WATER QUALITY TECHNICAL REPORT

Castlerock

Vesting Tentative Map - Rezone Site Development Permit - Planned Development Permit

CITY OF SAN DIEGO, CALIFORNIA

Lat33 Job No. 666.00

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF ATTACHMENTS

INTRODUCTION

The City of San Diego's Standard Urban Stormwater Mitigation Plan (SUSMP) states a Water Quality Technical Report (WQTR) must accompany all applications for a permit or approval associated with a Land Disturbance Activity. The purpose of this WQTR is to describe how the project will minimize the short and long-term impacts on receiving water quality. The plans and specifications found in this WQTR are conceptual, in nature, and not intended for construction purposes.

1 PROJECT DESCRIPTION

1.1 Project Location/Setting

Castlerock is located on the north side of Mast Boulevard along the easterly boundary of San Diego adjacent to the city of Santee. The project area encompasses 203.64 acres and is undeveloped natural landscape.

Located within the project boundary is a large SDG&E substation that is not a part of this project. An existing single family residential development lies to the east. A high school is adjacent to the project on the south, across Mast Boulevard. The City's Multiple Habitat Planning Area (MHPA) lies in the western portion of the project.

1.2 Project Description

The project proposes to develop the 203.64 acre site into a residential community consisting of 283 single family lots and 147 multi-family detached units, along with 58.21 acres of dedicated open space.

1.3 Project Activities

Proposed construction activities include:

- Rough & Precise grading
- Construction of public/private storm drain facilities
- Construction of public/private sewer facilities
- Construction of public/private water facilities
- Construction of off-site public utilities
- Public and private roads

1.4 Existing Drainage Improvements

Presently, off-site storm water runoff drains to the project from the north and the west. Eight existing hydrologic basins drain through the project via canyons or smaller drainage ways. The large Sycamore Canyon extends approximately 1.7 miles to the north of the project. Runoff is collected on the southerly and easterly subdivision boundary at various inlets and headwalls.

1.5 Proposed Drainage Improvements

There are 5 above ground detention basins proposed for this project along the easterly border, detaining runoff for 152 acres (75%) of the project site. These detention basins will maintain the existing flow rate up to the 100 year storm event; therefore there are no downstream impacts due to this development.

1.6 Downstream Conditions

Storm water collected along the easterly project boundary is piped through the existing residential subdivision to Sycamore Channel which runs north to south along the westerly side of Santee Lakes. Storm water collected along the southerly boundary of the project is piped through the high school site or piped within Mast Boulevard. The Sycamore Channel and southern pipe systems into the San Diego River located approximately 1 mile south of the project. Refer to the preliminary drainage study dated October 22, 2010 for more particulars.

1.7 Hydrologic Context Watershed Contribution

The project is located within the lower San Diego Hydrologic Unit (HA 907.00), and the Santee Sub-Area (HSA 7.12) as defined by the Water Quality Control Plan for the San Diego Basin (9). The San Diego Hydrologic Unit covers a total watershed area of 440 square miles, and this project represents less than 0.01% of this total area.

2 PRIORITY PROJECT DETERMINATION

The following table determines whether the project is a "priority project" according to guidelines laid out in the San Diego Region Municipal Separate Storm Sewer Systems (MS4) Permit (Order No. R9-2007-0001, NPDES No. CAS0108758), adopted in January 2007. Projects are subject to MS4 Priority Project requirements if one or more of the criteria described in the table are met.

Based on the information presented in the table below, the proposed project is a priority project.

PRIORITY PROJECT	YES	NO
1. Does the project disturb one acre or more and not meet one of the exclusions listed below?	✓	
Exclusions: Projects creating less than 5,000 sf of impervious surface; projects that add landscaping that does not require regular use of pesticides and fertilizers such as a slope stabilization project using native plants; linear pathway projects that are for infrequent vehicle use, such as for emergency or maintenance access or for bicycle or pedestrian use, if they are built with impervious surfaces or if they sheet flow to surrounding pervious surfaces; and, projects that do not meet the definition of New Development or Significant Redevelopment in the Storm Water Standards.		
2. New detached or attached residential development of 10 or more units	✓	
3. New developments of heavy industry greater than 1 acre		✓
4. New commercial development greater than 1 acre		✓
5. New automotive repair shop		✓
6. New restaurant		✓
7. New hillside development greater than 5,000 square feet		✓
8. New project within, directly adjacent to or discharging to receiving waters within the Environmentally Sensitive Areas		✓
9. New parking lots greater than or equal to 5,000 square feet or with at least 15 parking spaces		✓
10. New streets, roads, highways, and freeways which would create a new paved surface that is 5,000 square feet or greater	✓	
11. New retail gasoline outlets		✓
12. Redevelopment that installs and/or replaces 5,000 square feet or more of impervious surface and the existing site meets at least one of the categories 2-11 above	✓	

3 HYDROLOGIC SETTING

This section provides a summary of relevant storm water quality issues pertaining to the project site and identifies the section where further discussion is provided.

3.1 Topography

The northwestern corner of the site is the high point. The majority of the site (approximately 152 acres) drains east, while the remaining area flows south. Elevations within the project range from 390 feet MSL to 704 feet MSL.

3.2 Land Use & Vegetation

The majority of the project site is undeveloped, with the exception of an existing 1.3 acre SDG&E substation that is not a part of this project. Currently a large majority of the site is in its natural condition. Vegetation consists of native weeds and grasses on the lower elevations, and native shrubbery on the steeper hillside. Existing natural drainage channels direct flow into drainage structures along the southern and eastern borders of the site. The large SDG&E substation is located within drainage basins 4A and 5A. This represents the largest impervious area currently at the site. Due to the sparse vegetation in the area, care should be taken to ensure that disturbed soil is prevented from entering the storm drain system.

3.3 Dry Weather Flow

There is no anticipated dry weather flow.

3.4 Receiving Waters

The most immediate receiving water is upstream end of the portion of the San Diego River classified as "Lower San Diego River". The San Diego River outfalls into the Pacific Ocean at Dog Beach, just south of Mission Bay. San Diego River (Lower) is listed as an impaired water body on the California 2006 303(d) list. See section 3.5 for further information.

Under the 303(d) section of the Clean Water Act, States are required to identify and list surface water bodies that are polluted. States area required to compile these water bodies into a list, referred to as the "Clean Water Act Section 303(d) List of Water Quality Limited Segments". States must also prioritize the water bodies on the list and develop Total Maximum Daily Loads (TMDLs) to improve the water quality. Table 3-1 summarized the 303(d) impairments of the receiving waters for this project.

3.5 Receiving Waters

Table 3-1 Summary of Receiving Surface Waters

Receiving Water	Hydrologic Unit Code	Approximate Distance From Site	303(d) Impairment(s)
San Diego Hydrologic Unit (907.00)			
Lower San Diego - Santee Subarea	907.12	1 mile	Fecal Coliform
			Low Dissolved Oxygen
			Phosphorus
			Total Dissolved Solids

3.6 Risk Assessment

The receiving waters for this project do have a potential beneficial use for municipal water supply systems.

3.7 Total Maximum Daily Load (TMDL)

Based on the 2006 303(d) list, TMDLs exist for the receiving waters for the following pollutants: Fecal Coliform, Low Dissolved Oxygen, Phosphorus, and Total Dissolved Solids.

3.8 General Climate

The San Diego region has a Mediterranean Climate characterized by a long dry season, and a short, moderately wet season. The average annual precipitation ranges from less than 8 inches, along the coast, to 18 inches in the mountain areas. The majority of yearly precipitation generally falls during a few storms in close proximity to each other.

3.9 Soil Characteristics

A full geotechnical analysis and report was performed by Geocon, dated May 5, 2006. Five surficial soil deposits and four geologic formations were encountered during the field investigation. Surficial soil deposits include Quaternary-age terrace deposits, Eocene-age Stadium Conglomerate and Friars Formation. A Cretaceous-age plutonic unit known as the Cuyamaca Gabbro underlies the sedimentary units.

3.10 Contaminated Soil & Hazardous Waste Assessment

There are no known contaminated soils or hazardous waste present in the site area.

4 WATERSHED IDENTIFICATION

			303(d) Impairments
Receiving Water	San Diego River (Lower)		See Table 3-1
Hydrologic Subarea	Santee (HSA 907.12)		
Hydrologic Area	Lower San Diego (HA 906.10)		
Hydrologic Unit	San Diego River (HU 907)		

5 BENEFICIAL USES

5.1 Definitions

From the San Diego County Basin Plan, The Porter-Cologne Act establishes a comprehensive program for the protection of beneficial uses of the waters of the state. California Water Code Section 13050(f) describes the beneficial uses of surface and ground waters that may be designated by the State or Regional Board for protection as follows:

"Beneficial uses of the waters of the state that may be protected against quality degradation include, but are not necessarily limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves."

Beneficial uses for surface waters are designated under the Clean Water Act Section 303 in accordance with regulations contained in 40 CFR 131. The State is required to specify appropriate water uses to be achieved and protected. The beneficial use designation of surface waters of the state must take into consideration the use and value of water for public water supplies, protection and propagation of fish, shellfish and wildlife, recreation in and on the water, agricultural, industrial and other purposes including navigation.

In 1972, the State Board adopted a uniform list and description of beneficial uses to be applied throughout all basins of the State. During the 1994 San Diego Basin Plan update, beneficial use definitions were revised and some new beneficial uses were added. The

following beneficial uses are defined statewide and are designated within the San Diego Region:

Municipal and Domestic Supply (MUNI) Includes uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.

Agricultural Supply (AGR) Includes uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

Industrial Process Supply (PROC) Includes uses of water for industrial activities that depend primarily on water quality.

Industrial Service Supply (IND) Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

Ground Water Recharge (GWR) Includes uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.

Freshwater Replenishment (FRSH) Includes uses of water for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).

Navigation (NAV) Includes uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

Hydropower Generation (POW) Includes uses of water for hydropower generation.

Contact Water Recreation (REC-1) Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs.

Non-Contact Water Recreation (REC-2) Includes the uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Commercial and Sport Fishing (COMM) Includes the uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

Aquaculture (AQUA) Includes the uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.

Warm Freshwater Habitat (WARM) Includes uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

Cold Freshwater Habitat (COLD) Includes uses of water that support cold-water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

Inland Saline Water Habitat (SAL) Includes uses of water that support inland saline water ecosystems including, but not limited to, preservation or enhancement of aquatic saline habitats, vegetation, fish, or wildlife, including invertebrates.

Estuarine Habitat (EST) Includes uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).

Marine Habitat (MAR) Includes uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

Wildlife Habitat (WILD). Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Rare, Threatened, or Endangered Species (RARE) Includes uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered

Preservation of Biological Habitats of Special Significance (BIOL) Includes uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection.

Tables 5-1, 5-2, and 5-3 summarize the beneficial uses of the downstream waters.

Table 5-1 Beneficial Uses of Downstream Inland Surface Waters (RWQCB, 1998).

● Existing Beneficial Use ○ Potential Beneficial Use + Except from Municipal Use	**Beneficial Use**														
Receiving Water (Hydrologic Unit Code)	MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Diego River (907.12)	○		●					●	●		●		●	●	

Table 5-2 Beneficial Uses of Downstream Coastal Waters (RWQCB, 1998).

● Existing Beneficial Use ○ Potential Beneficial Use + Except from Municipal Use	**Beneficial Use**														
Receiving Water (Hydrologic Unit Code)	IND	NAV	REC1	REC2	COMM	BIOL	EST	WILD	RARE	MAR	AQUA	MIGR	SPWN	WARM	SHELL
Mouth of San Diego River (907.11)			●	●	●		●	●	●	●		●	●		●
Pacific Ocean	●	●	●	●	●	●		●	●	●	●	●	●		●

Table 5-3 Beneficial Uses of Downstream Lakes and Reservoirs (RWQCB, 1998).

● Existing Beneficial Use ○ Potential Beneficial Use	**Beneficial Use**												
Receiving Water (Hydrologic Unit Code)	MUN	AGR	IND	PROC	GWR	FRSH	REC1	REC2	WARM	COLD	WILD	RARE	POW
N/A													

Table 5-4 Beneficial Use of Downstream Ground Waters (RWQCB, 1998).

● Existing Beneficial Use ○ Potential Beneficial Use ● **+** Exempt from Municipal Use	**Beneficial Use**					
Receiving Water (Hydrologic Unit Code)	MUN	AGR	IND	PROC	FRSH	GWR
Lower San Diego - Santee HSA (907.12)	●	●	●	●		

6 POLLUTANTS OF CONCERN

6.1 Potential Pollutants

Table 6-1 identifies generally anticipated pollutants that might be generated from priority project categories. This project proposes a detached residential development

Table 6-1 Anticipated and Potential Pollutants by Project Type (San Diego County SUSMP, March 2010)

✓ Anticipated Pollutants **P** Potential Pollutants	General Pollutant Categories								
Priority Project Categories	Sediments	Nutrients	Heavy Metals	Organic Substances	Trash and Debris	Oxygen-Demanding Substances	Oils and Grease	Bacteria and Viruses	Pesticides
Housing Development	✓	✓			✓	✓	✓	✓	✓
Attached Residential Development	✓	✓			✓	**P**(1)	**P**(2)	**P**	✓
Commercial (>100,000 sf)	**P**(1)	**P**(1)		**P**(2)	✓	**P**(5)	✓	**P**(3)	**P**(5)
Heavy Industry	✓		✓	✓	✓	✓	✓		
Auto Repair Shops			✓	✓	✓		✓		
Restaurants					✓	✓	✓	✓	**P**(1)
Hillside Development (>5,000 sf)	✓	✓			✓	✓	✓		✓
Parking Lots	**P**(1)	**P**(1)	✓		✓	**P**(1)	✓		**P**(1)
Streets, Highways, and Freeways	✓	**P**(1)	✓	**P**(4)	✓	**P**(5)	✓	✓	**P**(1)
Retail Gasoline Outlets			✓	✓	✓	✓	✓		

(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 involved food or animal waste product

(4) Including petroleum hydrocarbons

(5) Including solvents.

6.2 Pollutant Definitions

Sediments : Anticipated
Sediments are soils or other surface materials eroded and then transported or deposited by the action of wind, water, ice, or gravity. Sediments can increase turbidity, clog fish gills, reduce spawning habitat, lower young aquatic organisms survival rates, smother bottom dwelling organisms, and suppress aquatic vegetation growth.

Nutrients: Anticipated
Nutrients are inorganic substances, such as nitrogen and phosphorus. They commonly exist in the form of mineral salts that are either dissolved or suspended in water. Primary sources of nutrients in urban runoff are fertilizers and eroded soils. Excessive discharge of nutrients to water bodies and streams can cause excessive aquatic algae and plant growth. Such excessive production, referred to as cultural eutrophication, may lead to excessive decay of organic matter in the water body, loss of oxygen in the water, release of toxins in sediment, and the eventual death of aquatic organisms.

Heavy Metals: Anticipated
Metals are raw material components in non-metal products such as fuels, adhesives, paints, and other coatings. The primary sources of metal pollution in storm water are typically commercially available metals and metal products. Metals of concern include cadmium, chromium, copper, lead, mercury, and zinc. Lead and chromium have been used as corrosion inhibitors in primer coatings and cooling tower systems. At low concentrations naturally occurring in soil, metals are not toxic. However, at higher concentrations, certain metals can be toxic to aquatic life. Humans can be impacted from contaminated groundwater resources, and bioaccumulation of metals in fish and shellfish. Environmental concerns, regarding the potential for release of metals to the environment, have already led to restricted metal usage in certain applications.

Organic Compounds: Potential
Organic compounds are carbon-based (commercially available or naturally occurring) substances found in pesticides, solvents, and hydrocarbons. Organic compounds can, at certain concentrations, indirectly or directly constitute a hazard to life or health. When rinsing off objects, toxic levels of solvents and cleaning compounds can be discharged to storm drains. Dirt, grease, and grime retained in the cleaning fluid or rinse water may also adsorb levels of organic compounds that are harmful or hazardous to aquatic life.

Trash & Debris: Anticipated
Trash (such as paper, plastic, polystyrene packing foam, and aluminum materials) and biodegradable organic matter (such as leaves, grass cuttings, and food waste) are general waste products on the landscape. The presence of trash and debris may have a significant impact on the recreational value of a water body and aquatic habitat. Excess organic matter can create a high biochemical oxygen demand in a stream and thereby lower its water quality. Also, in areas where stagnant water exists, the presence of excess organic matter can promote septic conditions resulting in the growth of undesirable organisms and the release of odorous and hazardous compounds such as hydrogen sulfide.

Oxygen Demanding Substances: Anticipated
This category includes biodegradable organic material as well as chemicals that react with dissolved oxygen in water to form other compounds. Proteins, carbohydrates, and fats are examples of biodegradable organic compounds. Compounds such as ammonia and hydrogen sulfide are examples of oxygen-demanding compounds. The oxygen demand of a substance can lead to depletion of dissolved oxygen in a water body and possibly the development of septic conditions.

Oil & Grease: Anticipated
Oil and grease are characterized as high-molecular weight organic compounds. The primary sources of oil and grease are petroleum hydrocarbon products, motor products from leaking vehicles, esters, oils, fats, waxes, and high molecular-weight fatty acids. Introduction of these pollutants to the water bodies are very possible due to the wide uses and applications of some of these products in municipal, residential, commercial, industrial, and construction areas. Elevated oil and grease content can decrease the aesthetic value of the water body, as well as the water quality.

Bacteria & Viruses: Anticipated
Bacteria and viruses are ubiquitous microorganisms that thrive under certain environmental conditions. Their proliferation is typically caused by the transport of animal or human fecal wastes from the watershed. Water containing excessive bacteria and viruses can alter the aquatic habitat and create a harmful environment for humans and aquatic life. Also, the decomposition of excess organic waste causes increased growth of undesirable organisms in the water.

Pesticides: Anticipated
Pesticides (including herbicides) are chemical compounds commonly used to control nuisance growth of organisms. Excessive application of a pesticide may result in runoff containing toxic levels of its active component.

6.3 Primary Pollutants of Concern

Primary pollutants of concern are those that correspond with any CWA 303(d) designation for the receiving waters and the anticipated pollutants generated from the project (Table 6-1). This project's receiving waters, Lower San Diego River is impaired for Fecal Coliform, Low Dissolved Oxygen, Phosphorus, and Total Dissolved Solids.

Table 6-2 summarizes common 303(d) impairment listings and the probable pollutants that cause the impairment.

Table 6-2 Probable Pollutants causing 303(d) Designation **(San Diego Storm Water Manual)**

	303(d) Impairment Listing				
Probable Pollutants	Eutrophic	Benthic Community Degradation	Sediment Toxicity	Toxicity (in storm water runoff)	Low dissolved Oxygen
Sediment					
Nutrients	✓				✓
Heavy Metals		✓	✓		
Organic Compounds		✓	✓		✓
Trash & Debris					✓
Oxygen Demanding Substances	✓				✓
Oil & Grease					
Bacteria & Viruses					
Pesticides				✓	

The Primary Pollutants of concern are:

- **Nutrients** - due to Low Dissolved Oxygen, & Phosphorus impairments
- **Organic Compounds** - due to Low Dissolved Oxygen impairment
- **Trash & Debris** - due to Low Dissolved Oxygen impairment
- **Oxygen Demanding Substances** - due to Low Dissolved Oxygen impairment
- **Bacteria** - due to Fecal Coliform impairments

Table 6-3 summarizes the potential source of the primary pollutants of concern and the treatment control BMP recommended to target those pollutants. Refer to Section 11 for more information.

Table 6-3 Primary Pollutants of Concern versus BMP Matrix

Anticipated Pollutants	Potential Aggravating Pollutant Source(s)	Permanent Best Management Practice(s)
Nutrients	Landscaping	
Organic Compounds	Landscaping & cleaning substances	
Trash & Debris	General Use	
Oxygen Demanding Substances	Landscaping	
Bacteria	Landscaping/Animals	

6.4 Secondary Pollutants of Concern

Secondary pollutants of concern are anticipated pollutants, based on the project type, but are not correlated with 303(d) impairment listing of receiving waters. Table 6-4 summarizes the potential source of the secondary pollutants of concern and the treatment control BMP recommended to target those pollutants. Refer to Section 11 for more information.

Table 6-4 Secondary Pollutants of Concern versus BMP Matrix

Anticipated Pollutants	Potential Aggravating Pollutant Source(s)	Permanent Best Management Practice(s)
Sediment	Landscaping, soil disruption	
Heavy Metals	Streets, Driveways and Parking Areas	
Oils and Grease	Streets, Driveways and Parking Areas	
Pesticides	Landscaping	

7 CONSTRUCTION BMPS

Best management practices is defined by any schedule of activities, prohibitions of practices, general good house keeping practices, pollution prevention and educational practices, maintenance procedures, structural treatment BMPs, and other management practices to prevent or reduce to the maximum extent practicable the discharge of pollutants directly or indirectly to receiving waters. Construction Storm Water BMPs are practices, procedures, devices, or materials used to prevent the transport and introduction of pollutants both on and from a project site during construction. The selected BMPs must meet or exceed the minimum specified in both the statewide Construction General Permit (2009-0009-DWQ) and the San Diego Regional MS4 Permit.

Due to the project site being larger than one acre in size, and pursuant to the requirements for the Construction General Permit, a full Storm Water Pollution Prevention Plan for Construction Activities (SWPPP) will be developed for the project, separate from this WQTR at the time of final engineering.

8 DESIGN CRITERIA

This section summarizes the design criteria and methodology applied during the drainage analysis of the project site.

8.1 Volume-Based Water Quality Numeric Sizing Criteria

Volume-based BMPs are designed to capture and treat the most frequent storm events. Volume-based BMPs can include infiltration trenches, extended detention basins, wet detention basins, and water quality treatment wetlands.

The water quality capture volume may be included as part of the configuration of the detention basins or as a stand-alone water quality basin. The water quality volumes should be provided in addition to the flood-control detention volume and debris volumes allocated for each basin.

The San Diego Regional Water Quality Control Board (RWQCB Region 9) has defined the sizing criteria for volume-based Best Management Practices as the volume of runoff produced from an 85th percentile, 24-hour, storm event. The 85th Percentile storm event results in a 0.6-inch precipitation.

8.2 Flow-Based Water Quality Numeric Sizing Criteria

Flow-based BMPs are sized to filter or otherwise treat the peak flow of runoff from a stormwater quality storm event. Flow-based BMPs include vegetated filter strips and swales.

The San Diego RWQCB has defined the design discharge for flow-based BMPs as the runoff generated from a storm with a rainfall intensity of 0.2 inch/ho

9 LID BMPS

The objective of Low Impact Development (LID) BMPs is to slow and filter runoff using natural features. The applicability of Standard LID BMPs vary depending on the project characteristics such as density, development height, neighborhood, planning elements, or other land use characteristics. Priority Development Projects are to include LID, which will include features that attempt to mimic natural hydrologic conditions for the water quality design storm.

9.1 Standard LID BMP Requirements

9.1.1 Conserve natural areas, provide buffer zones between natural water bodies and the project footprint, preserve existing native trees and shrubs, and concentrate or cluster development on the lease environmentally sensitive portions of the site.

Approximately 58 acres will be left undisturbed and protected as open space.

9.1.2 Minimize impervious footprint

Roads and sidewalks are proposed at the minimum standard and density is in accordance with city plan.

9.1.3 Minimize directly connection impervious areas

Runoff from driveways and rooftops will be directed into landscape areas prior to entering the underground drainage systems.

9.1.4 Minimize soil compaction in landscaped areas.

Prior to final installation of landscaping, subsoils below the topsoil layer shall be scarified at least 6 inches.

9.1.5 Soil Amendments - Landscape topsoil improvements play a significant role in maintaining plan and lawn health plus improves the soil's capacity to retain moisture, which will reduce runoff from the water quality design storm and improved water quality.

The San Diego Landscape regulations shall be adhered to for the landscaped areas.

9.1.6 Convey runoff safely from the tops of slopes.

Runoff from slopes will be captured by brow ditches to protect slopes from erosion.

9.1.7 Vegetate slopes with native or drought tolerate vegetation.

Slopes shall be vegetated with native or drought tolerant vegetation pursuant of the City of San Diego Landscape design guidelines.

9.1.8 Stabilize permanent channel crossings.

There are no permanent channel crossings.

9.1.9 Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.

The outlet of storm drain pipes will be equipped with a designed energy dissipater.

9.2 Projects within Channels

There are no channels within the project boundary.

10 SOURCE CONTROL BMPS

Source control BMPs are defined as land use or site planning practices, or structures that aim to prevent urban runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between pollutants and urban runoff.

10.1 Design Outdoor Material Storage Areas to Reduce Pollution Introduction

10.1.1 Materials with the potential to contaminate urban runoff shall be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with rain, runoff or spillage to the storm water conveyance system; and (2) protected by secondary containment structures such as berms, dikes, or curbs. The storage area shall be paved and sufficiently impervious to contain leaks and spills, and have a roof or awning to minimize direct precipitation within the secondary containment area.

No outdoor material storage is proposed.

10.2 Design Trash Storage Areas to Reduce Pollution Introduction

10.2.1 Trash storage areas shall be: (1) paved with an impervious surface, designed not to allow run-on from adjoining areas, and screened or walled to prevent off-site transport of trash; and, (2) contain attached lids on all trash containers that exclude rain; or (3) contain a roof or awning to minimize direct precipitation.

Trash containers will have attached lids to prevent rain.

10.3 Design Employ Integrated Pest Management Principles

10.3.1 Eliminate and/or reduce the need for pesticide use in the project design by: (1) Plant pest-resistant or well-adapted plant varieties such as native plants; and (2) Discourage pests by modifying the site and landscaping design. Pollution prevention is the primary "first line of defense" because pollutants that are never used do not have to be controlled or treated (methods which are inherently less efficient).

Future residents will be trained to pest management and the use of fertilizers. Integrated pest management (IPM) is an ecosystem-based pollution prevention strategy that focuses on long term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant plant varieties. Hardscape and landscape barriers also reduce pests from entering buildings.

10.3.2 Distribute IPM educational materials to future site residents/tenants. Minimally, educational materials must address the following topics: (1) Keeping pests out of buildings and landscaping using barriers, screens, and caulking; (2) Physical pest elimination techniques, such as, weeding, squashing, trapping, washing, or pruning out pests; (3) Relying on natural enemies to eat pests; (4) Proper use of pesticides as a last line of defense. More information may be obtained at the UC Davis website (http://www.ipm.ucdavis.edu/WATER/U/index.html).

BMPs and pest control information packages will be distributed to the future residents.

10.4 Use Efficient Irrigation Systems & Landscape Design:

10.4.1 Employ rain shutoff devices to prevent irrigation during and after precipitation.

Rain shutoff devices to prevent irrigation during and after precipitation will be included in the design.

10.4.2 Design irrigation systems to each landscape area's specific water requirements.

Controllers will be used to control the amount of water to be delivered to each area.

10.4.3 Use flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.

Flow reducers or shutoff valves to control water loss in the event of broken sprinkler heads or pipes will be included in the irrigation design.

10.5 Provide Storm Water conveyance System Stenciling and Signage

10.5.1 Provide concrete stamping, or equivalent, of all storm water conveyance system inlets and catch basins within the project area with prohibitive language (e.g., "No Dumping – I Live in <<name receiving water>>"), satisfactory to the City Engineer. Stamping may also be required in Spanish.

Concrete stamping will be provided for all storm water conveyance system inlets with prohibitive language.

10.5.2 Post signs and prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area, trailheads, parks and building entrances.

Trash receptacles will be provided with signage.

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Trash receptacles will be provided with signage.

10.6 Private Roads

10.6.1 The design of private roadway drainage shall use at least one of the following (for further guidance, see Start at the Source [1999]): (1) rural swale system- street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings; (2) urban curb/swale system- street slopes to curb, periodic swale inlets drain to vegetated swale/biofilter; or (3) dual drainage system- first flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder.

Runoff from private driveways will be treated with inlet devices

10.7 Residential Driveways and Guest Parking

10.7.1 Driveways shall have one of the following: (1) shared access; (2) flared entrance (single lane at street); (3) wheelstrips (paving only under tires); (4) porous paving; or (5) designed to drain into landscaping prior to discharging to the storm water conveyance system.

Driveways have flared entrance and porous pavement is recommended.

10.7.2 Residential Driveways and Guest Parking: Uncovered temporary or guest parking on private residential lots shall be: (1) paved with a permeable surface; or (2) designed to drain into landscaping prior to discharging to the storm water conveyance system.

Any guest parking on private residential lots shall be designed to drain into landscaping and porous pavement is recommended

10.8 Dock Areas

10.8.1 Loading/unloading dock areas shall include the following: (1) cover loading dock areas, or design drainage to preclude urban run-on and runoff; and (2) An acceptable method of containment and pollutant removal, such as a shut-off valve and containment area. Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.

There are no dock areas proposed.

10.9 Maintenance Bays

10.9.1 Maintenance bays shall include at least one of the following: (1) repair/maintenance bays hall be indoors; or, (2) designed to preclude urban run-on and runoff.

There are no maintenance bays proposed.

10.9.2 Maintenance Bays: Maintenance bays shall include a repair/maintenance bay drainage system to capture all wash water, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the

repair/maintenance bays to the storm water conveyance system is prohibited.

There are no maintenance bays proposed.

10.10 Vehicle and Equipment Wash Areas

10.10.1 Areas for washing/steam cleaning of vehicles and areas for outdoor equipment/accessory washing and steam cleaning shall be: (1) self-contained to preclude run-on and run-off, covered with a roof or overhang, and equipped with a clarifier or other pretreatment facility; and (2) properly connected to a sanitary sewer.

There are no Vehicle/Equipment wash areas proposed.

10.11 Outdoor Processing Areas

10.11.1 Outdoor processing areas shall: (1) cover or enclose areas that would be the most significant source of pollutants; or, (2) slope the area toward a dead-end sump; or, (3) discharge to the sanitary sewer system.

There are no outdoor processing areas proposed.

10.11.2 Grade or berm processing area to prevent run-on from surrounding areas.

There are no outdoor processing areas proposed.

10.12 Surface Parking Lots

10.12.1 Where landscaping is proposed in surface parking areas (both covered and uncovered), incorporate landscape areas into the drainage design.

Surface parking is minimized and is only located in the multi-family areas as mostly parallel parking along the private driveway. Runoff will be treated with inlet inserts.

10.12.2 Overflow parking (parking in excess of the project's minimum parking requirements) may be constructed with permeable paving.

No overflow parking proposed.

10.13 Non-Retail Fueling Areas:

10.13.1 Fuel dispensing area that is: (1) paved with Portland cement concrete or equivalent smooth impervious surface (asphalt concrete is prohibited); (2) designed to extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less; (3) sloped to prevent ponding; (4) separated from the rest of the site by a grade break that prevents run-on of urban runoff; and (5) designed to drain to the project's treatment control BMP(s) prior to discharging to the storm water conveyance system.

There are no fueling areas are proposed.

10.13.2 Overhanging roof structure or canopy that is: (1) equal to or greater than the area within the fuel dispensing area's grade break; and (2) designed not to drain onto or across the fuel dispensing area.

There are no fueling areas are proposed.

10.14 Steep Hillside Landscaping

10.14.1 Steep hillside areas disturbed by project development shall be landscaped with deep-rooted, drought tolerant plant species selected for erosion control, in accordance with the Landscape Technical Manual.

Where slopes need to be replanted, the new landscaping will be designed and installed per the City's Landscape Technical Manual.

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11 TREATMENT CONTROL BMPS

Treatment Control BMPs (structural) are defined as any engineered system designed and constructed to remove pollutants from urban runoff. Pollutant removal is achieved by simple gravity settling of particulate pollutants, filtration, biological uptake, media adsorption or any other physical, biological, or chemical process.

11.1 Selection of Treatment Control BMPs

The selection of Treatment control BMPs should be based on medium to high removal efficiency of primary pollutants of concern, as indicated in Section 6.3. They shall be correctly sized and designed so as to removes pollutants to the Maximum Extent Possible (MEP).

Table 11-1 Grouping of Potential Pollutants (San Diego SUSMP, 2010)

Pollutant	Coarse Sediment & Trash	Pollutants that tend to associate with fine particles during treatment	Pollutants that tend to be dissolved following treatment
Sediment	✓	✓	
Nutrients		✓	✓
Heavy Metals		✓	
Organic Compounds		✓	
Trash & Debris	✓		
Oxygen Demanding Substances		✓	
Oil & Grease		✓	
Bacteria & Viruses		✓	
Pesticides		✓	

Table 11-2 Treatment Control BMP Selection Matrix (San Diego SUSMP, 2010).

Pollutants of Concern	Bioretention Facilities (LID)	Settling Basins (Dry Ponds)	Wet Ponds and Constructed Wetlands	Infiltration Facilities or Practices (LID)	Media Filters	Higher-rate Biofilters	Higher-rate Media Filters	Trash Racks & Hydro-dynamic Devices	Vegetated Swales
Coarse Sediment and Trash	High	High	High	High	High	High	High	High	High
Pollutants that tend to associate with fine particles during treatment	High	High	High	High	High	Medium	Medium	Low	Medium
Pollutants that tend to be dissolved following treatment	Medium	Low	Medium	High	Low	Low	Low	Low	Low

11.2 Treatment Control BMP Program

Treatment Control BMPs treat runoff from all developed portions of the site. Each single family lot will have on site swale area around the perimeter of the proposed building pad that will provide preliminary treatment of runoff from each lot as well as slow discharge to the public storm drain system. The swales can be classified as a combination of Bioretention Facilities, Infiltration Facilities, Media Filters, and Vegetated Swales. Swales have the potential to provide a medium to high removal efficiency of all 3 general pollutant grouping and thus providing adequate treatment of the Primary and Secondary targeted pollutants identified in Section 6.

In addition all curb inlets along the public streets and private driveways will be equipped with a Clearwater BMP from Clearwater Solutions. These inlet inserts (media filter, trash rack, and settling chamber) have been tested by SDSU and show medium to high removal of oil and grease, trash and debris, organics, metals, and pathogens. Additional information can be found in Attachment D. Media filters have a high removal efficiency for the pollutants of concern. These treatment control BMPs were selected on the basis that other BMPs such as infiltration basins, detention basins, ponds or wetlands are not feasible with the site steep natural topography, clayey soils, and sensitive vegetation to be preserved within the MHPA.

These alternative BMPs also require a large footprint that is not consistent with the required dedication of MHPA open space and the intended density for this area.

11.3 Treatment Control BMP Design

All drainage from developed areas of the project will enter a curb inlet equipped with a Clearwater BMP. Please refer to Attachment C for BMP sizing. Also see the Project Site Map in Attachment B for locations.

12 MAINTENANCE

The Clearwater BMPs shall be inspected at least once per year prior to the start of the rainy season, maintained at least once per year after the rainy season, or as needed. Units should be inspected/maintained before and after a large storm event. Maintenance includes removal of trash, sediment, etc. and replacement of media filter cartridges.

The Clearwater BMPs located within the public right of way will be maintained by the City of San Diego or the City of Santee at the completion of the project. This specific BMP has been recommended by the City of San Diego staff on other recent projects.

Maintenance demands for swales are similar to general landscaping maintenance.

13 SUMMARY

The project proposes 283 single family and 147 multi-family units, minimizing impervious area and maximizing open space dedications to preserve the natural landscape. The on lot swales and Clearwater BMP inlet inserts will provide adequate removal of primary and secondary pollutants. To further reduce pollutants, it is recommended that LID BMPs, such as porous pavements, be used to the maximum extent practicable.

Overall, most pollutants can be minimized by the practices of future residents, HOAs, and maintenance forces. Nutrients can be limited by responsible fertilizer application/use and landscape maintenance. Bacteria can be limited by cleaned up after pets and domesticated animals. Pesticides can be limited by responsible application and use. It is advised to ensure future residents are educated in such matters.

Water quality during the construction phase of the project will be dictated by a separate document, the Storm Water Pollution Prevention Plan associated with the SWRCB General Permit for Construction Activities.

14 REFERENCES

San Diego Municipal Code - Land Development Manual, Storm Water Standards, March 24, 2008

Countywide Model SUSMP - Standard Urban Stormwater Mitigation Plan, January 2, 2009

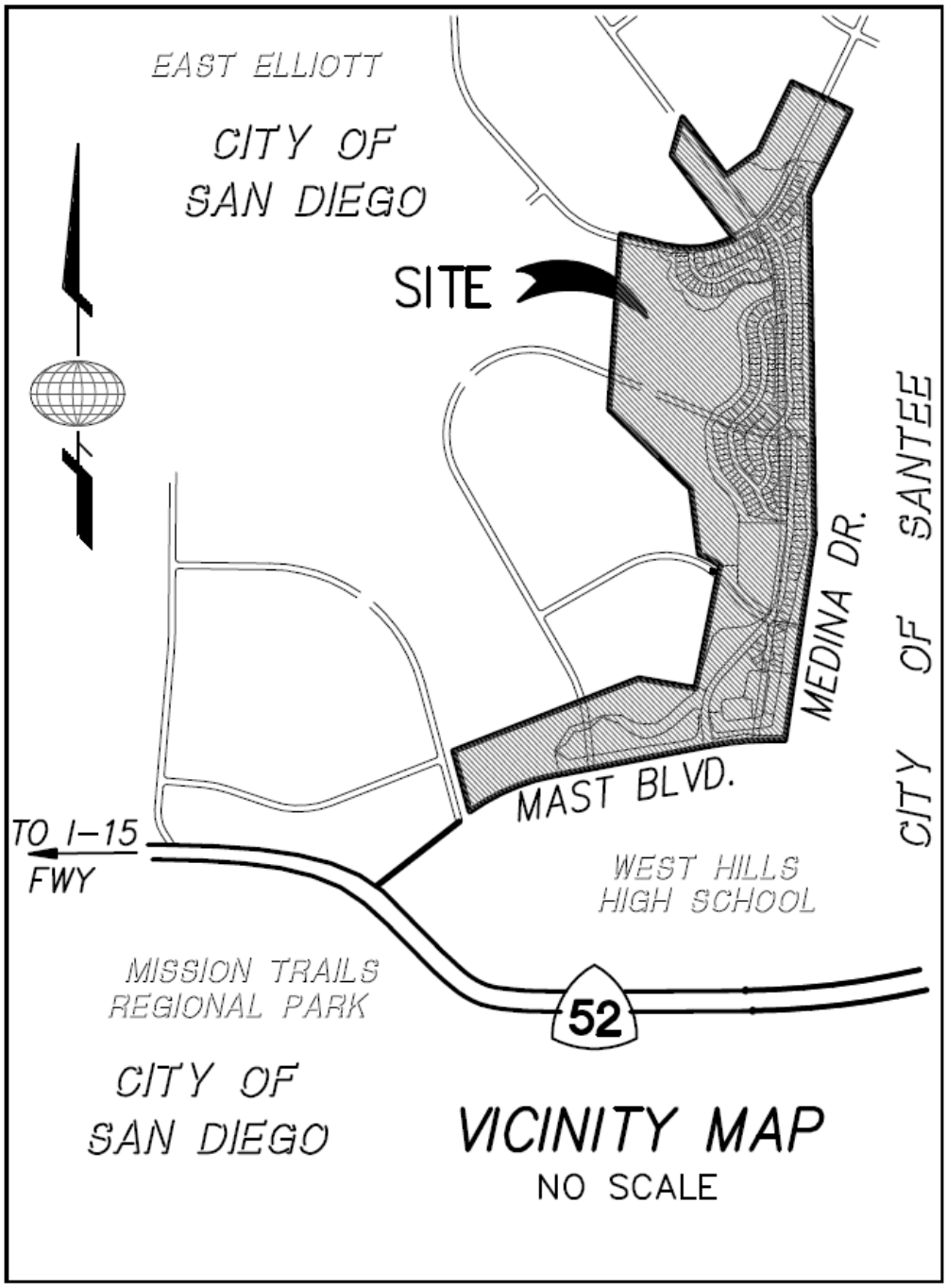
Water Quality Control Plan for the San Diego Basin, California Regional Water Quality Control Board: San Diego Region, September 8, 1994

Low Impact Development Handbook: Stormwater Management Strategies, County of San Diego, December 31, 2007

Los Penasquitos Lagoon Watershed Profile, California State Coastal Conservancy, August 16, 2001, http://wrpinfo.scc.ca.gov/watersheds/lp/lp_wsprofile.html

San Diego River Watershed Management Plan, san Diego River Watershed Work Group, March 2005

Attachment A
Location Map



Attachment B
Project BMP Site Map

Attachment C
BMP Sizing Calculations

Castlerock
First Flush Numeric Sizing Table

BASIN	C	I (in./hr.)	A (acres)	Q (cfs)	Number of Inlets	Q_{inlet} (cfs)
2B(2)	0.45	0.20	11.00	0.990	6	0.165
3B(2)	0.80	0.20	15.80	2.528	7	0.361
4B(2)	0.75	0.20	10.60	1.590	4	0.398
5B(2)	0.75	0.20	9.70	1.455	6	0.243
6B(2)	0.75	0.20	14.00	2.100	6	0.350
7B(2)	0.75	0.20	17.40	2.610	6	0.435
8C(2)	0.75	0.20	25.90	3.885	9	0.432
30	0.90	0.20	6.10	1.098	5	0.220
		Totals:	110.50	16.256		

C = composite runoff coefficient
I = intensity = 0.2 in/hr
A = basin area
Q = Flow = ciA
HDS = Hydrodynamic Seperator Unit
FF = Fossil Filter Inserts

Notes:
(1) Flow based criteria per Section 8.2
(2) Max Q treated by Clear Water BMP = 0.46 cfs
- Please refer to the submitted Drainage Study for basin information

Attachment D
Clear Water Solutions BMP