Water Quality Technical Report

For

5030 College

5030 College Avenue
San Diego, CA 92115

Prepared For
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May 15th, 2015

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Appendix F: City of San Diego Storm Water Standards Manual Excerpts Treatment Control BMP: Flow Through Planter
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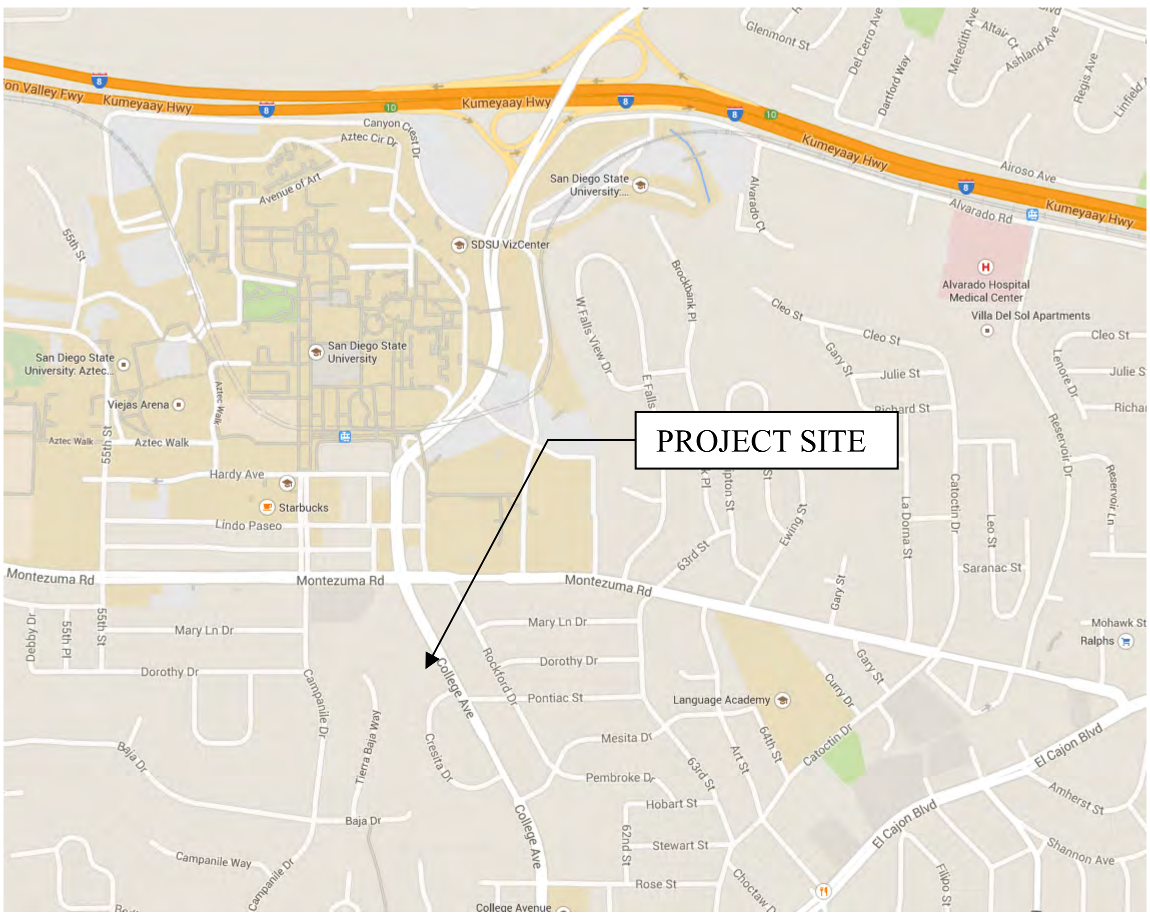
1 WATER QUALITY TECHNICAL REPORT

This Water Quality Technical Report (WQTR) has been written to comply with standards set forth in the City of San Diego Storm Water Standards Manual dated January 20, 2012. A "Storm Water Requirements Applicability Checklist" has been completed and it was determined that the 5030 College Avenue Project is subject to Priority Project Permanent Storm Water BMP Requirements. As such, this report identifies information such as the project location, project description and pollutants of concern then describes how Permanent Storm Water BMPs, Treatment Control BMPs, Low Impact Development (LID) BMPs and Source Control BMPs will be implemented to meet the storm water requirements.

2 PROJECT SUMMARY

The project summary section includes general information pertaining to the project such as a vicinity map, project description, descriptions of the existing and proposed drainage patterns, and a BMP Site Map.

2.1 VICINITY MAP:



Source: Google Maps

2.2 PROJECT DESCRIPTION

The 5030 College project site is located on the west side of College Avenue approximately 450 feet south of Montezuma Road in the City of San Diego. The proposed project would construct a student housing apartment building over 2 stories of underground parking. The project will be confined to an area encompassing approximately 1.51 acres. The general direction of the storm water flow for this site is shown on the attached hydrology exhibits (Existing Hydrology and Proposed Hydrology Exhibits).

2.3 EXISTING DRAINAGE PATTERN

The existing site encompasses approximately 1.51 acres of undeveloped land. The existing conditions are considered to be one drainage basin with an average slope of 13% which is considered to be steep. There is a curb inlet located in College Avenue that drains the right-of-way and is connected to an existing 18" storm drain system that currently runs through the proposed site. The existing drainage pattern generally sheet flows to the west and down to Tierra Baja Way where it eventually makes its way into the existing storm drain system.

Refer to the "Hydrology Study for 5030 College Avenue" prepared by Nasland Engineering dated May 2015 for a map of existing hydrologic conditions.

2.4 PROPOSED DRAINAGE PATTERN

The project proposes two buildings with residential apartments, a private drive lane, landscape improvements and storm water management facilities. In order to provide adequate site drainage, as well as meet City of San Diego Storm Water Standard requirements, improvements such as a flow-through planters and private storm drain system are incorporated into the design. The proposed 1.51 acre hydrologic area consists of approximately 76% impervious surface and 24% pervious surfaces such as landscape areas. Storm water from each basin is routed to onsite flow through planters which are sized for both Water Quality and Hydromodification requirements. The project proposes to reroute and upsize the existing storm drain system that runs through the property and tie into the existing 18" storm drain located at the west end of the property. The proposed 30" pipe will collect all runoff from both off site and on site. This area is also considered to be a single drainage basin and will discharge at the same location as the existing condition.

Refer to the "Hydrology Study for 5030 College Avenue" prepared by Nasland Engineering dated May 2015 for a map of proposed hydrologic conditions.

2.5 PROPOSED BMP SITE MAP

See the **Proposed BMP Site Map** exhibit located in Appendix E.

3 DETERMINE APPLICABLE STORM WATER BMP REQUIREMENTS

Storm water BMP requirements for the project have been determined by completing the City of San Diego Storm Water Requirements Applicability Checklist, located in Appendix C of this report. Section 1 of the checklist identifies the 5030 College project as a Priority Development Project due to the fact that it proposes residential development of 10 or more units. Section 2 of the checklist indicates that this is a "medium priority" project and a SWPPP will be required due to the project area being over 1 acre.

3.1 PERMANENT STORM WATER BMP REQUIREMENTS

Per the City of San Diego Storm Water Standards Manual, projects subject to Priority Development Project Requirements must incorporate all applicable requirements in Section 4 of the manual, "Required Permanent Best Management Practices for Priority Development Projects" into the project design. This includes the Low Impact Development (LID) BMPs, Source Control BMPS, BMPS applicable to individual Priority Development Project categories, and Treatment Control BMPs.

- Low Impact Development (LID) BMPs – *Required*
- Source Control BMPs – *Required*
- BMPS Applicable to Individual Priority Development Project Categories – *Required*
- Treatment Control BMPs – *Required*

3.2 CONSTRUCTION STORM WATER BMP REQUIREMENTS

The project will disturb an area of approximately 1.51 acres, and must provide a Storm Water Pollution Prevention Plan (SWPPP), which identifies all construction BMP requirements required in accordance with the State General Permit for Storm Water Discharges Associated with Construction Activity. A SWPPP for the project will be provided separately prior to issuance of a grading permit.

4 IDENTIFY POLLUTANTS OF CONCERN

This report shall identify the San Diego Regional Water Quality Control Board Watershed Basin, determine the impaired 303(d) receiving waters, and compare the impaired receiving waters to the anticipated project site pollutants.

4.1 IDENTIFY POLLUTANTS FROM THE PROJECT AREA

The project will generate anticipated and potential pollutants characteristic of residential development as identified in Table 4-1 of the City of San Diego Storm Water Standards Manual.

Anticipated pollutants for the project include:

- Sediment
- Nutrients
- Trash & Debris
- Pesticides

Potential pollutants for the project include:

- Oxygen Demanding Substances
- Oil & Grease
- Bacteria & Viruses

4.2 IDENTIFY POLLUTANTS OF CONCERN IN RECEIVING WATERS

According to the *San Diego Region 9 Water Quality Plan* located in Appendix B, the project has receiving waters located within the Lower San Diego as indicated below:

- San Diego (HU 907.00)

- Mission San Diego (HA 907.11)

The downstream bodies of water associated with this project are Lower San Diego River. These waters are listed in Section 303(d) as a contaminated or stressed by the following:

The Lower San Diego River (907.11) is polluted/stressed by the following contaminants:

- Fecal Coliforn (16 miles)
- Low Dissolved Oxygen (16 miles)
- Phosphorus (16 miles)
- Total Dissolved Solids (16 miles)

As a reference, the "2006 CWA Section 303(d) List of Water Quality Limited Segments Requiring TMDLS approved June 28, 2007" has been attached in Appendix A.

4.3 PRIMARY POLLUTANTS OF CONCERN

The primary pollutants of concern are pollutants that are anticipated/potential for the project and present in downstream impaired waterbodies. The primary pollutants of concern for this project are bacteria & viruses, nutrients and sediment.

Anticipated/Potential Pollutants Generated by Project	Pollutants in Receiving Waters 303(d)	Primary Pollutants of Concern
Sediment Nutrients Trash & Debris Pesticides Oil & Grease Bacteria & Viruses Oxygen Demanding Substances	Fecal Coliform Low Dissolved Oxygen Phosphorus Total Dissolved Solids	Bacteria & Viruses Nutrients Sediment

5 IDENTIFY CONDITIONS OF CONCERN

The existing site is an open area with a drainage system that runs through the center of the site. There are no natural habitats, creeks or streams on the project site. The project site has a varying elevation range of approximately 30 feet. Groundwater was not encountered during a geotechnical investigation of the site.

No conditions of concern are anticipated for the proposed project. The entire project site drainage will be routed to the westerly portion of the site and tie into the existing storm drain system downstream. The proposed project will not significantly impact the existing flow regime, and therefore no alterations to the existing downstream conditions such as erosion and habitat characteristics are anticipated.

6 ESTABLISH PERMANENT STORM WATER BEST MANAGEMENT PRACTICES

The project must meet Priority Project Permanent Storm Water BMP Requirements, which include Low Impact Development (LID) BMPs, Source Control BMPs and Treatment Control BMPs.

6.1 LOW IMPACT DEVELOPMENT (LID BMPS)

This project will incorporate applicable Low Impact Development principles into the site design. These LID features attempt to mimic predevelopment hydrologic conditions for the water quality design storm.

6.1.1 OPTIMIZE THE SITE LAYOUT

The project optimizes the site layout by including flow through planters interspersed throughout the site and increased pipe size to detain runoff.

6.1.2 MINIMIZE IMPERVIOUS FOOTPRINT

Because this project site is currently undeveloped, the impervious footprint will be significantly larger post-construction. However, the site has been zoned for such use, and the proposed storm drain system will collect surface runoff and treat it prior to leaving the site thus greatly reducing the amount of untreated surface runoff from the site. Pervious “grass-crete” paving is proposed for the fire access lane on the south side of the site.

6.1.3 DISPERSE RUNOFF TO ADJACENT LANDSCAPING BMPS

All impervious surfaces such as concrete or asphalt hardscape improvements and proposed roof tops will drain to a flow through planters throughout the site.

6.1.4 CONSTRUCTION CONSIDERATIONS

The City of San Diego Landscape regulations should be adhered to for landscape areas.

6.1.5 ADDITIONAL CONSIDERATIONS

This project stabilizes the site by vegetating disturbed soils and slopes with drought tolerant vegetation. In addition the project conveys runoff away from the tops of slopes through installation of brow ditch.

6.2 SOURCE CONTROL BEST MANAGEMENT PRACTICES

Source control best management practices aim to minimize pollutants generated by everyday activities such as trash recycling and disposal and the washing of vehicles and equipment. These practices specify required design features for proposed site elements that can potentially contaminate storm water run-off. The City of San Diego Storm Water Standards Manual requires that the following features utilize specific designs to reduce pollution:

- Maintenance Bays
- Vehicle & Equipment Wash Areas
- Outdoor Processing Areas
- Retail and Non-Retail Fueling Areas
- Steep Hillside Landscaping
- Use Efficient Irrigation Systems & Landscape Design
- Design Trash Storage Areas to Reduce Pollution Contribution

- Design Outdoor Material Storage Areas to Reduce Pollution Contribution
- Design Loading Docks to Reduce Pollution Contribution
- Employ Integrated Pest Management Principles
- Provide Storm Water Conveyance System Stamping & Signage
- Manage Fire Sprinkler System Discharges
- Manage Air Conditioning Condensate
- Use Non-Toxic Roofing Materials Where Feasible
- Other Source Control Requirements

6.2.1 MAINTENANCE BAYS

The project does not propose maintenance bays.

6.2.2 VEHICLE & EQUIPMENT WASH AREAS

The project does not propose vehicle & equipment wash areas.

6.2.3 OUTDOOR PROCESSING AREAS

The project does not propose outdoor processing areas.

6.2.4 RETAIL & NON-RETAIL FUELING AREAS

The project does not propose any fueling areas.

6.2.5 STEEP HILLSIDE LANDSCAPING

The proposed project development will be landscaped with drought tolerant and native plant species in accordance with the Landscape Technical Manual.

6.2.6 USE EFFICIENT IRRIGATION SYSTEMS & LANDSCAPE DESIGN

The proposed irrigation and landscape design shall be been performed by a Landscape Architect. Additionally, irrigation systems will be designed and constructed by professionals to match the specific water requirements of each individual landscape area. Plants with similar watering requirements will be grouped together in order to reduce excess irrigation runoff. Design timing and application methods of irrigation water will be practiced to minimize the runoff of excess irrigation water into the storm water drainage system. Rainfall sensors will be installed to monitor and prevent the use of the irrigation system during or after precipitation events. Shutoff valves shall be installed to stop irrigation flows after a pressure drop caused by a potential broken line. For additional information on efficient irrigation and landscape design areas see Appendix F of this report.

6.2.7 DESIGN TRASH STORAGE AREAS TO REDUCE POLLUTION CONTRIBUTION

Trash storage areas will be located within the underground parking garage and will not be exposed to rainfall.

6.2.8 DESIGN OUTDOOR MATERIAL STORAGE AREAS TO REDUCE POLLUTION CONTRIBUTION

The project does not propose outdoor material storage areas.

6.2.9 DESIGN LOADING DOCKS TO REDUCE POLLUTION CONTRIBUTION

The project does not propose any loading dock areas.

6.2.10 EMPLOY INTEGRATED PEST MANAGEMENT PRINCIPLES

Integrated Pest Management (IPM) shall be utilized for long term prevention of pests. An effort to reduce the need for pesticide use shall be made by using pest-resistant plantings where practical including native plants. Pesticides should only be used after monitoring indicates that they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Plant selections have been made through consideration of the current available information on plant maintenance, including responsible selections of pest-resistant plantings.

6.2.11 PROVIDE STORM WATER CONVEYANCE SYSTEM STENCILING AND SIGNAGE

All proposed storm drain system catch basins shall be labeled or stamped with prohibitive storm water dumping language such as, "No Dumping Drains to Ocean". Where practical, signage with prohibitive storm water dumping language shall also be posted near storm drain system catch basins.

6.2.12 MANAGE FIRE SPRINKLER SYSTEM DISCHARGES

Fire sprinkler system will convey all discharges to the sanitary sewer system.

6.2.13 MANAGE AIR CONDITIONING CONDENSATE

Air conditioning design features will convey condensate to the sewer system and landscaping areas where applicable per 4.2.13 of the Storm Water Standards Manual.

6.2.14 USE NON-TOXIC ROOFING MATERIAL WHERE FEASIBLE

This project does not propose toxic roofing material.

6.2.15 OTHER SOURCE CONTROL REQUIREMENTS

All proposed surfaces will be stabilized with landscaping, asphalt or concrete so no additional soil stabilization practices are anticipated. Trash receptacles will be placed where applicable.

7 TREATMENT CONTROL BMPS

Treatment control BMPs are designed to remove pollutants contained in storm water runoff. The primary pollutants of concern for this project are bacteria & viruses, nutrients and sediment; therefore, the proposed treatment control BMPs will be designed to provide pollutant removal efficiencies as designated in Table 4-3 of the Storm Water Standards Manual. Proposed treatment control BMPs for this project include flow-through planters.

7.1 FLOW-THROUGH PLANTER

Flow-through planter boxes are designed to treat and detain runoff typically via downspouts leading from adjacent buildings prior to entering the storm drain system. Flow-through plants are considered to be bio-filters. Bio-filters can achieve moderate to high levels of treatment for some potential pollutants such as sediment. Flow through planters can achieve high levels of removal for all potential pollutants except nutrients (medium removal). The flow-through planter boxes are sized using the City of San Diego Storm Water Standards Manual fact sheet and hydromodification sizing tables. For more information, refer to the Flow-Through Planter Fact Sheet located in Appendix F of this report.

7.1.1 SIZING CRITERIA (TREATMENT & HMP)

Table 7.1 indicates the required BMP area based on the impervious areas draining to the BMP's per calculations based on Table 4-8 of the Storm Water Standards Manual. The sizing factor of 0.05 was used to determine the size of the flow-through planter area in order to comply with both water quality treatment and hydromodification requirements. A geomorphic assessment was prepared by Chang Consultants that indicated a "low" level of erosivity of the downstream receiving water, therefore a lower flow threshold of $0.5Q_2$ is used for these calculations. The full geomorphic assessment titled "Hydromodification Screening for 5030 College Avenue" is located in Appendix J.

Soil Type: D Slope: Steep Rain Gauge: Oceanside
A: 0.050 V_1: 0.0417 V_2: 0.03

Table 7.1

5030 College - Drainage Management Areas

DMA Name	DMA Area (square feet)	Post-Project surface type	DMA Runoff	DMA area x runoff	Soil Type: D	IMP Name: BMP 1			
DMA 1	4,788	Roof	1	4,788	IMP Sizing Factor		Minimum Area	Proposed Area	
			Total	4,788	0.05		239	247	IMP Area

DMA Name	DMA Area (square feet)	Post-Project surface type	DMA Runoff	DMA area x runoff	Soil Type: D	IMP Name: BMP 2			
DMA 2	4,886	Roof	1	4,886	IMP Sizing Factor		Minimum Area	Proposed Area	
			Total	4,886	0.05		244	247	IMP Area

DMA Name	DMA Area (square feet)	Post-Project surface type	DMA Runoff	DMA area x runoff	Soil Type: D	IMP Name: BMP 3			
DMA 3	4,265	Roof	1	4,265	IMP Sizing Factor		Minimum Area	Proposed Area	
			Total	4,265	0.05		213	240	IMP Area

DMA Name	DMA Area (square feet)	Post-Project surface type	DMA Runoff	DMA area x runoff	Soil Type: D	IMP Name: BMP 4			
DMA 4	1,440	Roof	1	1,440	IMP Sizing Factor		Minimum Area	Proposed Area	
			Total	1,440	0.05		72	72	IMP Area

DMA Area (square feet)	Post-Project surface type	DMA Runoff	DMA area x runoff	Soil Type:	IMP Name			
				D	BMP 5			
2,110	Roof	1	2,110	IMP Sizing Factor		Minimum Area	Proposed Area	
		Total	2,110	0.05		106	110	IMP Area

DMA Area (square feet)	Post-Project surface type	DMA Runoff	DMA area x runoff	Soil Type:	IMP Name			
				D	BMP 6			
1,082	Roof	1	1,082	IMP Sizing Factor		Minimum Area	Proposed Area	
		Total	1,082	0.05		54	60	IMP Area

DMA Area (square feet)	Post-Project surface type	DMA Runoff	DMA area x runoff	Soil Type:	IMP Name			
				D	BMP 7			
3,514	Roof	1	3,514	IMP Sizing Factor		Minimum Area	Proposed Area	
		Total	3,514	0.05		176	191	IMP Area

DMA Area (square feet)	Post-Project surface type	DMA Runoff	DMA area x runoff	Soil Type:	IMP Name			
				D	BMP 8			
5,630	Courtyard	1	5,630	IMP Sizing Factor		Minimum Area	Proposed Area	
1,475	Roof	1	1,475					
		Total	7,105	0.05		355	357	IMP Area

DMA Area (square feet)	Post-Project surface type	DMA Runoff	DMA area x runoff	Soil Type:	IMP Name			
				D	BMP 9			
5,677	Roof	1	5,677	IMP Sizing Factor		Minimum Area	Proposed Area	
		Total	5,677	0.05		284	285	IMP Area

DMA Area (square feet)	Post-Project surface type	DMA Runoff	DMA area x runoff	Soil Type:	IMP Name			
				D	BMP 10			
8,169	Drivelane	1	8,169	IMP Sizing Factor		Minimum Area	Proposed Area	
		Total	8,169	0.05		408	418	IMP Area

DMA Area (square feet)	Post-Project surface type	DMA Runoff	DMA area x runoff	Soil Type:	IMP Name			
				D	BMP 10			
2,045	Roof	1	2,045	IMP Sizing Factor		Minimum Area	Proposed Area	
		Total	2,045	0.05		102	103	IMP Area

Self Treating Area

Self Treating Area (square feet)	Post-Project surface type
30,074	Landscaping
1,833	Pervious

Total	65,681
Acres	1.51

8 IMPLEMENTATION AND MAINTENANCE REQUIREMENTS

8.1 IMPLEMENTATION OF PROPOSED BMPS

The project will be built in a single phase of construction all proposed BMPs shall be installed as soon as project construction makes their installation possible.

8.2 PERMANENT BMP MAINTENANCE AGREEMENT REQUIREMENTS

All permanent BMPs proposed by the project shall be privately maintained by the owner.

9 OPERATION AND MAINTENANCE SCHEDULE

9.1 STORM DRAIN STENCILING

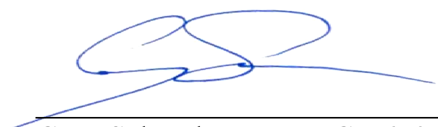
Legibility of markers and signs should be maintained as needed.

9.2 FLOW-THROUGH PLANTER

Flow-through planters remove storm water pollutants by filtration through soil. The planters are contained in a water tight concrete basin with an over flow pipe for larger storms. Soil plantings must be maintained, including routine pruning, replenishment of mulch, and weeding. The flow through planters should be inspected regularly and after storms. Erosion at inflow points (down spouts) must be repaired.

10 CERTIFICATION

This Water Quality Technical Report (WQTR) has been prepared under the direction of the following Registered Civil Engineer. The Registered Civil Engineer (Cory Schrack) attests to the technical information contained herein and the engineering data upon which the following design, recommendations, conclusions and decisions are based. The selection, sizing, and design of stormwater treatment and other control measures in this report meet the requirements of Regional Water Quality Control Board Order R9-2007-0001 and subsequent amendments.



Cory Schrack ● RCE 65976 ● Expires 06-30-16

11 REFERENCES

The City of San Diego Storm Water Standards Manual, January 20, 2012.

Countywide Model SUSMP, January 13, 2011.

CASQA Stormwater Best Management Practice Handbook, New Development and Redevelopment, January, 2003.

Water Quality Control Plan for the San Diego Basin.

APPENDIX A

2006 303(d) Waters

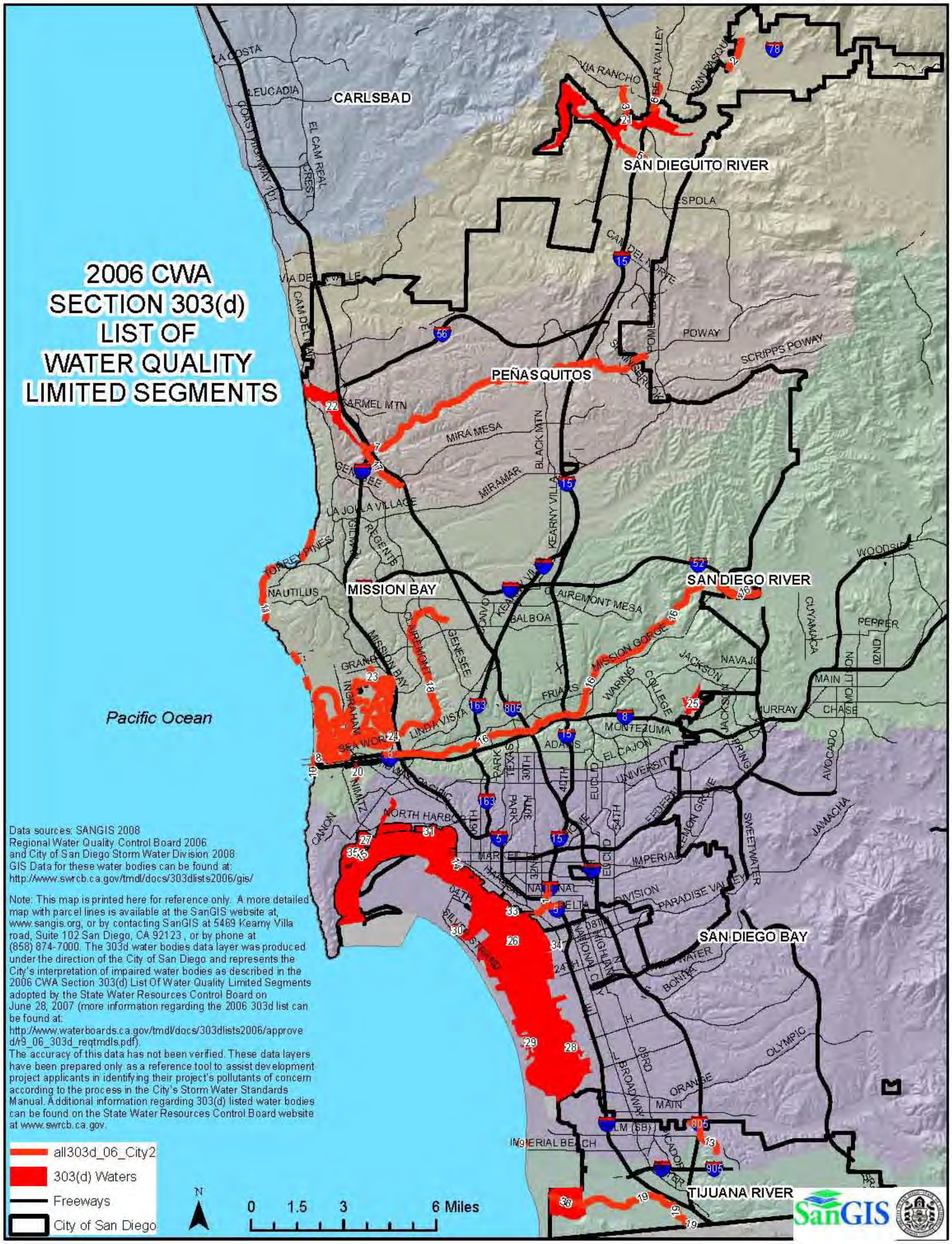
2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS REQUIRING TMDLS

SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD

USEPA APPROVAL DATE: JUNE 28, 2007

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
9	B	San Diego Bay Shoreline, Vicinity of B St and Broadway Piers	90821000				
				Benthic Community Effects		9.9 Acres	2019
					Nonpoint/Point Source		
				Indicator bacteria		9.9 Acres	2006
				Estimated size of impairment is 0.4 miles around the shoreline of the bay.			
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
				Sediment Toxicity		9.9 Acres	2019
					Nonpoint/Point Source		
9	R	San Diego River (Lower)	90711000				
				Fecal Coliform		16 Miles	2005
				Lower 6 miles.			
					Urban Runoff/Storm Sewers		
					Wastewater		
					Nonpoint/Point Source		
				Low Dissolved Oxygen		16 Miles	2019
				Impairment transcends adjacent Calwater wtareshed 90712.			
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
				Phosphorus		16 Miles	2019
				Impairment transcends adjacent Calwater watershed 90712.			
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
				Total Dissolved Solids		16 Miles	2019
				Impairment transcends adjacent Calwater watershed 90712.			
					Urban Runoff/Storm Sewers		
					Flow Regulation/Modification		
					Natural Sources		
					Unknown Nonpoint Source		
					Unknown point source		

Note: ID numbers denoting "2006 CWA Section 303(d) List of Water Quality Segments" are illustrated on the following map. These ID numbers may be cross-referenced with the tables following the map.



You may cross reference the tables below with the map on the previous page with regard to the ID# in the column to the left. Information listed in the tables below may also be viewed at: http://www.waterboards.ca.gov/tmdl/docs/303dlists2006/approved/r9_06_303d_reqtmdls.pdf

TABLES

ID	NAME	Cadmium	Copper	Lead	Zinc	Nickel	Aluminum	Thalium	Mercury	Manganese	Trace Elements	Sediment Toxicity*	Toxicity*	Fecal Coliform	Indicator Bacteria	Ph	Total Dissolved Solids	Dissolved Oxygen	Low Dissolved Oxygen*	Eutrophic*	PCP (Pentachlorophenol)	Pesticides	Choride	Chlordane	Lindane/Hexachlorocyclohexane (HCH)	DDT	PCBs (Polychlorinated biphenyls)	PAHs (Polycyclic Aromatic	Sedimentation/Siltation	Turbidity	Color	Trash	Solids	Synthetic Organics	Phosphorous	Nitrogen	Sulfates	Benthic Community Effects*
1	Chollas Creek		X	X	X										X																							
2	Cloverdale Creek																X																		X			
3	Felicita Creek						X										X																					
4	Forester Creek													X		X	X	X																	X			
5	Green Valley Creek									X											X		X														X	
6	Kit Carson Creek																X				X																	
7	Los Penasquitos Creek																X																		X			
8	Mission Bay Shoreline														X																							
9	Pacific Ocean Shoreline, Imperial Beach Pier																										X											
10	Pacific Ocean Shoreline, San Diego HU														X																							
11	Pacific Ocean Shoreline, Scripps HA														X																							
12	Pacific Ocean Shoreline, Tijuana HU														X																							
13	Pogi Canyon Creek																									X												
14	San Diego Bay Shoreline, G Street Pier														X																							
15	San Diego Bay Shoreline, Shelter Island Shoreli														X																							
16	San Diego River (Lower)													X			X		X																X			
17	Soledad Canyon											X																										
18	Tecolote Creek	X	X	X	X								X		X															X					X			
19	Tijuana River										X				X				X	X		X										X	X	X				
20	Famosa Slough and Channel																			X																		
21	Hodges, Lake									X						X														X	X				X	X		
22	Los Penasquitos Lagoon																												X									
23	Mission Bay (area at mouth of Rose Creek only)			X																X																		
24	Mission Bay (area at mouth of Tecolote Creek only)			X																X																		
25	Murray Reservoir															X																						
26	San Diego Bay																										X											
27	San Diego Bay Shoreline, at Americas Cup Harbor		X																																			
28	San Diego Bay Shoreline, at Bayside Park (J Street)														X																							
29	San Diego Bay Shoreline, at Coronado Cays		X																																			
30	San Diego Bay Shoreline, at Glorietta Bay		X																																			
31	San Diego Bay Shoreline, at Harbor Island (East Basin)		X																																			

2006 CWA Section 303(d) List of Water Quality Limited Segments

ID	NAME	Cadmium	Copper	Lead	Zinc	Nickel	Aluminum	Thallium	Mercury	Manganese	Trace Elements	Sediment Toxicity*	Toxicity*	Fecal Coliform	Indicator Bacteria	Ph	Total Dissolved Solids	Dissolved Oxygen	Low Dissolved Oxygen*	Eutrophic*	PCP (Pentachlorophenol)	Pesticides	Choride	Chlordane	Lindane/Hexachlorocyclohexane (HCH)	DDT	PCBs (Polychlorinated biphenyls)	PAHs (Polycyclic Aromatic	Sedimentation/Siltation	Turbidity	Color	Trash	Solids	Synthetic Organics	Phosphorous	Nitrogen	Sulfates	Benthic Community Effects*
32	San Diego Bay Shoreline, at Harbor Island (West Basin)		X																																			
33	San Diego Bay Shoreline, between Sampson and 28th Streets		X		X				X																		X	X										
34	San Diego Bay Shoreline, Seventh Street Channel											X																									X	X
35	San Diego Bay, Shelter Island Yacht Basin																																					
36	Tijuana River Estuary			X		X		X							X				X	X		X								X		X						
	Not provided by RWQCB in GIS																																					
	San Diego Bay Shoreline, near sub base											X																									X	X
	San Diego Bay Shoreline, Shelter Island Shoreline Park														X																							
	San Diego Bay Shoreline, North of 24th Street Marine Terminal											X																									X	X
	San Diego Bay Shoreline, at Marriott Marina		X																																			
	San Diego Bay Shoreline, Downtown Anchorage											X																									X	X
	San Diego Bay Shoreline, near Switzer Creek																							X	X			X										
	San Diego Bay Shoreline, Vicinity of B St and Broadway Piers											X			X																						X	X
	San Diego Bay Shoreline, 32nd St San Diego Naval Station											X																									X	X
	San Diego Bay Shoreline, near Chollas Creek											X																									X	X
	San Diego Bay Shoreline, near Coronado Bridge											X																									X	X
	San Diego Bay Shoreline, Chula Vista Marina		X																																			
	Pacific Ocean Shoreline, San Diequito HU														X																							

* see Table 3. For all others see Table 5.

2006 CWA Section 303(d) List of Water Quality Limited Segments

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC 1	REC 2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Diego River Watershed - continued																
Forrester Creek	7.12	○		●					●	●		●		●		
Sycamore Canyon	7.12	+	●	●					●	●		●		●	●	
unnamed tributary	7.12	+	●	●					●	●		●		●	●	
Clark Canyon	7.12	+	●	●					●	●		●		●	●	
West Sycamore Canyon	7.12	+	●	●					●	●		●		●		
Quail Canyon	7.12	+	●	●					●	●		●		●		
Little Sycamore Canyon	7.12	+	●	●					●	●		●		●		
Spring Canyon	7.12	+	●	●					●	●		●		●	●	
Oak Canyon	7.12	+	●	●					●	●		●		●		
San Diego River	7.11	+	●	●					●	●	●	●		●	●	
unnamed tributary	7.11	+	●	●					●	●		●		●	●	
Alvarado Canyon	7.11	+	●	●					●	●		●		●		
Lake Murray	7.11	See Reservoirs & Lakes – Table 2-4														
Murphy Canyon	7.11	+	●	●					●	●		●		●	●	
Shepherd Canyon	7.11	+	●	●					●	●		●		●		
Murray Canyon	7.11	+	●	●					●	●		●		●		
Mouth of San Diego River	7.11	See Coastal Waters – Table 2-3														

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-3. BENEFICIAL USES OF COASTAL WATERS

Coastal Waters	Hydrologic Unit Basin Number	BENEFICIAL USE														
		IND	NAV	REC1	REC2	COMM	BIOL	EST	WILD	RARE	MAR	AQUA	MIGR	SPWN	WARM	SHELL
Pacific Ocean		●	●	●	●	●	●		●	●	●	●	●	●		●
Dana Point Harbor		●	●	●	●	●			●	●	●		●	●		●
Del Mar Boat Basin		●	●	●	●	●			●	●	●		●	●		●
Mission Bay		●		●	●	●		●	●	●	●		●	●		●
Oceanside Harbor		●	●	●	●	●			●	●	●		●	●		●
San Diego Bay [1, 3]		●	●	●	●	●	●	●	●	●	●		●	●		●
Coastal Lagoons																
Tijuana River Estuary	11.11			●	●	●	●	●	●	●	●		●	●		●
Mouth of San Diego River	7.11			●	●	●		●	●	●	●		●	●		●
Famosa Slough and Channel	7.11			●	●	●		●	●	●	●		●	●		●
Los Penasquitos Lagoon [2]	6.10			●	●		●	●	●	●	●		●	●		●
San Dieguito Lagoon	5.11			●	●		●	●	●	●	●		●	●		
Batiquitos Lagoon	4.51			●	●		●	●	●	●	●		●	●		
San Elijo Lagoon	4.61			●	●		●	●	●	●	●		●	●		
Agua Hedionda Lagoon	4.31	●		●	●	●	●	●	●	●	●	●	●	●		●

[1] Includes the tidal prisms of the Otay and Sweetwater Rivers.

[2] Fishing from shore or boat permitted, but other water contact recreational (REC-1) uses are prohibited.

[3] The Shelter Island Yacht Basin portion of San Diego Bay is designated as an impaired water body for dissolved copper pursuant to Clean Water Act section 303(d). A Total Maximum Daily Load (TMDL) has been adopted to address this impairment. See Chapter 3, Water Quality Objectives for Pesticides, Toxicity and Toxic Pollutants and Chapter 4, Total Maximum Daily Loads.

● Existing Beneficial Use

APPENDIX B

Region 9 Water Quality Basin Map


030 College
07.00 San Diego Hydrologic Unit
907.11 Mission San Diego HA
SAN DIEGO
EL CAJON
LA MESA
SPRING VALLEY
NATIONAL CITY
CHULA VISTA
Coronado
Imperial Beach
Mission Beach
Exposed Wreck
Lights
Tidal flats
Lookout Tower
US NAVAL RESERVATIONS
FORT ROSECRANS NAT CEM
CABRILLO NAT MONT
Old Lighthouse
U S Naval Amphibious Base
Peninsula of San Diego
U S NAVAL RADIO STATION
US NAVAL STA SAN DIEGO
Zuniga Shoal
North Island
SAN DIEGO BAY
BALBOA PARK
Lemon Grove
Dictionary Hill
La Presa
Lincoln Acres
Sunnyside
Bonita
Lynwood Hills
Castle Park
Otay
Harbor Side
COWLES MOUNTAIN
Glenview
Sun Crest
Jamacha
Jamacha Junc
Indian Springs
Jamul
SAN MIGUEL MOUNTAIN
JAMUL MOUNTAINS
Upper Otay Reservoir
Lower Otay Res
Savage Dam Spillway 491
O'Neal Canyon
OTAY MOUNTAIN
Radio Towers
3566
SAN YSIDRO
Sweetwater Res
Proctor Valley
Ranch
Space Surv Syst
Montgomery
Grossmont
MT HELIX
McGINTY MTN

APPENDIX C

Storm Water Requirements Applicability Checklist

City of San Diego
Development Services
1222 First Ave., MS-302
San Diego, CA 92101
(619) 446-5000

THE CITY OF SAN DIEGO

Storm Water Requirements Applicability Checklist

FORM
DS-560
JANUARY 2011

Project Address: 5030 College Avenue	Project Number *(for City Use Only)*:

SECTION 1. Permanent Storm Water BMP Requirements:
Additional information for determining the requirements is found in the Storm Water Standards Manual.

Part A: Determine if Exempt from Permanent Storm Water BMP Requirements.
Projects that are considered maintenance, or are otherwise not categorized as "development projects" or "redevelopment projects" according to the Storm Water Standards manual are not required to install permanent storm water BMPs.
If "Yes" is checked for any line in Part A, proceed to Part C and check the box labeled "Exempt Project." If "No" is checked for all of the lines, continue to Part B.

1. The project is not a Development Project as defined in the Storm Water Standards Manual: for example habitat restoration projects, and construction inside an existing building. ❑ Yes ❑ No
2. The project is only the construction of underground or overhead linear utilities. ❑ Yes ❑ No
3. The project qualifies as routine maintenance (replaces or renews existing surface materials because of failed or deteriorating condition). This includes roof replacement, pavement spot repairs and resurfacing treatments such as asphalt overlay or slurry seal, and replacement of damaged pavement. ❑ Yes ❑ No
4. The project only installs sidewalks, bike lanes, or pedestrian ramps on an existing road, and does not change sheet flow condition to a concentrated flow condition. ❑ Yes ❑ No

Part B: Determine if Subject to Priority Development Project Requirements.
Projects that match one of the definitions below are subject to additional requirements including preparation of a Water Quality Technical Report.
If "Yes" is checked for any line in Part B, proceed to Part C and check the box labeled "Priority Development Project." If "No" is checked for all of the lines, continue to Part C and check the box labeled "Standard Development Project."

1. **Residential development of 10 or more units.** ❑ Yes ❑ No
2. **Commercial development and similar non-residential development greater than one acre.** Hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; municipal facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; and other light industrial facilities. ❑ Yes ❑ No
3. **Heavy industrial development greater than one acre.** Manufacturing plants, food processing plants, metal working facilities, printing plants, and fleet storage areas. ❑ Yes ❑ No
4. **Automotive repair shop.** Facilities categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539. ❑ Yes ❑ No
5. **Restaurant.** Facilities that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), and where the land area for development is greater than 5,000 square feet. ❑ Yes ❑ No
6. **Hillside development greater than 5,000 square feet.** Development that creates 5,000 square feet of impervious surface and is located in an area with known erosive soil conditions and where the development will grade on any natural slope that is twenty-five percent or greater. ❑ Yes ❑ No
7. **Water Quality Sensitive Area.** Development located within, directly adjacent to, or discharging directly to a Water Quality Sensitive Area (as depicted in Appendix C) in which the project either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" is defined as being situated within 200 feet of the Water Quality Sensitive Area. "Discharging directly to" is defined as outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands. ❑ Yes ❑ No
8. **Parking lot with a minimum area of 5,000 square feet or a minimum of 15 parking spaces** and potential exposure to urban runoff (unless it meets the exclusion for parking lot reconfiguration on line 11). ❑ Yes ❑ No

9.	**Street, road, highway, or freeway.** New paved surface in excess of 5,000 square feet used for the transportation of automobiles, trucks, motorcycles, and other vehicles (unless it meets the exclusion for road reconfiguration on line 11).	☐ Yes ☐ No
10.	**Retail Gasoline Outlet (RGO)** that is: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.	☐ Yes ☐ No
11.	**Significant Redevelopment**; project installs and/or replaces 5,000 square feet or more of impervious surface and the existing site meets at least one of the categories above. The project is not considered Significant Redevelopment if reconfiguring an existing road or parking lot without a change to the footprint of an existing developed road or parking lot. The existing footprint is defined as the outside curb or the outside edge of pavement when there is no curb.	☐ Yes ☐ No
12.	**Other Pollutant Generating Project.** Any other project not covered in the categories above, that disturbs one acre or more and is not excluded by the criteria below.	☐ Yes ☐ No

Projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces or if they sheet flow to surrounding pervious surfaces.

Part C: Select the appropriate category based on the outcome of Parts A & B.

1.	If "Yes" is checked for any line in Part A, then check this box. Continue to Section 2.	☐ Exempt Project
2.	If "No" is checked for all lines in Part A, and Part B, then check this box. Continue to Section 2.	☐ Standard Development Project
3.	If "No" is checked for all lines in Part A, and "Yes" is checked for at least one of the lines in Part B, then check this box. Continue to Section 2. See the Storm Water Standards Manual for guidance on determining if Hydromodification Management Plan requirements apply.	☑ Priority Development Project

SECTION 2. Construction Storm Water BMP Requirements:
For all projects, complete Part D. If "Yes" is checked for any line in Part D, then continue to Part E.

Part D: Determine Construction Phase Storm Water Requirements.

1.	Is the project subject to California's statewide General NPDES Permit for Storm Water Discharges Associated with Construction Activities? (See State Water Resources Control Board Order No. 2009-0009-DWQ for rules on enrollment)	☐ Yes ☐ No
2.	Does the project propose grading or soil disturbance?	☑ Yes ☐ No
3.	Would storm water or urban runoff have the potential to contact any portion of the construction area, including washing and staging areas?	☐ Yes ☐ No
4.	Would the project use any construction materials that could negatively affect water quality if discharged from the site (such as, paints, solvents, concrete, and stucco)?	☐ Yes ☐ No
5.	Check this box if "Yes" is checked for line 1. Continue to Part E.	☑ SWPPP Required
6.	Check this box if "No" is checked for line 1, and "Yes is checked for any line 2-4. Continue to Part E.	☐ WPCP Required
7.	Check this box if "No" is checked for all lines 1-4. Part E does not apply.	☐ No Document Required

Part E: Determine Construction Site Priority
This prioritization must be completed with this form, noted on the plans, and included in the SWPPP or WPCP. The City reserves the right to adjust the priority of the projects both before and during construction. [Note: The construction priority does NOT change construction BMP requirements that apply to projects; rather, it determines the frequency of inspections that will be conducted by City staff.]

☐ 1. **High Priority**
- a) Projects where the site is 50 acres or more and grading will occur during the wet season
- b) Projects 1 acre or more and tributary to an impaired water body for sediment (e.g., Peñasquitos watershed)
- c) Projects 1 acre or more within or directly adjacent to or discharging directly to a coastal lagoon or other receiving water within a Water Quality Sensitive Area.
- d) Projects subject to phased grading or advanced treatment requirements.

☑ **2 Medium Priority**. Projects 1 acre or more but not subject to a high priority designation.

☐ **3 Low Priority.** Projects requiring a Water Pollution Control Plan but not subject to a medium or high priority designation.

Name of Owner or Agent *(Please Print)*:	Title:
Signature:	Date:

Reset Button Page 2

APPENDIX D

City of San Diego Storm Water Standards Manual Excerpts

Table 4-1. Anticipated and Potential Pollutants Generated by Land Use Type.									
General Project Categories	General Pollutant Categories								
	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Detached Residential Housing Development	X	X			X	X	X	X	X
Attached Residential Development	X	X			X	P(1)	P(2)	P	X
Commercial Development	P(1)	P(1)	X	P(2)	X	P(5)	X	P(3)	P(5)
Industrial Development	X		X	X	X	X	X		
Automotive Repair Shops			X	X(4)(5)	X		X		
Restaurants					X	X	X	X	P(1)
Steep Hillside Developments	X	X			X	X	X		X
Parking Lots	P(1)	P(1)	X		X	P(1)	X		P(1)
Streets, Highways & Freeways	X	P(1)	X	X(4)	X	P(5)	X	X	P(1)
Retail Gasoline Outlets (RGO)			X	X	X	X	X		

X = anticipated
P = potential
(1) A potential pollutant if landscaping exists on-site.
(2) A potential pollutant if the project includes uncovered parking areas.
(3) A potential pollutant if land use involves food or animal waste products.
(4) Including petroleum hydrocarbons.
(5) Including solvents.

4.1.6 Identification of Pollutants of Concern for the Receiving Water

For PDPs, the following analysis shall be conducted and reported in the project's Water Quality Technical Report:

- For each of the proposed project discharge points, identify the receiving waters (including hydrologic unit basin numbers) as identified in the most recent version of the *Water Quality Control Plan for the San Diego Basin*[2], prepared by the RWQCB (see Suggested Resources in Appendix A).

[2] To view a copy of the Basin Plan, go to: http://www.swrcb.ca.gov/rwqcb9/programs/basinplan.html

- Identify any receiving waters included in the *2006 CWA Section 303(d) List of Water Quality Limited Segments*[3], approved by the State Water Resources Control Board on October 25, 2006. List all pollutants for which the receiving waters are impaired. To assist in determining a project's pollutants of concern, the City created a reference map showing 303d listed water bodies and associated pollutants. This map, titled, "2006 Clean Water Act Section 303(d) Water Quality Limited Segments," is provided for reference on the SANGIS website[4]. A reduced copy of the map is also included in Appendix D.
- Identify any receiving waters for which Total Maximum Daily Loads (TMDL) have been developed. List all pollutants for which the TMDL was developed.

Note: Some 303(d) listings do not identify a pollutant causing impairment, but instead identify a condition, such as Eutrophic, Benthic Community Degradation, Toxicity, or Sediment Toxicity. To assist in determining the pollutant that would likely cause the 303(d) listing, the following table identifies probable pollutants associated with impairments identified in *2006 CWA Section 303(d) List of Water Quality Limited Segments.*

Table 4-2. Probable Pollutants Causing Clean Water Act Section 303(d) Impairment Listing

Probable Pollutants	303(d) Impairment Listing				
	Eutrophic	Benthic Community Degradation	Sediment Toxicity	Toxicity (in Storm Water Runoff)	Low Dissolved Oxygen
Sediment					
Nutrients	X				X
Heavy Metals		X	X		
Organic Compounds		X	X		X
Trash and Debris					X
Oxygen Demanding Substances	X				X
Oil and Grease					
Bacteria and Viruses					
Pesticides				X	

[3] To view the 2006 303(d) List of Impaired Water Bodies, go to: www.waterboards.ca.gov/tmdl/303d_lists2006.html

[4] To view the City's map titled, "(To be updated) 2006 Clean Water Act Section 303(d) Water Quality Limited Segments," go to: www.sangis.org

Table 4-3. Structural BMP Treatment Control Selection Matrix									
BMP	LID	HMP Control	Sediment	Nutrients	Trash	Metals	Bacteria	Oils and Grease	Organics
Infiltration Basin	Y	Y	H	H	H	H	H	H	H
Bioretention Basin	Y	Y	H	M	H	H	H	H	H
Cistern Plus Bioretention	Y	Y	H	M	H	H	H	H	H
Vault plus Bioretention	Y	Y	H	M	H	H	H	H	H
Self-retaining Area	Y	Y	H	H	H	H	H	H	H
Dry Wells	Y	Y	H	H	H	H	H	H	H
Constructed Wetlands	Y	Y	H	M	H	H	H	H	H
Extended Detention Basin	Y	Y	M	L	H	M	M	M	M
Vegetated Swale	Y	N	M	L	L	M	L	M	M
Vegetated Buffer Strips	Y	N	H	L	M	H	L	H	M
Flow-Through Planter Boxes	Y	Y	H	M	H	H	H	H	H
Vortex Separator or Wet Vault	N	N	M	L	M	L	L	L	L
Media Filter	N	N	H	L	H	H	M	H	H

H High removal efficiency
M Medium removal efficiency
L Low removal efficiency

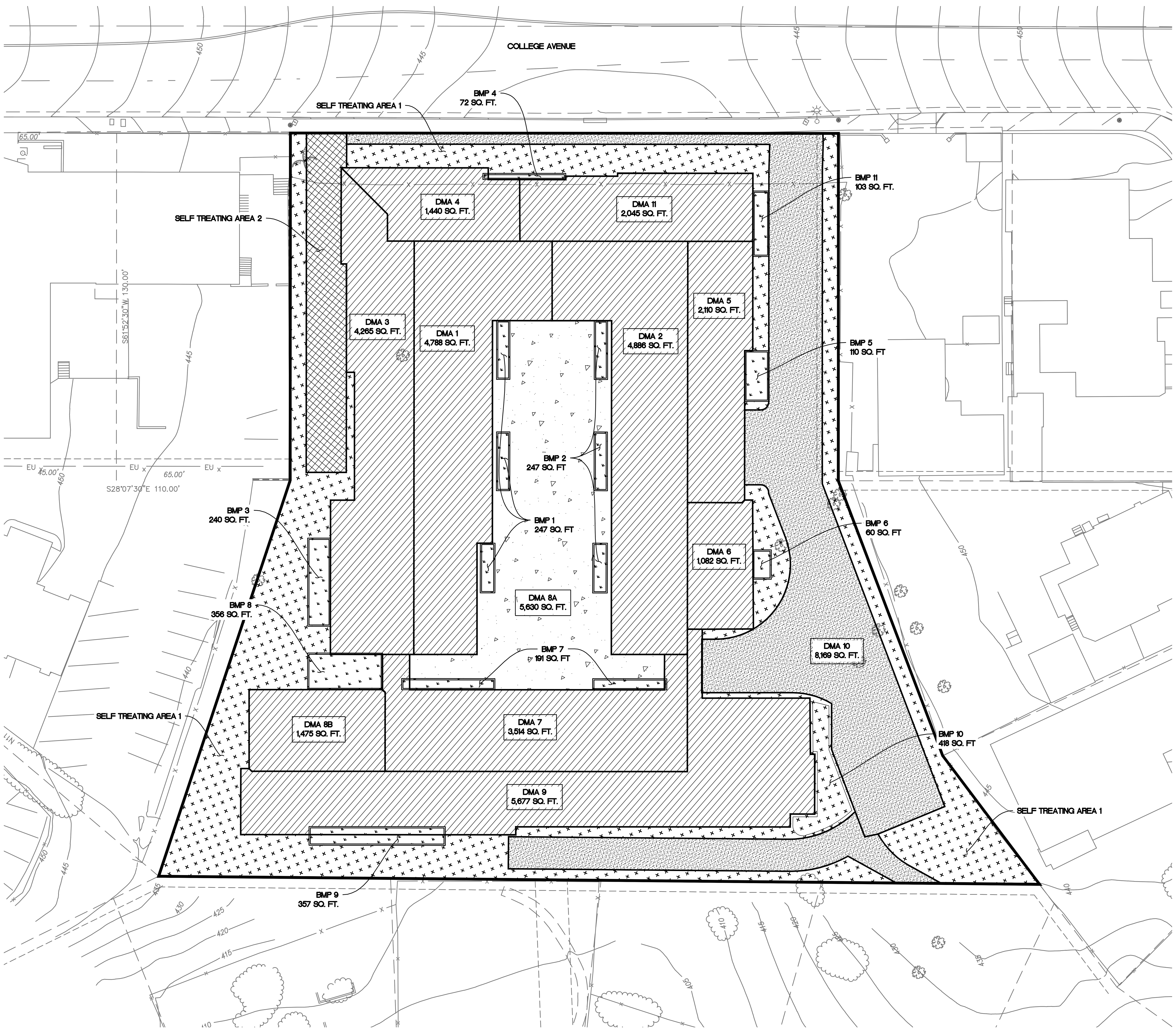
4.4.2 Restrictions on the Use of Infiltration Treatment BMPs

Treatment control BMPs that are designed to function as infiltration devices shall meet the following conditions (these conditions do not apply to treatment BMPs which allow incidental infiltration and are not designed to function primarily as infiltration devices, such as grassy swales, detention basins, vegetated buffer strips, constructed wetlands, etc.):

- Urban runoff from commercial developments shall undergo pretreatment to remove both physical and chemical contaminants prior to infiltration.
- All dry weather flows shall be diverted from infiltration devices except for those non-storm water discharges authorized pursuant to 40 CFR 122.26(d)(2)(iv)(B)(1):
  - Diverted stream flows
  - Rising ground waters

APPENDIX E

BMP Site Map



LEGEND

- PERVIOUS (FLOW THROUGH PLANTERS)
- IMPERVIOUS (ROOF)
- IMPERVIOUS (ASPHALT)
- PERVIOUS (GRASS-CRETE)
- PERVIOUS (LANDSCAPING)
- IMPERVIOUS (CONCRETE)
- BASIN LIMITS
- BASIN DRAINAGE FLOW

20 0 20 40 60 80

SCALE 1" = 20'

BMP SITE MAP

5030 COLLEGE AVENUE

Nasland
Civil Engineering
Surveying
Land Planning
T (858) 292-7770
4740 Ruffner Street
San Diego, CA 92111
nasland.com

APPENDIX F

City of San Diego Storm Water Standards Manual Excerpts

Treatment Control BMPs: Flow Through Planter

4.8 Flow-through Planter

Portland 2004 Stormwater Manual

Flow-through planters treat and detain runoff without allowing seepage into the underlying soil. They can be used next to buildings and on slopes where stability might be affected by adding soil moisture.

Flow-through planters typically receive runoff via downspouts leading from the roofs of adjacent buildings. However, they can also be set in-ground and receive sheet flow from adjacent paved areas.

Best Uses

- Management of roof runoff
- Next to buildings
- Dense urban areas
- Where infiltration is not desired

Advantages

- Can be used next to structures
- Versatile
- Can be any shape
- Low maintenance

Limitations

- Can be used for flow-control only on sites with "C" and "D" soils
- Requires underdrain
- Requires 3-4 feet of head

Pollutants are removed as runoff passes through the soil layer and is collected in an underlying layer of gravel or drain rock. A perforated-pipe underdrain is typically connected to a storm drain or other discharge point. An overflow inlet conveys flows which exceed the capacity of the planter.

4.8.1 Criteria

Treatment only. For development projects subject only to runoff treatment requirements, the following criteria apply:

Parameter	Criterion
Soil mix depth	18 inches minimum
Soil mix minimum percolation rate	5 inches per hour minimum sustained (10 inches per hour initial rate recommended)
Soil mix surface area	0.04 times tributary impervious area (or equivalent)
Surface reservoir depth	6" minimum; may be sloped to 4" where adjoining walkways.
Underdrain	Typically used. Perforated pipe embedded in gravel ("Class 2 permeable" recommended), connected to storm drain or other accepted discharge point.

4.8.2 Details

Configuration. The planter must be level. To avoid standing water in the subsurface layer, set the perforated pipe underdrain and orifice as nearly flush with the planter bottom as possible.

Inlets. Protect plantings from high-velocity flows by adding rocks or other energy-dissipating structures at downspouts and other inlets.

Soil mix. The required soil mix is similar to a loamy sand. It must maintain a minimum percolation rate of 5" per hour throughout the life of the facility, and it must be suitable for maintaining plant life. Typically, on-site soils will not be suitable due to clay content.

Gravel storage and drainage layer. "Class 2 permeable," Caltrans specification 68-1.025, is recommended. Open-graded crushed rock, washed, may be used, but requires 4"-6" of washed pea gravel be substituted at the top of the crushed rock layer. Do not use filter fabric to separate the soil mix from the gravel drainage layer.

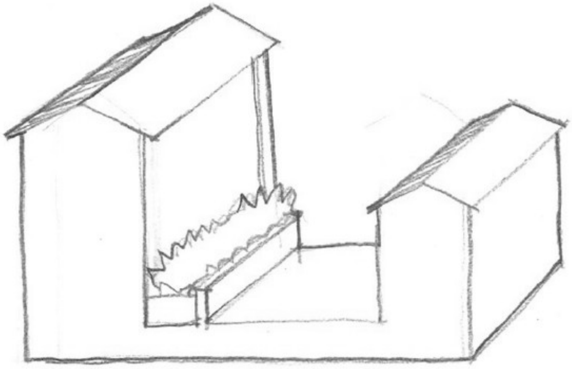
Emergency overflow. The planter design and installation should anticipate extreme events and potential clogging of the overflow and route emergency overflows safely.

4.8.3 Applications

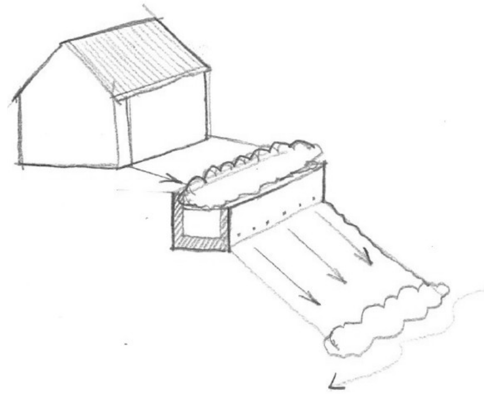
Adjacent to buildings. Flow-through planters may be located adjacent to buildings, where the planter vegetation can soften the visual effect of the building wall. A setback with a raised planter box may be appropriate even in some neo-traditional pedestrian-oriented urban streetscapes.

At plaza level. Flow-through planters have been successfully incorporated into podium-style developments, with the planters placed on the plaza level and receiving runoff from the tower roofs above. Runoff from the plaza level is typically managed separately by additional flow-through planters or bioretention facilities located at street level.

Steep slopes. Flow-through planters provide a means to detain and treat runoff on slopes that cannot accept infiltration from a bioretention facility. The planter can be built into the slope similar to a retaining wall. The design should consider the need to access the planter for periodic maintenance. Flows from the planter underdrain and overflow must be directed in accordance with local requirements. It is sometimes possible to disperse these flows to the downgradient hillside.



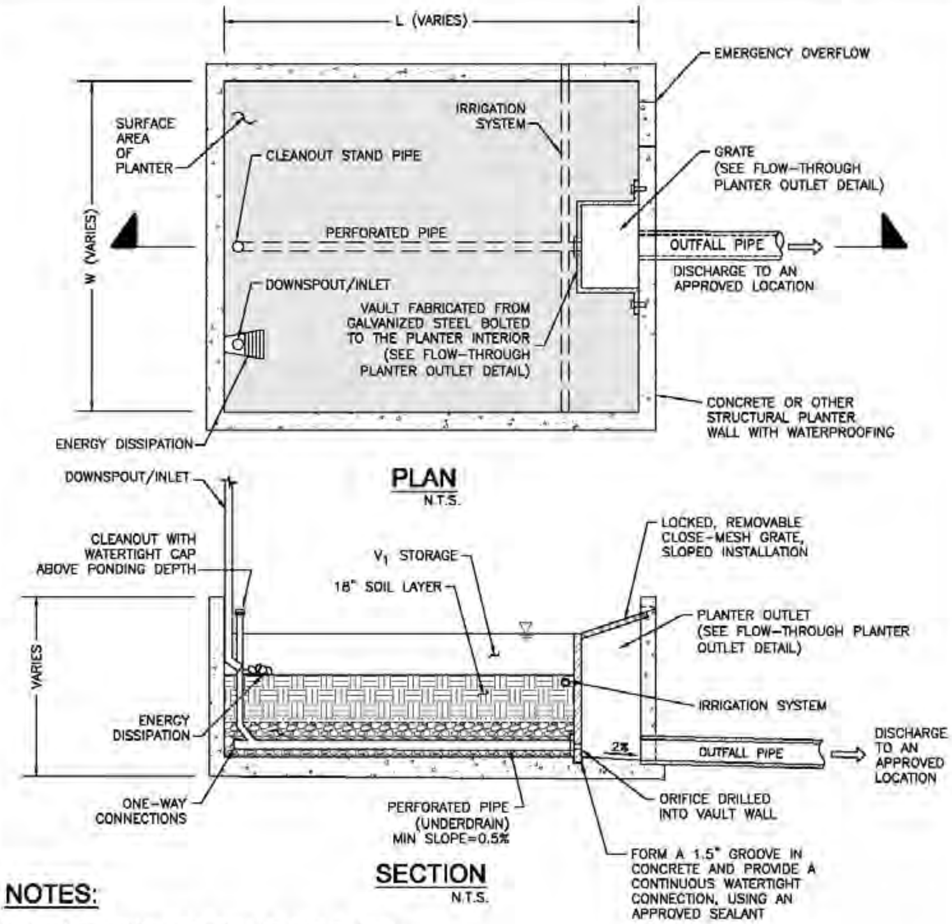
Flow-through planter on the
plaza level of a podium-style development.



Flow-through planter built into a hillside.
Flows from the underdrain and overflow must be
directed in accordance with local requirements.

4.8.4 Design Checklist for Flow-through Planter

- ❐ Reservoir depth is 4-6" minimum.
- ❐ 18" depth "loamy sand" soil mix with minimum long-term infiltration rate of 5"/hour.
- ❐ Area of soil mix meets or exceeds minimum.
- ❐ "Class 2 perm" drainage layer.
- ❐ No filter fabric.
- ❐ Perforated pipe underdrain with outlet located flush or nearly flush with planter bottom. Connection with sufficient head to storm drain or discharge point.
- ❐ Underdrain has a clean-out port consisting of a vertical, rigid, non-perforated PVC pipe, with a minimum diameter of 6 inches and a watertight cap.
- ❐ Overflow connected to a downstream storm drain or approved discharge point.
- ❐ Location and footprint of facility are shown on site plan and landscaping plan.
- ❐ Planter is set level.
- ❐ Emergency spillage will be safely conveyed overland.
- ❐ Plantings are suitable to the climate and a well-drained soil.
- ❐ Irrigation system with connection to water supply.



NOTES:

1. FLOW–THROUGH PLANTER SHALL BE SIZED TO MEET CCCWP CRITERIA FOR TREATMENT AND/OR FLOW CONTROL.
2. MINIMUM SURFACE AREA OF PLANTER IS 4% OF TRIBUTARY IMPERVIOUS AREA FOR TREATMENT ONLY DESIGN. FOR FLOW CONTROL AND TREATMENT, REFER TO CCCWP SIZING TOOL CRITERIA.
3. SHAPE OF PLANTER CAN VARY TO MEET PROJECT DESIGN REQUIREMENTS AND LOCATION.
4. CLASS 2 PERMEABLE MATERIAL
5. DOWNSPOUTS/INLET PIPES REQUIRE ENERGY DISSIPATION.
6. USE COUNTY APPROVED ADDITIVE MIXTURE FOR WATERPROOFING CONCRETE.
7. PLANTINGS: SEE CCCWP RECOMMENDED PLANT LIST AND GUIDELINES.
8. PLANTER DESIGN MAY REQUIRE STRUCTURAL ENGINEERING DESIGN.
9. AREA = W x L (ABOVE). EXCLUDES AREA OF VAULT

Flow-Through Planter Detail

APPENDIX G

Permanent BMP Construction
DS-563

City of San Diego
Development Services
1222 First Ave., MS-501
San Diego, CA 92101
(619) 236-5500

THE CITY OF SAN DIEGO

Permanent BMP Construction

Self Certification Form

FORM
DS-563
FEBRUARY 2013

Date Prepared:	Project No.:
Project Applicant:	Phone:
Project Address:	
Project Engineer:	Phone:

The purpose of this form is to verify that the site improvements for the project, identified above, have been constructed in conformance with the approved Standard Urban Storm Water Mitigation Plan (SUSMP) documents and drawings.

This form must be completed by the engineer and submitted prior to final inspection of the construction permit. Completion and submittal of this form is required for all new development and redevelopment projects in order to comply with the City's Storm Water ordinances and NDPES Permit Order No. R9-2007-0001. Final inspection for occupancy and/or release of grading or public improvement bonds may be delayed if this form is not submitted and approved by the City of San Diego.

CERTIFICATION:
As the professional in responsible charge for the design of the above project, I certify that I have inspected all constructed Low Impact Development (LID) site design, source control and treatment control BMP's required per the approved SUSMP and Construction Permit No. ________________________; and that said BMP's have been constructed in compliance with the approved plans and all applicable specifications, permits, ordinances and Order No. R9-2007-0001 of the San Diego Regional Water Quality Control Board.

I understand that this BMP certification statement does not constitute an operation and maintenance verification.

Signature: ____

Date of Signature: __________________________________

Printed Name: ____________________________________

Title: ____

Phone No. ____

Clear Form

Engineer's Stamp

APPENDIX H

Hydromodification Discussion

Hydromodification Discussion

A geomorphic assessment was prepared by Chang Consultants that indicated a "low" level of erosivity or the downstream receiving water, therefore a lower flow threshold of $0.5Q_2$ is used for the sizing of the flow through planters. The full geomorphic assessment title "Hydromodification Screening for 5030 College Avenue" is located in Appendix J.

HMP Discussion

The 5030 College Avenue project complies with the HMP requirements outlined in the Storm Water Standards Manual. The proposed flow-though planter facilities were designed to provide both water quality treatment and hydromodification flow control per the following sizing factors, also found in table 4-8:

Soil Type: D	Slope: Steep	Rain Gauge: Oceanside
A: 0.050	V_1: 0.0417	V_2: 0.03

See section 7.1.1 Sizing Criteria (Treatment and HMP) of this report for the final calculations of each flow-through planter.

6. Ensure the facility can infiltrate the entire volume within the minimum drawdown time as determined by the governing jurisdiction.

To size a **cistern or vault in series with a bioretention facility (criteria below for "water quality treatment only" option)**:

1. Use Equation 4-8 to calculate the required cistern or vault volume.
2. Design a discharge orifice for a drawdown time of 24 hours.
3. Determine the maximum discharge from the orifice.
4. The minimum area of the bioretention facility must treat this flow based on a percolation rate of 5" per hour through the engineered soil.

If a facility is designed to provide both water quality treatment and hydromodification flow control, then refer to the appropriate tables below (Tables 4-8 through 4-12) to determine the appropriate sizing factors for the IMP design.

Table 4-8. Sizing Factors for Bioretention Facilities

Lower Flow Threshold	Soil Group	Slope	Rain Gauge	A	V_1	V_2
$0.5Q_2$	A	Flat	Lindbergh	0.060	0.0500	N/A
$0.5Q_2$	A	Moderate	Lindbergh	0.055	0.0458	N/A
$0.5Q_2$	A	Steep	Lindbergh	0.045	0.0375	N/A
$0.5Q_2$	B	Flat	Lindbergh	0.093	0.0771	N/A
$0.5Q_2$	B	Moderate	Lindbergh	0.085	0.0708	N/A
$0.5Q_2$	B	Steep	Lindbergh	0.065	0.0542	N/A
$0.5Q_2$	C	Flat	Lindbergh	0.100	0.0833	0.0600
$0.5Q_2$	C	Moderate	Lindbergh	0.100	0.0833	0.0600
$0.5Q_2$	C	Steep	Lindbergh	0.075	0.0625	0.0450
$0.5Q_2$	D	Flat	Lindbergh	0.080	0.0667	0.0480
$0.5Q_2$	D	Moderate	Lindbergh	0.080	0.0667	0.0480
$0.5Q_2$	D	Steep	Lindbergh	0.060	0.0500	0.0360
$0.5Q_2$	A	Flat	Oceanside	0.070	0.0583	N/A
$0.5Q_2$	A	Moderate	Oceanside	0.065	0.0542	N/A
$0.5Q_2$	A	Steep	Oceanside	0.060	0.0500	N/A
$0.5Q_2$	B	Flat	Oceanside	0.098	0.0813	N/A
$0.5Q_2$	B	Moderate	Oceanside	0.090	0.0750	N/A
$0.5Q_2$	B	Steep	Oceanside	0.075	0.0625	N/A
$0.5Q_2$	C	Flat	Oceanside	0.075	0.0625	0.0450
$0.5Q_2$	C	Moderate	Oceanside	0.075	0.0625	0.0450
$0.5Q_2$	C	Steep	Oceanside	0.060	0.0500	0.0360
$0.5Q_2$	D	Flat	Oceanside	0.065	0.0542	0.0390
$0.5Q_2$	D	Moderate	Oceanside	0.065	0.0542	0.0390
$0.5Q_2$	D	Steep	Oceanside	0.050	0.0417	0.0300

APPENDIX I

Storm Water Management and Discharge Control Maintenance Agreement

THE CITY OF SAN DIEGO

RECORDING REQUESTED BY:
THE CITY OF SAN DIEGO
AND WHEN RECORDED MAIL TO:

Capstone Development Partners, LLC

162 S. Rancho Santa Fe Road

Suite B-80, Encinitas, CA 92024

(THIS SPACE IS FOR RECORDER'S USE ONLY)

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

APPROVAL NUMBER:	ASSESSORS PARCEL NUMBER:	PROJECT NUMBER:
	467-150-29	350930

This agreement is made by and between the City of San Diego, a municipal corporation [City] and Capstone Development Partners, LLC.,

the owner or duly authorized representative of the owner [Property Owner] of property located at

5030 College Avenue, San Diego, CA 92115.

(Property Address)

and more particularly described as: Portion of Lot 21 of Rancho Mission of San Diego, in the City of San Diego, County of San Diego, State of California.

(Legal Description of Property)

in the City of San Diego, County of San Diego, State of California.

Property Owner is required pursuant to the City of San Diego Municipal Code, Chapter 4, Article 3, Division 3, Chapter 14, Article 2, Division 2, and the Land Development Manual, Storm Water Standards to enter into a Storm Water Management and Discharge Control Maintenance Agreement [Maintenance Agreement] for the installation and maintenance of Permanent Storm Water Best Management Practices [Permanent Storm Water BMP's] prior to the issuance of construction permits. The Maintenance Agreement is intended to ensure the establishment and maintenance of Permanent Storm Water BMP's onsite, as described in the attached exhibit(s), the project's Water Quality Technical Report [WQTR] and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): ______________________.

Property Owner wishes to obtain a building or engineering permit according to the Grading and/or Improvement Plan Drawing No(s) or Building Plan Project No(s): ______________________.

Continued on Page 2

NOW, THEREFORE, the parties agree as follows:

1. Property Owner shall have prepared, or if qualified, shall prepare an Operation and Maintenance Procedure [OMP] for Permanent Storm Water BMP's, satisfactory to the City, according to the attached exhibit(s), consistent with the Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): __________.

2. Property Owner shall install, maintain and repair or replace all Permanent Storm Water BMP's within their property, according to the OMP guidelines as described in the attached exhibit(s), the project's WQTR and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s) ___________.

3. Property Owner shall maintain operation and maintenance records for at least five (5) years. These records shall be made available to the City for inspection upon request at any time.

This Maintenance Agreement shall commence upon execution of this document by all parties named hereon, and shall run with the land.

Executed by the City of San Diego and by Property Owner in San Diego, California.

See Attached Exhibit(s): 'A'

____
(Owner Signature)

____
(Print Name and Title)

____
(Company/Organization Name)

____
(Date)

THE CITY OF SAN DIEGO

APPROVED:

____
(City Control Engineer Signature)

____
(Print Name)

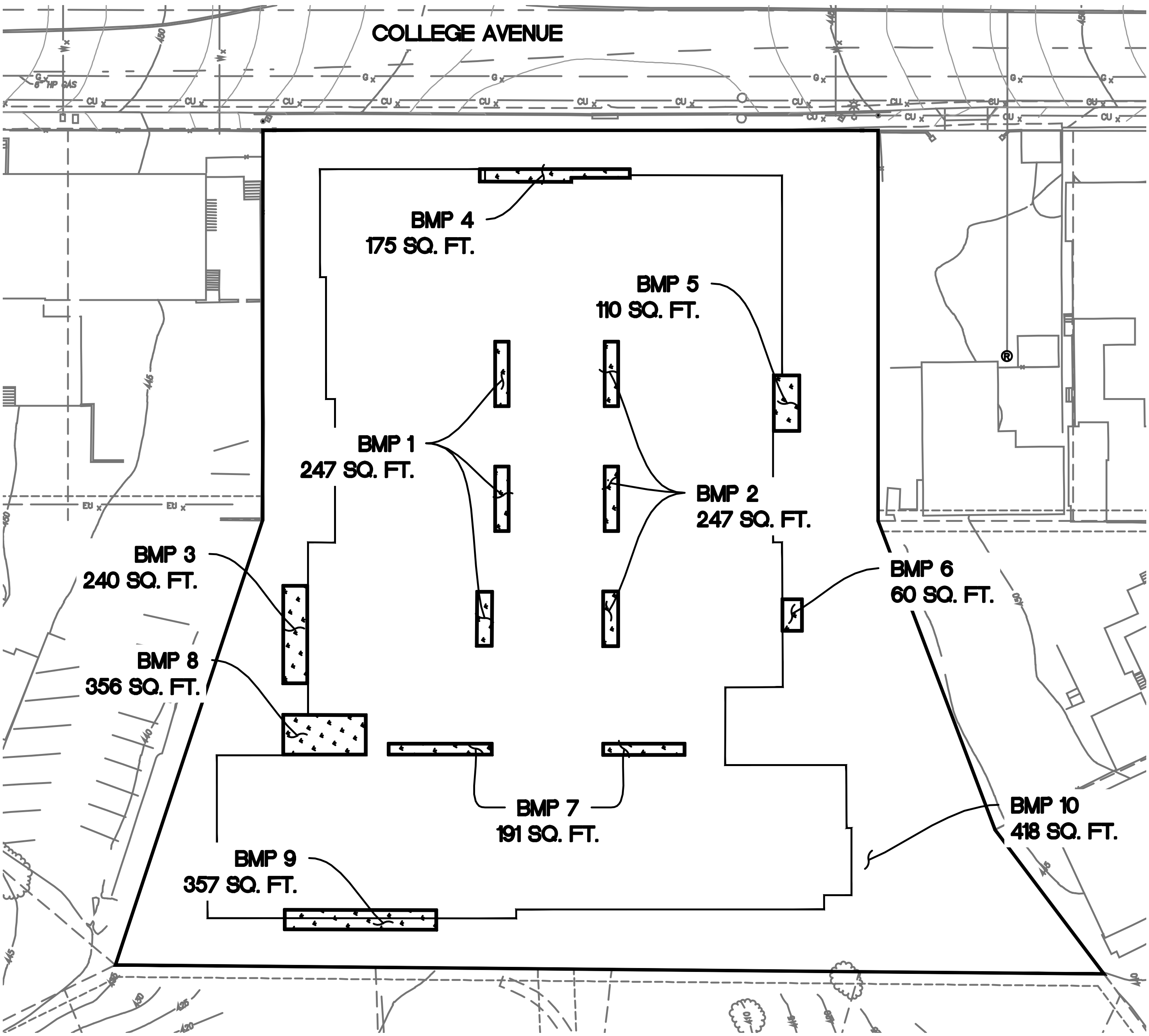
____
(Date)

NOTE: ALL SIGNATURES MUST INCLUDE NOTARY ACKNOWLEDGMENTS PER CIVIL CODE SEC. 1180 ET.SEQ.

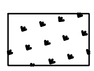
Reset Button Page 2

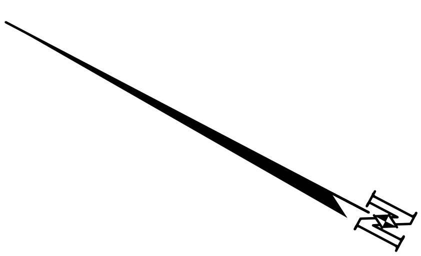
EXHIBIT "A"

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT
5030 COLLEGE AVENUE



LEGEND OF POST-CONSTRUCTION BMP:

INDICATES FLOW-THROUGH PLANTER 



SHEET 1 OF 1

APPENDIX J

Hydromodification Screening Report by Wayne Chang

HYDROMODIFICATION SCREENING

FOR

5030 COLLEGE AVENUE

January 30, 2015

REGISTERED PROFESSIONAL ENGINEER
WAYNE W. CHANG
No. 46548
Exp. 6/30/15
CIVIL
STATE OF CALIFORNIA

Wayne W. Chang, MS, PE 46548

ChangConsultants
Civil Engineering ◦ Hydrology ◦ Hydraulics ◦ Sedimentation

P.O. Box 9496
Rancho Santa Fe, CA 92067
(858) 692-0760

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Initial Desktop Analysis..4
Field Screening 5
Conclusion 8
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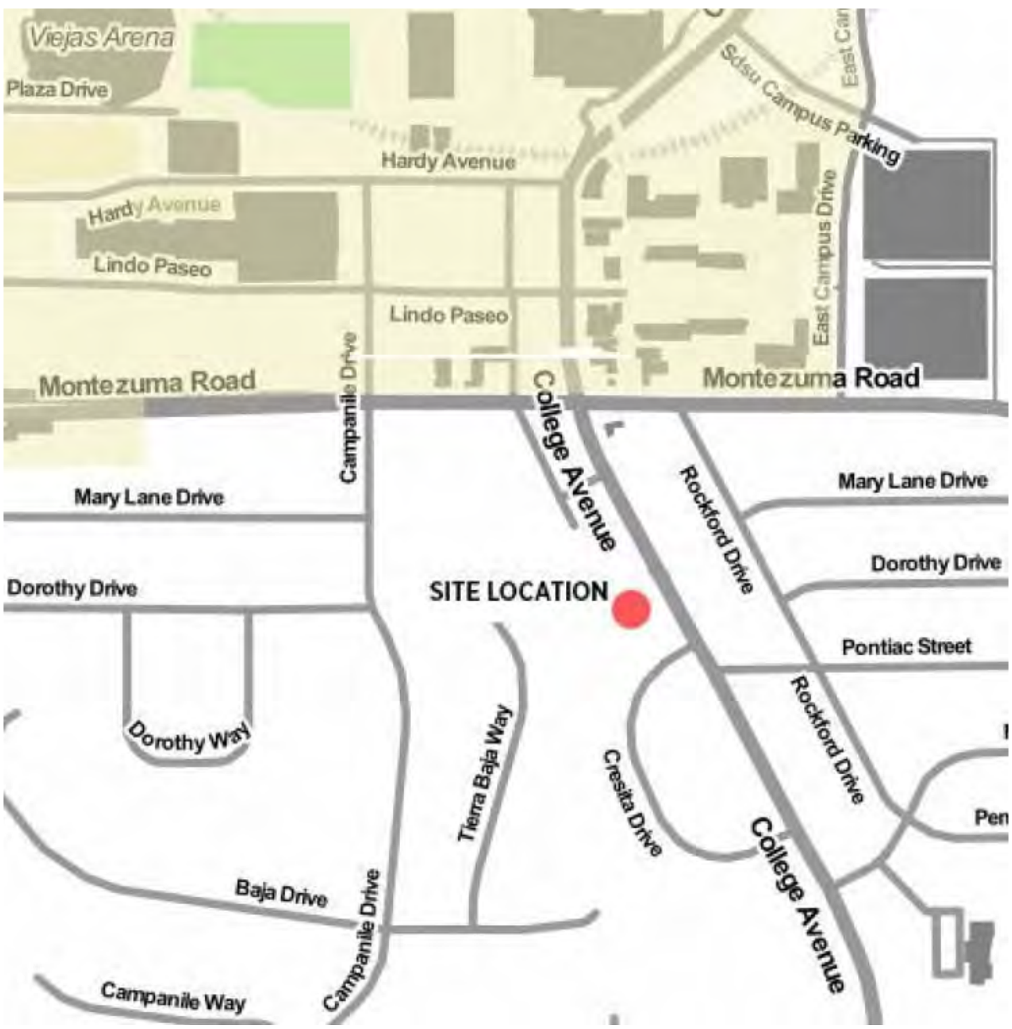
APPENDICES

A. SCCWRP Initial Desktop Analysis

B. SCCWRP Field Screening Data

INTRODUCTION

The City of San Diego's January 14, 2011, *Storm Water Standards,* outline low flow thresholds for hydromodification analyses. The thresholds are based on a percentage of the pre-project 2-year flow (Q_2), i.e., $0.1Q_2$ (low flow threshold and high susceptibility to erosion), $0.3Q_2$ (medium flow threshold and medium susceptibility to erosion), or $0.5Q_2$ (high flow threshold and low susceptibility to erosion). A flow threshold of $0.1Q_2$ represents a natural downstream receiving conveyance system with a high susceptibility to bed and/or bank erosion. This is the default value used for hydromodification analyses and will result in the most conservative (largest) on-site facility sizing. A flow threshold of $0.3Q_2$ or $0.5Q_2$ represents downstream receiving conveyance systems with a medium or low susceptibility to erosion, respectively. In order to qualify for a medium or low erosion susceptibility rating, a project must perform a channel screening analysis based on the March 2010, *Hydromodification Screening Tools: Field Manual for Assessing Channel Susceptibility,* developed by the Southern California Coastal Water Research Project (SCCWRP). The SCCWRP results are compared with the critical shear stress calculator results from the County of San Diego's BMP Sizing Calculator to establish the appropriate erosion susceptibility threshold of low, medium, or high.



Vicinity Map

This report provides a hydromodification screening analysis for the 5030 College Avenue project being designed by Nasland Engineering. The 1.51 acre site is located on the west side of College Avenue approximately 430 feet south of Montezuma Road in the city of San Diego (see the Vicinity Map). The site is currently an undeveloped lot just south of San Diego State University. The proposed project will construct a student housing residence with 95 units covering 220,850 square feet and 238 parking spaces.

Under pre-project conditions, the site slopes downwards towards the southwest at an approximately 12 percent slope. The undeveloped site primarily supports sparse low-lying grass and weeds. An existing 18-inch RCP storm drain flows in a southwesterly direction through the middle of the site. Storm runoff within the site sheets flows in southwesterly direction and ultimately enters the storm drain. Under post-project conditions, the proposed on-site drainage facilities will continue to convey the project runoff into the existing 18-inch RCP. The City of San Diego's storm drain atlas sheet (see Appendix A) and SANGIS' storm drain data show that the RCP continues off-site generally in a southwesterly direction and ultimately outlets into an unnamed natural drainage course near the westerly end of Campanile Way (see the Study Area Exhibit in Appendix A).

The SCCWRP screening tool requires both office and field work to establish the vertical and lateral susceptibility of a natural downstream receiving channel to erosion. The vertical and lateral assessments are performed independently of each other although the lateral results can be affected by the vertical rating. A screening analysis was performed to assess the low flow threshold for the project's point of compliance, which is the location where the storm drain system discharges into the unnamed natural drainage course.

The initial step in performing the SCCWRP screening analysis is to establish the domain of analysis and the study reaches within the domain. This is followed by office and field components of the screening tool along with the associated analyses and results. The following sections cover these procedures in sequence.

DOMAIN OF ANALYSIS

SCCWRP defines an upstream and downstream domain of analysis, which establish the study limits. The County of San Diego's HMP specifies the downstream domain of analysis based on the SCCWRP criteria. The HMP indicates that the downstream domain is the first point where one of these is reached:

- at least one reach downstream of the first grade control point
- tidal backwater/lentic waterbody
- equal order tributary
- accumulation of 50 percent drainage area for stream systems or 100 percent drainage area for urban conveyance systems (storm drains, hardened channels, etc.)

The upstream limit is defined as:

- proceed upstream for 20 channel top widths or to the first grade control point, whichever comes first. Identify hard points that can check headward migration and evidence of active headcutting.

SCCWRP defines the maximum spatial unit, or reach (a reach is circa 20 channel widths), for assigning a susceptibility rating within the domain of analysis to be 200 meters (656 feet). If the domain of analysis is greater than 200 meters, the study area should be subdivided into smaller reaches of less than 200 meters for analysis. Most of the units in the HMP's SCCWRP analysis are metric. Metric units are used in this report only where given so in the HMP. Otherwise English units are used.

Downstream Domain of Analysis

The downstream domain of analysis location for the study area has been determined by assessing and comparing the four bullet items above. As discussed in the Introduction, the project runoff will be collected by an existing storm drain system within the site and then conveyed by the storm drain system to an unnamed natural drainage course downstream near the westerly end of Campanile Way (see the Study Area Exhibit). The location where the storm drain discharges into the natural drainage course is the point of compliance (POC) for the project. The downstream domain of analysis is selected below this POC.

Per the first bullet item, the first permanent grade control below the POC was located. A site inspection revealed that the unnamed natural drainage course enters a concrete-lined trapezoidal channel approximately 795 feet downstream of the POC (see the Study Area Exhibit and Figures 7 and 8). The channel acts as a permanent grade control since it is a non-erodible structure that will prevent erosion of the upstream channel bed elevations.

The second bullet item is the tidal backwater or lentic (standing or still water such as ponds, pools, marshes, lakes, etc.) waterbody location. Based on review of Google Earth, there is no tidal backwater or lentic waterbody near the site. The nearest such significant waterbody is within the San Diego River near Mission Valley, which is approximately 3.8 miles west of the site. Therefore, the second bullet item criteria will not govern over the first bullet item criteria in establishing the downstream domain of analysis location.

The third bullet item is met when the unnamed natural drainage course confluences into a stream with an equal order or larger tributary drainage area. The unnamed natural watercourse does not confluence with another stream between the POC and permanent grade control. Therefore, the third bullet item criteria will not govern over the first bullet item criteria in establishing the downstream domain of analysis location.

The fourth bullet item does not govern over the first bullet item criteria because the unnamed drainage course does not accumulate much drainage area between the POC and permanent grade control. The tributary area is merely from the minor hillsides immediately adjacent to the unnamed drainage course. It is obvious from the Watershed Exhibit in Appendix A that the unnamed drainage course will not accumulate anywhere near 50 or 100 percent drainage area between these two points.

From the above assessment, the downstream domain of analysis location for the POC is based on the first bullet item, i.e., the permanent grade control criteria. This is the location closest to the POC from the four bullet criteria. The permanent grade control criteria requires that the downstream domain of analysis location extend one reach (20 channel top widths) below the grade control. In this case, one reach is still within the concrete-lined trapezoidal channel, which is over 800 feet long. Since the channel is non-erodible, the downstream domain of analysis location is at the upstream entrance to the channel.

Upstream Domain of Analysis

A natural channel does not exist upstream of the POC. The storm drain outlet at the POC discharges into the uppermost end of the receiving natural drainage course. Since the natural drainage course does not extend upstream of the POC, the upstream domain of analysis location will be at the POC.

Study Reaches within Domain of Analysis

The entire domain of analysis extends over 795 feet from the upstream domain of analysis location at the POC to the downstream domain of analysis location at the permanent grade control formed by the upper end of the concrete trapezoidal channel (see the Study Area Exhibit in Appendix A). This was analyzed as a single reach, Reach 1, which is greater than the 656 foot (200 meters) maximum reach length described by SCCWRP. Review of topographic mapping, aerial photographs, and field conditions reveals that the physical (channel geometry and longitudinal slope), vegetative, hydraulic, and soil conditions within this reach are relatively uniform. Subdividing the reach into smaller subreaches of less than 656 feet will not yield varying conclusions within the reach. Although the screening tool was applied across the entire length of the reach, the results will be identical for shorter subreaches within the reach.

INITIAL DESKTOP ANALYSIS

After the domain of analysis is established, SCCWRP requires an "initial desktop analysis" that involves office work. The initial desktop analysis establishes the watershed area, mean annual precipitation, valley slope, and valley width. These terms are defined in Form 1, which is included in Appendix A. SCCWRP recommends the use of National Elevation Data (NED) to determine the watershed areas, valley slopes, and valley widths. The NED data is similar to USGS quadrangle mapping. Consequently, the watershed area was delineated based on USGS quadrangle mapping and is shown on the Watershed Exhibit in Appendix A.

The mean annual precipitation was obtained from the rain gage closest to the site. This is the Western Regional Climate Center's La Mesa gage (see Appendix A). The average annual rainfall measured at the La Mesa gage for the period of record from 1899 to 2006 is 12.93 inches.

The valley slope and valley width of the study reach within the unnamed natural watercourse was determined from SANGIS' 2-foot contour interval topographic mapping. A site visit confirmed that this mapping is representative of the site conditions. This mapping source is much more detailed than NED/USGS mapping, so will yield more accurate results. The valley slope is the longitudinal slope of the channel bed along the flow line, so it is determined by dividing the elevation difference within a reach by the length of the flow line. The valley width is the valley bottom width dictated by breaks in the hillslope, i.e., the average bottom width of the natural drainage course. The tributary drainage area, valley slope, and valley width for Reach 1 are summarized in Table 1.

Reach	Tributary Drainage Area, sq. mi.	Valley Slope, m/m	Valley Width, m
1	0.5735	0.0277	6.7

Table 1. Summary of Drainage Area, Valley Slope, and Valley Width

The above described values were input to a spreadsheet to calculate the simulated peak flow, screening index, and valley width index outlined in Form 1. The input data and results are tabulated in Appendix A. This completes the initial desktop analysis.

FIELD SCREENING

After the initial desktop analysis is complete, a field assessment must be performed. The field assessment is used to establish a natural channel's vertical and lateral susceptibility to erosion. SCCWRP states that although they are admittedly linked, vertical and lateral susceptibility are assessed separately for several reasons. First, vertical and lateral responses are primarily controlled by different types of resistance, which, when assessed separately, may improve ease of use and lead to increased repeatability compared to an integrated, cross-dimensional assessment. Second, the mechanistic differences between vertical and lateral responses point to different modeling tools and potentially different management strategies. Having separate screening ratings may better direct users and managers to the most appropriate tools for subsequent analyses.

The field screening tool uses combinations of decision trees and checklists. Decision trees are typically used when a question can be answered fairly definitively and/or quantitatively (e.g., d_{50} < 16 mm). Checklists are used where answers are relatively qualitative (e.g., the condition of a grade control). Low, medium, high, and very high ratings are applied separately to the vertical and lateral analyses. When the vertical and lateral analyses return divergent values, the most conservative value shall be selected as the flow threshold for the hydromodification analyses.

Vertical Stability

The purpose of the vertical stability decision tree (Figure 6-4 in the County of San Diego HMP) is to assess the state of the channel bed with a particular focus on the risk of incision (i.e., down cutting). The decision tree is included in Figure 10. The first step is to assess the channel bed resistance. There are three categories defined as follows:

1. Labile Bed – sand-dominated bed, little resistant substrate.

2. Transitional/Intermediate Bed – bed typically characterized by gravel/small cobble, Intermediate level of resistance of the substrate and uncertain potential for armoring.

3. Threshold Bed (Coarse/Armored Bed) – armored with large cobbles or larger bed material or highly-resistant bed substrate (i.e., bedrock).

Figures 9 contains a photograph of the channel material within Reach 1. A gravelometer is included in the photograph for reference. Each square on the gravelometer indicates grain size in millimeters (the squares range from 2 mm to 180 mm). Based on the photograph and site investigation, the bed material and resistance is within the transitional/intermediate bed category. A pebble count was performed that determined the median (d_{50}) bed material size for the study reach is 16 millimeters (see Appendix B). Figure 6-4 in the County HMP indicates that a d_{50} of 16 mm or greater is within the transitional/intermediate bed category. Dr. Eric Stein from SCCWRP, who co-authored the *Hydromodification Screening Tools: Field Manual* in the *Final Hydromodification Management Plan* (HMP), stated that it would be appropriate to analyze channels with multiple factors that impact erodibility using the transitional/intermediate bed procedure. This requires the most rigorous steps and will generate the appropriate results for the size range.

Transitional/intermediate beds cover a wide susceptibility/potential response range and need to be assessed in greater detail to develop a weight of evidence for the appropriate screening rating. The three primary risk factors used to assess vertical susceptibility for channels with transitional/intermediate bed materials are:

1. Armoring potential – three states (Checklist 1)

2. Grade control – three states (Checklist 2)

3. Proximity to regionally-calibrated incision/braiding threshold (Mobility Index Threshold – Probability Diagram)

These three risk factors are assessed using checklists and a diagram (see Appendix B), and the results of each are combined to provide a final vertical susceptibility rating for the intermediate/transitional bed-material group. Each checklist and diagram contains a Category A, B, or C rating. Category A is the most resistant to vertical changes while Category C is the most susceptible.

Checklist 1 determines armoring potential of the channel bed. The channel bed along Reach 1 is within Category B, which represents intermediate bed material of unknown resistance or unknown armoring potential due to a surface veneer such as vegetation. Figures 1 through 6 show that the entire natural drainage course within the study reach contains a uniform, dense cover of mature vegetation including grasses, weeds, and trees. The soil was probed and penetration was relatively difficult through the underlying layer.

Checklist 2 determines grade control characteristics of the channel bed. SCCWRP states that grade controls can be natural. Examples are vegetation or confluences with a larger waterbody.

As verified with photographs and during a site investigation, Reach 1 contains mature, dense, uniform vegetation (see Figures 1 through 6). The plant roots and tree trunks serve as a natural grade control. The spacing of these is much closer than the 50 meters identified in the checklist. Further evidence of the effectiveness of the natural grade controls is the absence of headcutting and mass wasting (large vertical erosion of a channel bank). Based on this information, the study reach is within Category A on Checklist 2. The presence of dense, mature vegetation throughout both reaches further confirms that the reaches exhibit stability and are within Category A on Checklist 2.

The Screening Index Threshold is a probability diagram that depicts the risk of incising or braiding based on the potential stream power of the valley relative to the median particle diameter. The threshold is based on regional data from Dr. Howard Chang of Chang Consultants and others. The probability diagram is based on d_{50} as well as the screening index value determined in the initial desktop analysis (see Appendix A). d_{50} is derived from a pebble count in which a minimum of 100 particles are obtained along transects at the site. SCCRWP states that if fines less than ½-inch thick are at a sample point, it is appropriate to sample the coarser buried substrate. The d_{50} value is the particle size in which 50 percent of the particles are smaller and 50 percent are larger. The pebble count results for Reach 1 is included in Appendix B. The results show a d_{50} of 16 millimeters (mm). The screening index value for the study reach is tabulated in Appendix A. The Mobility Index Threshold diagram shows that there is less than 50 percent probability of incision if the screening index value is less than 0.049 for a 16 mm d_{50}. The screening index value in Appendix A is 0.042 for Reach 1, so the reach has less than 50 percent probability of incision.

The overall vertical rating is determined from the Checklist 1, Checklist 2, and Screening Index Threshold results. The scoring is based on the following values:

Category A = 3, Category B = 6, Category C = 9

The vertical rating score for Reach 1 is based on these values and the equation:

$$\text{Vertical Rating} = [(\text{armoring} \times \text{grade control})^{1/2} \times \text{screening index score}]^{1/2}$$
$$= [(6 \times 3)^{1/2} \times 3]^{1/2}$$
$$= 3.6$$

Since the vertical rating is less than 4.5, Reach 1 has a low threshold for vertical susceptibility.

Lateral Stability

The purpose of the lateral decision tree (Figure 6-5 from County of San Diego HMP is included in Figure 11) is to assess the state of the channel banks with a focus on the risk of widening. Channels can widen from either bank failure or through fluvial processes such as chute cutoffs, avulsions, and braiding. Widening through fluvial avulsions/active braiding is a relatively straightforward observation. If braiding is not already occurring, the next logical step is to assess the condition of the banks. Banks fail through a variety of mechanisms; however, one of the most important distinctions is whether they fail in mass (as many particles) or by fluvial detachment of individual particles. Although much research is dedicated to the combined effects of weakening, fluvial erosion, and mass failure, SCCWRP found it valuable to segregate bank types based on the inference of the dominant failure mechanism (as the management approach may vary based on the dominant failure mechanism). A decision tree (Form 4 in Appendix B) is used in conducting the lateral susceptibility assessment. Definitions and photographic examples are also provided below for terms used in the lateral susceptibility assessment.

The first step in the decision tree is to determine if lateral adjustments are occurring. The adjustments can take the form of extensive mass wasting (greater than 50 percent of the banks are exhibiting planar, slab, or rotational failures and/or scalloping, undermining, and/or tension cracks). The adjustments can also involve extensive fluvial erosion (significant and frequent bank cuts on over 50 percent of the banks). Neither mass wasting nor extensive fluvial erosion was evident within Reach 1 during a field investigation. Mass wasting and extensive fluvial erosion has not occurred on any of the channel slopes within the study reach (see Figures 2 through 6).

The next step in the Form 4 decision tree is to assess the consolidation of the bank material. The banks in each reach were moderate to well-consolidated. This determination was made because the ground surface was difficult to penetrate with a probe and/or the banks were well vegetated as seen in the figures. In addition, the banks showed no evidence of crumbling and were composed of relatively well-packed particles.

Form 6 (see Appendix B) is used to assess the probability of mass wasting. Form 6 identifies a 10, 50, and 90 percent probability based on the bank angle and bank height. From the topographic mapping and site investigation, the maximum bank angle in the study reach is equal to or flatter than 2:1 (26 degrees). Form 6 shows that the probably of mass wasting and bank failure has less than 10 percent risk for a 26 degree bank angle or less regardless of the bank height.

The final two steps in the Form 4 decision tree are based on the braiding risk determined from the vertical rating as well as the Valley Width Index (VWI) calculated in Appendix A. If the vertical rating is high, the braiding risk is considered to be greater than 50 percent. Excessive braiding can lead to lateral bank failure. For Reach 1 the vertical rating is low, so the braiding risk is less than 50 percent. Furthermore, a VWI greater than 2 represents channels unconfined by bedrock or hillslope and, hence, subject to lateral migration. The VWI calculation in the spreadsheet in Appendix A shows that the VWI for Reach 1 is less than 2.

From the above steps, the lateral susceptibility rating is low for Reach 1 (colored circles are included on the Form 4: Lateral Susceptibility Field Sheet decision tree in Appendix B showing the decision path).

CONCLUSION

The SCCWRP channel screening tools were used to assess the downstream channel susceptibility for the 5030 College Avenue project being designed by Nasland Engineering. The project runoff will be collected and then conveyed in an existing storm drain system to an unnamed natural drainage course southwest of the site. A downstream channel assessment for the POC at the storm drain outlet was performed based on office analyses and field work. The results indicate a low threshold for vertical and lateral susceptibility for the study reach.

The HMP requires that these results be compared with the critical stress calculator results outlined in the County of San Diego HMP. The critical stress results are included in Appendix B for the study reach using the spreadsheet provided by the County. The channel dimensions were estimated from the topographic mapping. Based on these values, the critical stress results returned a low threshold consistent with the SCCWRP channel screening results. Therefore, the SCCWRP analyses and critical stress calculator demonstrate that a low overall threshold is applicable to the study reach (i.e., $0.5Q_2$).

Figure 1. Looking towards Point of Compliance at Upper End of Reach 1

Figure 2. Looking Downstream at Reach 1 from Upper End

Figure 3. Looking Upstream at Reach 1 from Middle

Figure 4. Looking Downstream at Reach 1 from Middle

Figure 5. Dense, Mature Vegetation in Middle of Reach 1

Figure 6. Looking Upstream from Lower End of Reach 1

Figure 7. Upper End of Concrete-Lined Trapezoidal Channel / Lower End of Reach 1

Figure 8. Looking Downstream at Concrete-Lined Trapezoidal Channel

Figure 9. Gravelometer in Reach 1

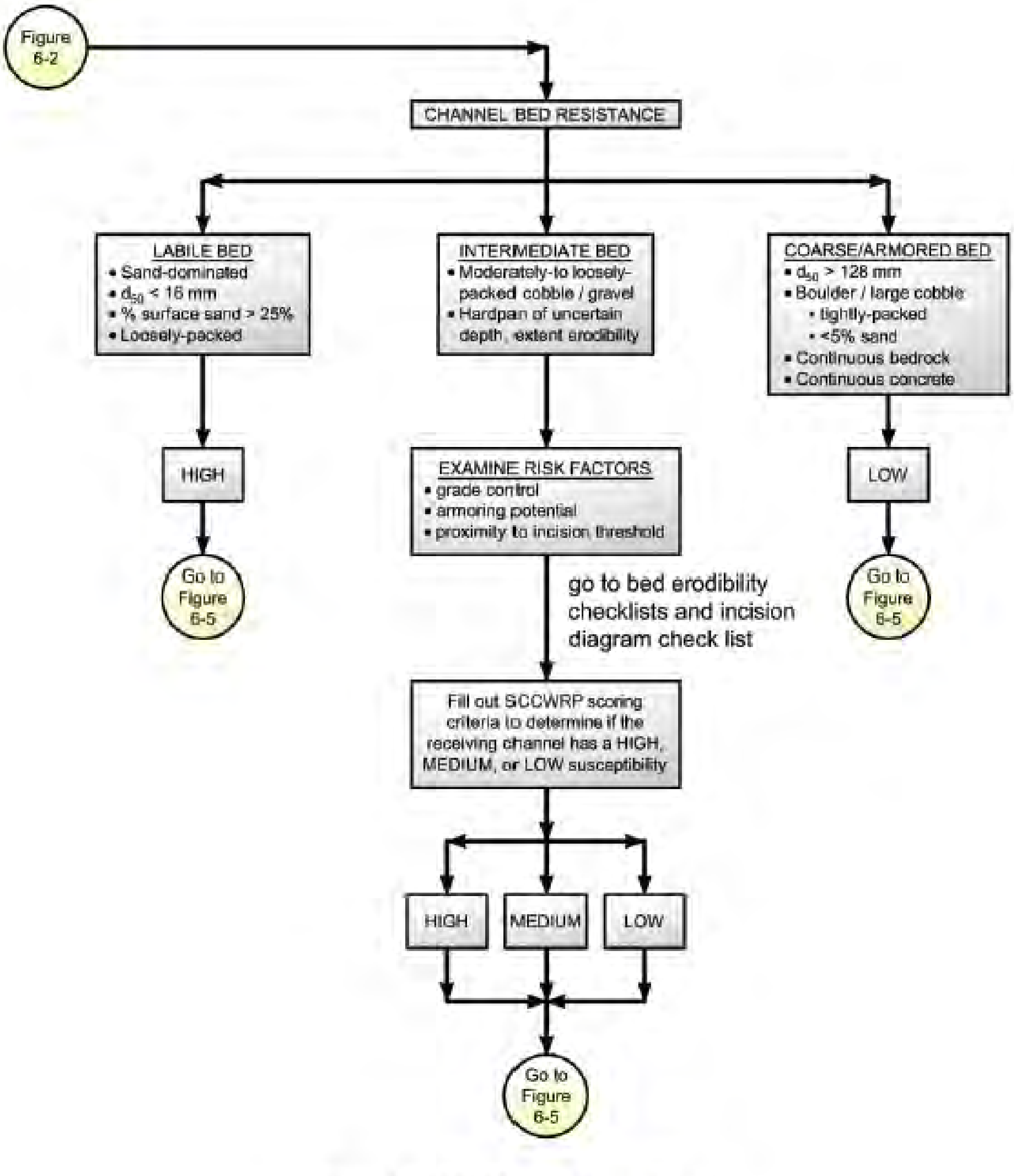


Figure 6-4. SCCWRP Vertical Susceptibility

Figure 10. SCCWRP Vertical Channel Susceptibility Matrix

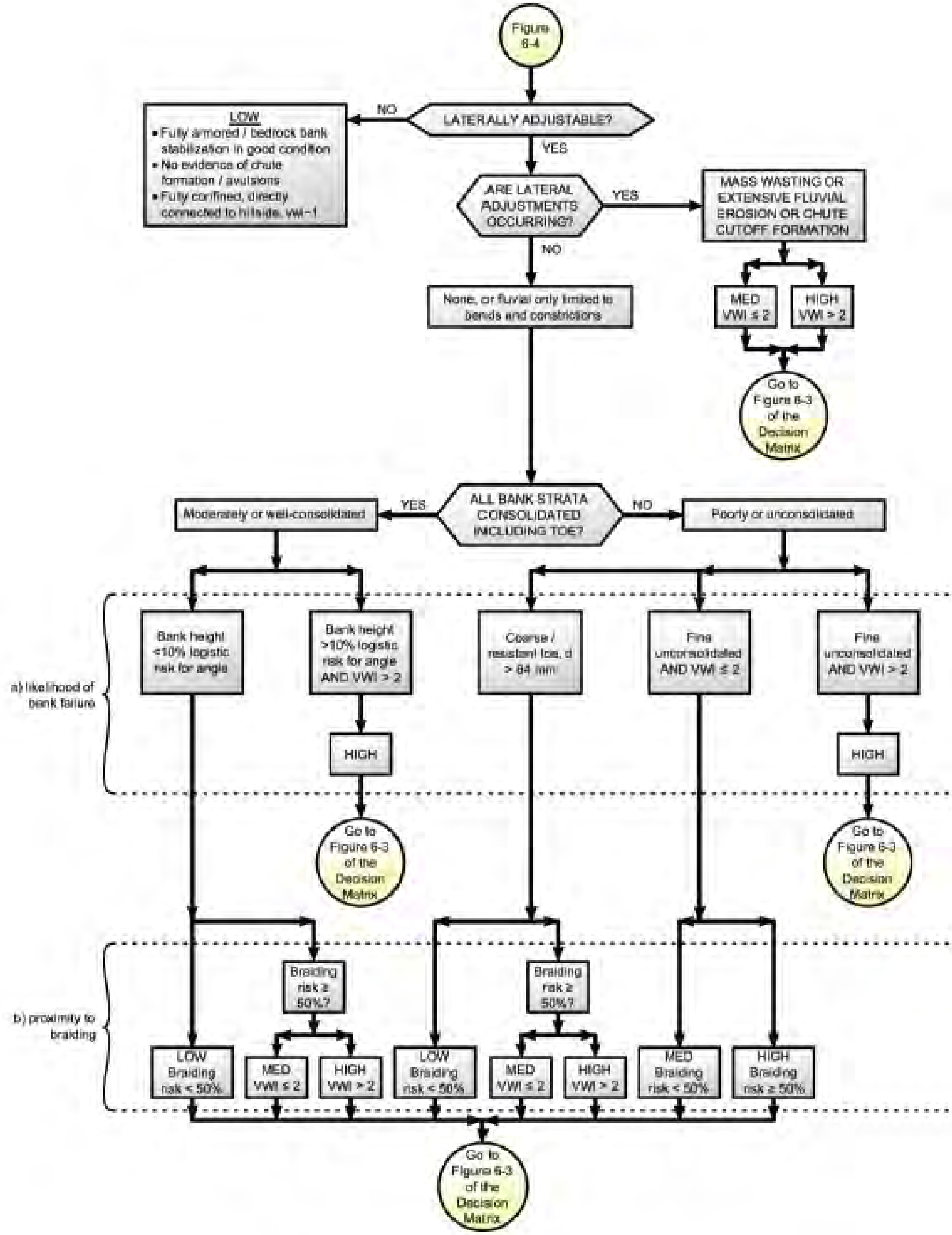


Figure 6-5. Lateral Channel Susceptibility

Figure 11. SCCWRP Lateral Channel Susceptibility Matrix

APPENDIX A

SCCWRP INITIAL DESKTOP ANALYSIS

FORM 1: INITIAL DESKTOP ANALYSIS

Complete all shaded sections.

IF required at multiple locations, circle one of the following site types:

Applicant Site / **Upstream Extent** / **Downstream Extent**

Location: Latitude: 32.7641 e -117.0764 Longitude: ____

Description (river name, crossing streets, etc.): 5030 College Avenue e

GIS Parameters: The International System of Units (SI) is used throughout the assessment as the field standard and for consistency with the broader scientific community. However, as the singular exception, US Customary units are used for contributing drainage area (A) and mean annual precipitation (P) to apply regional flow equations after the USGS. See SCCWRP Technical Report 607 for example measurements and "Screening Tool Data Entry.xls" for automated calculations.

Form 1 Table 1. Initial desktop analysis in GIS.

	Symbol	Variable	Description and Source	Value
Watershed properties (English units)	**A**	Area (mi^2)	Contributing drainage area to screening location via published Hydrologic Unit Codes (HUCs) and/or ≤ 30 m National Elevation Data (NED), USGS seamless server	Form 1 table on next page for calculated values for study
	P	Mean annual precipitation (in)	Area-weighted annual precipitation via USGS delineated polygons using records from 1900 to 1960 (which was more significant in hydrologic models than polygons delineated from shorter record lengths)	
Site properties (SI units)	**S_v**	Valley slope (m/m)	Valley slope at site via NED, measured over a relatively homogenous valley segment as dictated by hillslope configuration, tributary confluences, etc., over a distance of up to ~500 m or 10% of the main-channel length from site to drainage divide	
	W_v	Valley width (m)	Valley bottom width at site between natural valley walls as dictated by clear breaks in hillslope on NED raster, irrespective of potential armoring from floodplain encroachment, levees, etc. (imprecise measurements have negligible effect on rating in wide valleys where VWI is >> 2, as defined in lateral decision tree)	

Form 1 Table 2. Simplified peak flow, screening index, and valley width index. Values for this table should be calculated in the sequence shown in this table, using values from Form 1 Table 1.

Symbol	Dependent Variable	Equation	Required Units	Value
Q_{10cfs}	10-yr peak flow (ft^3/s)	$Q_{10cfs} = 18.2 * A^{0.87} * P^{0.77}$	A (mi^2) P (in)	Form 1 table on next page for calculated values for study
Q_{10}	10-yr peak flow (m^3/s)	$Q_{10} = 0.0283 * Q_{10cfs}$	Q_{10cfs} (ft^3/s)	
INDEX	10-yr screening index ($m^{1.5}/s^{0.5}$)	$INDEX = S_v * Q_{10}^{0.5}$	Sv (m/m) Q_{10} (m^3/s)	
W_{ref}	Reference width (m)	$W_{ref} = 6.99 * Q_{10}^{0.438}$	Q_{10} (m^3/s)	
VWI	Valley width index (m/m)	$VWI = W_v/W_{ref}$	W_v (m) W_{ref} (m)	

(Sheet 1 of 1)

SCCWRP FORM 1 ANALYSES

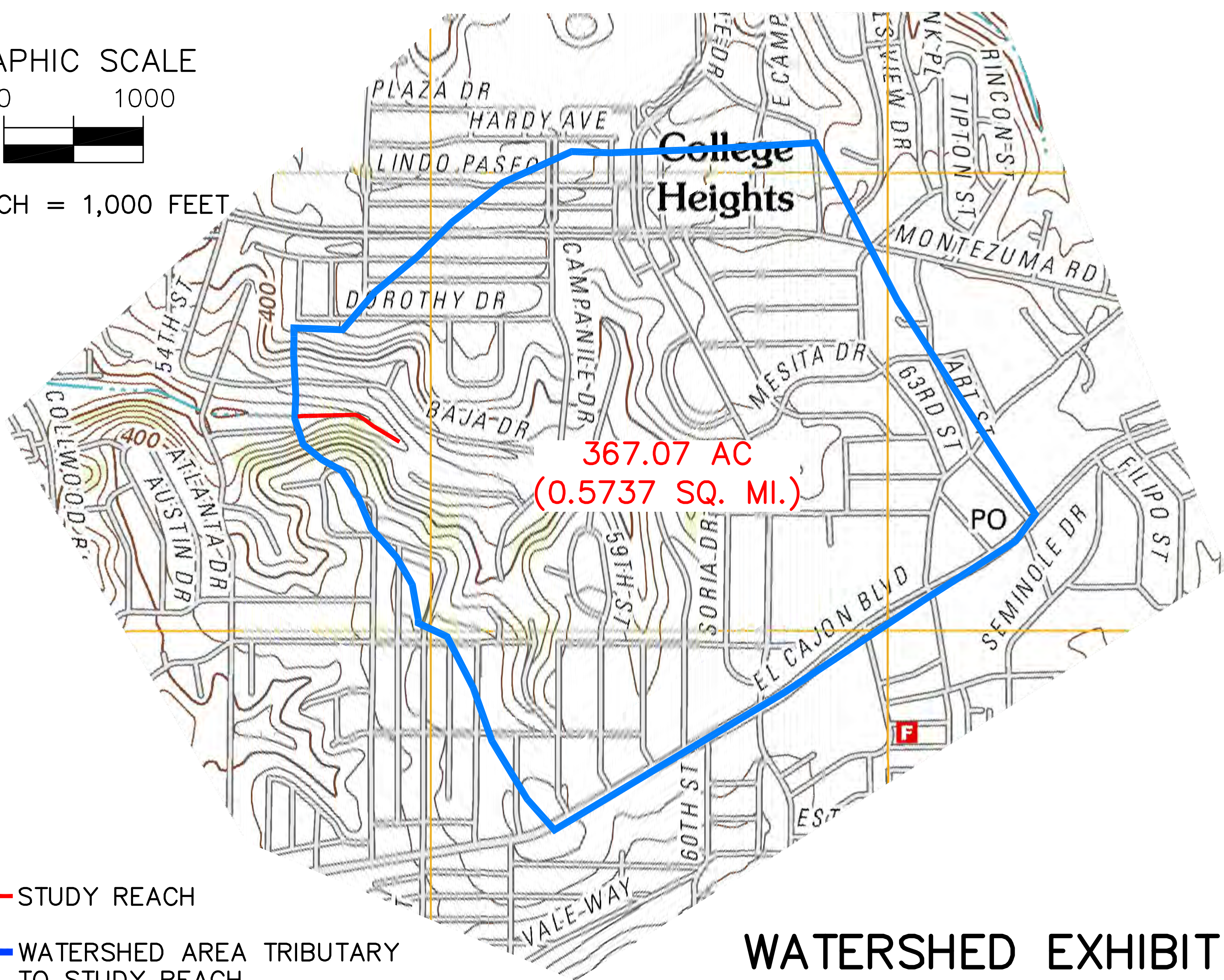
Reach	Area A, sq. mi.	Mean Annual Precip. P, inches	Valley Slope Sv, m/m	Valley Width Wv, m	10-Year Flow Q10cfs, cfs	10-Year Flow Q10, cms
1	0.5735	12.93	0.0277	6.7	81	2.3

Reach	10-Year Screening Index INDEX	Reference Width Wref, m	Valley Width Index VWI, m/m
1	0.0418	10.0	0.67

GRAPHIC SCALE

0 1000

1 INCH = 1,000 FEET



LEGEND:

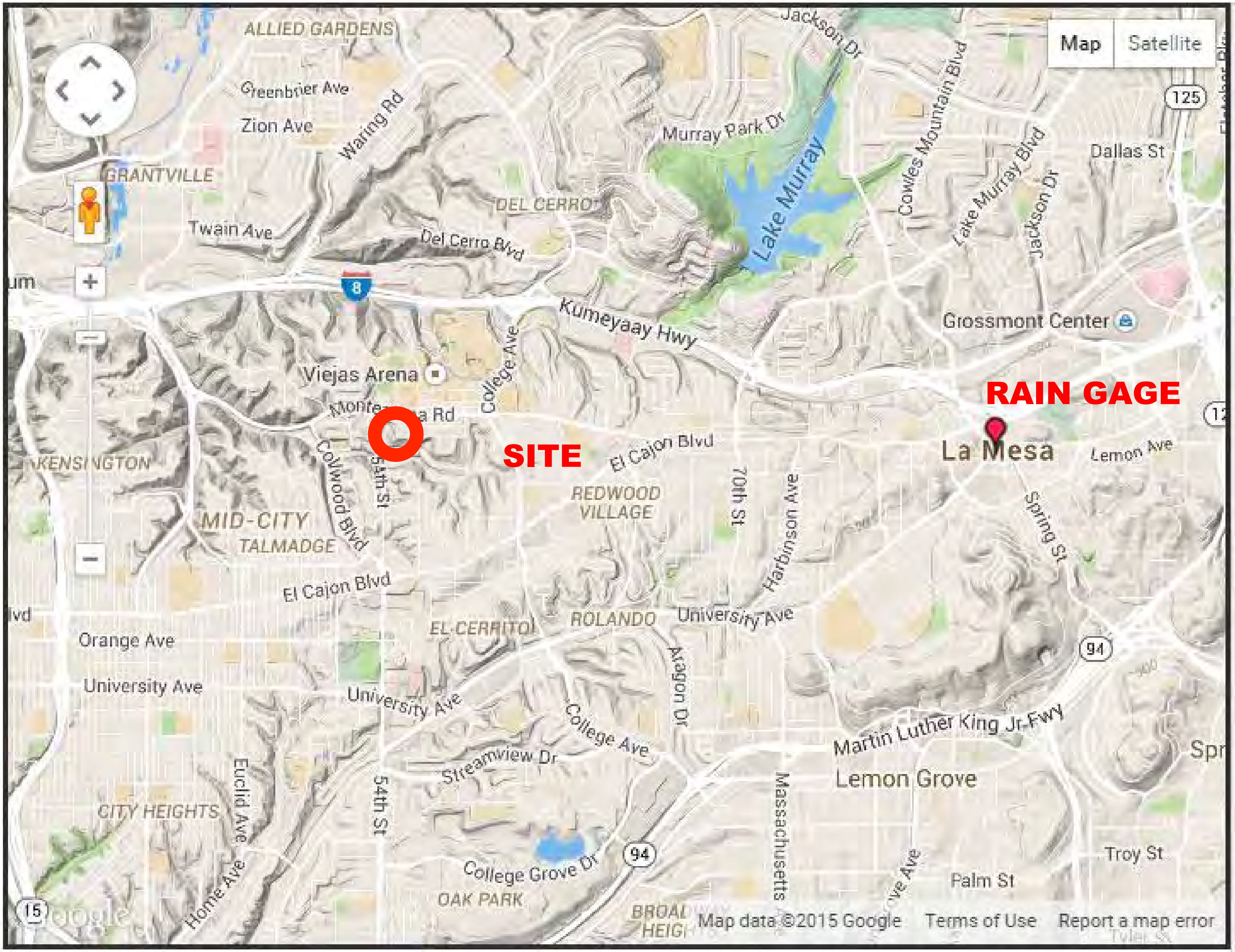
STUDY REACH

WATERSHED AREA TRIBUTARY TO STUDY REACH

WATERSHED EXHIBIT

5030 COLLEGE AVENUE

US COOP Station Map



LA MESA, CALIFORNIA (044735)

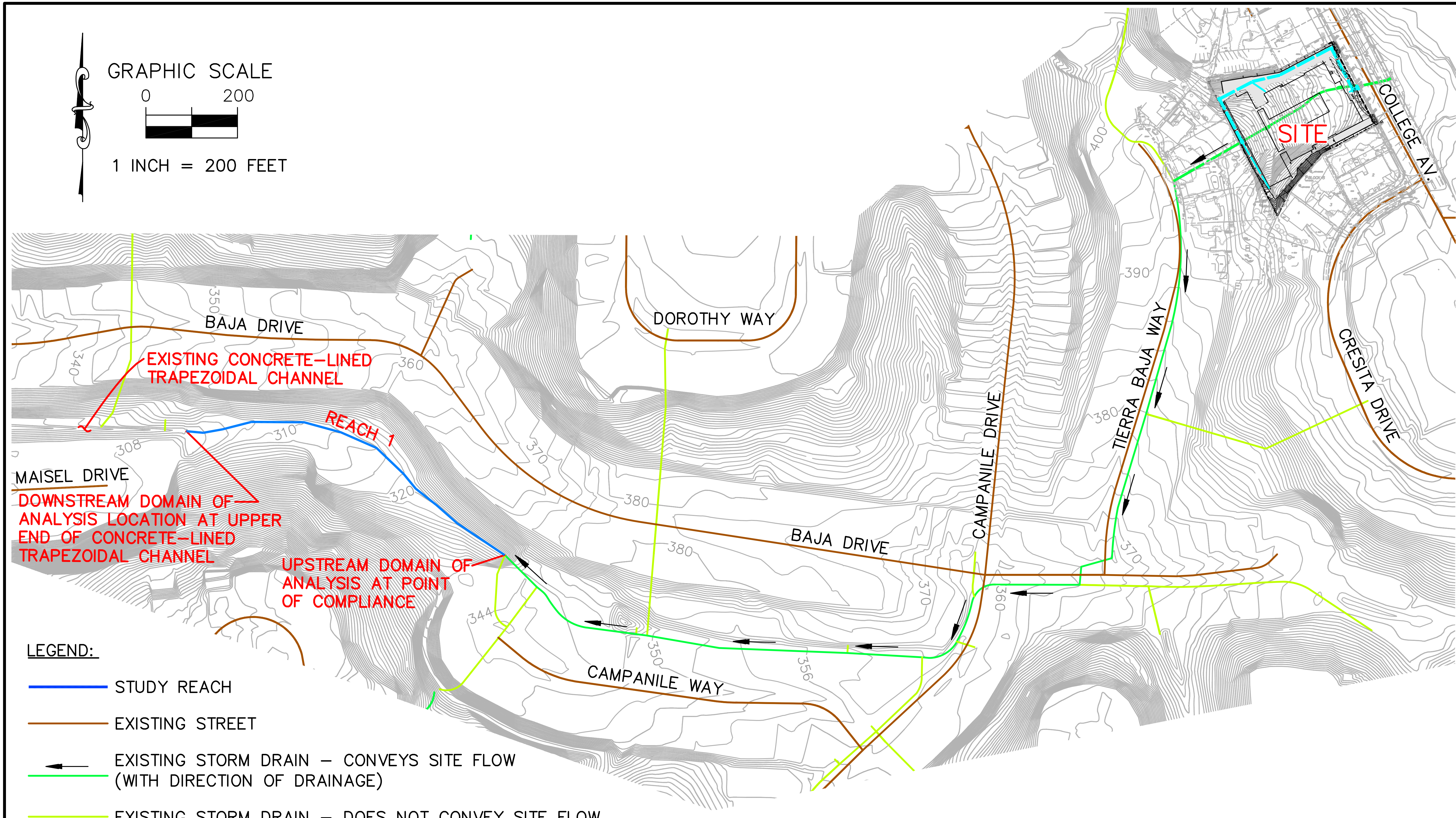
Period of Record Monthly Climate Summary

Period of Record : 01/01/1899 to 07/22/2006

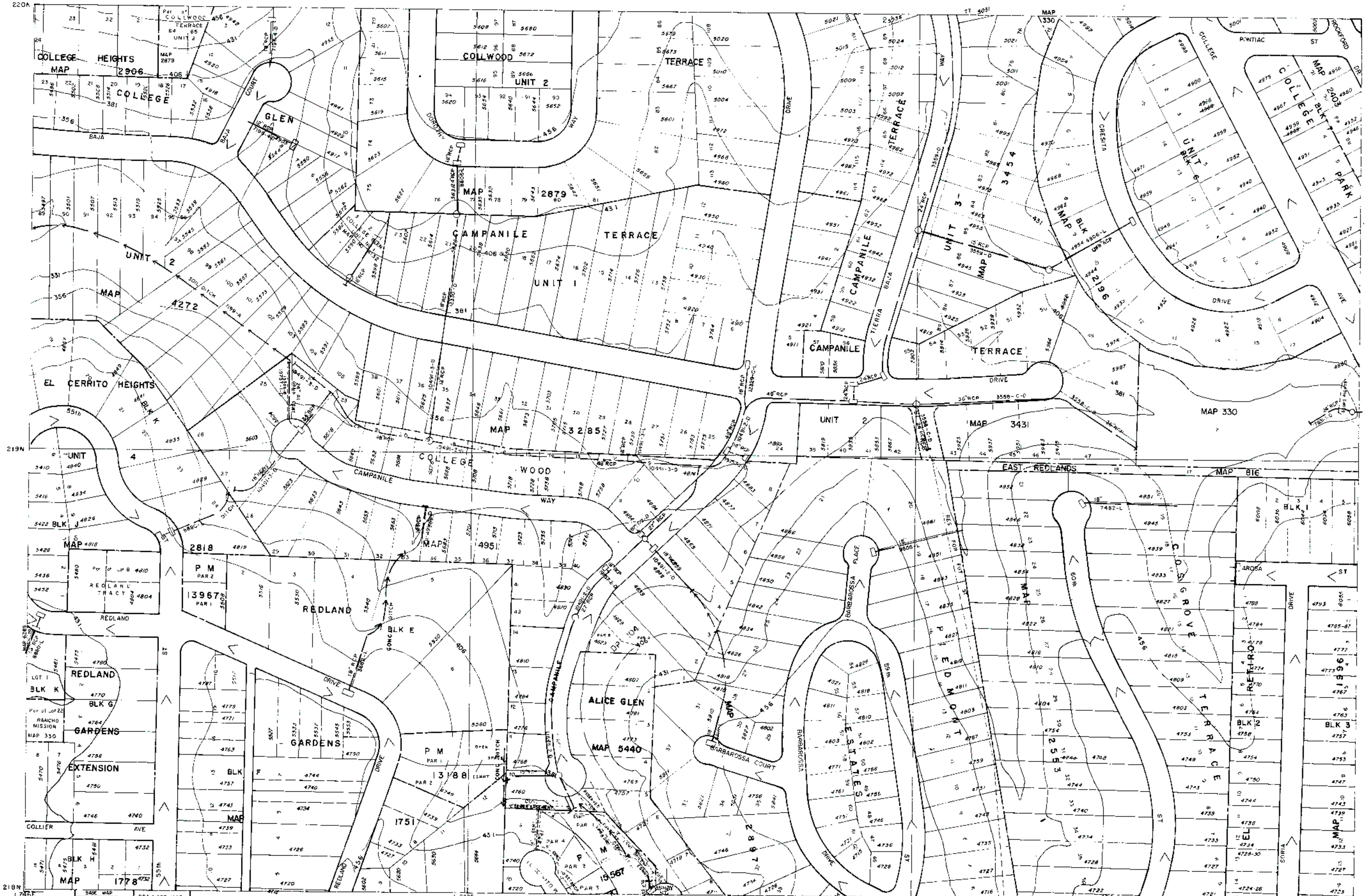
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	67.1	68.1	68.7	71.7	73.9	77.5	83.1	84.5	83.7	79.0	73.5	68.7	75.0
Average Min. Temperature (F)	43.7	45.1	46.8	50.1	53.8	57.0	61.0	62.2	60.3	55.1	48.3	44.5	52.3
Average Total Precipitation (in.)	2.44	2.42	2.43	1.04	0.29	0.10	0.05	0.09	0.24	0.57	1.37	1.89	12.93
Average Total SnowFall (in.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average Snow Depth (in.)	6	6	5	5	5	5	5	5	5	5	4	5	5

Percent of possible observations for period of record.
Max. Temp.: 96.3% Min. Temp.: 95.7% Precipitation: 97% Snowfall: 97.2% Snow Depth: 97.1%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu



STUDY AREA EXHIBIT
5030 COLLEGE AVENUE



SASE MAP — DRAINAGE MAP

12-12-95

CITY OF SAN DIEGO, CALIFORNIA

SCALE: 1 INCH = 100 FEET
DATUM IS MEAN SEA LEVEL

DRAINAGE MAP
218-1746

220-1746

218-1745 | 218-1747

216-1746

218-1746

APPENDIX B

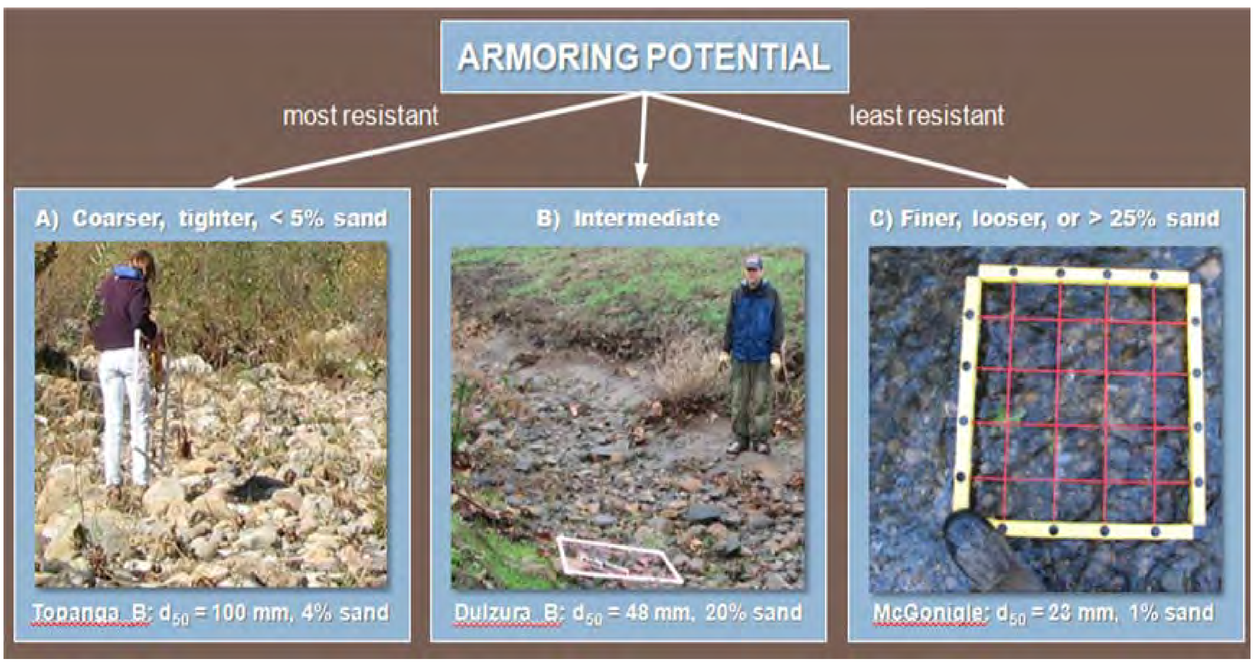
SCCWRP FIELD SCREENING DATA

Form 3 Support Materials

Form 3 Checklists 1 and 2, along with information recording in Form 3 Table 1, are intended to support the decisions pathways illustrated in Form 3 Overall Vertical Rating for Intermediate/Transitional Bed.

Form 3 Checklist 1: Armoring Potential

□	A	A mix of coarse gravels and cobbles that are tightly packed with <5% surface material of diameter <2 mm
☒ e	B	Intermediate to A and C or hardpan of unknown resistance, spatial extent (longitudinal and depth), or unknown armoring potential due to surface veneer covering gravel or coarser layer encountered with probe
□	C	Gravels/cobbles that are loosely packed or >25% surface material of diameter <2 mm



Form 3 Figure 2. Armoring potential photographic supplement for assessing intermediate beds (16 < d_{50} < 128 mm) to be used i**n conjunction with Form 3 Checklist 1.**

(Sheet 2 of 4)

REACH 1 RESULTS

ee

Form 3 Checklist 2: Grade Control

☒ A Grade control is present with spacing <50 m or $2/S_v$ m

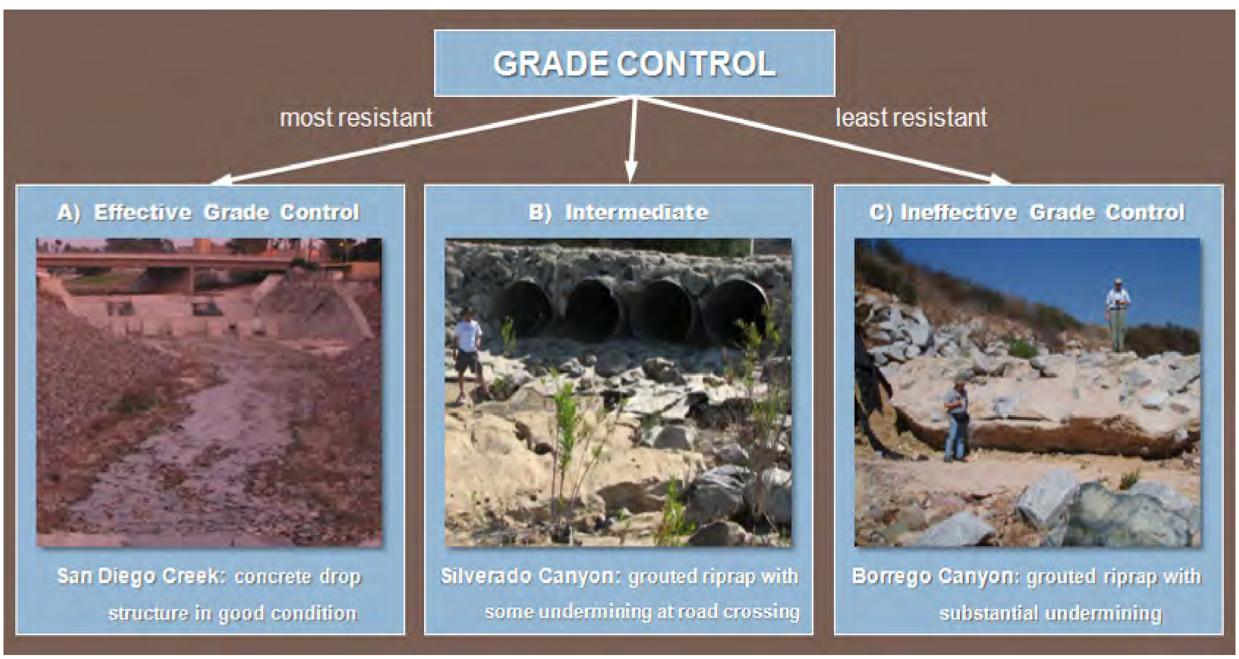
- No evidence of failure/ineffectiveness, e.g., no headcutting (>30 cm), no active mass wasting (analyst cannot say grade control sufficient if mass-wasting checklist indicates presence of bank failure), no exposed bridge pilings, no culverts/structures undermined

e

- Hard points in serviceable condition at decadal time scale, e.g., no apparent undermining, flanking, failing grout
- If geologic grade control, rock should be resistant igneous and/or metamorphic; For sedimentary/hardpan to be classified as 'grade control', it should be of demonstrable strength as indicated by field testing such as hammer test/borings and/or inspected by appropriate stakeholder

□ B Intermediate to A and C – artificial or geologic grade control present but spaced 2/Sv m to 4/Sv m or potential evidence of failure or hardpan of uncertain resistance

□ C Grade control absent, spaced >100 m or $>4/S_v$ m, or clear evidence of ineffectiveness



Form 3 Figure 3. Grade-control (condition) photographic supplement for assessing intermediate beds ($16 < d_{50} < 128$ mm) to be used in conjunction with Form 3 Checklist 2.

(Sheet 3 of 4)

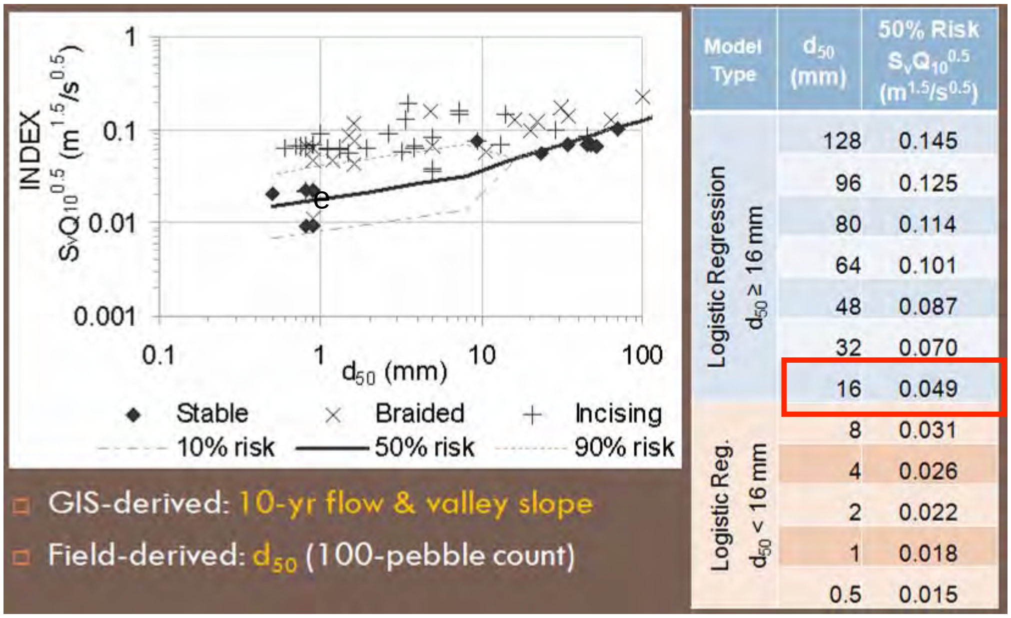
e

REACH 1 RESULTS

e

Regionally-Calibrated Screening Index Threshold for Incising/Braiding

For transitional bed channels (d_{50} between 16 and 128 mm) or labile beds (channel not incised past critical bank height), use Form 3 Figure 3 to determine Screening Index Score and complete Form 3 Table 1.



Form 3 Figure 4. Probability of incising/braiding based on logistic regression of Screening Index and d_{50} to be used in conjunction with Form 3 Table 1.

Form 3 Table 1. Values for Screening Index Threshold (probability of incising/braiding) to be used in conjunction with Form 3 Figure 4 (above) to complete Form 3 Overall Vertical Rating for Intermediate/Transitional Bed (below).. Screening Index Score: A = <50% probability of incision for current Q_{10}, valley slope, and d_{50}; B = Hardpan/d_{50} indeterminate; and C = ≥50% probability of incising/braiding for current Q_{10}, valley slope, and d_{50}.

d_{50} (mm) *From Form 2*	**S_v*$Q_{10}^{0.5}$ ($m^{1.5}/s^{0.5}$)** *From Form 1*	**S_v*$Q_{10}^{0.5}$ ($m^{1.5}/s^{0.5}$)** *50% risk of incising/braiding from table in Form 3 Figure 3 above*	**Screening Index Score (A, B, C)**

Overall Vertical Rating for Intermediate/Transitional Bed

Calculate the overall Vertical Rating for Transitional Bed channels using the formula below. Numeric values for responses to Form 3 Checklists and Table 1 as follows: A = 3, B = 6, C = 9.

$$Vertical\ Rating = \sqrt{\left\{\left(\sqrt{armoring * grade\ control}\right) * screening\ index\ score\right\}}$$

6 x 3 x 3 =

3 6

Vertical Susceptibility based on Vertical Rating: <4.5 = LOW; 4.5 to 7 = MEDIUM; and >7 = HIGH.

(Sheet 4 of 4)

REACH 1 RESULTS

PEBBLE COUNT

#	Diameter, mm
1	2.8
2	2.8
3	4
4	4
5	4
6	5.6
7	5.6
8	5.6
9	5.6
10	5.6
11	5.6
12	8
13	8
14	8
15	8
16	8
17	11
18	11
19	11
20	11
21	11
22	11
23	11
24	11
25	11
26	11
27	11
28	11
29	11
30	11
31	11
32	16
33	16
34	16
35	16
36	16
37	16
38	16
39	16
40	16
41	16
42	16
43	16

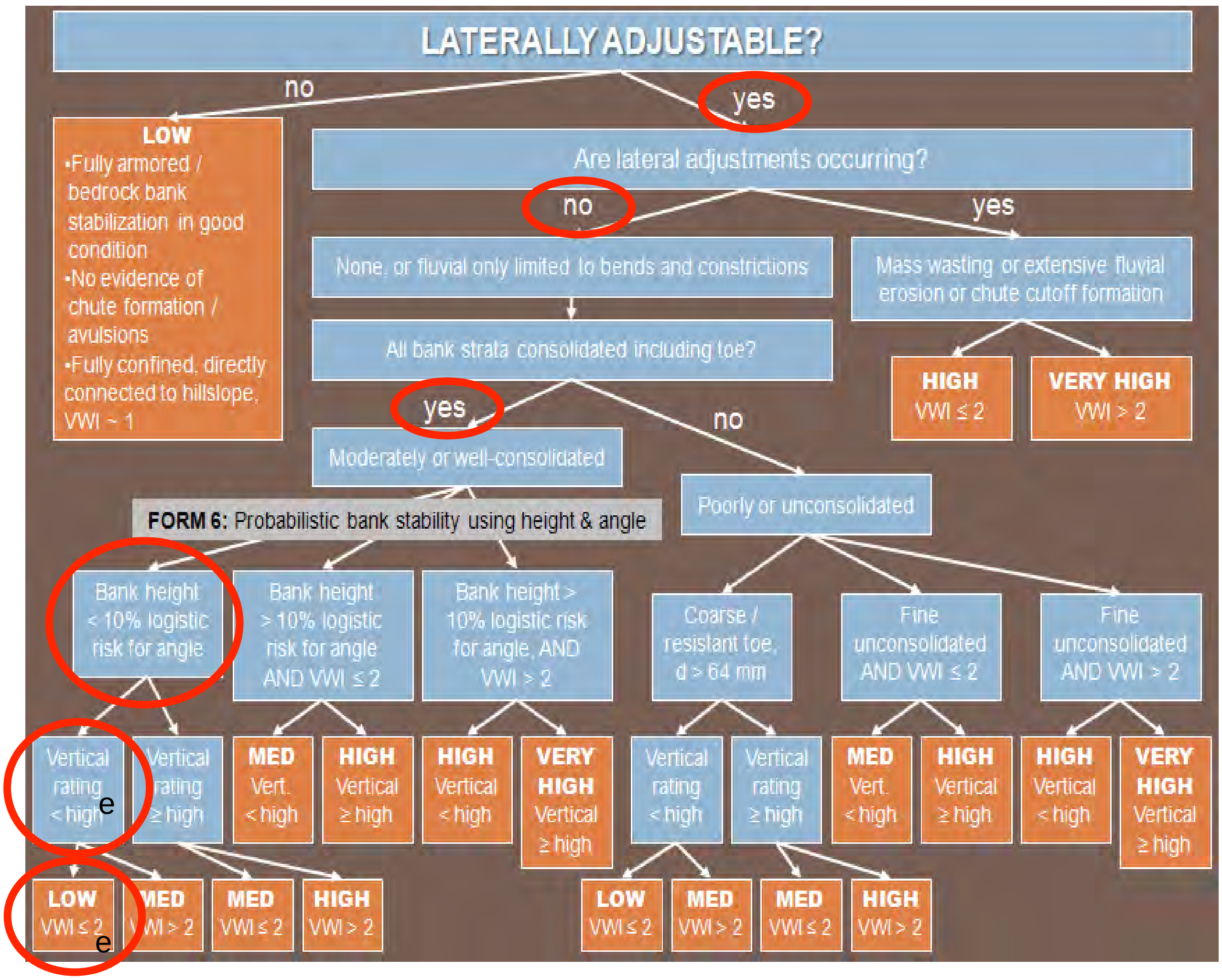
#	Diameter, mm	
44	16	
45	16	
46	16	
47	16	
48	16	
49	16	
50	16	D50
51	16	
52	22.6	
53	22.6	
54	22.6	
55	22.6	
56	22.6	
57	22.6	
58	22.6	
59	22.6	
60	32	
61	32	
62	32	
63	32	
64	32	
65	32	
66	32	
67	32	
68	32	
69	32	
70	32	
71	45	
72	45	
73	45	
74	45	
75	45	
76	45	
77	45	
78	45	
79	45	
80	64	
81	64	
82	64	
83	64	
84	64	
85	64	
86	64	
87	64	
88	90	

#	Diameter, mm
89	90
90	90
91	90
92	90
93	90
94	90
95	90
96	90
97	128
98	128
99	128
100	128

e

FORM 4: LATERAL SUSCEPTIBILTY FIELD SHEET

Circle appropriate nodes/pathway for proposed site
OR use sequence of questions provided in Form 5.



e

(Sheet 1 of 1) e

REACH 1 RESULTS

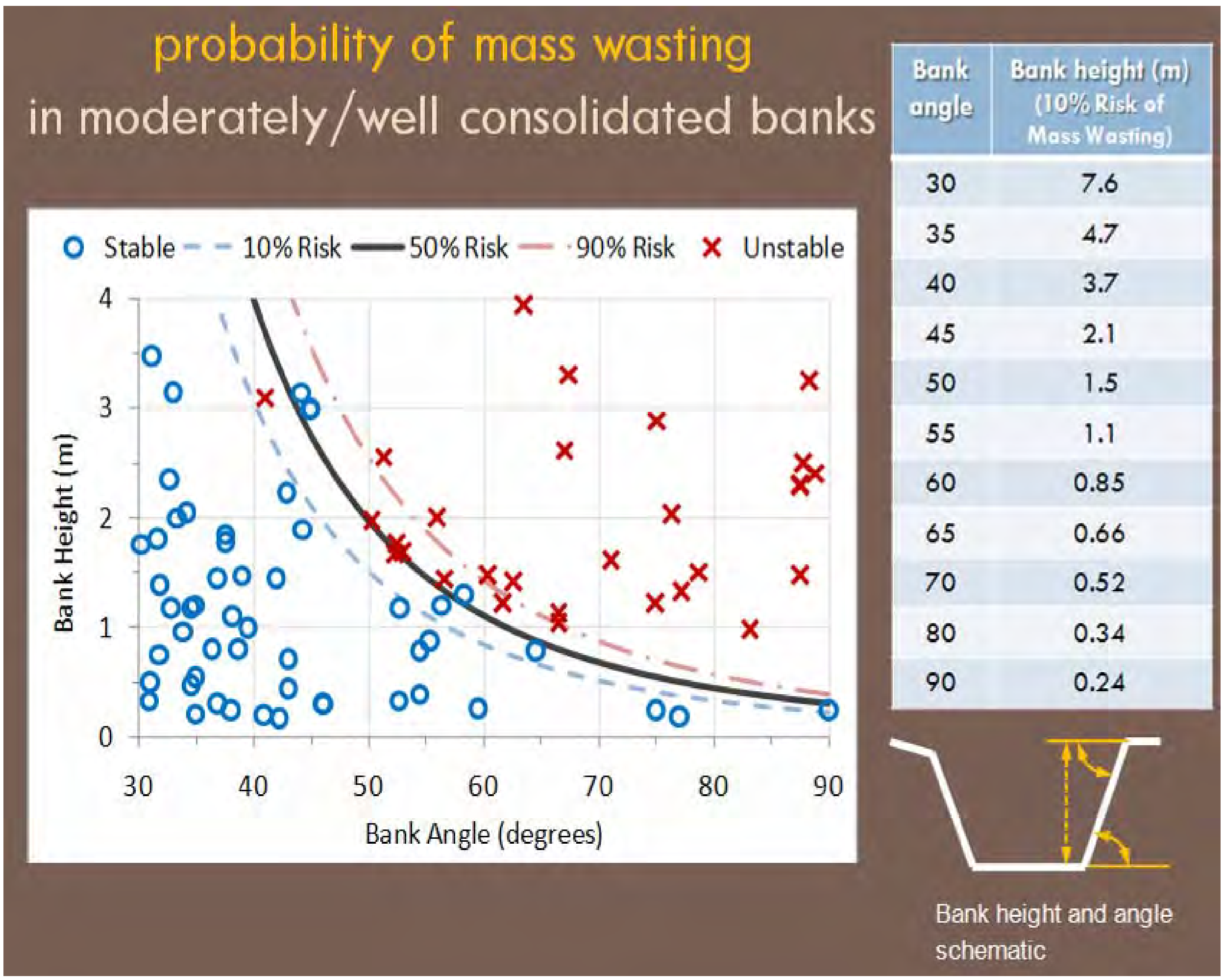
e

e

FORM 6: PROBABILITY OF MASS WASTING BANK FAILURE

If mass wasting is not currently extensive and the banks are moderately- to well-consolidated, measure bank height and angle at several locations (i.e., at least three locations that capture the range of conditions present in the study reach) to estimate representative values for the reach. Use Form 6 Figure 1 below to determine if risk of bank failure is >10% and complete Form 6 Table 1. Support your results with photographs that include a protractor/rod/tape/person for scale.

	Bank Angle (degrees) *(from Field)*	**Bank Height (m)** *(from Field)*	**Corresponding Bank Height for 10% Risk of Mass Wasting (m)** *(from Form 6 Figure 1 below)*	**Bank Failure Risk** *(<10% Risk)* *(>10% Risk)*
Left Bank	[illegible]		---	<10%
Right Bank	26.6 degrees (2:1)	----	---	<10%



Form 6 Figure 1. Probability Mass Wasting diagram, Bank Angle:Height/% Risk table, and Band Height:Angle schematic.

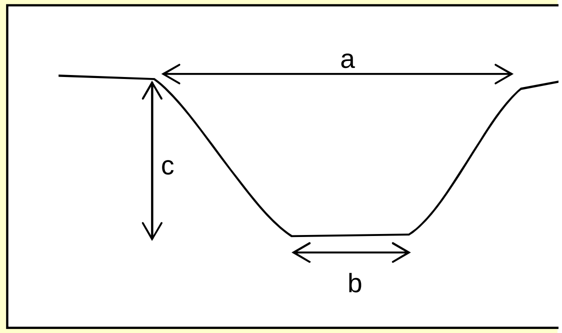
(Sheet 1 of 1) e

REACH 1 RESULTS

Critical Flow Calculator

enter all values in green cells
and drop down boxes

Example using Otay Village



Inputs

a) Receiving channel width at top of bank (ft) - see figure on right	60.0
b) Channel width at bed (ft)	22.0
c) Bank height at top of bank (ft)	4.0
Channel gradient (ft/ft)	0.028
Receiving channel roughness	Same as above. with flood stage reaching branches n=0.12

Channel materials (use weakest of bed or banks). If materials are varied use weakest material covering more than 20% of channel.

- unconsolidated sandy loam 0.035 lb/sq ft
- alluvial silt (non coloidal) 0.045 lb/sq ft
- medium gravel 0.12 lb/sq ft
- alluvial silt/clay 0.26 lb/sq ft
- 2.5 inch cobble 1.1 lb/sq ft
- enter own d50 (variable)
- vegetation (bed and banks) 0.6 lb/sq ft

Select method of calculating Q2

- Input own Q2
- Calculate Q2 using USGS regression

Receiving water watershed annual precip (inches)	12.9	Receiving water watershed area at PoC (sq mi)	0.6
Project watershed annual precipitation (inches)	12.9	Project watershed area draining to PoC (sq mi)	0.6

Outputs - Flow control range

Receiving water Q2	5.9	**Point of Compliance low flow rate (cfs)**	**3.0**
Project site Q2	5.9	**Low flow class**	**0.5Q2**
		Channel vulnerability	**Low**