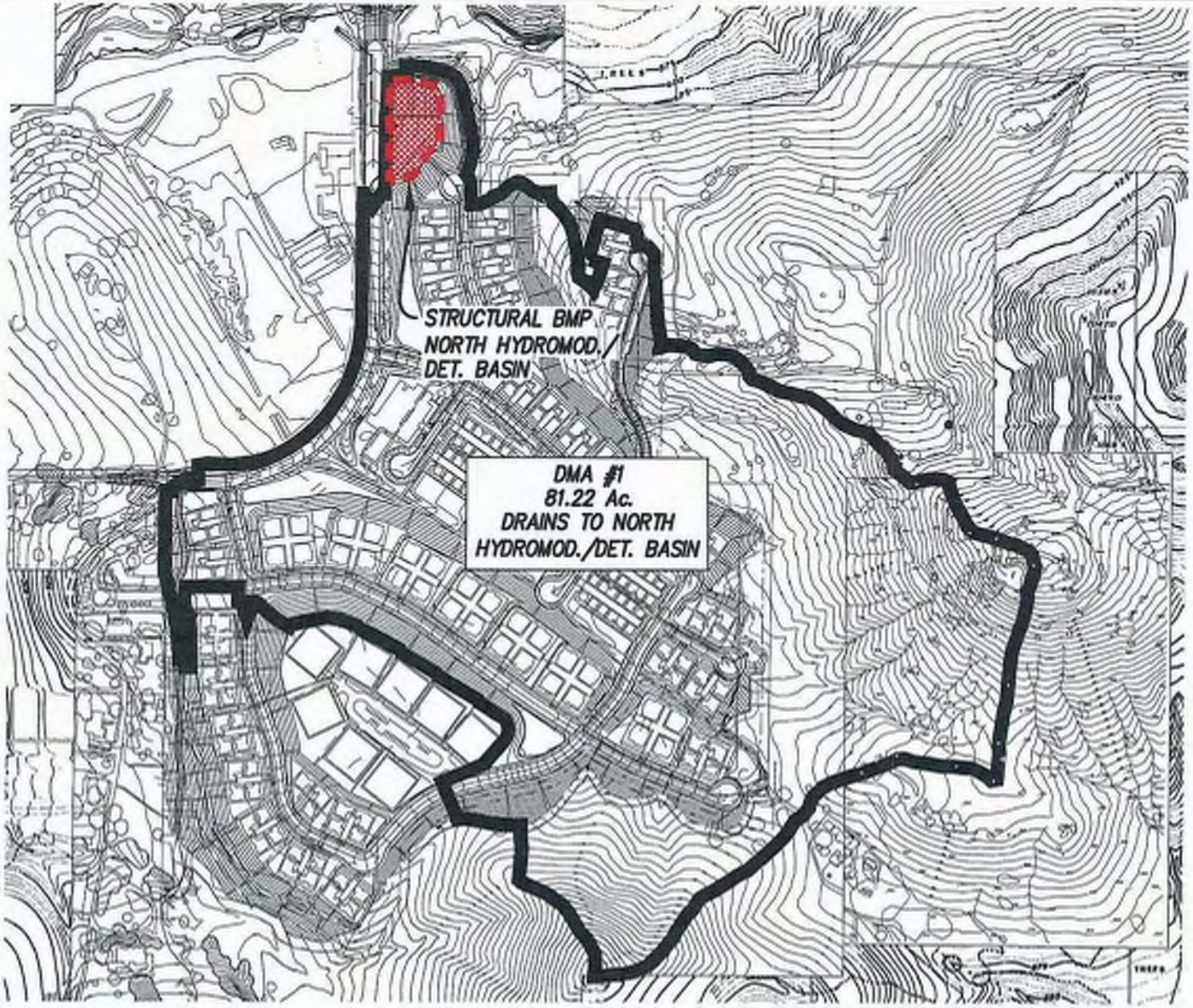
PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ATTACHMENT 1d

BMP DMA MAPBOOK



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PREPARED BY:

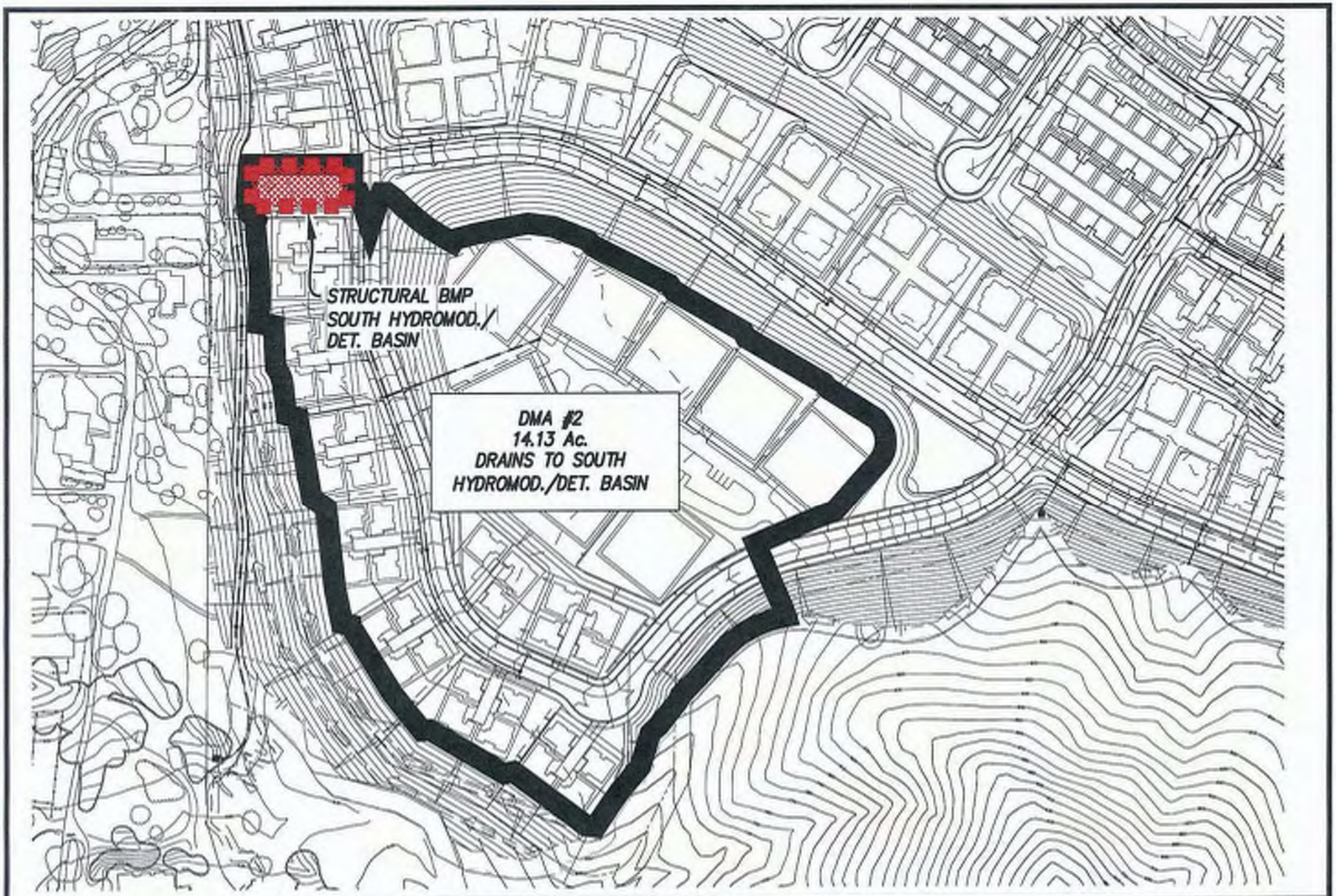
PROJECT DESIGN CONSULTANTS
Planning | Engineering | Survey

COUNTY OF SAN DIEGO

HARMONY GROVE VILLAGE SOUTH

DMA MAPBOOK

DMA 1



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PREPARED BY:

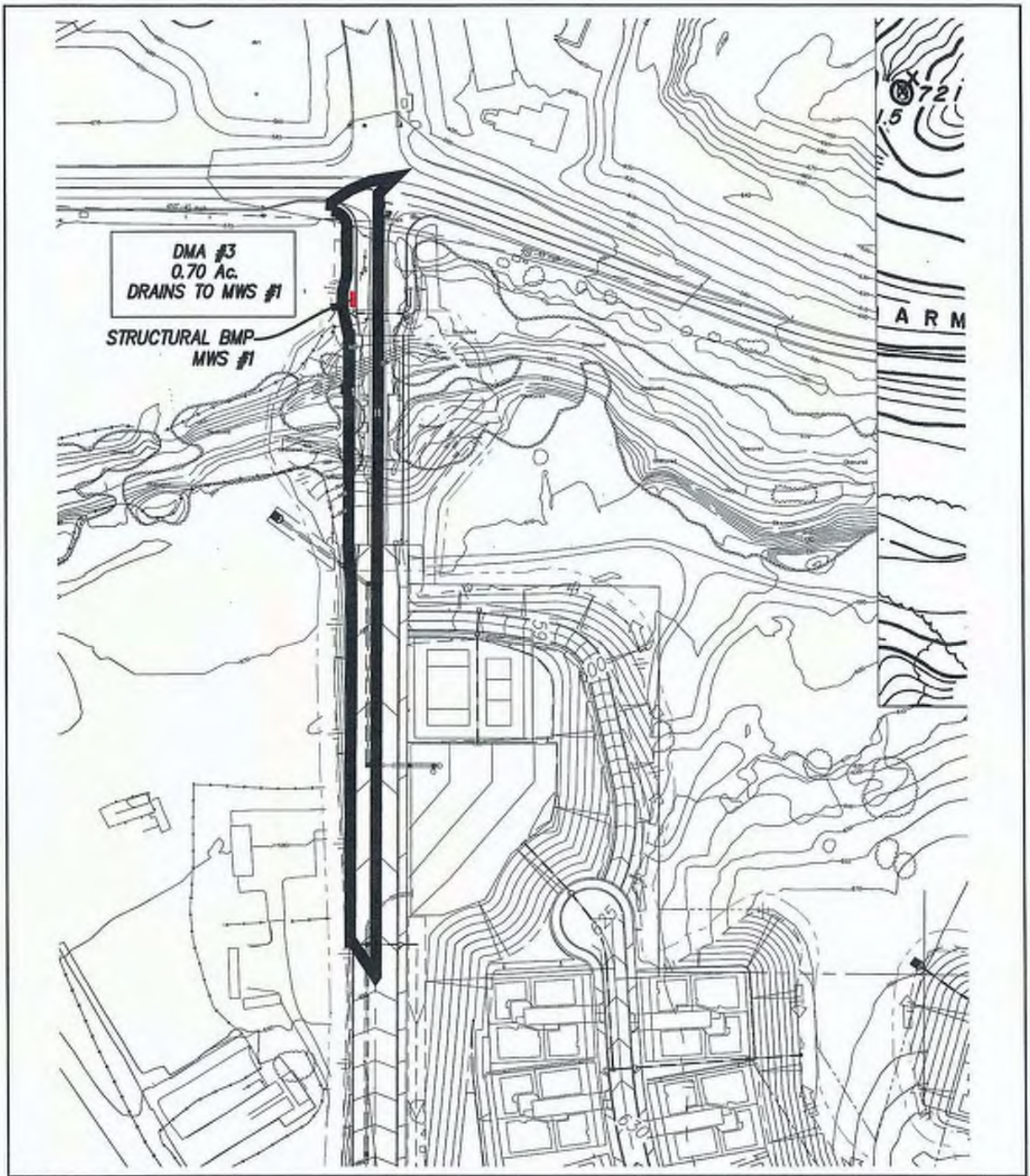
PROJECT DESIGN CONSULTANTS
Planning | Engineering | Survey

COUNTY OF SAN DIEGO

HARMONY GROVE VILLAGE SOUTH

DMA MAPBOOK

DMA 2



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			DMA 3

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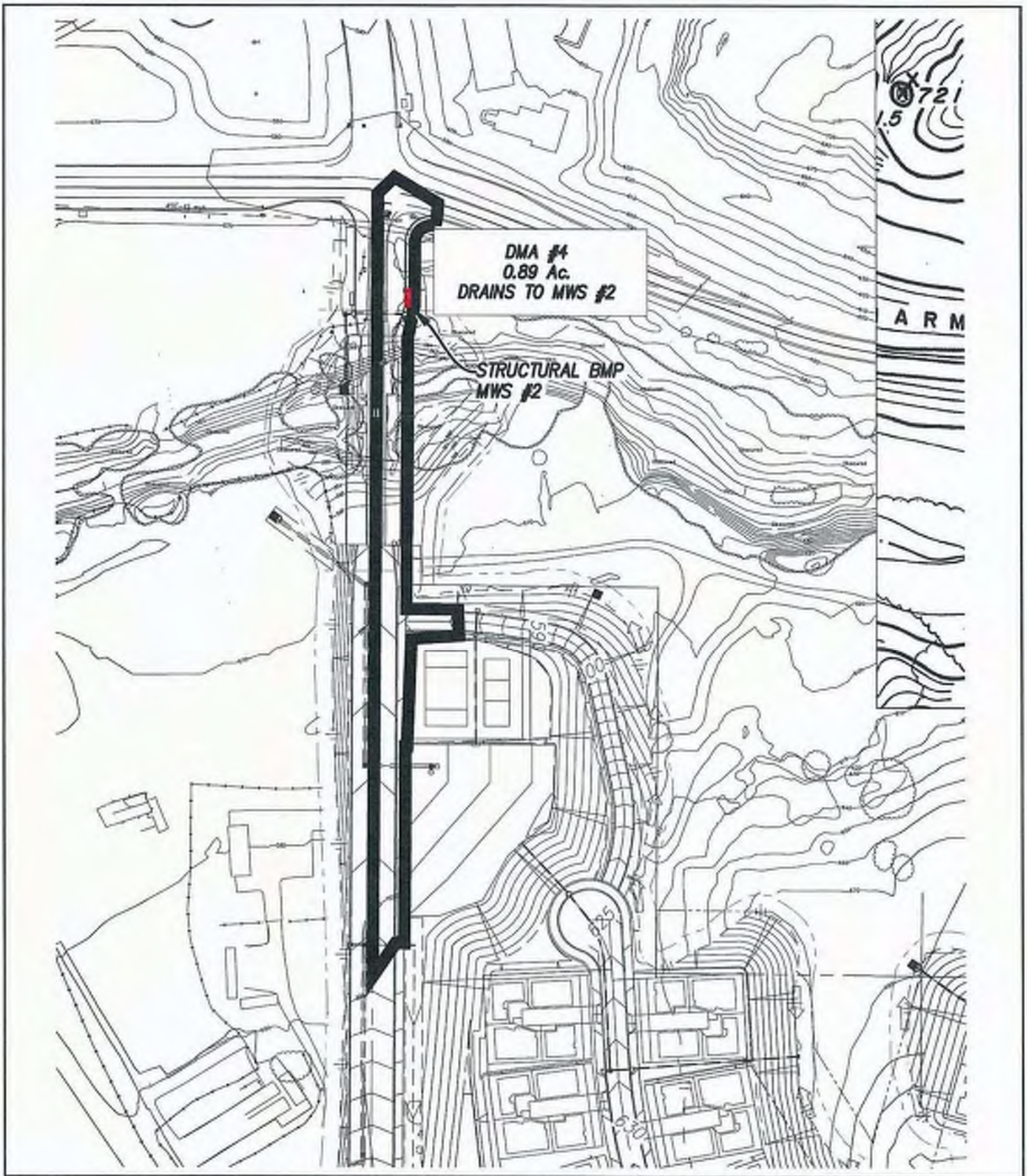

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			DMA 4

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PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ATTACHMENT 2

BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

☐ Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 2a	Flow Control Facility Design, including Structural BMP Drawdown Calculations and Overflow Design Summary (Required) See Chapter 6 and Appendix G of the BMP Design Manual	☒ Included ☐ Submitted as separate stand-alone document (Hydromod. Study submitted as separate stand alone document)
Attachment 2b	Hydromodification Management Exhibit (Required)	☒ Included See Hydromodification Management Exhibit Checklist on the back of this Attachment cover sheet.
Attachment 2c	Management of Critical Coarse Sediment Yield Areas See Section 6.2 and Appendix H of the BMP Design Manual.	☒ Exhibit depicting onsite and/or upstream sources of critical coarse sediment as mapped by Regional or Jurisdictional approaches outlined in Appendix H.1 AND, ☒ Demonstration that the project effectively avoids and bypasses sources of mapped critical coarse sediment per approaches outlined in Appendix H.2 and H.3. OR, ☐ Demonstration that project does not generate a net impact on the receiving water per approaches outlined in Appendix H.4.
Attachment 2d	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	☐ Not performed ☐ Included ☒ Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	☐ Included ☒ Not required because BMPs will drain in less than 96 hours

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ATTACHMENT 2a

STRUCTURAL DRAWDOWN CALCULATIONS

(REFER TO THE HYDROMODIFCATION REPORT UNDER A SEPARATE COVER)

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ATTACHMENT 2b

HYDROMODIFICATION MANAGEMENT EXHIBIT

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Use this checklist to ensure the required information has been included on the Hydromodification Management Exhibit:

The Hydromodification Management Exhibit must identify:

- ☒ Underlying hydrologic soil group
- ☐ Approximate depth to groundwater
- ☐ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☐ Critical coarse sediment yield areas to be protected
- ☒ Existing topography
- ☒ Existing and proposed site drainage network and connections to drainage offsite
- ☒ Proposed grading
- ☒ Proposed impervious features
- ☒ Proposed design features and surface treatments used to minimize imperviousness
- ☒ Point(s) of Compliance (POC) for Hydromodification Management
- ☒ Existing and proposed drainage boundary and drainage area to each POC (when necessary, create separate exhibits for pre-development and post-project conditions)
- ☐ Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail)

BASIN 3 IS BYPASS AREA FOR POC#1. DRAINAGE AREA=1.59 ac.

DISCHARGE FOR BASIN #3

POC#1

PROPOSED BRIDGE LIMITS

ESCONDIDO CREEK

HARMONY GROVE ROAD

(1) PROPOSED NORTH HYDROMOD/DET BASIN. AREA DRAINING INTO BASIN=81.22 ac.

SELF-MITIGATING AREAS

SELF-MITIGATING AREAS

(1) PROPOSED SOUTH HYDROMOD/DET BASIN. AREA DRAINING INTO BASIN=14.13 ac.

SELF-MITIGATING AREAS

POC#2

COUNTRY CLUB DRIVE

PRIVATE DRIVE 'A'

PRIVATE DRIVE 'B'

PRIVATE DRIVE 'C'

PRIVATE DRIVE 'D'

PRIVATE DRIVE 'E'

PRIVATE DRIVE 'F'

PRIVATE DRIVE 'G'

PRIVATE DRIVE 'J'

PRIVATE DRIVE 'K'

N

0 40 80 160 240

GRAPHICAL SCALE
SCALE: 1" = 80'

LEGEND

- PROJECT BOUNDARY
- DRAINAGE SUBAREA TO BMP
- DRAINAGE FLOWPATH
- DRAINAGE DIRECTION
- SOIL TYPE A (OTHER UNHATCHED AREAS WITHIN DRAINAGE BOUNDARY ARE SOIL TYPE C)
- SOIL TYPE D (OTHER UNHATCHED AREAS WITHIN DRAINAGE BOUNDARY ARE SOIL TYPE C)

SCALE:	1"=80'
JOB #:	4095.01
CREATED:	02/05/15

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COUNTY TO SAN DIEGO

HARMONY GROVE VILLAGE SOUTH

POST-PROJECT
DRAINAGE SUBBASIN AREAS
EXHIBIT

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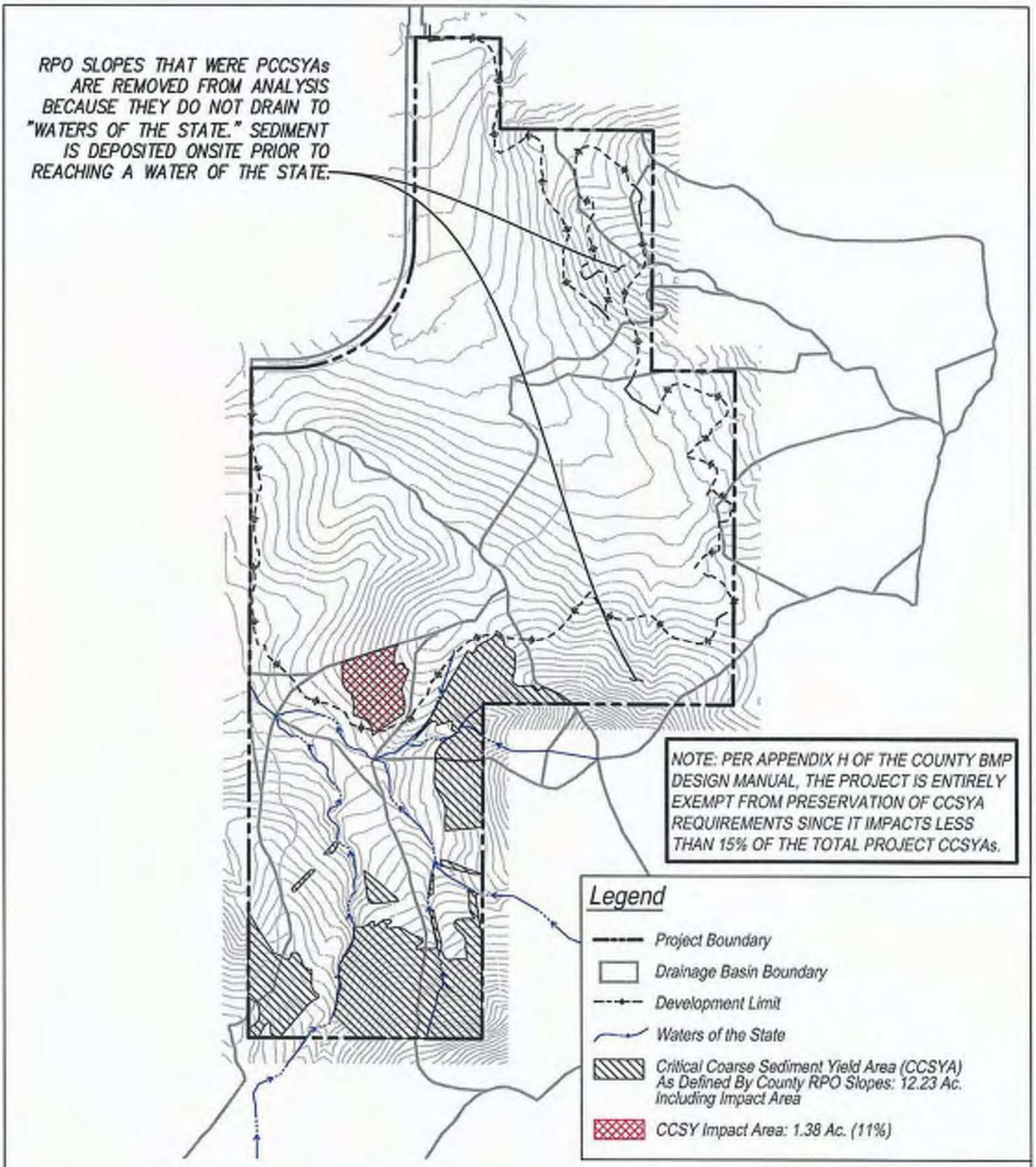
PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ATTACHMENT 2c

- CRITICAL COARSE SEDIMENT YIELD AREAS EXHIBIT
- REFERENCE DOCUMENT – *Resource Protection Study Steep Slope Waiver. Prepared by Helix Environmental Planning (dated July 2015)*
- Depositional Analysis



Harmony Grove Village South

Critical Coarse Sediment Yield Impact Analysis

0 250 500

PROJECT DESIGN CONSULTANTS

Planning | Landscape Architecture | Engineering | Survey

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RESOURCE PROTECTION STUDY
STEEP SLOPE WAIVER

Harmony Grove Village South Project

PDS 2015-GPA-15-002, PDS 2015-SP-15-002, PDS 2015-TM-5600, PDS 2015-REZ-15-003

Prepared for:
County of San Diego
Planning & Development Services
5510 Overland Avenue, Suite 310
San Diego, CA 92123

JULY 17, 2015

RESOURCE PROTECTION STUDY
STEEP SLOPE WAIVER

Harmony Grove Village South Project

PDS2015-GPA-15-002, PDS2015-SP-15-002, PDS2015-TM-5600, PDS2015-REZ-15-003

Lead Agency:

County of San Diego
Planning & Development Services
5510 Overland Avenue, Suite 310
San Diego, CA 92123
Marisa Smith, Project Planning Division Project Manger
858-694-2621

Preparer:
HELIX Environmental Planning
7578 El Cajon Boulevard
La Mesa, CA 91942
Contact: Lisa Kay Capper, JD
619-462-1515

With technical data from:

Project Design Consultants
701 B Street, Suite 800
San Diego, CA 92101
Debby Reece, PE
Camille Passon, AICP

Project Proponent:

David Kovach
RCS Harmony Partners, LLC

Lisa Kay Capper

July 17, 2015

County-approved Visual Analyst
Lisa Kay Capper

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LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

A Steep Slope Resource Protection Study was prepared by HELIX Environmental Planning to evaluate Harmony Grove Village South's (Project) request for a steep slope waiver pursuant to Section 86.604[e] [2] [cc] [3]) of the County's Resource Protection Ordinance (RPO). This Study is based upon the technical RPO steep slope analysis conducted by Project Design Consultants (PDC), with review, confirmation and interpretation by licensed landscape architects from PDC and SWA Group.

ES.1 Project Location

The Project is located in the community of Harmony Grove, approximately 2.5 miles west of Interstate 15 (I-15) and approximately 2.6 miles south of State Route 78 (SR-78). The community of Elfin Forest is located approximately 5 miles to the west. The site is contiguous to Harmony Grove Village, which is currently being developed, and is a part of the same flat valley and valley viewshed as Harmony Grove Village. The Project is also adjacent to a number of existing homes located to the east and west that are sited on RPO steep slope sides as well as on ridgelines and hilltops. The southern and southeastern boundaries of the site abut the Del Dios Highlands Preserve (DDHP).

ES.2 Project Description

The Project proposes to develop a sustainable planned community that integrates a mix of residential, commercial, institutional and open space uses on 111 acres. The Project would include 453 single- and multi-family residential units within 229 structures and approximately 5,000 square feet of recreational/community development. Approximately 68 percent of the site will be retained in open space areas that include: over 30 acres of permanent biological open space (BOS), a system of parks both private and public, a community garden and multi-use trails.

The Project has been planned based on an opportunities and constraints analysis that was prepared to identify the most appropriate location to direct development based on a number of factors; including the location of natural resources, the physical features of the site, and the contiguous uses of Harmony Grove Village. The Project proposes to cluster development in order to preserve a significant percentage of natural resources on the site and to preserve the integrity of the existing landforms.

The Project clusters development away from the southern portion of the site that contains high quality biological resources in order to set aside open space land as a part of a planned and integrated preserve area. In particular, the Project preserves over 30 acres of BOS in the southern portion of the Project, which includes high quality biological resources and a substantial percentage of the on-site steep slopes. This southern area also connects directly to areas in permanent open space preserve associated with the DDHP. Clustering also supports compact neighborhood design and facilitates village uses and non-motorized vehicular travel modes (walking, bike riding) rather than standard design that would seek to develop non-steep slope areas, regardless of location (including farther to the south and closer to DDHP).

The Project would result in some encroachment into three small areas that meet the definition of steep slopes under RPO and a waiver is being requested, pursuant to Section 86.604[e][2][cc][3]. These areas are identified as Area A, B and C in this focused steep slopes technical study and represent less than five percent of the total Project acreage.

ES.3 Waiver Request

RPO is intended to protect the integrity of sensitive lands including wetlands, wetland buffers, floodplains/floodways, sensitive habitats, cultural resources, and steep slopes while allowing for the reasonable use of private property. The purpose and intent of this ordinance to focus on the preservation and protection of the County's unique topography in relation to the preservation of steep slopes.

A waiver from the restrictions of the RPO steep slopes and easement requirements may be granted if the following four findings can be made (RPO Section 86.604[e] [2] [cc] [3]):

aa. The slope is an insignificant visual feature and isolated from other landforms, **OR** surrounding properties have been developed on steep slopes such that this project would be considered "infill"; and

bb. The property is zoned for 0.5 acre lots or smaller at the time the application was made, or a concurrent Rezone has been filed; and

cc. The greater encroachment is consistent with the goals and objectives of the applicable community plan; and

dd. Site Plan review is required to ensure consistency of design with these regulations.

The ability for a slope to be seen does not necessarily mean that it is a significant visual feature. As noted above, the purpose of the ordinance is to preserve unique topography. In this context, land forms that are considered significant visual features include those slopes that meet the definition of RPO steep slope lands and are both visible and visually notable and interesting (i.e., unique) topographic features. Significant landforms draw the viewer's attention and provide primary elements in the viewers' memory of the viewshed. They are the elements noted as "vivid," or memorable, in the County Guidelines. These types of topographic features are therefore generally comprised of large rock outcrops, peaks and promontories. On the other hand, insignificant visual features may meet the RPO steep slope definition relative to gradient and minimum rise, but are either not highly visible; not part of an identifiable peak or ridgeline; and/or "fade" into their surroundings. In other words, they do not present as unique or memorable.

After conducting a RPO steep slope analysis for the Project site, it was determined Areas A, B, and C qualify for a waiver pursuant to Section 86.604[e] [2] [cc] [3]) based upon the following findings:

Criterion aa

Slope Visibility

Area A (approximately 0.5 acre) is located on a uniform slope feature in the center of the site. Although the argument is not being made that the slopes are modified (there is no known historic photography depicting slopes prior to the agricultural use of the parcels in the 1920s), it appears to be a modified slope in that it is a uniformly sloping and rounded feature whereas most of the surrounding topographic features are more abrupt and peaked in nature. As a result of its visual uniformity, it is difficult to identify any specific area on this slope that is, or is not, steep slope. It does not stand out as anything different from the rest of the visible disturbed grassland. There is nothing interesting or unique about this half acre that differentiates it from the non-steep slope areas on the bench. Non-steep slope area extends "above" the area to the top of (and along) the bench feature, as well as to either side and below. This steep slope area is visually insignificant in that it is isolated from an identifiable peak, promontory, or ridgeline, and is not perceived as an integral element of the surrounding peaks that are a part of the Harmony Grove setting.

Area B (approximately 0.2 acre) is comprised of three very small vertical "bars" that are located on the south side of the central bench on the western side of the Project. Each of these isolated stretches just attains the 50-foot reach required under RPO. They are extremely narrow elements, surrounded on all sides by non-steep slope portions of the slope face, and are indistinguishable from those surrounding non-steep slope areas. These areas are also both visually insignificant and isolated.

Area C (approximately four acres for which waiver is requested) is located south of the bench referenced above, with a portion of this slope located on the south side, and a portion located on the westerly facing slope of an increasingly (on- and off-site) steep hill above it. This area is generally not visible to viewers from the north, since so much of the slope is "hidden" from the north. In fact, the closer that one comes to the slope from the north, the less one can see it as it ultimately becomes entirely shielded by the intervening bench. Similar to the discussion above, the on-site top portion of this feature is a much softened knoll, without the sharp and more vertical features of the surrounding peaks. The slope in question does not stand out as visually interesting; in fact, the viewer's eye is drawn over the site to the north, where the hill just north of Harmony Grove Road provides notable (RPO) slope features. The lack of visual impact of this isolated feature, combined with the relatively small number of viewers exposed to this view due to its shielding by the intervening bench from the north, combine to render this slope visually insignificant.

Infill Project

Finding aa provides an option to either find that the slope is an insignificant visual feature or that surrounding properties have been developed on steep slopes such that this project would be considered "infill." In the case of the Project, although many of the homes in the immediate vicinity are located near the valley floor, many are also sited on RPO steep slope sides as well as on ridgelines and hilltops, including the home currently being built near the Project's eastern boundary. A review of RPO steep slope locations against existing homes visible on Google Earth south of Harmony Grove Road shows that approximately 35 percent of the currently existing

homes are sited within steep slope areas. These homes are located to the northeast, southwest and west of the Project (there is no building due south of the Project due to the DDHP boundary, which is immediately adjacent to the Project.) In addition, although it is not yet fully present, Harmony Grove Village is being developed. Therefore the Project can be seen an infill project for this area, which would also – and separately – provide an important consideration of this waiver.

Criterion bb

The project satisfies criterion bb, in that the property is currently designated SR-0.5 and zoned A-70 which allows 0.5 acre lots. The project is also filing a General Plan Amendment to be redesignated to Village 10.9 and SR-0.5 and to be rezoned to S88 (Specific Plan) which would also allow for 0.5 acre lots or smaller on the Project site.

Criterion cc

Relative to criterion cc, the encroachment onto the steep slopes within Areas A, B and C is consistent with the goals and objectives of the Harmony Grove portion of the Elfin Forest and Harmony Grove Community Plan (Community Plan). The Project has been designed to maximize the preservation of high quality biological open space and preserves the integrity of Harmony Grove Valley natural mountainous landform. The desire to preserve a large percentage of the site in open space and develop the property pursuant to the smart growth principles outlined in the County's General Plan led to the decision to cluster development on the Project site. Clustering development on the site allows for the conservation of a large block of contiguous BOS on the southern portion of the Project site. Preservation of this habitat area would also contribute to the continued health of the abutting DDHP. Although this development pattern would require some encroachment into insignificant RPO steep slopes, it is more efficient than pushing development farther into the southern portion of the site in an effort to strictly remain on slopes of less than 25 percent/non-RPO steep slopes. The Project's preservation of open space and natural habitat contributes to the retention of the rural setting and lifestyle of the adjacent Harmony Grove community.

The RPO steep slopes, for which this waiver is being requested, are not interesting topographic features, not part of an identifiable peak, promontory, or ridgeline and are not perceived as an integral element of the surrounding peaks that are a part of the Harmony Grove setting. The Project would retain "unspoiled views to intact hills" consistent with the goals of the Community Plan. The Project would avoid impacts into the "dramatic" hill formations called out in the Community Plan as critical to the setting of the community. The steepest and most notable slopes of the Project would be retained in open space. The Project would keep all development downslope from the iconic ridgeline formations that rim the valley. No ridgelines (formed by connecting the highest peaks along a ridge) are located on site, and therefore no ridgelines would be impacted. The views to steep slopes southeast of the central portion of the Project and to the intact hills in the southern portion would be retained. These undisturbed areas would continue to merge seamlessly into the protected slopes of the DDHP. Finally, the Project does not impact the views toward the Lady of the Valley, called out in the Community Plan as an important community landmark.

Additional information regarding the project's consistency with the Community Plan can also be found in the General Plan Consistency Analysis submitted for the Project.

Criterion dd

Relative to criterion dd, the Specific Plan has applied a "D" designator to the property which requires site plan review to ensure consistency of design with the Specific Plan.

ES.4 Conclusion

The Project has been designed to preserve the integrity of surrounding significant landforms and maximize the preservation of high quality biological open space. The waiver being requested for the three areas described above is consistent with criteria specified in the RPO, in that such steep slope areas are considered insignificant because the slopes are not visually notable and interesting topographic features, not part of an identifiable peak, promontory, or ridgeline and are not perceived as an integral element of the surrounding peaks that are a part of the Harmony Grove setting as documented in this focused steep slope technical analysis.

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1.0 INTRODUCTION

The County's Resource Protection Ordinance (RPO) provides special regulations applicable to certain types of discretionary applications, including tentative maps. It is intended to protect the integrity of sensitive lands including wetlands, wetland buffers, floodplains/floodways, sensitive habitats, cultural resources, and steep slopes (lands having a natural gradient of 25 percent or greater and a minimum rise of 50 vertical feet, unless said land has been substantially disturbed by previous legal grading) while allowing for the reasonable use of private property. Specifically related to topography, the RPO states that the purpose and intent is to focus on the preservation and protection of the County's unique topography.

This analysis is focused on those slopes found to be visually insignificant, and for which a waiver under County Code Title 8, Division 6, Chapter 6 is proposed.

1.1 Project Location

The Harmony Grove Village South (HGV South) Project site is located in the unincorporated portion of San Diego County in the community of Harmony Grove, approximately 2.5 miles west of Interstate 15 (I-15) and approximately 2.6 miles south of State Route (SR) 78. Escondido Creek flows east-west just north of the Project, and the City of Escondido is located to the east. The community of Elfin Forest is located approximately 5 miles to the west. County open-space parcels (the Del Dios Highlands Preserve; DDHP) abut the southern and southeastern boundaries of the Project. Primary access to the Project vicinity is provided by Harmony Grove Road (the nearest east-west connector) and Country Club Drive (a north-south connector that abuts the Project's western boundary). An aerial of the Project site is shown in Figure 1, *Project Site Aerial Photograph*.

1.2 Project Description

The Project proposes to develop 453 single- and multi-family residential units within 229 structures and approximately 5,000 square feet of recreational/community use/commercial space (the Center House) on 111 acres. In addition to the civic and recreational uses, the Center House is currently planned to include a coffee shop or small café as well a small overnight facility (up to four-bed B&B facility) to accommodate the Project as well as the neighborhood. Approximately 68 percent of the site would be retained in open space areas that include approximately 37 acres of permanent open space, a system of parks both private and public, a community garden and public multi-use trails as well as connections to existing and planned trail facilities. A substandard crossing of Escondido Creek that is subject to flooding would be improved to allow for safe ingress and egress to and from the subject and surrounding properties. A water treatment/water reclamation facility (WTWRF) is also proposed.

2.0 HARMONY GROVE VILLAGE SOUTH DEVELOPMENT/ PLANNING CONCEPT

The site is contiguous to Harmony Grove Village, currently being developed, and adjacent to a number of existing homes located to the east and west. Slightly beyond the immediate Project

boundaries, the City of Escondido provides a large number of commercial and industrial uses/opportunities as well as public services such as schools, together with denser housing. The site is also approximately three miles from the Nordahl Road Sprinter (light rail) Station.

The HGV South Project has been planned based on an opportunities and constraints analysis that was prepared to identify the most appropriate location to direct development based on a number of factors; including the location of natural resources, the physical features of the site, and the adjacent uses of Harmony Grove Village. It included a comprehensive environmental review, topographic review, and visual evaluation that take all of these elements into consideration.

The County (and Applicant's) focus on smart growth principles as detailed in the adopted General Plan led first to identification of the Project site as appropriate for development – being close to these services and employment opportunities – and then led to the decision to consolidate development in order to preserve a larger percentage of sensitive resources *in perpetuity*.

The compact development plan would reduce the overall Project footprint, which then results in maximizing area set aside for preservation. The Project would preserve over 30 acres of biological open space (BOS) in the southern portion of the Project, which includes high quality biological resources and a substantial percentage of the on-site steep slopes. This southern area also connects directly to areas in permanent open space preserve associated with the DDHP. Clustering also supports the compact neighborhood design that facilitates village uses and non-motorized vehicular travel modes (walking, bike riding) rather than standard design that would seek to develop all non-RPO slope area, regardless of location (including farther to the south and closer to DDHP).

3.0 STEEP SLOPES CONTEXT

Figure 2, *Slopes Providing the Project Setting*, illustrates the mountainous landform ridgeline rimming the valley setting that provides the general overall context for the valley as a whole as well as the Project site. Figure 3, *Steep Slope Areas South of Harmony Grove Road*, shows a more focused view of steep slope areas that contribute to the visual context within which the site is located. The on-site and highlighted RPO steep slopes within this area alone constitute 368 acres. The elevations of peaks that surmount the notable steep slopes visible from Harmony Grove Valley and that provide the dramatic setting of the valley, are noted on this figure. Located at the base of these primary slopes and in the valley portion, the Project site boundary is also shown, together with some sample on-site elevations. Project site portions proposed for waiver top out at 775 feet above mean sea level (amsl), or approximately 185 feet lower than the closest lowest peak (which, although notably higher than developable on-site areas, is not one of the defining southern and western peaks due to its lower elevation). The other peaks exceed this on-site elevation by up to over 960 feet.

As shown on Figures 2 and 3, in this landform, the surrounding contiguous and visually dominant steep slopes (including notable and often connected sections of areas reaching or exceeding 50 percent slopes) are located all along the higher elevations and connect to the lower portions of higher slopes located east, south and west of the Project. Elevations south of the site

range from 1,000 to 1,320 feet amsl. Elevations associated with Mt. Whitney and adjacent peaks range from 1,618 to 1,736 feet amsl. These slopes contribute to the notable and often abrupt ridgelines in Elfin Forest Recreational Reserve (EFRR) and the DDHP to the south of the Project, as well as in hill formations located to the west; ultimately connecting to Mt. Whitney (and the associated highly valued "Lady of the Valley" formation) in the high slopes west of Harmony Grove and Eden valleys. These ridgelines (lines formed along the highest [topmost] points of a mountain ridge) are specifically noted as valuable and worthy of preservation in the Elfin Forest and Harmony Grove Community Plan portion of the San Dieguito Community Plan.

These notable peaks also provide visual context for smaller topographic features in the valley. As indicated, although even higher mountains are located along the valley edge to the west, the proximity and height of the higher surrounding slopes to the south are so dominant, that on-site topographic variation in the (approximately) northern half of the site and within the disturbed/ grassland areas is not very prominent or visually "meaningful." The abrupt and peaked formations tend to minimize the visual impact of smaller topographic features. This is demonstrated from the north on Figure 4, *View Toward Project Site From Country Club Drive,* where the rocky and scrub-vegetated slopes extend above the lower and flattened hill forms south of Harmony Grove Road, and is additionally depicted below from the south.

3.1 On-site Steep Slopes

The RPO steep slope analysis for the Project site was conducted by Project Design Consultants (PDC) using Autocad Civil 3D, with review, confirmation and interpretation by licensed landscape architects from PDC and SWA Group. As shown on Figure 5, *Study Area Slope Map,* and quantified on Table 1, *On-Site Slope Categories,* 40 percent of the site is categorized as containing steep topography. Sixty (60) percent of the HGV South site contains slopes of less than 25 percent slope.

Table 1
ON-SITE SLOPE CATEGORIES

Slope Range	Acres	Percent
0% - 25%	66.7	60
25% - 50%	39.7	35.8
50%+	4.6	4.1
Total	**111**	**100**

Of the 44.3 acres exceeding 25 percent slope, approximately 26.5 acres meet the definition of steep slopes under the County's RPO. This represents approximately 24 percent of Project site. Table 2, *RPO Slope Acreage*, shows that 26.5 acres, or 24 percent of the site, contains slopes that qualify as RPO steep slopes; whereas 84.5 acres, or 76 percent of the site, does not contain RPO steep slopes.

Table 2 RPO SLOPE ACREAGE		
	Acres	**Percent**
Total Site	111	100
RPO Steep Slopes	26.5	24
Remainder of Site	84.5	76
Total	**111**	**100**

The steep slopes areas of over 25 and 50 percent gradient are located primarily in the southern half of the Project. Although flatter lands also intersperse this area, the terrain is overall higher and more rugged. These also can be the most visible and the most visually abrupt slopes. They also often connect to the steeper formations associated with areas already protected as part of DDHP, as indicated on Figure 4. These southeastern and southernmost portions of the Project are proposed for permanent open space as BOS.

3.2 Requirements Related to RPO Steep Slopes

RPO Section 86.603(c) provides that one or more of the following actions may be required:

1. Application of an open space easement to portions of the site with sensitive (steep) lands,
2. Rezone of the site through application of special area designators for sensitive lands, and
3. Other actions as determined by the decision-making body (the Board of Supervisors).

3.3 RPO Density Formula

Subdivision of parcels within slope dependent land use designations as defined in RPO Section 86.604(e) generally is subject to residential quantity restrictions. The number of homes for the site overall is based on the minimum lot size permitted by the General Plan, multiplied by slope categories of: 0 to 25 percent slope, 25 to 50 percent slope, and over 50 percent slope,

In this case, however, the Project proposes a General Plan Amendment to designate the majority of the developable portion of the site (approximately 53 acres) as Village Residential 10.9. This land use designation is not slope dependent, and the slopes addressed under the proposed waiver discussion below would not be subject to the RPO density formula. The remainder of the site (approximately 58 acres) would maintain the Semi-Rural 0.5 (SR-0.5) designation. This is a slope-dependent land use designation that would permit up to 82 dwelling units. Due to the large area within the southern portion of the project site that would be preserved, however, only 30 units are proposed within the SR-0.5 land use designation, thereby being in conformance with General Plan requirements.

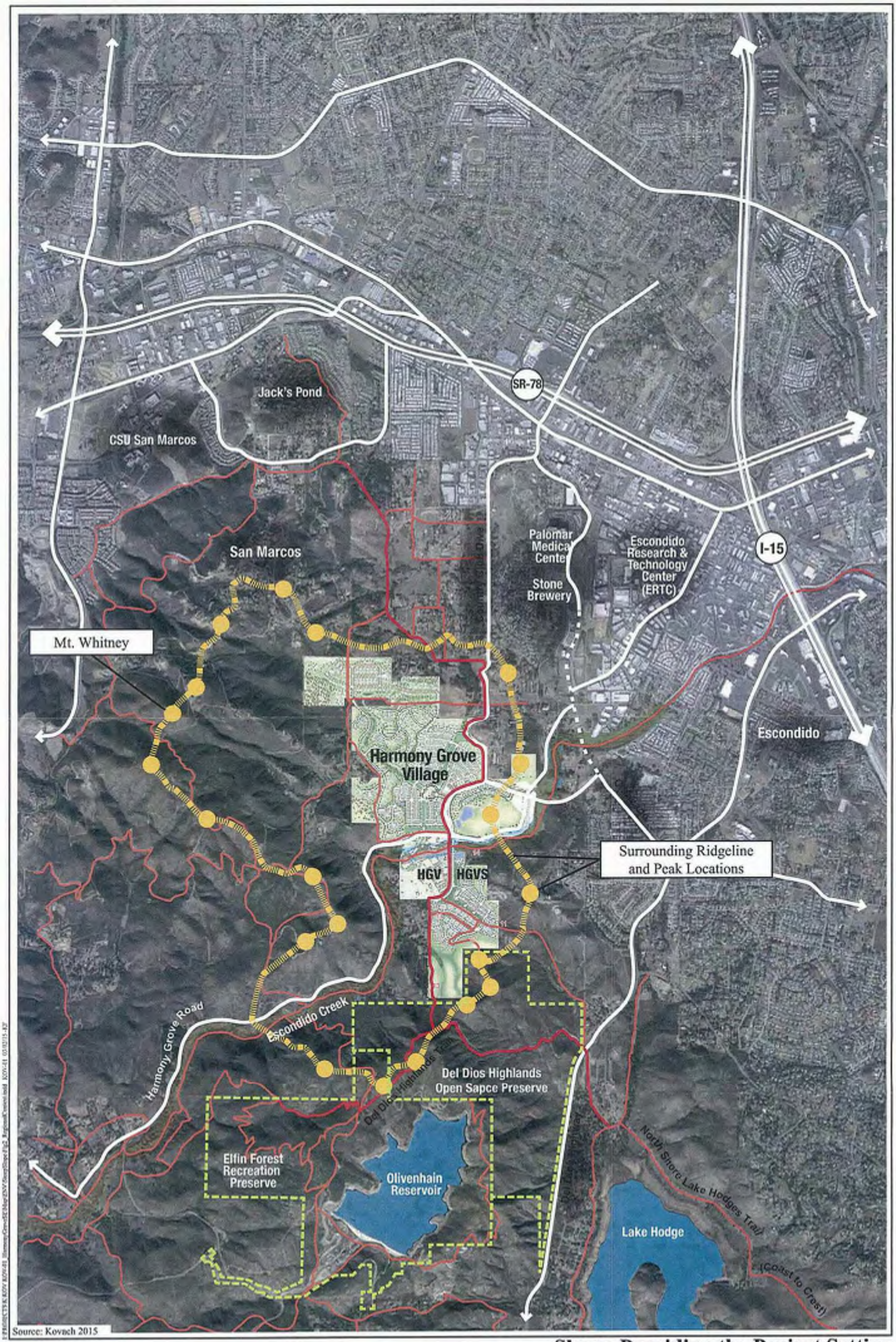
Project Site Aerial Photograph

HARMONY GROVE VILLAGE SOUTH

HELIX Environmental Planning

0 400 Feet

Figure 1

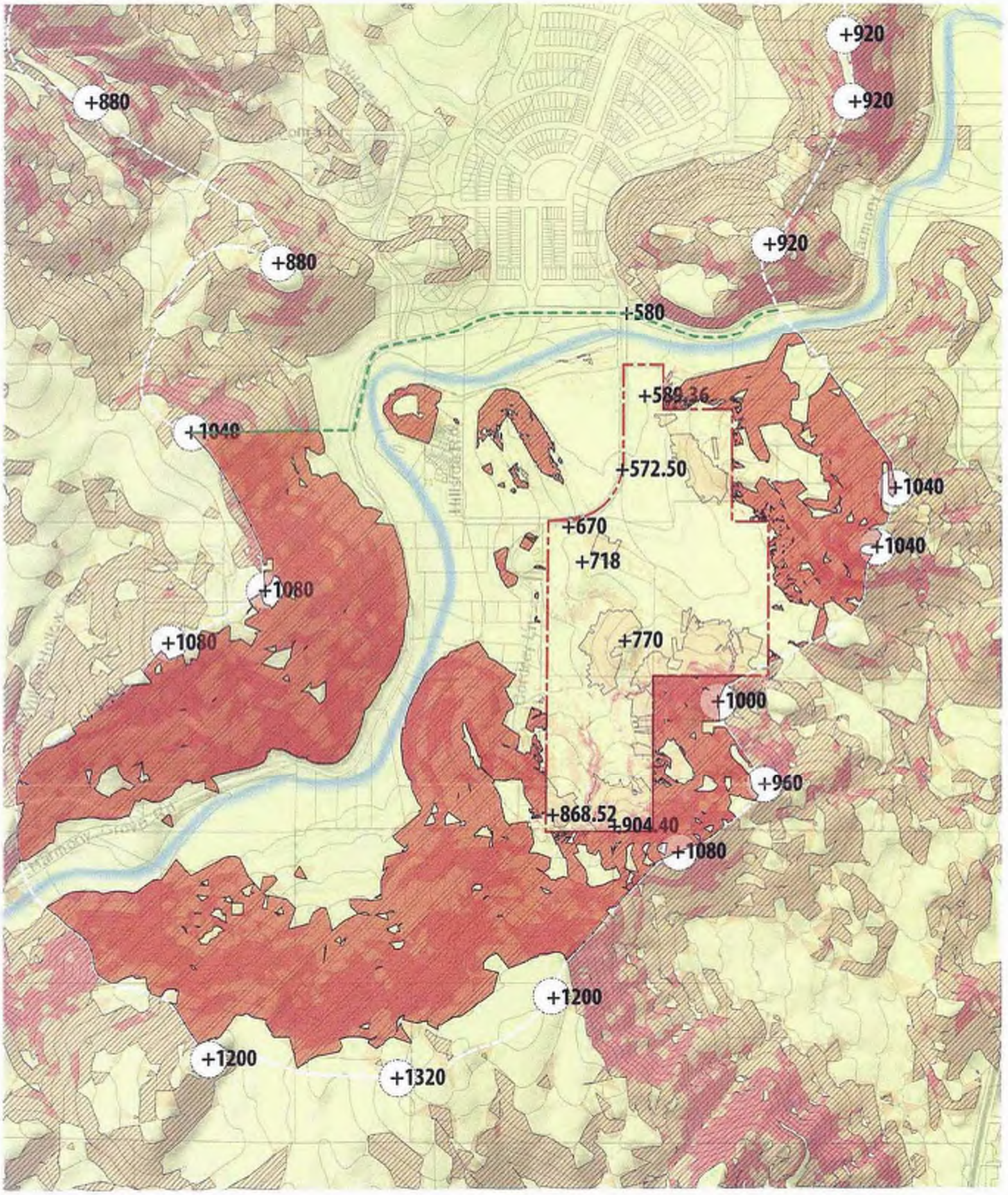


Slopes Providing the Project Setting

HARMONY GROVE VILLAGE SOUTH

HELIX Environmental Planning

Figure 2



Slope Study Legend

- Site Boundary
- Knoll and Ridge Line
- 0 - 25%
- 25% - 50%
- 50% - Above
- Above 25%, 50 Feet or More in Height Within Site Boundary
- Above 25%, 50 Feet or More in Height Outside Site Boundary
- Steep slopes within ridgeline south of Harmony Grove Road

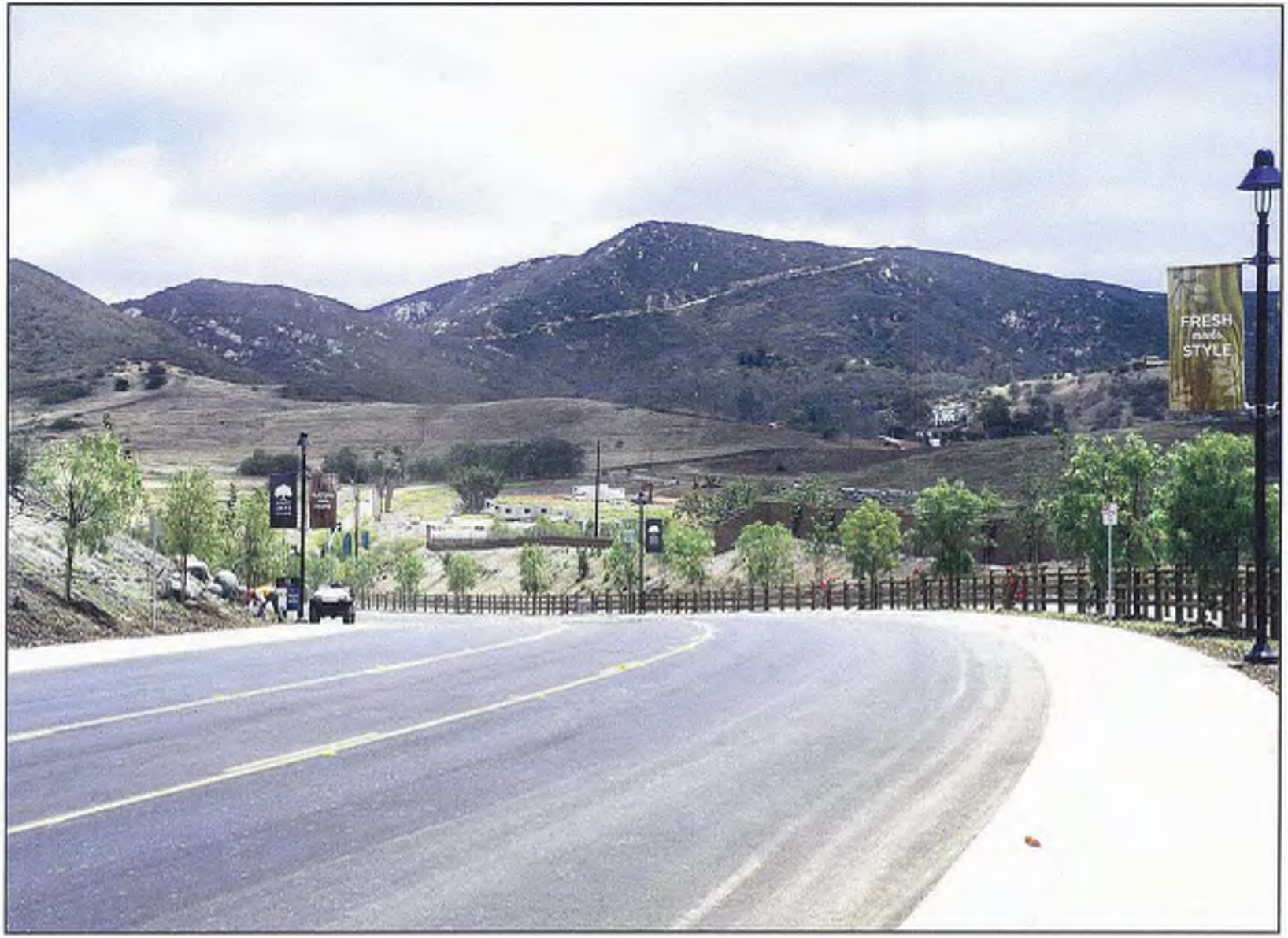
Source: Kovach Group of Companies 2015

Steep Slope Areas South of Harmony Grove Road

HARMONY GROVE VILLAGE SOUTH

HELIX Environmental Planning

Figure 3



View Toward Project Site From Country Club Drive

HARMONY GROVE VILLAGE SOUTH

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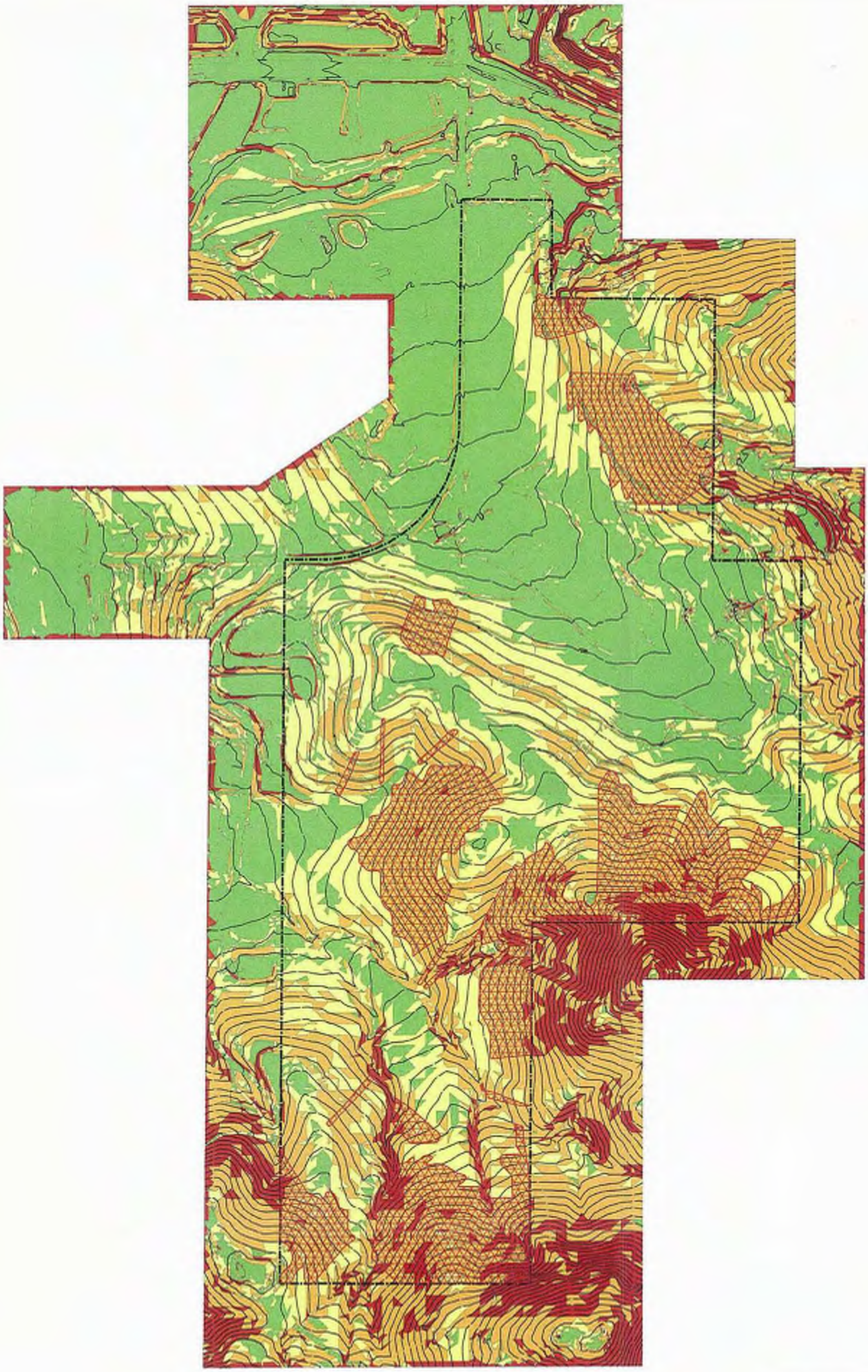
Figure 4



Source: PDC 2015

Study Area Slope Map

HARMONY GROVE VILLAGE SOUTH

HELIX Environmental Planning

Figure 5

4.0 RPO STEEP SLOPES WAIVER

A waiver from the restrictions of the RPO steep slopes and easement requirements (County Code Title 8, Division 6, Chapter 6) may be granted if the following four findings can be made (RPO Section 86.604[e][2][cc][3]):

aa. The slope is an insignificant[1] visual feature and isolated from other landforms, **OR** surrounding properties have been developed on steep slopes such that this project would be considered "infill"; and

bb. The property is zoned for 0.5 acre lots or smaller at the time the application was made, or a concurrent Rezone has been filed; and

cc. The greater encroachment is consistent with the goals and objectives of the applicable community plan; and

dd. Site Plan review is required to ensure consistency of design with these regulations.

Isolated areas in the central portion of the site are proposed for a waiver of the easement requirements. Each of the above criteria and findings is individually addressed below.

4.1 Finding aa

4.1.1 Significant Visual Features

Land forms that are considered significant visual features include those slopes that meet the definition of RPO steep slope lands and are both visible and visually notable and interesting (i.e., unique) topographic features. Significant landforms draw the viewer's attention and provide primary elements in the viewers memory of the viewshed. They are the elements noted as "vivid," or memorable. These types of topographic features are therefore generally comprised of large rock outcrops, peaks and promontories, which is consistent with the identification of "dramatic brush-covered hills" and "granitic formations" and need to "prohibit construction along ridgelines" cited in the Elfin Forest and Harmony Grove Community Plan portion of the San Dieguito Community Plan (2011:15, 19, respectively). In the vicinity of the Project, visible peaks rising above the valley floor that comprise the rim of the valley and are skylined are clearly significant, such as Mt. Whitney and the associated peaks forming the "Lady of the Valley."

4.1.2 Insignificant and Isolated Visual Features

Whether areas with the appropriate slope percentage and height differential are considered "insignificant" depends on the whether they are isolated from other steep slope forms and the extent to which they read as unique forms. Insignificant visual features may meet the RPO steep slope definition relative to gradient and minimum rise; but are either not highly visible, not part

[1] The ability to see a slope does not necessarily mean that it is a significant visual feature. As noted above, the purpose of the ordinance is to preserve unique topography, which by definition means that a significant slope should visually differentiate from those areas that are not protected.

of an identifiable peak or ridgeline, and/or are generally not perceived as part of the Harmony Grove mountainous landform. These include features that do not include the peaks and skylining elements noted above and that generally "fade" into their surroundings. They do not present as unique or memorable. Neither do they appear especially steep in the context of their surroundings. They also are somewhat separated from contiguous reaches of steep slope, either visually and/or by intervening topographic features such as a swale.

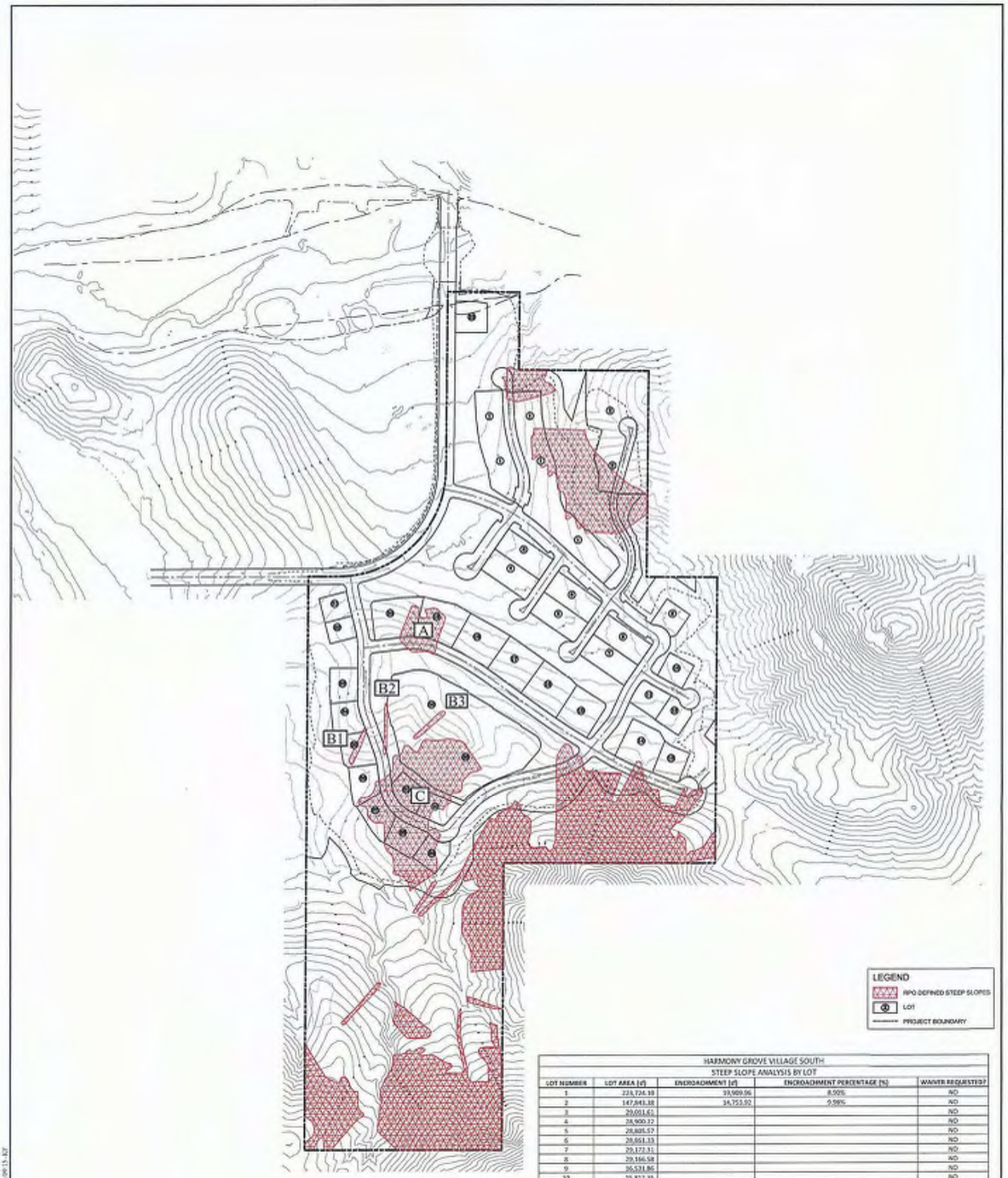
4.1.3 On-site Insignificant and Isolated Visual Features

Relative to criterion aa, each of the slope areas in which a waiver is being requested is physically separated from other areas of steep slope, and is visually insignificant and indistinguishable. They are identified on Figure 6, *RPO Steep Slopes* as A, B (1, 2 and 3) and C. As shown on Figure 6, they do not flow into contiguous areas of RPO-protected steep slope, but are each surrounded by non-steep slope topography, creating small islands.

Area A (approximately 0.5 acre) is shown on Figure 7. Photo a, *The Central Bench*, provides a good reference photo for this slope. As can be seen from this panorama, the bench is a topographically uniform feature. Although the argument is not being made that the slopes are modified (there is no known historic photography depicting slopes prior to the agricultural use of the parcels in the 1920s), it appears to be a modified slope, in that it is a uniformly sloping and rounded feature whereas most of the surrounding topographic features are more abrupt and peaked in nature. Regardless, given the visual uniformity, it is difficult to identify any specific area on this slope that is, or is not, steep slope. Figure 7, Photo b, *Central Bench Steep Slope Area*, identifies the area that modeling (as opposed to the human eye) identifies as RPO steep slope on this north-facing slope. As shown, the approximately 0.5 acre of steep slope called out on Photo 7b does not stand out as anything different from the rest of the visible disturbed grassland. There is nothing interesting or unique about this half acre that differentiates it from the non-steep slope areas on the bench. It is completely consistent with and visually indistinguishable from the rest of the central bench depicted in the figure. Non-steep slope area extends "above" the area to the top of (and along) the bench feature, as well as to either side and below. This area is therefore both visually insignificant and isolated.

Area B is comprised of three very small vertical "bars" that are located on the south side of the central bench on the western side of the Project. As shown on Figure 6, each of these isolated stretches just attain the 50-foot reach required under RPO. They are extremely narrow elements, surrounded on all sides by non-steep slope portions of the slope face, and are indistinguishable from those surrounding non-steep slope areas. These areas are also both visually insignificant and isolated.

Area C includes approximately four acres of area proposed for waiver as insignificant slope. It is located south of the bench just discussed, with a portion of this slope located on that south side, and a portion located on the westerly facing slope of increasingly (on- and off-site) steep hill above it. This area is generally not visible to viewers from the north, since so much of the slope is "hidden" from the north. In fact, the closer that one comes to the slope from the north, the less one can see it as it ultimately becomes entirely shielded by the intervening bench. Similar to the discussion of Area A, the on-site top portion of this feature is a very softened knoll, without the sharp and more vertical features of the surrounding peaks.



HARMONY GROVE VILLAGE SOUTH
STEEP SLOPE ANALYSIS BY LOT

LOT NUMBER	LOT AREA (sf)	ENCROACHMENT (sf)	ENCROACHMENT PERCENTAGE (%)	WAIVER REQUESTED?
1	233,726.38	19,969.96	8.50%	NO
2	147,843.38	14,753.92	9.98%	NO
3	29,051.61			NO
4	28,900.22			NO
5	28,805.57			NO
6	28,651.33			NO
7	29,172.31			NO
8	29,166.58			NO
9	26,521.86			NO
10	35,852.35			NO
11	39,260.32			NO
12	26,857.89			NO
13	29,352.82			NO
14	34,548.34	753.33	2.66%	NO
15	30,849.32			NO
16	36,540.05			NO
17	36,176.38			NO
18	37,071.08			NO
19	38,434.07	14,401.60	37.47%	YES
20	39,558.93	7,885.68	19.93%	YES
21	35,049.20		0.00%	NO
22	32,681.92		0.00%	NO
23	20,518.78		0.00%	NO
24	20,324.06	150.59	0.74%	NO
25	21,689.38	3,514.39	16.20%	YES
26	22,662.41	8,061.66	35.57%	YES
27	22,443.57	15,193.88	67.70%	YES
28	21,995.48	21,995.48	100.00%	YES
29	17,610.25	11,374.82	64.59%	YES
30	19,879.09	10,881.35	54.75%	YES
31	18,637.01	18,637.01	100.00%	YES
32	267,420.39	64,456.13	24.10%	YES
33	21,186.02			NO

Source: PDC 2015

RPO Steep Slopes

HARMONY GROVE VILLAGE SOUTH

HELIX Environmental Planning

Figure 6

a. The Central Bench

b. Central Bench Steep Slope Area

View Toward Central Bench

HARMONY GROVE VILLAGE SOUTH

Figure 7

HELIX Environmental Planning

Viewpoints to this area with the greatest number of viewers sharing the most open and unobstructed views, would be from the south/southwest along public trails. For the purposes of this discussion, the Harmony Grove Overlook in EFRR was chosen. This is one location where both shade and a seating area is provided, and the intention is to look northerly over the valley. It is possible to sit down to enjoy a static view from this viewpoint and this makes it likely that many visitors would do so (although currently abutting vegetation obscures views to the site from the bench itself). As can be seen in Figure 8, Photo a, *View Toward the Project*, the Project area is visible from the vicinity of the overlook. From this (and other elevated) viewpoints, the amount of vertical differential is not visible to the viewer. In fact, referencing Figure 8, Photo b, *Steep Slope Area South of the Central Bench,* relative to the unique and surrounding steep slope mountains, the site looks flat, and without much topographic variation at all in this area. The location of the home being built in RPO steep slope area east of the Project boundary is more identifiable as being on slope. It is within steep slope area contiguous to the higher peak to the east, but still appears relatively flat to the viewer.

Although viewers are expected to be on the move, the site also would be openly visible to the viewers from the Del Dios Highlands Trail in the DDHP. The height of the trail on the viewing hill (the only east-west trail in DDHP), and its location on the broad expanse of slopes exceeding 25 percent with a rise exceeding 50 feet, results in the on-site slope fading into the other non-RPO slopes on site. This is demonstrated on Figure 9, Photo a, *View Toward Project*, where the central portion of the project can be seen to be located on what appears to be a very gentle slope with varied and somewhat disturbed vegetation rising to the east before lowering into a swale. The slope in question does not stand out as visually unique, memorable or interesting. In fact, the viewer's eye is drawn over the site to the north, where the hill just north of Harmony Grove Road provides notable (albeit modified) slope features. The eye is then further drawn to the ridgeline in San Marcos, farther to the north, and to the tops of the mountain range beyond that. It should also be noted that this picture was taken with potential use for simulation under the rigorous County requirements in mind. As a result, it focuses on a 60 degree cone-of-vision. This eliminates views to nearby and lateral upper slopes of which the viewer would be aware (and actually see) as they move through the area. This includes the steep slopes in DDHP south of the viewer, as well as those nearby in the DDHP and EFRR to the east and west. Nonetheless, Figure 9, Photo b, *Steep Slope Area South of the Central Bench*, depicts how the more rolling nature of the lower slopes below the significant peak lines visually fades into connection with valley floor as opposed to reading as steep slope.

From both EFRR and DDHP viewpoints, the lack of unique or notable topography of this isolated feature, combined with its topographic disconnection with steep slopes to the east, north and west, render this slope visually insignificant.

4.1.4 Infill Project

Finding aa provides an option to either find that the slope is an insignificant visual feature or that surrounding properties have been developed on steep slopes such that this project would be considered "infill." Although the previous discussion stands on its own merits, mention should also be made of this "infill" issue. In the case of the Project, although many of the homes in the immediate vicinity are located near the valley floor, many are also sited on RPO steep slope sides as well as on ridgelines and hilltops, including the home currently being built adjacent to

the Project's eastern boundary. A review of RPO steep slope locations against existing homes visible on Google Earth south of Harmony Grove Road shows that approximately 35 percent of the currently existing homes are sited within steep slope areas.[2] These homes are located to the northeast, southwest and west of the Project (there is no building due south of the Project due to the DDHP boundary, which is immediately adjacent to the Project.)

To the north of Harmony Grove Road, the pattern continues. A number of existing homes along the western valley slopes also have been developed on steep slopes. In addition, although it is not yet fully present, Harmony Grove Village is building out. As shown on Figure 2.4-7 (Steep Slope Encroachment Map) of that project's EIR, the 3,000,000 cubic yards of cut and 3,000,000 cubic yards of fill approved for that project has resulted in encroachment into RPO steep slopes. A number of that project's compounds, hillside farmhouses, and grove country house or farmhouses west of Country Club Drive, and village housing (hillside cottages) east of Country Club Drive, will encroach into RPO steep slopes; as has that project's water reclamation facility, located at the very visible intersection of Harmony Grove Road and Country Club Drive.

In conjunction with the very limited availability for additional development in the area, the proposed HGV South development can indeed be seen an infill project, which would also – and separately – provide an important consideration of this waiver.

4.1.5 Project Mitigative Measures

During the planning process for the Project, the on-site landforms formed a primary focus of evaluation. A number of mitigative elements have been folded into Project design as a result of this evaluation. These include elements relative to grading, landscaping and open space protection.

Grading

General Grading. Grading plans have been designed to follow the underlying existing topography, thereby retaining the existing underlying nature of the landform and reflecting the topographic features of the terrain. This is demonstrated by cross sections developed for the Project. Long, continuous straight slopes with hard edges and no transition areas at the top or toe of slope (as relevant) have been avoided.

Open Space Protection. Grading would be prohibited in BOS/natural open space lots except for possible trail placement.

Contour Grading. Contour grading to retain the overall character of the underlying existing features would be implemented. Elements include:

- Rounding of toe and top of slopes
- Blending of graded slope contours into abutting natural topography
- Use of vegetation/landscaping to attenuate angular slopes

[2] This number does not include the non-conforming residential uses associated with the Harmony Grove Spiritualist Association, which is planning to rebuild structures destroyed in the 2014 Cocos Fire.

a. View Toward the Project

b. Steep Slope Area South of the Central Bench

View Toward Project From Harmony Grove Overlook in Elfin Forest Recreational Reserve

HARMONY GROVE VILLAGE SOUTH

Figure 8

HELIX Environmental Planning

a. View Toward the Project

b. Steep Slope Area South of the Central Bench

View Toward Project From Del Dios Highlands Fire Break Trail

HARMONY GROVE VILLAGE SOUTH

HELIX Environmental Planning

Figure 9

- Design of drainage courses to blend with the natural and manufactured terrain within the development

Landscaping

Landscaping has been designed to blend with the existing Harmony Grove Village, as well as reference the surrounding natural environment.

Coast Live Oak Woodland. The existing coast live oak woodland primarily would be preserved. This habitat is important to the character of the area.

Slope Vegetation. Slope plantings would be fast growing and installed to provide slope retention capability. Visual qualities of native vegetation in the surrounding open space (e.g., color, massing) would be incorporated, as would use of native species when appropriate.

Fire Management. Brush management would be implemented in sensitive buffer areas to both follow fire management guidelines provided in the Project Fire Protection Plan and in accordance with County requirements, while maintaining the character of the existing vegetation.

Irrigation. All new planting would be irrigated to quickly establish slope vegetation and protect the slopes. Reclaimed water would be used for irrigation. The HGV South Project would utilize drip or microspray systems with weather-based controllers, backflow prevention, and rain-sensing override devices if any potable water is used for outdoor irrigation purposes. Drought tolerant and native plant species have been chosen for the landscape palette to minimize irrigation needs.

Open Space Protection

Ultimately, the HGV South Project would include a funded Resource Management Plan (RMP) to manage lands retained as BOS. The RMP would control access into BOS, formally restricting it only to approved on-site locations. This would contribute to preservation of sensitive areas.

4.2 Finding bb

The current zoning designation is A-70 and RR with a minimum lot size of 0.5 acre (except for an approximately 0.5 acre piece of land at the far northern boundary that is zoned A-70 with a minimum lot size of eight acres, and which is not proposed for residential development). The Project is also filing for a rezone to S88 – Specific Plan concurrently with Project evaluation.

4.3 Finding cc

HGV South is located within the Harmony Grove Community of the San Dieguito Community Plan. The Elfin Forest and Harmony Grove Community Plan (Community Plan) describes an ideal future for the Harmony Grove community where residents continue their rural small-town lifestyle, local farmers sell organically grown produce, and residents' children often find first homes or their parents can choose to live in retirement.

An important goal of the Plan is to preserve the rural residential lifestyle while accommodating growth. The Harmony Grove Community is designed consistent with the Community Development Model whereby the most intense development is located within the Village and is generally, but not necessarily uniformly, surrounded by decreasing residential densities. HGV South is contiguous to Harmony Grove Village and is a logical extension of this Village. The Project would preserve open space and natural habitat, thereby contributing to the retention of the rural setting and lifestyle of the adjacent Harmony Grove community.

The Harmony Grove Community "strongly supports conservation and protection of native species" (Community Plan 2011:20). The design concept for HGV South allows this to occur by focusing development within the least constrained areas of the site and making the most efficient use of the land. This compact and efficient development pattern reduces the building footprint and preserves the largest block possible of contiguous open space where sensitive biological resources are located. Although this development pattern would require some encroachment into insignificant RPO steep slopes, it is much more efficient than pushing development farther into the southern portion of the site in an effort to strictly remain on non-RPO steep slope land. If the Project design fully avoided all RPO-defined steep slopes, the BOS preserves could be much more fragmented, with substantially increased edge effects and more impacts to rare plants and sensitive species.

The grading plan has been designed to closely follow the underlying existing topography, thereby retaining the existing overall shape of the landform and reflecting the topographic features of the terrain, including focused rise and fall in the northern and central portions of the site. Where no development is proposed, of course, the existing natural terrain would remain. The steepest on-site slopes and connections to the steep and rugged off-site slopes in the southeast and southernmost portions of the Project would be preserved. These lead to and merge seamlessly with the memorable and unique peaks that form the southern edge of the Harmony Grove Valley.

The Community Plan requires standard two-acre lots outside of the Village Boundary "unless significant preservation of resources is achieved and specific findings are met for the preservation of community character with the utilization of lot area averaging, planned residential developments, or specific plans" (Community Plan 2011:31). Although the Project would be incorporated into the Village and would; therefore, not be subject to the two-acre minimum standard, significant preservation of resources and protection of community character would still be achieved through the use of a Specific Plan. Per the Specific Plan, development would be located within the northern and central portion of the site and approximately 30 acres or 27 percent of the site would be preserved within permanent BOS in the southern part of the Project.

The noted retention of BOS leads into Community Plan guidance regarding steep slopes that is particularly relevant to the issue of "greater encroachment." As described in Finding aa, the Project would avoid impacts into the "dramatic" hill formations called out in the Community Plan as critical to the setting of the community. Similarly, the Community Plan voices concern over development on ridgelines (2011:19). The Project would keep all development downslope from the iconic ridgeline formations that rim the valley. No ridgelines (formed by connecting the highest peaks along a ridge) are located on site, and therefore no ridgelines would be impacted.

In addition to not impacting ridgelines, the Project would preserve a large swath of native habitat in the south-central and southern portion of the Project as BOS. Preservation of this habitat would contribute to continued health of abutting habitat in the DDHP. This is consistent with the goal to preserve ridgelines in their native habitat (Community Plan 2011:44).

The most notable slopes of the Project also would be retained in open space. Views to the steep slopes leading to the intact promontory just southeast of the central portion of the Project, and to the intact hills in the southern portion, would be retained. This is consistent with the goal to retain "unspoiled views to the intact hills" (Community Plan 2011:30). These undisturbed areas would continue to merge seamlessly into protected slopes in DDHP with nearby notable peaks reaching 960, 1,000, 1,080 and 1,200 feet amsl; and the slightly more distant peak at 1,320 feet amsl (see Figure 3).

The Project also would not contribute to any ongoing degradation of views toward the Lady of the Valley, called out as "threatened by urban sprawl" in the Community Plan (2011:30). The Project is located southerly of the peaks making up this formation, which are north of Harmony Grove Road and on the western side of the valley. The "Lady" is visible from portions of the Project site. Off-site views taking in both the Project and those peaks require the viewer to be at some distance. Viewers south of the Project would look over the Project to the notable higher peaks that form the "Lady," encompassing all the intervening development in Harmony Grove Valley, as well as Eden Valley and points well to the north. Viewers from the north would be closer to the "Lady" but would be looking westerly to see her. Views toward the Project would then be lateral, and the Project would appear as a smaller development in the distance without relationship to the Lady of the Valley. Implementation of the Project would not impact the importance, form, or visibility of this important community landmark.

It should also be noted that the Community Plan references the General Plan Goal COS-12 regarding the preservation of ridgelines (Community Plan 2011:30). The General Plan indicates that undeveloped ridgelines and steep hillsides should be protected through the application of semi-rural or rural designations on these areas. HGV South has maintained the SR-0.5 designation within the southern portion of the site where the most significant and steep on-site slopes would be preserved within permanent open space.

To protect community character, the Project has been designed to appear much less dense than the number of dwelling units would suggest. Over half of the proposed homes are single-family residences. The remaining residences would be located within structures built to accommodate multiple dwellings, yet still appear like single-family homes or repurposed agricultural/rural structures. The site layout promotes a feeling of openness with substantial internal open space features such as a remnant drainage that would be restored to a naturalized state, wide landscaped areas between buildings, and an assortment of park and recreation areas including community gardens. Together, natural open space, common area landscaping, and recreational areas are important framework elements and represent approximately 75 acres or 68 percent of the entire Project area.

For expanded information regarding the Project's consistency with specific Community Plan goals and policies and community character, refer to the General Plan Consistency Analysis (under separate cover).

4.4 Finding dd

As part of the Project's rezone, a D designator would be applied to the site which would require site plan review. This designator would ensure that future development is consistent with the design of these regulations and the design guidelines within the HGV South Specific Plan.

5.0 CONCLUSION

The Project design is based on a process that fully values the on-site and surrounding significant landforms. A total of approximately 4.7 acres of RPO steep slope is proposed for waiver as insignificant slope consistent with the specific and objective criteria specified in the RPO. This is 1.3 percent of the steep slopes located south of Harmony Grove Road and shown on Figure 3.

The Project has been designed to retain the unique and memorable landforms, as well as those that are visually related to the steep and upward reaching slopes associated with the surrounding peaks.

Taking all the information provided above regarding:

1. relative lack of visual prominence,
2. lack of slope significance and/or connection of these slope areas to more contiguous RPO-steep slope areas,
3. infill nature of the Proposed Project relative to surrounding residences placed onto RPO steep slopes, and
4. requirements for design review and Project conditions; as well as
5. consistency with environmental protection sections of the Community Plan;

a waiver from the RPO steep slope easement restrictions is appropriate for these areas. The steep slopes for which a waiver is requested are indistinguishable from surrounding areas of non-RPO protected slopes, and do not present unique landforms. They are, therefore, not significant slopes and a waiver to the steep slope open space easement requirement is requested.

SCALE: 1"=100'

N

LEGEND

PROJECT BOUNDARY

DRAINAGE SUBAREA

DRAINAGE FLOWPATH

HYDROLOGY NODE

SUBAREA ACREAGE (FROM UPSTREAM TO DOWNSTREAM NODE) — 0.15 AC

CROSS SECTION LOCATION FOR PCCSYA DEPOSITIONAL ANALYSIS — B B

NOTE: FOR FULL 100-YR MAP, REFER TO DRAINAGE STUDY.

HARMONY GROVE RD

0.85 AC

COUNTRY CLUB DR

201

ESCONDIDO CREEK

200

Q2=46.5 (NODE 202 TO 200), V<3 FPS, SO UPSTREAM PCCSYA SLOPES ARE NOT CCSYAs PER DEPOSITIONAL ANALYSIS.

32.9 AC

	SCALE: 1"=100'	PREPARED BY: PROJECT DESIGN CONSULTANTS Planning | Landscape Architecture | Engineering | Survey 701 B Street, Suite 800 San Diego, CA 92101 619.235.6471 TEL 619.234.0349 FAX	COUNTY OF SAN DIEGO
	JOB #: 4095		HARMONY GROVE VILLAGE SOUTH
	CREATED: 12/28/16		DRAINAGE MAP-Q2 EXISTING CONDITIONS DEPOSITIONAL ANALYSIS FOR PCCSYA

P:\4095\Engr\Reports\SWQMP\Attachments\Attach2\CCSY\CCSYA Depositional Analysis\EXIST_HYD-Q2.dwg 12/28/2016 6:38:26 PM

Cross Section for Section B-exist

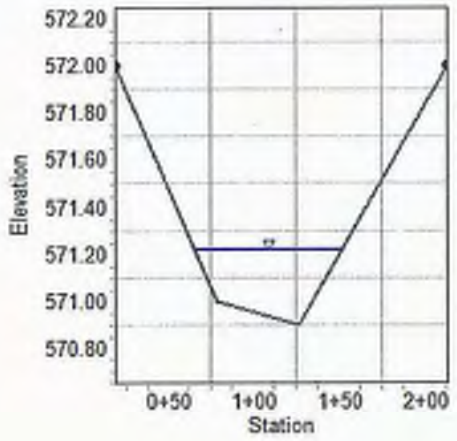
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02000	ft/ft
Normal Depth	0.32	ft
Discharge	46.50	ft³/s ← Q_2

Cross Section Image



Worksheet for Section B-exist

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02000	ft/ft
Discharge	46.50	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+19	572.00
0+79	571.00
1+26	570.90
2+13	572.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+19, 572.00)	(2+13, 572.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.32	ft
Elevation Range	570.90 to 572.00 ft	
Flow Area	18.49	ft²
Wetted Perimeter	86.01	ft
Hydraulic Radius	0.22	ft
Top Width	86.00	ft
Normal Depth	0.32	ft
Critical Depth	0.32	ft
Critical Slope	0.02205	ft/ft

Worksheet for Section B-exist

Results

Velocity		2.51 ft/s	< 3 fps, OK
Velocity Head		0.10 ft	
Specific Energy		0.42 ft	
Froude Number		0.96	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

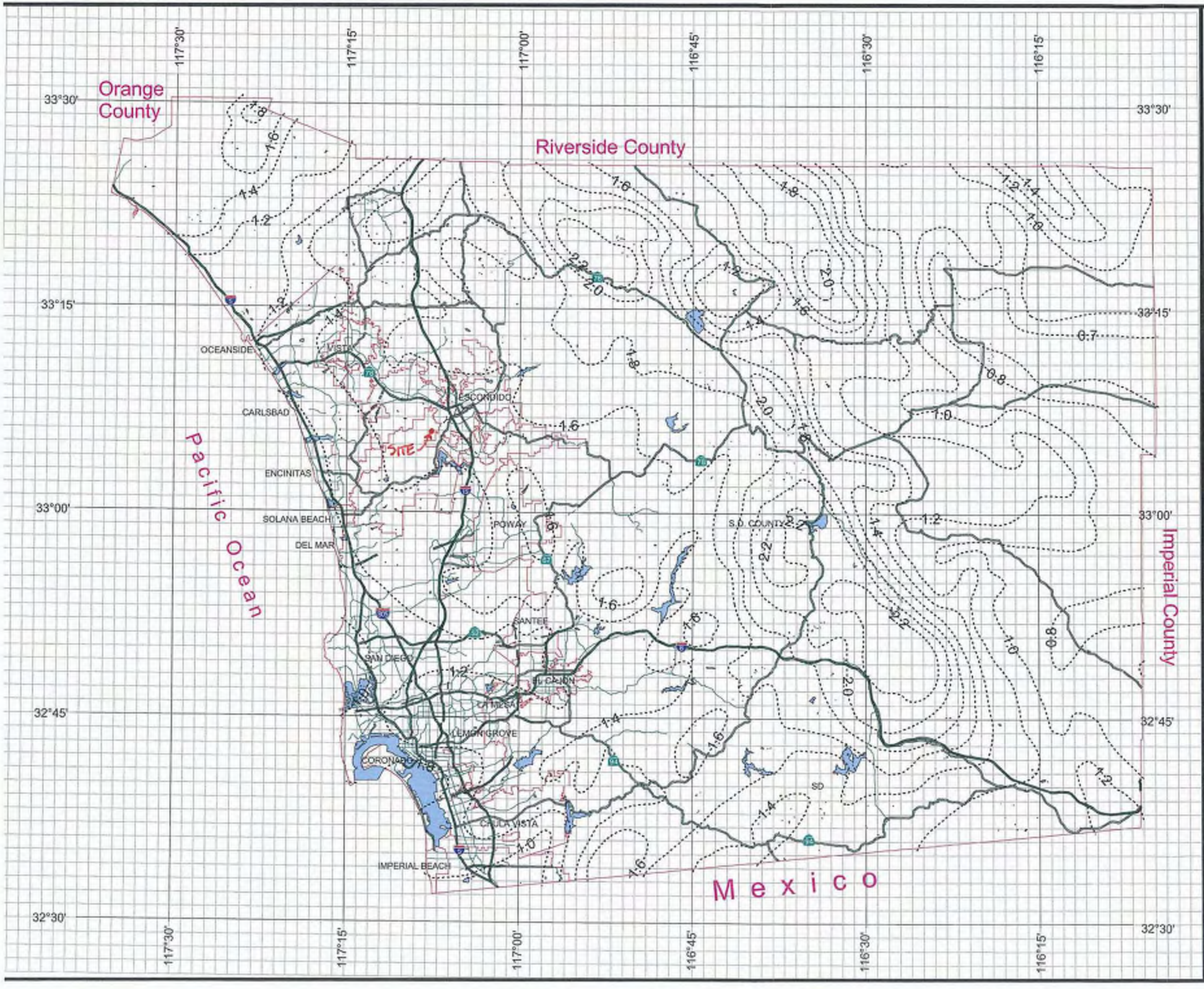
Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.32	ft
Critical Depth	0.32	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.02205	ft/ft

County of San Diego Hydrology Manual

Rainfall Isopluvials

2 Year Rainfall Event - 6 Hours

Isopluvial (inches)



DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N W E S

3 0 3 Miles

```
**************************************************************************

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2012 Advanced Engineering Software (aes)
            Ver. 19.0 Release Date: 06/01/2012  License ID 1509

                          Analysis prepared by:


 ************************** DESCRIPTION OF STUDY **************************
* HARMONY GROVE                                                           *
* BASIN 200                                                               *
* EXISTING CONDITION - 100-YEAR STORM EVENT                               *
 *************************************************************************

  FILE NAME: S200E02.DAT
  TIME/DATE OF STUDY: 09:28 12/28/2016
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  6-HOUR DURATION PRECIPITATION (INCHES) =    1.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)     SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  =====  ====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE     214.00 TO NODE     212.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3300
  S.C.S. CURVE NUMBER (AMC II) =  0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   180.00
  UPSTREAM ELEVATION(FEET) =    828.50
  DOWNSTREAM ELEVATION(FEET) =    808.00
  ELEVATION DIFFERENCE(FEET) =     20.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.434
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.359
  SUBAREA RUNOFF(CFS) =       0.53
  TOTAL AREA(ACRES) =       0.48   TOTAL RUNOFF(CFS) =       0.53

****************************************************************************
  FLOW PROCESS FROM NODE     212.00 TO NODE     210.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     808.00  DOWNSTREAM(FEET) =     690.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   725.00   CHANNEL SLOPE =  0.1628
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   1.00
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.606
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.89
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   3.10
  Tc(MIN.) =    9.54
  SUBAREA AREA(ACRES) =    10.40       SUBAREA RUNOFF(CFS) =    8.40
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.311
  TOTAL AREA(ACRES) =       10.9         PEAK FLOW RATE(CFS) =       8.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   4.94
  LONGEST FLOWPATH FROM NODE    214.00 TO NODE    210.00 =     905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     210.00 TO NODE     202.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     690.00  DOWNSTREAM(FEET) =     638.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   990.00   CHANNEL SLOPE =  0.0525
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   1.00
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.112
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.31
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.50
  AVERAGE FLOW DEPTH(FEET) =   0.36   TRAVEL TIME(MIN.) =   3.67
  Tc(MIN.) =   13.21
  SUBAREA AREA(ACRES) =    31.90       SUBAREA RUNOFF(CFS) =   20.89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.310
  TOTAL AREA(ACRES) =       42.8         PEAK FLOW RATE(CFS) =      28.03

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =   5.12
  LONGEST FLOWPATH FROM NODE    214.00 TO NODE    202.00 =    1895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     210.00 TO NODE     202.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =   13.21
RAINFALL INTENSITY(INCH/HR) =   2.11
TOTAL STREAM AREA(ACRES) =    42.78
PEAK FLOW RATE(CFS) AT CONFLUENCE =     28.03

****************************************************************************
FLOW PROCESS FROM NODE    208.00 TO NODE    206.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) =  85
INITIAL SUBAREA FLOW-LENGTH(FEET) =   170.00
UPSTREAM ELEVATION(FEET) =    888.00
DOWNSTREAM ELEVATION(FEET) =    828.00
ELEVATION DIFFERENCE(FEET) =     60.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.664
WARNING:  INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.277
SUBAREA RUNOFF(CFS) =      0.32
TOTAL AREA(ACRES) =      0.35   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
FLOW PROCESS FROM NODE    206.00 TO NODE    204.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    828.00  DOWNSTREAM(FEET) =    680.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   610.00   CHANNEL SLOPE =  0.2426
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   1.00
   2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.522
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) =  85
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.76
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.04
AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   3.35
Tc(MIN.) =   10.03
SUBAREA AREA(ACRES) =     3.73       SUBAREA RUNOFF(CFS) =    2.82
AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
TOTAL AREA(ACRES) =       4.1         PEAK FLOW RATE(CFS) =       3.07

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   3.73
LONGEST FLOWPATH FROM NODE    208.00 TO NODE    204.00 =     780.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    204.00 TO NODE    202.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    680.00  DOWNSTREAM(FEET) =    638.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   545.00   CHANNEL SLOPE =  0.0771
```

```
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   1.00
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.100
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  85
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.46
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.76
 AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   3.29
 Tc(MIN.) =   13.32
 SUBAREA AREA(ACRES) =     1.30       SUBAREA RUNOFF(CFS) =    0.82
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
 TOTAL AREA(ACRES) =        5.4         PEAK FLOW RATE(CFS) =       3.38

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   2.72
 LONGEST FLOWPATH FROM NODE    208.00 TO NODE    202.00 =    1325.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    204.00 TO NODE    202.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   13.32
 RAINFALL INTENSITY(INCH/HR) =   2.10
 TOTAL STREAM AREA(ACRES) =     5.36
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.38

 ** CONFLUENCE DATA **
 STREAM      RUNOFF        Tc       INTENSITY       AREA
 NUMBER       (CFS)      (MIN.)    (INCH/HOUR)     (ACRE)
     1        28.03     13.21        2.112          42.78
     2         3.38     13.32        2.100           5.36

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF        Tc       INTENSITY
 NUMBER       (CFS)      (MIN.)    (INCH/HOUR)
     1        31.38     13.21        2.112
     2        31.25     13.32        2.100

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      31.38   Tc(MIN.) =   13.21
 TOTAL AREA(ACRES) =       48.1
 LONGEST FLOWPATH FROM NODE    214.00 TO NODE    202.00 =    1895.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    202.00 TO NODE    200.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    638.00  DOWNSTREAM(FEET) =    570.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1525.00   CHANNEL SLOPE =  0.0446
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.738
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
```

```
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  76
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      41.69
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.45
 AVERAGE FLOW DEPTH(FEET) =   0.59   TRAVEL TIME(MIN.) =   4.66
 Tc(MIN.) =   17.87
 SUBAREA AREA(ACRES) =    32.90       SUBAREA RUNOFF(CFS) =   20.59
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.330
 TOTAL AREA(ACRES) =       81.0         PEAK FLOW RATE(CFS) =      46.45  <- Q2@BB

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.62   FLOW VELOCITY(FEET/SEC.) =   5.69
 LONGEST FLOWPATH FROM NODE    214.00 TO NODE    200.00 =    3420.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    201.00 TO NODE    200.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.738
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5100
 S.C.S. CURVE NUMBER (AMC II) =  76
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3316
 SUBAREA AREA(ACRES) =    0.85   SUBAREA RUNOFF(CFS) =    0.75
 TOTAL AREA(ACRES) =      81.9   TOTAL RUNOFF(CFS) =     47.20
 TC(MIN.) =   17.87

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    200.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.738
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) =  85
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3316
 SUBAREA AREA(ACRES) =    0.00   SUBAREA RUNOFF(CFS) =    0.00
 TOTAL AREA(ACRES) =      81.9   TOTAL RUNOFF(CFS) =     47.20
 TC(MIN.) =   17.87
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       81.9  TC(MIN.) =     17.87
 PEAK FLOW RATE(CFS)    =      47.20
============================================================================

 END OF RATIONAL METHOD ANALYSIS
```

ATTACHMENT 3

Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Plan (Required)	☒ Included See Structural BMP Maintenance Information Checklist on the back of this Attachment cover sheet.
Attachment 3b	Draft Stormwater Maintenance Notification / Agreement (when applicable)	☐ Included ☒ Not Applicable (Will be included in Final Engineering)

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ATTACHMENT 3a

STRUCTURAL BMP MAINTENANCE PLAN

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:

Attachment 3a must identify:

- ☒ Specific maintenance indicators and actions for proposed structural BMP(s). This must be based on Section 7.7 of the BMP Design Manual and enhanced to reflect actual proposed components of the structural BMP(s)
- ☒ How to access the structural BMP(s) to inspect and perform maintenance
- ☒ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☒ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☒ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☒ Recommended equipment to perform maintenance
- ☒ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management

Attachment 3b: For all Structural BMPs, Attachment 3b must include a draft maintenance agreement in the County's standard format depending on the Category (PDP applicant to contact County staff to obtain the current maintenance agreement forms). Refer to Section 7.3 in the BMP Design Manual for a description of the different categories.

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ATTACHMENT 3a

Proposed pollutant control BMPs are proposed to be privately maintained into perpetuity. Details will be forthcoming in subsequent submittals for Final Engineering.

Underground Basin Maintenance:

The provision for maintenance will include a combination of manhole(s) and strategically located inspection port(s) to observe the condition of the facility from the surface. The level of sediment and debris should be inspected at least twice a year. If upon visual inspection, it is found that the outlet is clogged or that sediment or debris has accumulated up to a certain pre-determined depth (i.e., 3 inches), a clean-out should be performed with a vacuum truck, JetVac process, or equally effective method.

Maintenance Indicators and Actions for Basins:

Inspection. Minimum three times per year (prior to, during, and after the rainy season). Perform inspections of the basin for standing water, erosion, energy dissipation stability, sediment accumulation, trash and debris, and presence of burrows. Inspect outlet structures for clogging.

Sediment Removal. Remove accumulated sediment as needed, or when the accumulated sediment begins to obstruct the low flow orifices.

Obstructed Inlet or Outlet Structure. Clear obstructions and confirm orifices on risers are un-clogged. Repair any damage to structural components such as weirs, inlet or outlet structures.

Trash & Debris Removal. Remove trash and debris in the basin and around the outlet pipe as needed.

Standing Water. There should be no areas of standing water 96 hours after rain has ceased.

Modular Wetland Maintenance:

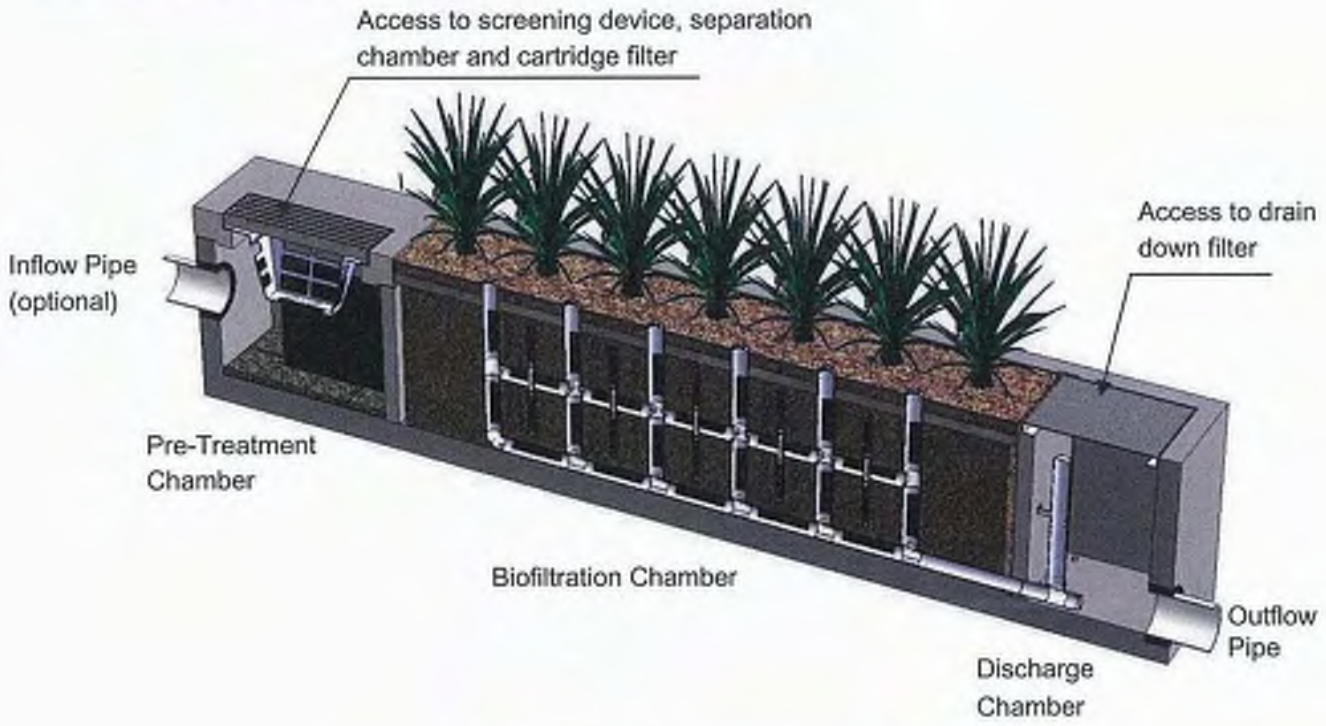
Refer to the attached maintenance guides for maintenance information for the proprietary wetland devices.

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
  - (*5 minute average service time*).
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
  - (*10 minute average service time*).
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
  - (*10-15 minute per cartridge average service time*).
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
  - (*5 minute average service time*).
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - (*Service time varies*).

System Diagram



Maintenance Procedures

Screening Device

1. Remove grate or manhole cover to gain access to the screening device in the Pre-Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck. The hose of the vacuum truck will not damage the screening device.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

Separation Chamber

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

Cartridge Filters

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

Drain Down Filter

1. Remove hatch or manhole cover over discharge chamber and enter chamber.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.

2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.

3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

4. Entry into chambers may require confined space training based on state and local regulations.

5. No fertilizer shall be used in the Biofiltration Chamber.

6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

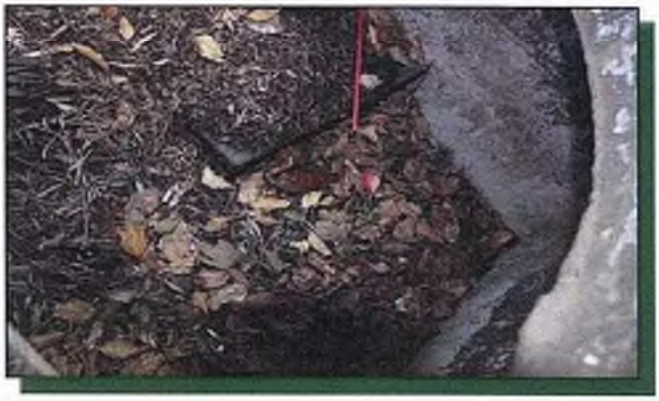
Maintenance Procedure Illustration

Screening Device

The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.

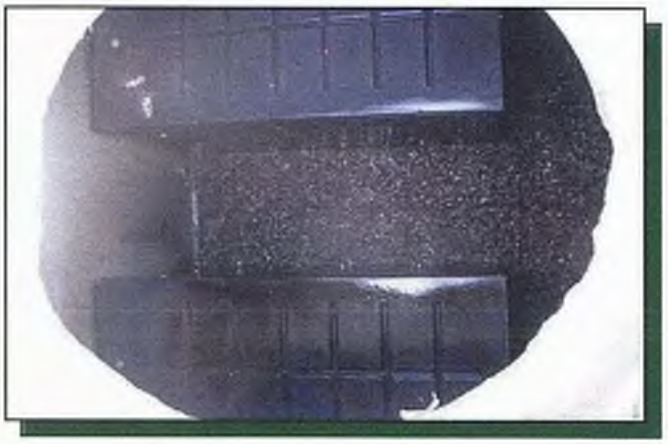
Separation Chamber

The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.



Cartridge Filters

The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.



Drain Down Filter

The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.

MODULAR WETLANDS

Trim Vegetation

Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.

MODULAR WETLANDS

Inspection Form

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

BIO CLEAN ENVIRONMENTAL SERVICES, INC.

Inspection Report
Modular Wetlands System

MODULAR WETLANDS

Project Name _____

Project Address _____ (city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): _____ Size (22', 14' or etc.): _____

Structural Integrity:	Yes	No	Comments
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
Other Inspection Items:			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	Yes	No
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: _____

2972 San Luis Rey Road, Oceanside, CA 92058 P (760) 433-7640 F (760) 433-3176

Maintenance Report

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Cleaning and Maintenance Report
Modular Wetlands System

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

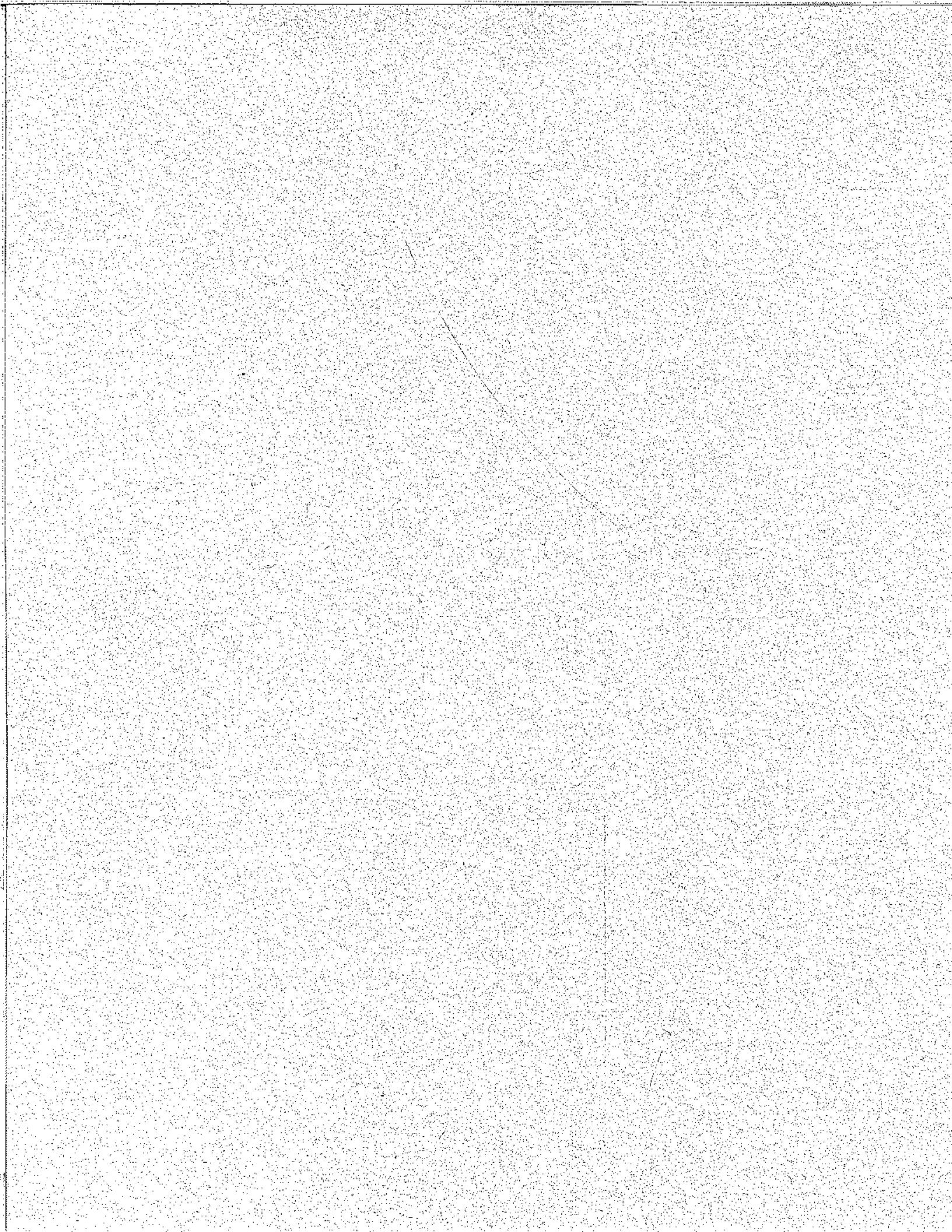
Weather Condition _____ Additional Notes _____

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:	MWS Catch Basins						
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:

2972 San Luis Rey Road, Oceanside, CA 92058 P. 760.433.7640 F. 760.433.3176



3. Notice to Purchasers: Section 67.812(e) of the WPO requires developers to provide clear written notification to persons acquiring land upon which a BMP is located, or others assuming a BMP maintenance obligation, of the maintenance duty.
4. Conditions in Ongoing Land Use Permits: For those applications (listed in WPO Section 67.803(c)) upon whose approval ongoing conditions may be imposed, a condition will be added which requires the owner of the land upon which the stormwater facility is located to maintain that facility in accordance with the requirements specified in the maintenance plan (Attachment F in the Major SWMP). Failure to perform maintenance may then be addressed as a violation of the permit, under the ordinance governing that permit process.
5. Subdivision Public Report: Tentative Map and Tentative Parcel Map approvals will be conditioned to require that, prior to approval of a Final or Parcel Map, the subdivider must provide evidence to the County that the subdivider has requested the California Department of Real Estate to include in the public report to be issued for the sales of lots within the subdivision, a notification regarding the maintenance requirement. (The requirement for this condition would not be applicable to specific subdivisions which are exempt from regulation under the Subdivided Lands Act, or for which no public report will be issued.)
6. BMP Maintenance Notification: WPO Section 67.812(f) requires that an agreement be entered into with the County, which will function in three ways:
    a. It will notify new landowners of the presence and location of the BMP(s);
    b. It will include an agreement by the landowner to maintain the BMP(s) in accordance with the maintenance plan (this obligation would be passed on to future purchasers or successors of the landowner, as a covenant); and
    c. It will require annual verification by the landowner of maintenance of the BMPs.

Funding:

None Required.

7.3.2 Category Two

Structural BMPs that are moderately complex are typical for commercial, industrial, or multi-residential land uses. Category 2 structural BMPs may have multiple owners. Likewise, the structural BMPs may be more complex to maintain, for example it may require heavy equipment or special training to maintain and/or the drainage management area is large so may have a greater impact on the water quality if there is a failure. The primary responsibility for maintenance of Category 2 structural BMPs may reside with individual property owners, a HOA, or another private party.

Minimally, the responsible party must provide annual documentation to the County verifying that the BMPs are maintained and functioning properly. However, if the responsible party fails to perform maintenance, the County (in a "backup" role) may be required to perform the maintenance; therefore security funding is required. Maintenance securities are required for an interim 5-year period. However, maintenance responsibilities remain in perpetuity.

Category 2 Mechanisms to Assure Maintenance

1. Watershed Protection Ordinance Requirement: WPO Section 67.812 requires ongoing maintenance of BMPs. In the event that the mechanisms below prove ineffective, or in

addition to enforcing those mechanisms, civil action, criminal action or administrative citation could also be pursued for violations of the ordinance.

2. Public Nuisance Abatement: Under the WPO failure to maintain a BMP would constitute a public nuisance, which may be abated under the Uniform Public Nuisance Abatement Procedure. This provides an enforcement mechanism additional to the above, and would allow costs of maintenance to be billed to the owner, a lien placed on the property, and the tax collection process to be used.
3. Notice to Purchasers: Section 67.812(e) of the WPO requires developers to provide clear written notification to persons acquiring land upon which a BMP is located, or others assuming a BMP maintenance obligation, of the maintenance duty.
4. Conditions in Ongoing Land Use Permits: For those applications (listed in WPO Section 67.810(a)) upon whose approval ongoing conditions may be imposed, a condition will be added which requires the owner of the land upon which the stormwater facility is located to maintain that facility in accordance with the requirements specified in the maintenance plan. Failure to perform maintenance may then be addressed as a violation of the permit, under the ordinance governing that permit process.
5. Subdivision Public Report: Tentative Map and Tentative Parcel Map approvals will be conditioned to require that, prior to approval of a Final or Parcel Map, the subdivider must provide evidence to the County , that the subdivider to be issued for the sales of lots within the subdivision, a notification regarding the maintenance requirement. (The requirement for this condition would not be applicable to specific subdivisions which are exempt from regulation under the Subdivided Lands Act, or for which no public report will be issued.)
6. BMP Maintenance Agreement with Easement and Covenant: WPO Section 67.812(f) requires that an agreement will be entered into with the County, which will function in three ways:
    a. It will commit the land to being used only for purposes of the BMP;
    b. It will include an agreement by the landowner to maintain the BMPs in accordance with the maintenance plan (this obligation would be passed on to future purchasers or successors of the landowner, as a covenant); and
    c. It will include an easement giving the County the right to enter onto the land (and any necessary adjacent land needed for access) to maintain the BMPs.

This would be required of all applications listed in WPO Section 67.810 with Category 2 BMPs. In the case of subdivisions, this easement and covenant would be recorded on or prior to the Final or Parcel Map.

Funding:

The developer must provide the County with security to substantiate the maintenance agreement; security will remain in place for an interim period of 5 years from the date of approval of the structural BMP Verification Acceptance Package. The amount of the security would equal the estimated cost of 2 years of maintenance activities. The security may be a Cash Deposit, Letter of Credit, or other form acceptable to the County. If at any time, owners fail to maintain BMPs and the County must perform any of the maintenance activities, then owners must pay all of County's costs incurred in performing the maintenance as defined in the maintenance agreement.

I.3.2 Category 2: Storm Water Facilities Maintenance Agreement

REQUEST AND INSTRUCTIONS FOR PREPARATION OF STORM WATER FACILITIES MAINTENANCE AGREEMENT

Provide the following information, to enable PDS to prepare the "STORMWATER FACILITIES MAINTENANCE AGREEMENT, WITH EASEMENT AND COVENANTS":

#	Done	Information to be Inserted

[1] ☐ County staff document custodian to receive document after recording will be:

_____ _____
Name of Custodian Mail Stop

[2] ☐ Provide applicable Project **Reference Number(s)**:

Tentative Map:	TM_____
Tentative Parcel Map:	TPM_____
Grading Plan / Grading Permit:	L-_____
Major Use Permit:	MUP_____
Site Plan:	STP_____

[3] ☐ Provide EXACT **name of Owner** [This must be word-for-word, letter-for-letter identical to vesting title information]:

_____
Name of Owner

[4] ☐ Indicate the status of the Owner:

☐ a natural person; or

☐ a business entity.

If the Owner is a business entity, then please indicate what type ("a California Corporation", "a [other state] Corporation", "a California General Partnership", "a California Limited Partnership" or "a California Limited Liability Company"):

_____
Type of Owner's Business Entity

[5] ☐ Create and attach an "Exhibit A", which is an accurate Legal Description of the property involved in the entire project

[6] ☐ Provide brief Description of Type of Project [E.g. "a 100-unit residential subdivision"]:

_____

Project Description

[7] ☐ Provide official name, number and date of plan or drawing which shows the BMPs in detail ["Improvement Plans", "Site Plan", "Grading Plans" etc.]:

_____ _____ _____

Type of Plan Plan Number Plan Date

[8] ☐ Create and attach an "Exhibit B", using the format of Attachment 2 ("BMP MAINTENANCE PROGRAM") as an example.

[9] ☐ Create and attach an "Exhibit C", which shows the locations of the installed BMPs.

[10] Advise us whether the on-site easement to be granted to the County to access and maintain the BMPs, covers:

☐ the entire project property; or

☐ a smaller area

☐ If "a smaller area" is checked, then create and provide an Exhibit C, being a legal description of the access and maintenance area

[11] ☐ If a private off-site easement or right of way is used to access the PROPERTY, please provide the following information about the off-site easement:

_____

Date of Easement

_____

Grantor of Easement

_____

Grantee of Easement

_____
Date Easement Was Recorded

_____
Recording File/Page No. or Document No.

☐ ALSO, please attach a copy of the Easement and a copy of a "plan view" drawing showing the Easement, if available.

[12] Advise us whether the owner will provide as security:

~~☐ a Letter of Credit; or~~ ☐ a Cash Deposit

[13] ☐ Specify the amount of the security:

$_____

[14] ☐ Provide Name and Address of the person who the Owner designates as his/her/its Agent for administration of the Agreement and receipt of notices:

Name: _____

Address: _____

[15] Advise us whether or not the project is a **Common Interest Development**:

☐ No ☐ Yes

[16] ☐ Provide the Name(s) and title(s) of **persons who will sign** agreement for the Owner:

_____
Name

_____
Title

If the Owner (see #3 above) is a natural person, County Counsel will assume that person will sign the agreement, and will so provide in the signature block. If the Owner is a business entity, please indicate the names and titles of all persons who will sign on behalf of the business entity.

A sample signature block for a corporation would look like:

"Clean Water, Inc., a California Corporation

By: _____ _____
John Q. Adams, President Date

By: _____ _____
Adam Q. Johns, Secretary Date"

Include Exhibits that illustrate:

- the Project Site Vicinity;
- the Project Site Map; and
- a map for each BMP and it's Drainage Management Area .

Samples of each of these map types are shown in Figure I.11-1 through Figure I.11-4.

COUNTY OF SAN DIEGO • DEPARTMENT OF PUBLIC WORKS
I.11.4 Category 4: STRUCTURAL BMP ACCEPTANCE MEMORANDUM

Project No: APN:

The Structural BMPs on project: _____
Project Name

have been completed in accordance with the Stormwater Quality Management Plan (SWQMP) and approved Grading and/or Improvement Plans and is recommended for County acceptance for ongoing maintenance. A list of **Structural BMPs** and **map** showing their location must be attached.

Yes **No**
☐ ☐ Permanent Stormwater Structural Best Management Practices have been installed in accordance with the WPQ and BMP Design Manual requirements.

Location description:
Transfer Date:

RECOMMENDED FOR ACCEPTANCE	**COMMENTS**
Resident Engineer Date	
Operations Manager Date	
Project Manager Date	
Construction Project Manager Date	
Construction Program Manager Date	
Other Date	

Distribution: Operations Manager ; Project Manager ; Materials Lab ; Traffic Engineering ; Resident Engineer ; Project File ; Watershed Protection Program ; Others ;

7.3.4 Category Four

The County also assumes ongoing maintenance of Category 4 Structural BMPs. This includes proposed BMPs that are recognized from the beginning as deserving of public ownership and maintenance (e.g., serving a public need and benefit larger in scope than an individual development project). In addition, BMP's in publicly initiated projects are included under this category.

Category 4 Mechanisms to Assure Maintenance:

1. Dedication of BMP to County: The developer would be required to dedicate the BMP (and the property on which it is located and any necessary access) to the County. This could be an immediate dedication, or for cases where the County would not want to assume responsibility for the facility for some time (e.g., until after construction is completed), then an IOD could be used instead.
2. County Maintenance Documentation: Internal County or Flood Control District maintenance program documentation, such as a Maintenance Acceptance Memorandum would memorialize the required maintenance and illustrate the Department's concurrence with accepting the responsibility to maintain.

Funding:

A permanent source will be implemented; options include gas tax, TransNet, General Fund, or new special taxes or fees.

ATTACHMENT 4

County of San Diego PDP Structural BMP Verification for Permitted Land Development Projects

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

County of San Diego BMP Design Manual Verification Form		
Project Summary Information		
Project Name	Harmony Grove Village South	
Record ID (e.g., grading/improvement plan number)	PDS2015-TM-5600, PDS2015-SP-002, PDS2015-GPA-15-002	
Project Address	South of Harmony Grove Road and East of Country Club Drive, Escondido, CA 92029	
Assessor's Parcel Number(s) (APN(s))	235-011-06-00, 238-021-08-00, 238-021-09-00, 238-021-10-00	
Project Watershed (Complete Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	Carlsbad HU (904), Escondido Creek HA (904.6), Escondido HAS (904.62)	
Responsible Party for Construction Phase		
Developer's Name	RCS Harmony Partners, LLC	
Address	2305 Historic Decatur Road, Suite 100, San Diego, CA 92106	
Email Address	david@kovachcompanies.com	
Phone Number	(949) 300-6742	
Engineer of Work	Project Design Consultants	
Engineer's Phone Number	(619) 235-6471	
Responsible Party for Ongoing Maintenance		
Owner's Name(s)*	For MWS - County	For Detention Basin/Vaults - HOA (Property Manager information TBD)
Address	5500 Overland Avenue, Suite 310, San Diego, CA 92123	TBD
Email Address	TBD	
Phone Number	(858) 694-2212	
*Note: If a corporation or LLC, provide information for principal partner or Agent for Service of Process. If an HOA, provide information for the Board or property manager at time of project closeout.		

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

County of San Diego BMP Design Manual Verification Form Page 2 of 4					
Stormwater Structural Pollutant Control & Hydromodification Control BMPs* (List all from SWQMP)					
Description/Type of Structural BMP	**Plan Sheet #**	**STRUCTURAL BMP ID#**	**Maint-enance Category**	**Maintenance Agreement Recorded Doc #**	**Revisions**
BF-3 Proprietary Biofiltration		Modular Wetland Unit #1	4		
BF-3 Proprietary Biofiltration		Modular Wetland Unit #2	4		
HU-1 Retention by Harvest and Use		North Hydromodification/ Detention Basin Vault	2		
HU-1 Retention by Harvest and Use		South Hydromodification/ Detention Basin Vault	2		
*All Priority Development Projects (PDPs) require a Structural BMP					

Note: If this is a partial verification of Structural BMPs, provide a list and map denoting Structural BMPs that have already been submitted, those for this submission, and those anticipated in future submissions.

Checklist for Applicant to submit to PDCI:

- ☐ Copy of the final accepted SWQMP and any accepted addendum.
- ☐ Copy of the most current plan showing the Stormwater Structural BMP Table, plans/cross-section sheets of the Structural BMPs and the location of each verified as-built Structural BMP.
- ☐ Photograph of each Structural BMP.
- ☐ Photograph(s) of each Structural BMP during the construction process to illustrate proper construction.
- ☐ Copy of the approved Structural BMP maintenance agreement and associated security

By signing below, I certify that the Structural BMP(s) for this project have been constructed and all BMPs are in substantial conformance with the approved plans and applicable regulations. I understand the County reserves the right to inspect the above BMPs to verify compliance with the approved plans and Watershed Protection Ordinance (WPO). Should it be determined that the BMPs were not constructed to plan or code, corrective actions may be necessary before permits can be closed.

Please sign your name and seal.

Professional Engineer's Printed Name:

_____

Professional Engineer's Signed Name:

_____

Date:_____

[SEAL]

COUNTY - OFFICIAL USE ONLY:

For PDCI: Verification Package #: _____

PDCI Inspector: _____

Date Project has/expects to close: _____

Date verification received from EOW: _____

By signing below, PDCI Inspector concurs that every noted Structural BMP has been installed per plan.

PDCI Inspector's Signature: _____ Date: _____

FOR WPP:

Date Received from PDCI: _____

WPP Submittal Reviewer: _____

WPP Reviewer concurs that the information provided for the following Structural BMPs is acceptable to enter into the Structural BMP Maintenance verification inventory:

List **acceptable** Structural BMPs:

WPP Reviewer's Signature: _____ Date: _____

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ATTACHMENT 5

Copy of Plan Sheets Showing Permanent Storm Water BMPs, Source Control, and Site Design

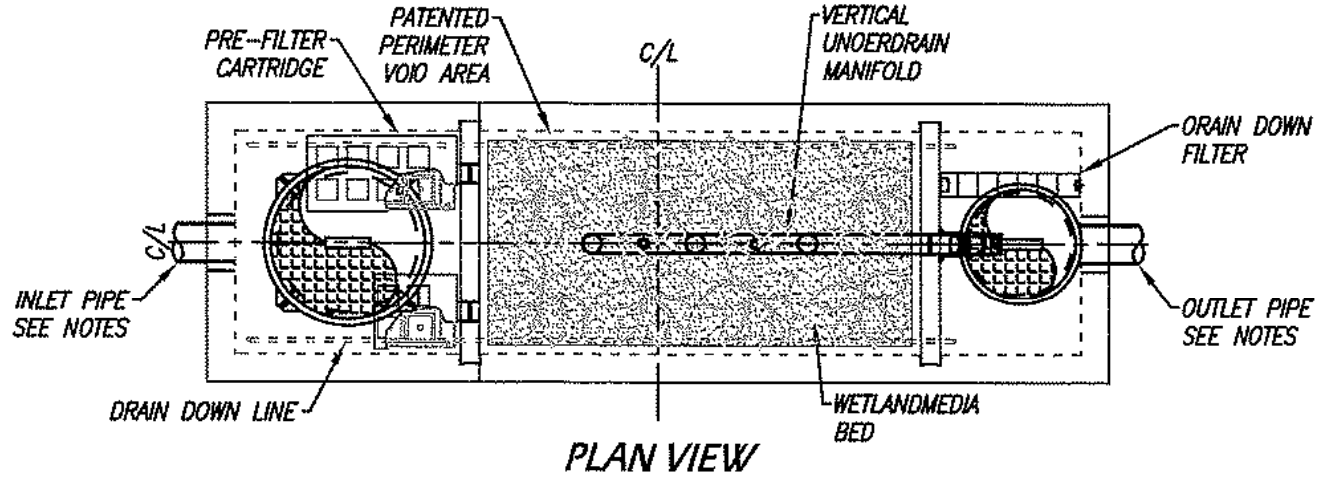
This is the cover sheet for Attachment 5.

Use this checklist to ensure the required information has been included on the plans:

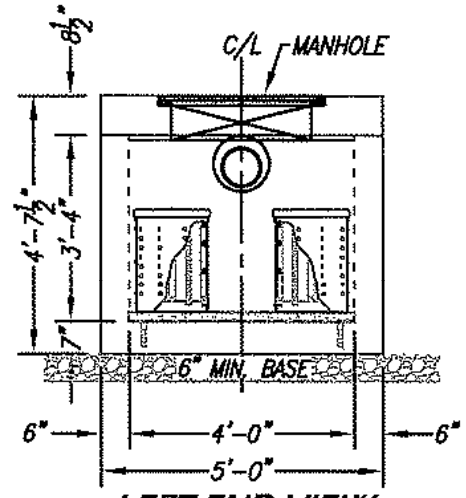
The plans must identify:

- ☐ Structural BMP(s) with ID numbers matching Step 6 Summary of PDP Structural BMPs
- ☐ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☐ Details and specifications for construction of structural BMP(s)
- ☐ Signage indicating the location and boundary of structural BMP(s) as required by County staff
- ☐ How to access the structural BMP(s) to inspect and perform maintenance
- ☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☒ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☐ Recommended equipment to perform maintenance
- ☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- ☐ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- ☐ All BMPs must be fully dimensioned on the plans
- ☒ When proprietary BMPs are used, site-specific cross section with outflow, inflow, and model number must be provided. Photocopies of general brochures are not acceptable.
- ☐ Include all source control and site design measures described in Steps 4 and 5 of the SWQMP. Can be included as a separate exhibit as necessary.

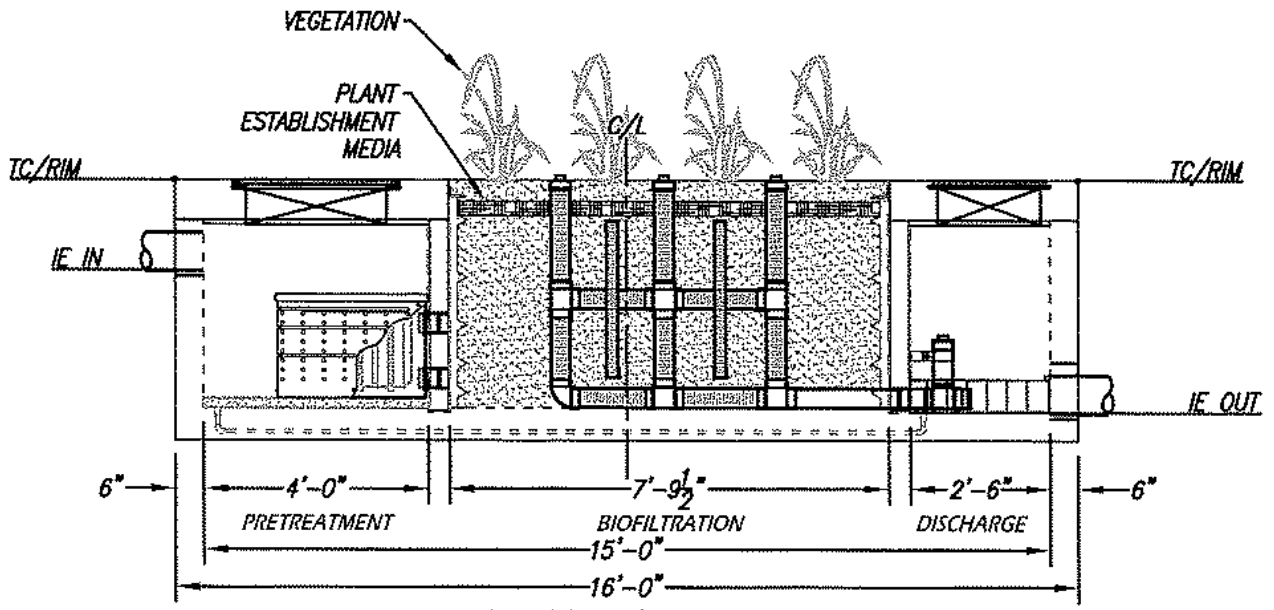
SITE SPECIFIC DATA			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PARKWAY	OPEN PLANTER	PARKWAY
FRAME & COVER	ø30"	N/A	ø24"
WETLANDMEDIA VOLUME (CY)			4.30
WETLANDMEDIA DELIVERY METHOD			TBD
ORIFICE SIZE (DIA. INCHES)			ø1.89"
MAXIMUM PICK WEIGHT (LBS)			31000
NOTES:			



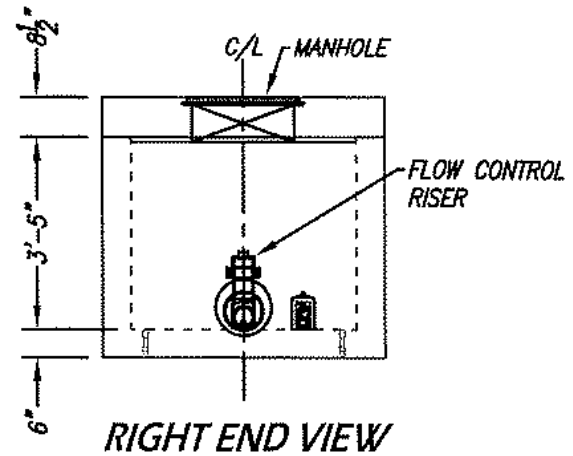
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.

TREATMENT FLOW (CES)	0.175
OPERATING HEAD (ET)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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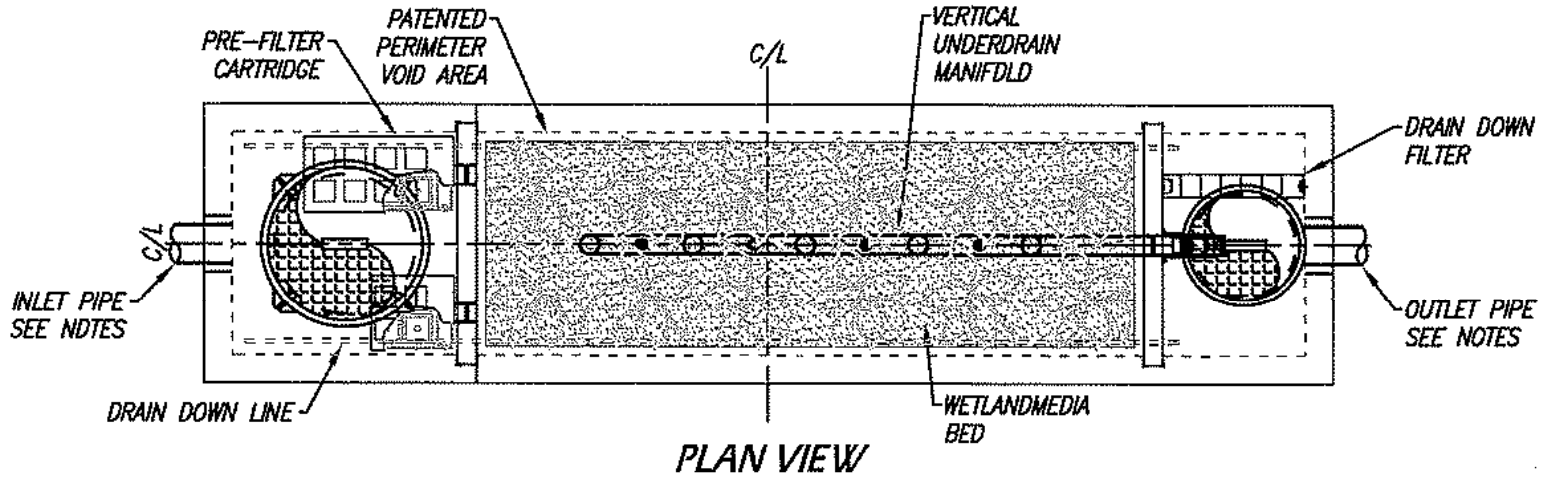
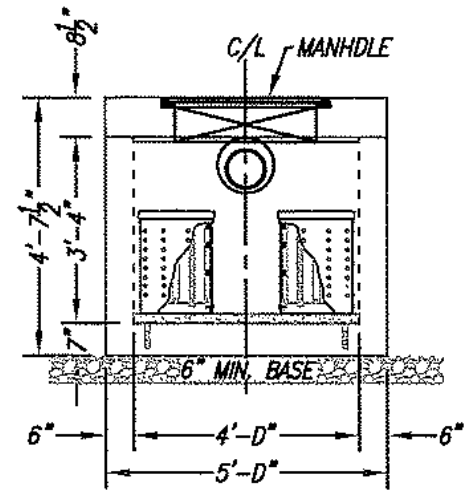
MWS-L-4-15-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

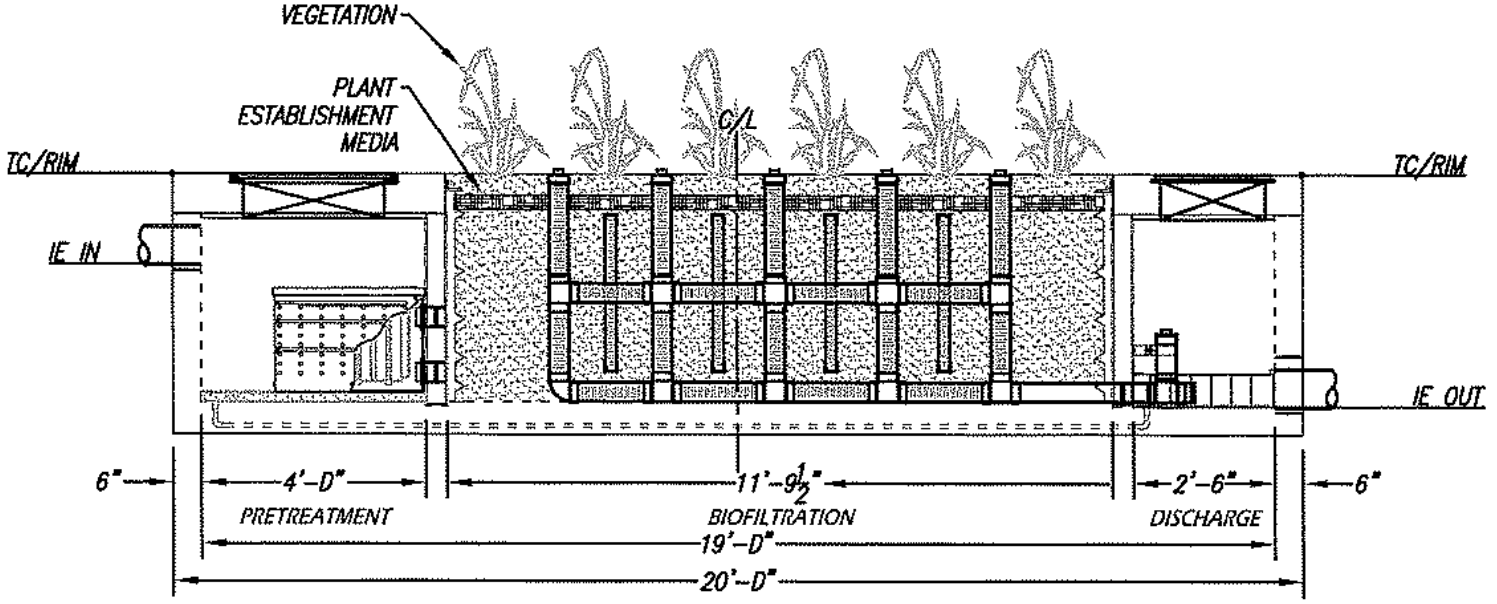
SITE SPECIFIC DATA			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PARKWAY	OPEN PLANTER	PARKWAY
FRAME & COVER	ø30"	N/A	ø24"
WETLANDMEDIA VOLUME (CY)			6.52
WETLANDMEDIA DELIVERY METHOD			TBD
ORIFICE SIZE (DIA. INCHES)			ø2.20"
MAXIMUM PICK WEIGHT (LBS)			40000
NOTES:			



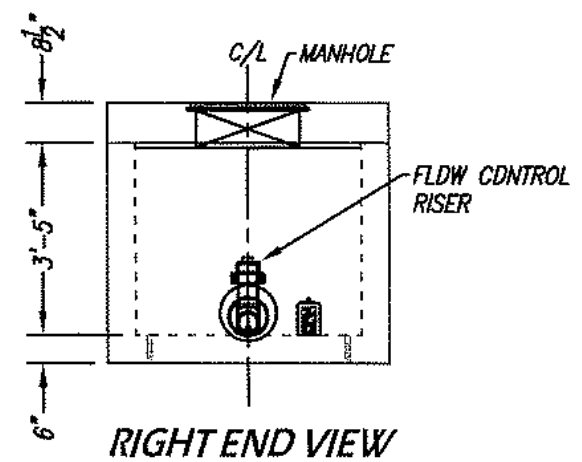
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

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TREATMENT FLOW (CFS)	0.237
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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MWS-L-4-19-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ATTACHMENT 6

Copy of Project's Drainage Report

This is the cover sheet for Attachment 6.

COMPACT DISK

CEQA PRELIMINARY HYDROLOGY/DRAINAGE STUDY

HARMONY GROVE VILLAGE SOUTH

PREPARED BY PROJECT DESIGN CONSULTANTS

DATED DECEMBER 29, 2016

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ATTACHMENT 7

Copy of Project's Geotechnical and Groundwater Investigation Report

This is the cover sheet for Attachment 7.

COMPACT DISK

GEOTECHNICAL REPORT

HARMONY GROVE VILLAGE SOUTH

PREPARED BY GEOCON INCORPORATED

DATED FEBRUARY 3, 2015