Water Quality Technical Report

Chula Vista Bayfront-Gaylord Development

March, 2008

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WATER QUALITY TECHNICAL REPORT

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1. Introduction

The project site is located on the southeastern edge of San Diego Bay in the City of Chula Vista, California. The Chula Vista Bayfront Master Plan (CVBMP) proposes a mixture of land uses including hotels, retail, office/research and development, residential, civic/cultural, marina, marina sales and service, R/V Park, open space, and an energy utility zone. This master plan consists of 550-acres bounded by Sweetwater Wildlife Refuge to the north, Interstate 5 and Bay Boulevard to the east, Palomar Street and the salt evaporation ponds to the south, and San Diego Bay to the west.

Construction of the CVBMP will take about 25 years to complete and is divided into four construction phases. Phase I includes the Gaylord development in the Harbor District on parcel H-3. The parcel will be developed into a Resort Conference Center with the main entrance fronting H Street. The majority of parking for the Resort Conference Center will be underground; however, surface parking will also be provided along with a truck delivery area. The total developed area is 46.8 acres. See **Figure 1** for location of Gaylord development and overall master plan boundary.

The existing topography for parcel H-3 consists of flat undeveloped area and a portion of an existing RV park. The entire site lies within the San Diego Bay watershed; therefore, the site drains to the San Diego Bay. The proposed Gaylord site will discharge runoff from storm drains at three locations; the northern most corner of the parcel, the southwest corner, and the southeast corner (see **Figure 2** for discharge locations).

Best Management Practices (BMPs) must be installed to meet the Regional Water Quality Control Board's (RWQCB) National Pollutant Discharge Elimination System (NPDES) permit requirements for stormwater treatment. The main objective is to reduce runoff pollutants from urbanized areas discharging to the bay. The purpose of this Water Quality Technical Report (WQTR) is to describe the permanent stormwater BMPs that will be incorporated into the project.

This WQTR is based on the City of Chula Vista's WQTR guidelines and its SUSMP requirements as well as the Port's SUSMP requirements. It is important to ensure compliance with these documents; however these documents are currently being updated to reflect the newly adopted Municipal Separate Storm Sewer Systems (MS4) permit, Order R9-2007-0001. Therefore this WQTR is based on the requirements of the Port's SUSMP and the City of Chula Vista SUSMP document as well as the San Diego Regional Water Quality Control Board's (RWQCB) updated MS4 permit. The referenced manuals for this WQTR are the County of San Diego's Final Model SUSMP dated January 2008 (**Appendix A**) and the City of Chula Vista's Water Quality Technical Report Guidelines in **Appendix B**.

During final design, precise locations for BMPs will be determined. Onsite BMPs shown in this report may be relocated during final design but they must operate at the same effectiveness as in this study. The overall goal is to incorporate a treatment train of stormwater treatment solutions into the project in order to achieve pollutant removal from stormwater runoff to the maximum extent practical.

Insert Figure 1: Vicinity Map……

2. Municipal Separate Storm Sewer Systems (MS4) Permit

The most significant new requirements of the permit include:

1. Low-Impact Development BMPs
2. Treatment Control BMP effectiveness
3. Treatment Control BMP Maintenance Tracking Required
4. Hydromodification Management Plan Required
5. Phase Grading Required for Construction
6. Advanced Treatment Required for Construction
7. Specific Schedule for Maintenance of the MS4 Required
8. Street Sweeping Required
9. Industrial/Commercial Inspection Requirements Combined
10. Watershed Activities That Reduce Pollutant Discharges Required

Compliance with these requirements will be addressed in the following sections of this report.

3. Pollutants that May Affect Storm Water Quality

The future use of this site will be a Resort Conference Center which falls into the category of a commercial development. This commercial development is over one acre and contains a restaurant; therefore, is a "priority project". From Table 1 of the County of San Diego's Final Model SUSMP Requirements (**Appendix A**), the anticipated and potential pollutants can be identified based on project category. For a commercial development, the anticipated pollutants of concern are trash & debris and oil & grease. The potential pollutants of concern include sediments, nutrients, organic compounds, oxygen demanding substances, bacteria & viruses, and pesticides. The Resort Conference Center will also contain a truck delivery area and surface parking lot. The anticipated pollutants for parking lots are heavy metals, trash & debris, and oil & grease. The potential pollutants are sediments, nutrients, oxygen demanding substances, and pesticides.

The Gaylord development will be a hotel with mixed use commercial areas, therefore the anticipated pollutants will be from the Resort Conference Center as well as from surface parking areas. The majority of the parcel will be developed which decreases the amount of sediment and nutrients entering the storm drain system. Oxygen demanding substances also will not enter runoff since solvents are not anticipated on the developed site. Bacteria & viruses are potential pollutants from restaurants.

The pollutants expected from the Resort Conference Center are trash & debris, oil & grease, and bacteria & viruses. Anticipated pollutants from the parking lot are heavy metals, trash & debris and oil & grease. Potential pollutants from the parking lot are sediment, nutrients, oxygen demanding substances, and pesticides.. The parking lot will have minimal sediment discharge since parkway areas will be landscaped and maintained.

The project is located within the Sweetwater Watershed which discharges to the San Diego Bay. The San Diego Bay Shoreline, Chula Vista Marina is listed on the 2006 CWA Section 303(d) List of Water Quality Limited Segments for polychlorinated biphenyls (PCBs) and copper. Please see **Appendix C** for

watershed delineation and list of water quality limited segments.

The manufacture of PCBs ended in the United States in 1977 because evidence was found that PCB buildup can cause harmful health effects. PCBs were used as coolants and lubricants in transformers, capacitors, and other electrical equipment. PCBs can also be found in old fluorescent lighting fixtures and old microscopes. The proposed project will not produce PCBs into the environment. Metals such as copper are toxic to aquatic life. Copper is produced form vehicle brake pads, natural minerals, copper plumbing, irrigation water and pesticides. Copper is considered a primary pollutant since this is an anticipated pollutant based on the use. Permanent storm water BMPs must be incorporated into future projects where necessary to mitigate the impacts of urban runoff as a result of the development. For this project, a series of bioswales and water quality inlets will provide filtering for runoff prior to entering offsite storm drain systems. Also, Filterra units will be utilized in areas with heavy vehicular activities such as truck delivery areas. Bioretention unit will be used for surface parking lots. All runoff will be treated prior to discharge from the site. Pollution removal is maximized when an appropriate combination (treatment train) of BMPs is used (see TC-60 in **Appendix D**).

Beneficial uses to ground waters in the Sweetwater Hydrologic Unit are listed in the Water Quality Control Plan for San Diego Basin. Existing beneficial uses are agriculture supply and the potential uses include municipal and domestic supply and industrial service supply. Infiltration techniques such as pervious surfaces must be constructed with impermeable layers and under drains to prevent adverse affects to the groundwater.

Table 1. Anticipated and Potential Pollutants Generated by Land Use Types

	General Pollutant Categories								
Priority Project Categories	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Detached Residential Development	X	X			X	X	X	X	X
Attached Residential Development	X	X			X	P(3)	P(4)	P	X
Commercial Development >1 acre	P(1)	P(1)		P(5)	X	P(3)	X	P(3)	P(3)
Heavy Industry/ Industrial development	X		X	X	X	X	X		
Automotive Repair Shops			X	X(5)(6)	X		X		
Restaurants					X	X	X	X	
Hillside Development >5,000 SF	X	X			X	X	X		X
Parking Lots	P(1)	P(1)	X		X	P(3)	X		P(3)
Retail Gasoline Outlets			X	X	X	X	X		
Streets, Highways & Freeways	X	P(1)	X	X(5)	X	P(3)	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. Conditions of Concern

Changes in the hydrologic regime caused by development are typically increased runoff volume and velocity; reduced infiltration, increased flow frequency, duration, and peaks; faster time to reach peak flow; and water quality degradation. If any of these changes impacts the downstream channels and habitat integrity, the change in hydrologic regime would be considered a condition of concern. Potential impacts to the downstream channels and habitat is considered in this section of the report. Mitigation for these potential impacts is also discussed in this section.

Runoff from the site enters offsite storm drains in three locations: the northwest corner, southwest corner, and south east corner. Drainage from the northern portion of the site is collected and conveyed in a 36" storm drain to an offsite storm drain in the private street just north of the parcel. The storm drain then connects to the storm drain in E Street which conveys the flow north and discharges into the bay. Per the CVBMP, the outlet to the bay will be lined with rip rap.

Runoff from the southern portion is divided into two basin and discharges on the southwest and

southeast corner of the site. A 30" storm drain to the southeast corner collects and conveys flows into a storm drain in H Street. The storm drain runs across H Street and runs south along Marina Parkway. Just south of C Street the storm drain runs east and discharges into the bay. A 24" storm drain in the southwest corner collects and conveys flows into a storm drain in E Street. The storm drain runs south along E Street and discharges to the bay. Per the CVBMP, the outlet to the bay will be lined with rip rap to reduce the potential for erosion.

Table 2 shows the existing and proposed peak discharge for the 2 and 10 year event. Projects over 50 acres are subject to the interim hydromodification requirements. The proposed project is less than 50 acres; however, the project is part of the larger CVBMP which is larger than 50 acres. The downstream storm drains of the CVBMP are directly connected to the bay with outlets lined with rip rap which makes the project exempt from the Interim Hydromodification Requirements. As stated in the permit, projects that discharge into the bay with erosion protection are exempt from the interim hydromodification plan.

Table 2: Existing and Proposed Peak Discharge

Discharge Node	Existing		Proposed	
	2 year	10 year	2 year	10 year
1003	3	4.5	6.8	10.4
2005	12.7	18.7	20.8	34.2
3005	10.6	15.5	17.5	26.3

5. Proposed Control Measures

The post construction Storm Water Management Plan for this project relies on implementation of site design BMPs, source control BMPs, and treatment control BMPs to the maximum extent practical. The main objective is to ensure that pollutants do not come in contact with storm water by reducing or eliminating the pollutants. These objectives are achieved by implementing the required source, site, and treatment BMPs set forth in the City of Chula Vista's Best Management Practices. The project is required to implement LID, Source Control and treatment control measures to the maximum extent practical to achieve the stormwater treatment requirements in the model SUSMP.

Low Impact Development Site Design

Low Impact Development (LID) techniques are required in the MS4 permit which will be incorporated to further reduce pollution from this project entering the bay. The first goal of LID is to reduce the generation of storm water runoff. The second goal is to treat pollutants where they are generated by evenly distributing the management of storm water throughout the site.

The Gaylord site will be designed to minimize the pollutants of concern into the storm water conveyance system and the bay. Incorporating multiple Integrated Management Practices (IMPs) or self treating areas will maximize the effectiveness of LID design. The final site layouts for the specific parcels have not been determined; however, site design BMPs will be incorporated into the design. The ultimate precise location of the following LID strategies will be determined during onsite plan development.

Locations of buildings, number of buildings, landscaped areas, and pervious areas have not yet been determined. The following are examples of LID that will be incorporated on the site. Soil condition and groundwater elevation must be considered for some of the following devices. These following site design BMPs will be required but the locations may be relocated based on the final site plan.

Minimizing impervious areas will help retain the permeability of the site which naturally filters and reduces pollutants. Impervious areas will be minimized by clustering buildings, using necessary minimum sidewalk widths, and placing pervious material for sidewalks where feasible. Per ADA, minimum sidewalk widths must be 5 feet. Per Geotechnical recommendations, infiltration next to roadways should provide cut off walls that extend 6 inches below the base material.

Rainfall infiltration will also be increased by directing rooftop runoff to vegetated swales, using green roofs where practical, building permeable sidewalks, and including permeable parking areas. Permeable surfaces for sidewalks and parking area can be constructed with pervious concrete, pervious asphalt, or permeable pavers. Place perforated pipes underneath permeable surfaces to collect runoff to a cistern or storm drain. Plastic liners should be included below base where infiltration is not desirable due to high groundwater depth. See **Figure 3** below for design concept. Compacted soil does not absorb water well, soil amendments such as organic material or top soil can improve filtering. Minimizing compaction or soil amendments must not alter the integrity of proposed structures. Therefore, minimizing compaction and soil amendments can be best utilized in open space or landscaped areas.

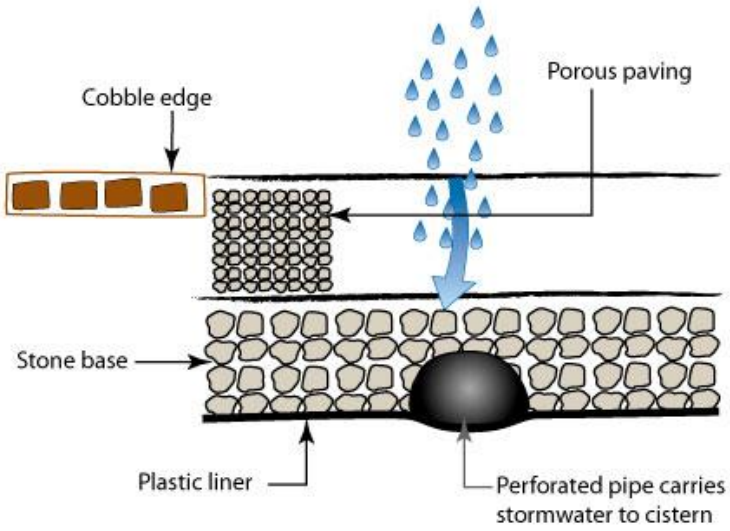

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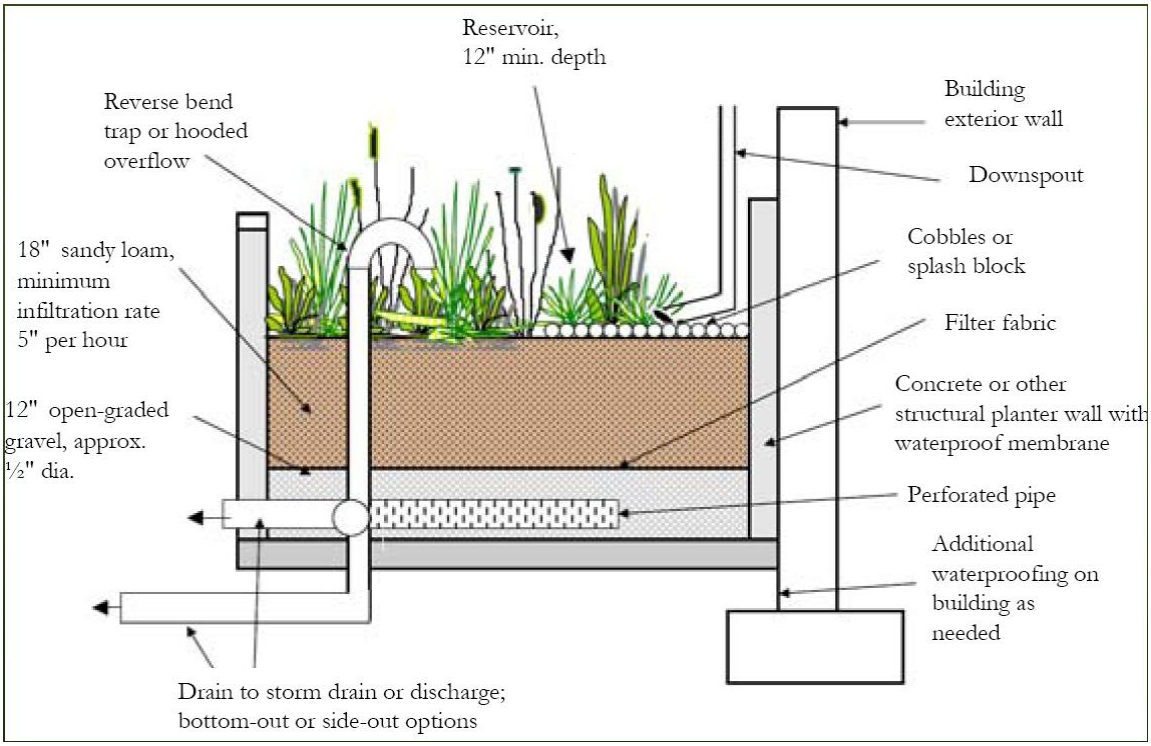
Figure 3: Porous Paving Conceptual Design

Rainfall interception will be achieved by preserving and planting native trees and shrubs. Native trees and shrubs are typically the most sustainable plants and require minimal maintenance. A rain collection system will be used consisting of roof drains directing runoff to vegetated swales and notched curbs directing parking lot runoff to grass swales. The grass swales are located on the down stream side of each parcel. Wherever possible, engineered swales will be used in place of curbs and gutters. When building roof drains can not be directed to grass swales, rooftop drains will be directed to flow-through

planters in impervious boxes. Flow-through planters treat and detain runoff without seeping into underlying soil. They are best used next to buildings and areas where infiltration is not desirable. See **Figure 4** below for design of a flow through planter. Maintenance yards and outdoor work areas must be covered to limit pollutants contacting storm water. Place cisterns downstream of permeable surfaces to capture stormwater runoff in order to supplement irrigation. Paved areas next to landscape must have a cut off wall with extends 6 inches below the base material.

Traditionally, runoff from impervious areas is captured by inlets, conveyed through onsite pipes, and directly connected to the main storm drain system. The project site will disconnect impervious area with permeable surfaces. Where permeable surfaces can not be incorporated, parking lots, sidewalks, and patio runoff will be directed towards landscaped area. These landscaped areas will be designed similar to the planter box with perforated pipes draining to the storm drain. A waterproof membrane will be required where high groundwater is present.



Alameda County Wide Clean Water Program

Figure 4: Flow-Through Plant Design Concept

The Gaylord site proposes clustered buildings for the hotel and conference area. Existing natural are not conserved; however, open landscaped spaces are proposed. Native plants or drought tolerant vegetation will be placed on slopes and riprap will be required for storm drains discharging into the vegetated channel to minimize erosion at the outfall.

Source Control
The Source design BMPs are identified below (Model SUSMP):

1. Storm drain system stenciling and signage
2. Outdoor material and trash storage area designed to reduce or control rainfall runoff
3. Efficient irrigation system
4. Incorporate requirements applicable to individual priority project categories

Dumping waste materials will be prohibited with notices regarding discharge prohibitions adjacent to storm drain inlets. Storm drain signs and stencils with the message "No Dumping-Drains to Bay" (or comparable statement) will be used to alert public against dumping waste into the storm drain conveyance system, see SD-13 in **Appendix D** for more information on storm drain signage. The stenciling will be required on all public and private inlets. Additional signage to prevent pet wastes and use of trash receptacles will be placed throughout the development to encourage the public to pick up after pets. Also, appropriate signage describing the function of the vegetated swales will be placed to increase public awareness.

Outdoor storage areas will be properly designed to reduce pollutants from entering the storm drain system. Pollutants from outdoor storage may be raw products, by-products, finished products, and waste products. Materials that may contaminate water should be placed in an enclosure or contained with a berm, dike, or curb. All storage areas will be paved to prevent infiltration and sloped towards a dead-end sump to contain spills. Restaurant/dining areas will have designated areas for washing kitchen utensils, floor mats, and other polluting activities located inside. See SD-34 in **Appendix D** for more information.

Excess irrigation from landscaped areas will be prevented by choosing native or drought tolerant plants which have low irrigation. Plants will also be chosen to minimize or eliminate the use of fertilizer or pesticides to sustain growth. The landscape architect will be responsible for recommended species for the area. See SD-12 in **Appendix D** for more information.

Dock areas and maintenance bays must either be covered or have an acceptable method of containment to prevent runon and runoff. There will be no direct connections to storm drains. Areas for washing vehicles and areas for outdoor equipment/accessory washing must be self-contained, covered with a roof or overhang, and equipped with a pretreatment facility and properly connected to a sanitary sewer. Outdoor processing areas must cover or enclose areas with the most significant source of pollutants and slope the area toward a dead-end sump. The processing area shall be graded or bermed to prevent run-on from surrounding areas. There will not be installation of storm drains in areas of equipment repair. Overflow surface parking areas (parking in excess of the project's minimum parking requirements) may be constructed with permeable paving.

Treatment Control BMPs
Treatment control BMPs are designed to filter or treat runoff prior to discharging into an onsite or offsite storm drain system. The Gaylord development will contain a Resort Conference Center and parking lot with limited open space. The site runoff flows into an offsite storm drain at two points.

Vegetated swales will function as a treatment design BMP (See **Figure 2** for locations). Runoff drains to the vegetated swales along the north and south edge of the property. The Model SUSMP (**Appendix A**)

lists the sizing criteria for sizing treatment control BMPs. The water quality flow rate for sizing the vegetated swales are produced from a rainfall intensity of 0.2 inches per hour (85th percentile). Runoff is slowly conveyed through the vegetated swales with a minimum contact time of 10 minutes to allow pollutants to settle. A runoff "c" value of 0.95 was used for the overall site; see **Appendix E** for vegetated swale calculations. The area of the site was taken from the Drainage Technical Memorandum for Chula Vista Bayfront-Gaylord Development, Kimley-Horn and Associates 2007. Two vegetated swales are located on northern edge of the parcel. Each swale slopes at 0.5% for approximately 400ft. The two vegetated swales on the southern edge also slope at 0.5% for approximately 400ft each. These swales are not connected to allow the Resort Conference Center an open front for a water feature/fountain. The vegetated swale requires approximately 2% of the site area.

Water quality inlets are proposed in combination with the vegetated swales (see **Figure 2**). The Ultra-Urban Filter with Smart Sponge developed by AbTech Industry absorbs oil & grease and captures trash in stormwater. This water quality filter can capture pollutants in the vegetated swale during high flows over the water quality flow rate. Water quality inlets will be evenly placed at intervals between the vegetated swales to capture high flows. An additional water quality inlet will be placed in the system at the junction to the offsite storm drain. A study in Long Beach, Ca found the Ultra-Urban Filter with Smart Sponge destroyed 79-97% of bacteria (**Appendix G**).

The preliminary site design includes surface parking and loading areas for truck deliveries on the east side of the parcel. Additional treatment for this area is necessary to prevent oil & grease and trash & debris in the storm drain system. Bioretention filtration systems will be utilized in areas with heavy vehicular activities such as truck delivery areas and parking lots. The loading docks will be designed to flow to bioretention areas which treats runoff and discharges into vegetated swale. During high flows, runoff will drain directly into vegetated swale. The parking lot will be designed to drain toward landscape areas for treatment. Runoff will infiltrate through soil and into perforated underdrains that discharge into a vegetated swale.

Filterra manufactures a high-rate biofilter which includes a landscaped concrete container filled with a filter media. Storm water enters the system and flows through the engineered media which decomposes pollutants. Treated water then enters back into the system. The size of the box can be determined based on manufacturer's guidelines (see **Appendix F**). The maximum tributary area draining to one Filterra unit is 0.66 acres, the required box size for treating 0.66 acres is a 6'x12' unit. A standard box with dimensions 6'x6' can treat up to 0.8 acres. Multiple units may be used if more area is draining to the inlet. In this case, units will be spaced evenly and consistently throughout the project. Filterra units for the streets will be placed in the public right-of-way allowing sidewalk widths to meet the ADA requirements. Sizing and specific onsite locations will be completed during final design. An experiment by Yu and Stanford found Filterra average efficiency ratios to be: TSS 85%; TP 55%; TKN 20%; Cu 16%, and Zn 50% see **Appendix G**. This study shows comparable results to studies conducted for Filterra: TSS 85%, TP 73%, Nitrogen 43%, Heavy Metal 33-82%, and Fecal Coliform 57-76%.

These BMPs were chosen on the basis of site design feasibility and the Model SUSMP requirements. The Regional Water Quality Control Board's Municipal Separate Storm Sewer Systems (MS4) permit, Order number R9-2007-001 requires selected treatment control BMPs to have high or medium pollutant removal efficiency rating see **Table 3 and 4**. A combination of BMPs will be incorporated for the Gaylord site.

Bioretention facilities incorporated include flow-through planters. Infiltration practice used is dispersal of runoff to landscape and pervious pavement. Bioretention and infiltration is discussed in the LID site design section of this report. High-rate biofilters, Filterra units, will be used in the loading dock and bioretention areas will be used in the medians of the parking lot. Medium/low efficiency BMPs were chosen to work in a treatment train. Vegetated swales and water quality inlets have medium removal efficiency for different constituents; the combination of both can improve the overall removal efficiency. From TC-60, multiple systems provide redundancy of pollutant removal which increases effectiveness. The treatment train distributes treatment throughout the site which provides more opportunities for pollutants to be treated. To the maximum extent practicable, treatment control BMPs have been included in the planning of this project at this phase.

Since the project is adjacent to the bay, the site has a high groundwater table of 5 ft. Settling basins also know as detention basins typically treat the end of the storm drain system. A detention basin can not be placed adjacent to the bay because of tidal flow. The base of a detention basin should never intersect with the groundwater table. Wet ponds and wetlands were not chosen for the Gaylord site because the design requires a maintained water level which causes vector problems. High-rate media filters were not specified since they are proprietary.

Table 3: BMP Efficiency Rating

Pollutant	Bioretention Facilities (LID)	Settling Basins (Dry Ponds)	Wet Ponds and Wetlands	Infiltration Facilities or Practices (LID)	Media Filters	High-rate Biofilters	High-rate Media Filters	Trash racks, Hydrodynamic Devices, Drainage Inserts
Coarse Sediment and Trash	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
Pollutants that tend to be dissolved following treatment	Medium	Low	Medium	High	Low	Low	Low	Low

Table 4: Pollutant Groups

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

Individual Priority Project
The project also falls into the Individual Priority Project Categories and must adhere to source control BMP requirements set forth in the Port of San Diego's Standard Urban Storm Water Mitigation Plan. The individual priority project categories consist of dock areas, maintenance bays, vehicle wash areas, outdoor processing areas, surface parking areas:

1. Loading and unloading dock areas shall have an acceptable method of containment and pollutant removal, such as a shut-off valve and containment area. There will be no direct connections to storm drains from depressed loading docks (truck wells).
2. Maintenance bays shall be designed to preclude urban run-on and runoff and shall include a repair/maintenance bay drainage system to capture all wash water, leaks and spills. Drains shall be connected to a sump for collection and disposal. There will be no direct connection of the repair/maintenance bays to the storm water conveyance system.
3. Vehicle and Equipment wash areas: Areas for washing of vehicles and areas for outdoor equipment/accessory washing shall be 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 properly connected to a sanitary sewer.
4. Outdoor processing areas shall cover or enclose areas that would be the most significant source of pollutants, slope the area toward a dead-end sump or discharge to the sanitary sewer system. The processing area shall be graded or bermed to prevent run-on from surrounding areas. There will not be installation of storm drains in areas of equipment repair.
5. Overflow surface parking areas (parking in excess of the project's minimum parking requirements) may be constructed with permeable paving.

6. Construction Activities

Pollutants from construction activities include excessive erosion, sedimentation, metals, nutrients, soil additives, pesticides, construction chemicals, and other construction wastes. Locations of construction materials exposed to water, building activity areas, and BMPs to eliminate or reduce discharge of pollutants from the site during construction will be addressed in the Storm Water Pollution Prevention Plan (SWPPP). Typical construction BMPs include:

1. EC-1 Scheduling
2. EC-10 Velocity Dissipation Devices
3. EC-2 Preservation of Existing Vegetation

4. EC-4 Hydroseeding
5. EC-5 Soil Binders
6. EC-9 Earth Dikes and Drainage Swales
7. SE-1 Silt Fence
8. SE-10 Storm Drain Inlet Protection
9. SE-4 Check Dams
10. SE-5 Fiber Rolls
11. SE-7 Street Sweeping and Vacuuming
12. SE-8 Sandbag Barrier
13. TR-1 Stabilized Construction Entrance/Exit
14. TR-2 Stabilized Construction Roadway
15. TR-3 Entrance/Outlet Tire Wash
16. WE-1 Wind Erosion Control

The SWPPP will indicate where materials would be directly exposed to storm water. Construction activity areas including materials and waste storage, hazardous material storage, equipment fueling and cleaning will be required for the SWPPP. Construction fencing will be placed around the legal site boundary to ensure offsite areas are not disturbed. The Municipal Separate Storm Sewer Systems (MS4) permit requires a designated maximum disturbed area to be determined and street sweeping. The permit will also require advanced treatment for sediment at construction sites determined to be an exceptional threat to water quality. These issues will be addressed in the SWPPP, which will be developed and implemented concurrent with the commencement of grading activities. Special construction precaution should be included in the SWPPP for sensitive areas. A Notice-of-Intent will be filed with the Storm Water Regional Water Control Board. A cleanup and abatement order will be fully implemented prior to the commencement of construction. The developer will be required to immediately notify the City of Chula Vista and other relevant agencies of any accidental spills or illegal discharges during the construction of the project.

During and after construction, groundwater extraction will be an important issue because of the high water table. At the beginning of construction, groundwater will be tested for contamination. Contaminated water must be treated onsite prior to discharging to the San Diego Bay. The City of Chula Vista prohibits the discharge of non-storm water into storm water conveyance systems or receiving waters. A permit must be obtained to discharge contaminated water directly into the sewer system. Protocol for worker safety must be provided where areas are identified as contaminated.

7. Operation and Maintenance Procedures

Vegetated Swale

1) Inspect swales at least twice annually for erosion, damage to vegetation, and sediment and debris. See BMP detail TC-30 in **Appendix D** for preferred schedule.
2) Regularly inspect swales for pools of standing water to prevent mosquito breeding.
3) Every few years maintenance of dead or fallen trees may be required.

Water Quality Inlets

1) Annually inspect filters. See manufacturer information in **Appendix F** for preferred schedule.
2) Regularly remove trash to prevent screen clogs, twice during wet season.
3) Depending on pollutant load, change and dispose of filter medium.

MWS-Linear Hybrid

1. Inspect and clean catch basin filter every six months
2. Replace hydrocarbon booms once a year
3. Inspect and clean separation chamber, perimeter filters, drain down filter, and wetland filter at least once a year

Porous Pavement

1. Vacuum twice per year
2. Maintain adjacent planted areas
3. Clean inlets twice a year

Flow-Through Planter

1. Inspect vegetation and irrigation system periodically and after storms
2. Minimize use of pesticides and quick-release synthetic fertilizers

8. Operation and Maintenance Responsibility

The appropriate operation and maintenance of the above referenced control measures shall be the responsibility of the owner, Gaylord Development.

9. Installation Costs

Installation costs will vary depending on the type of BMP installed. In general, vegetated swales range from \$1.00 to \$2.00 per ft^2, water quality inlets range from \$250 to \$750 per unit (EPA 2007), bioretention systems range from \$2,000 to \$8,000 per unit. The price of one MWS-Linear is \$20,000.

Maintenance cost for vegetated swales can vary based on the tributary area and size of the swale. Annual maintenance cost for a grass swale draining 5 acres is approximately \$4,500. The majority of the maintenance cost is mowing; therefore, the cost is also dependent on frequency. The cost of lawn mowing is approximately \$2.00/1,000 ft^2/swale (TC-30 in **Appendix D**). For a more detailed cost estimate see TC-30 in **Appendix D**. A vactor truck is typically required to clean out the debris and sediment captured in water quality inlets, the cost of this type of truck starts at \$150,000. One truck can clean 750 to 1,000 catch basins a year assuming each catch basin is cleaned semi-annually. Another costs associated is staff to operate truck and disposal cost for sediment. Cleaning out one inlet should take less than ten minutes (**Appendix F**). For more information see TC-20 in **Appendix D**. Bioretention systems can be maintained by the manufacturer or the owner. Maintenance includes removal of debris, mulch replacement, and pruning which can cost from \$100-600 per year per unit (LSNB, 2005). Maintenance cost for the MWS-Linear is approximately \$1,200 annually for catch basin filter cleaning,

settling chamber cleaning, and media replacement.

10. Conclusion

The Gaylord development in the City of Chula Vista will include source, site, and treatment control BMPs consistent with the City of City of Chula Vista and Port of San Diego Standards. This project consists of a series of treatment control BMPs prior to discharge from the site. LID design techniques will be used onsite to the maximum extent practical prior to discharging stormwater into vegetated swales. The combination of vegetated swales and water quality inlets will treat and filter runoff prior to entering the storm drain system.

Areas where the primary pollutant of concern, copper from vehicles braking, is anticipated will incorporate bioretention filtration systems to remove pollutants. All proposed impervious area will be treated prior to discharging into the bay. At the time of this report, only interim hydromodification requirements are in place and which the project is exempt from. The Final Hydromodification Criteria will be finalized in January 2009. This project is exempt from the interim hydromodification requirements because the site discharges directly into the bay from underground storm drains with outlets protected with rip rap. Use of these control measures complies with the Municipal Stormwater National Pollutant Discharge Elimination System (NPDES) Permit.

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Appendices

Appendix A Model Standard Urban Storm Water Mitigation Plan

Appendix B City of Chula Vista's Water Quality Technical Report Guidelines

Appendix C Watershed Information

Appendix D Treatment BMP Specifications

Appendix E Vegetated Swale Design Calculations

Appendix F Storm water Inlet Filter Inserts Technical Information
Storm water Bioretention Filtration Technical Information

Appendix G Pollutant Removal Efficiency

Appendix H References

REFERENCES

This Water Quality Technical Report incorporates, by reference, the appropriate elements of the following documents and plans required by local; State or Federal agencies.

1. Alameda County Wide Clean Water Program www.cleanwaterprogram.org/indexFlash.htm
2. California Regional Water Quality Control Board www.swrcb.ca.gov 2007
3. California Regional Water Quality Control Board San Diego Region Order No. R9-2007-0001, January 2007
4. California Storm water BMP Handbook, New Development and Redevelopment, January 2003
5. Chula Vista Bayfront Master Plan, *Civil Engineering Technical Studies*, Kimley-Horn and Associates, May 2006
6. City of Chula Vista's Standard Urban Storm Water Mitigation Plan Requirements, January 2008
7. City of Chula Vista's Water Technical Report Guidelines, January 2008
8. County of San Diego Low Impact Development Handbook, July 2007
9. Development of Interim Hydrograph Modification Criteria for the San Diego County HMP Presentation, Andy Collison & Christie Beeman, November 2007
10. Environmental Protection Agency www.epa.gov 2007
11. LSNB, LLLP, *Memorandum: LIDs Annual Maintenance Cost*, September 2005
12. Municipal Storm Water National Pollutant Discharge Elimination System (NPDES) Permit
13. Port of San Diego's Standard Urban Storm water Mitigation Plan
14. Preliminary Geotechnical Investigation, Chula Vista Bayfront Master Plan EIR, Geocon Inc., September 2007.
15. San Diego Regional Permit: Hydromodification Management Plan (HMP), March 2007
16. Modular Wetland System Linear (MWS-Linear), Representative Robert Wells