Appendix I Utilities Data

City of Huntington Beach

2000 Main Street ♦ PO Box 190 ♦ CA 92648

Travis K. Hopkins, PE
Director

Department of Public Works
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May 23, 2008

Mr. Robert Ghirelli
Director of Engineering
ORANGE COUNTY SANITATION DISTRICT
P.O. Box 8127
Fountain Valley, CA 92728-8127

Subject Connection to Existing 69-inch District Sewer Line
In Old Hoover Street in the City of Huntington Beach

Dear Mr. Ghirelli:

The City of Huntington Beach is currently processing a development application with an environmental impact report for a project located on a site currently occupied by the vacant Montgomery Wards buildings adjacent to the Bella Terra Mall, formerly the Huntington Center Mall, located between Center Avenue, Edinger Avenue, old Hoover Street and Beach Boulevard. The City will be processing a General Plan Amendment and Zoning Text Amendment for mixed-use residential and commercial development that may result in an estimated peak project flow of 0.442 mgd.

Currently the site is served by an existing 10-inch sewer lateral that connects to a 10-inch stubout connected to the existing 69-inch OCSD sewer trunk line in the old Hoover Street Railroad right-of-way. The stub-out location is at Edinger Avenue.

The City of Huntington Beach is requesting increasing this stub-out connection to 12-inches in size so that a replacement lateral 12-inches in size can be installed for the new development. Additionally, a second 12-inch point of connection will be needed for the development.

The City is requesting confirmation that the upsized connection and additional connection will be allowed, confirmation of the connection charges for these connections and confirmation that there is adequate sewer capacity in the 69-inch trunk sewer for the proposed project.

If you have any questions regarding our proposed development or the requested upsizing or additional connection, please feel free to contact me at (714) 535-5580 or via email at telliott@surfcity-hb.org.

Sincerely,

Steven Bogart, PE for

Terri Elliott, PE
Principal Civil Engineer

TE/RR:cs

Final

City of Huntington Beach

Wet Utilities Study

for

The Village at Bella Terra

July 2008

Prepared by:

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1.0 Introduction

The purpose of this Wet Utilities Study is to provide information related to water, wastewater, and stormwater infrastructure anticipated to serve The Village at Bella Terra project. This review of infrastructure and infrastructure capacity is summarized in Table 1-1. Results of this study will be incorporated into other environmental documents as necessary, including but not limited to the Environmental Impact Report (EIR).

Table 1-1 Utility Evaluation Summary

Utility		Project Impact	Evaluation Result
Water	Supply	Project will increase demand in the City by 174 acre-feet per year (based on GPA/ZTA Option 2).	WSA/WSV provided determined there is sufficient water supply to serve the proposed project.
	Capacity	Project will require 261 gpm design average flow rate of capacity; this will be provided by two separate connections to the public water system (based on GPA/ZTA Option 2).	Based on City's hydraulic model results, sufficient capacity has been concluded. Private and public on-site pipes need to be constructed and sized to meet fire flow and peak daily flow rates.
Wastewater	Conveyance/ Volume Rate	Increase peak sewer flows by no more than 0.442 MGD (based on GPA/ZTA Option 2).	OCSD has acknowledged connection to the trunk sewer located in the Old Hoover Street alignment. OCSD has confirmed that there is capacity in the existing trunk sewer located in the Old Hoover Street alignment.
	Treatment	Project will be served by OCSD, no stated capacity limitations.	OCSD has acknowledged adequate capacity at treatment Plant No. 1.
Stormwater	Volume/Rate	No-net increase in stormwater runoff is anticipated; however, runoff to specific catchment areas is unknown. Changes in catchment-specific runoff may cause exceedence in one or more drainage systems.	Because the project's effect on the storm drain system capacity cannot be determined at this time, Project Conditions of Approval and Mitigation Measures have been provided. Applicant will be required to provide a Drainage Plan and Hydrology and Hydraulic Study.
	Quality	NPDES Permit Priority Project; requires WQMP with routine BMPs, reduction of pollutants to the maximum extent practicable (MEP), and numeric sizing of treatment BMPs.	Applicant to provide Final WQMP for review and approval. Because the potential proposed project effect on the stormwater quality can only be generally estimated at this time, Project Conditions of Approval and Mitigation Measures have been provided.

2.0 Project Description

The project site is currently developed for retail and auto service use. A vacant 190,100 square-foot retail building, formerly occupied by a Montgomery Wards Department store, occupies the central portion of the project site. A vacant 18,600 square-foot auto repair facility associated with the Montgomery Wards store is located on the southwestern portion of the project site. Both developments were vacated in 2001.

A portion of the proposed project would be located on a existing parking area that currently serves Bella Terra Mall. As depicted on the Conceptual Plan, this existing parking area would be removed as a result of project development and replaced with new development as a combination of impervious and pervious areas. Incorporating this existing parking area into the project site area for The Village at Bella Terra will require a future lot line adjustment.

The proposed project is a General Plan Amendment (GPA) and Zoning Text Amendment (ZTA) for mixed-use residential and commercial development. The potential development combinations result in a maximum total building area floor area ratio of 1.75 or 1,208,245 square feet (sf) of total commercial and residential development.

For analysis purposes, two options have been developed with respect to the proposed project. GPA/ZTA Option 1 would include 713 residential units and 138,085 sf of commercial uses. This option would be developed at 45 dwelling units per acre for residential uses and a floor area ratio of 0.2 for commercial uses. GPA/ZTA Option 2 would include 538 residential units and 414,255 sf of commercial uses. This option would be developed at 34 dwelling units per acre for residential uses and a floor area ratio of 0.6 for commercial uses. Both GPA/ZTA options would result in an increase in allowable uses compared to the existing General Plan and Zoning designations for the project site; however, the ratios of the type of land uses would differ. Implementation of the proposed project would result in the development of a mixed-use scenario in which *either* more residential uses would be permitted (Option 1) or more commercial uses would be permitted (Option 2).

In addition to the two GPA/ZTA options, a third option is considered to address the effects of less-intensive development that is being analyzed as an alternative to the proposed project. The Reduced Project Alternative would include 538 residential units and 138,085 sf of commercial uses. This alternative combines the less intensive development options of GPA/ZTA Option 1 and GPA/ZTA Option 2 depending upon which Conceptual Plan option is used and the final design.

Each option has similar characteristics that can be applied consistently throughout the proposed project. For example, each option would have a similar mix of residential units that consist of approximately five percent studio units, 30 percent one-bedroom units, 55 percent two-bedroom units, and 10 percent three-bedroom units. Similarly, potential businesses under the GPA/ZTA options and Reduced Project Alternative are anticipated to include a market and general retail stores. Based on a retail employment factor of 3.0 employees per 1,000 sf, the commercial retail component of each development scenario would generate approximately 411 new full-time employment positions.

3.0 Water

3.1 Water Supply

The City of Huntington Beach provides potable water to the City and the Sunset Beach area of unincorporated Orange County and would serve the proposed project. The City obtains potable water from two sources: imported water and groundwater. In addition to these identified water sources, implementation of aggressive water conservation and efficient water use policies will allow the City to provide reliable service to its customers.

3.1.1 Imported Water

The City is a member of the Municipal Water District of Orange County (MWDOC). MWDOC wholesales imported water to the City from Metropolitan Water District of Southern California (Metropolitan). The City receives imported water through three connections to the Metropolitan system, which have a total capacity of 22,000 gallons per minute (gpm).[1] One connection (OC-9) enters Huntington Beach at Newland Street and Edinger Avenue, and has the capacity to deliver 6,300 gpm into the water system. The second connection (OC-35) is located at Springdale Street and Glenwood Drive with a capacity of 9,000 gpm. The third connection (OC-44) enters Huntington Beach at the Santa Ana River and Adams Avenue with a capacity of 6,700 gpm.[2]

The City also maintains four potable water storage reservoirs with a combined capacity of 55 million gallons (MG). Pumps draw water from the reservoirs and pressurize it into the water system during high demand periods.[3] Overmyer Reservoir has a capacity of approximately 20 MG. Peck Reservoir has a capacity of approximately 17 MG. Edwards Hill Reservoir has a capacity of 9 MG. Springdale Reservoir has a capacity of approximately 9 MG.[4]

3.1.2 Groundwater

The City is a member of Orange County Water District (OCWD), which manages the regional groundwater basin. As a member, the City is entitled to produce groundwater from the Orange County Groundwater Basin.

Within the City, groundwater for potable use is produced from ten operating wells currently in use that vary in depth from 306 feet to 996 feet, with production ranging from 500 gpm to 3,400 gpm. Total system capacity is approximately 25,050 gpm.[5]

3.1.3 Water Conservation and Efficient Use

Significant progress has been made in water conservation and efficient use over recent years. A number of conservation efforts are underway on the state-wide, regional, and local levels to further reduce water use. In a February 2008 press release from Governor Schwarzenegger regarding the Delta Vision Blue Ribbon Task Force, the Governor identified a plan under

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1 City of Huntington Beach. *Urban Water Management Plan*. 2005. p. 2-3 through 2-4.
2 City of Huntington Beach. *Water Master Plan*. 2005. p. 3-10.
3 City of Huntington Beach. *Urban Water Management Plan*. 2005. p. 2-4.
4 EIP Associates. Newland Street Residential Project. Water Supply and Wastewater TR. December 2005. p. 5.
5 City of Huntington Beach. *Urban Water Management Plan*. 2005. p. 2-8.

development to achieve a 20 percent reduction in per capita water use statewide by 2020.[6] This plan encourages a more aggressive approach including the implementation of additional legislation.

In response to the Governor's February 2008 press release, Timothy F. Brick, chairman of the board of directors of Metropolitan issued a statement including the following: "In Metropolitan's six-county service area, per-capita water use has declined dramatically since 1990, allowing the region to meet its current water needs with the same amount of imported water used nearly 20 years ago, even though our population has grown by more than 4 million. While urban Southern California is ahead of most other regions of the state, an approach that identifies local opportunities and creates incentives to promote conservation would be particularly effective."[7]

An example of Metropolitan's promotion of conservation is the "Cut Your Water Use" Ad campaign, which marks the first time Metropolitan has specifically directed consumers to reduce their landscape irrigation. The 13-week conservation ad campaign is aimed at customers to reduce their water use by cutting outdoor watering by at least one day a week. The campaign will reach out to customers through a variety of media including television, radio, print, and on-line ads.[8]

On behalf of its member agencies, MWDOC's Water Use Efficiency Department administers programs to encourage the public to reduce their water use in the residential, commercial, industrial, and institutional sectors. A number of rebate programs offer consumer's financial incentives to reduce their water use including home appliance, synthetic turf, and landscape rebates. MWDOC also participates in public outreach through school education programs and the California Friendly Landscape Training Program. MWDOC's Water Use Efficiency Program follows three basic goals:

1. Provide on-going water use efficiency program support for member agencies.

2. Assume the position of lead agency to implement water use efficiency programs that are more cost-effectively implemented on a regional basis than on a local basis.

3. Secure outside funding from Metropolitan's Conservation Credits Program, United States Bureau of Reclamation, and other sources.

On August 21, 2000, the City became Signatory to the Memorandum of Understanding (MOU) regarding Best Management Practices (BMP's) for Urban Water Conservation within the California Urban Water Conservation Council (CUWCC). The CUWCC has established fourteen cost-effective BMP's including rebate programs, conservation programs, education and information programs, etc. The City has been committed towards the implementation of these BMPs and its efforts are documented in Activity Reports, which are submitted annually by the City to the CUWCC. Activity Reports submitted between 2001 and 2004 are provided as an appendix in the 2005 Urban Water Management Plan.

Although the legislature recently declared the water supply to be a limited resource and a statewide concern, it is at the local level that water reliability and availability is best accomplished through aggressive water conservation and efficient use of the urban water

[6] Office of the Governor, Press Release (February 29, 2008)
[7] Metropolitan Water District of Southern California, News Release (February 29, 2008)
[8] Metropolitan Water District of Southern California, News Release (April 17, 2008)

supplies. Further, it is through public education about water conservation and efficient water use methods that will ensure a reliable source of water supply to accommodate the City's existing and future customers.

3.1.4 Future Water Supplies

Poseidon Resources Corporation has proposed a Seawater Desalination Project located in the City of Huntington Beach. The project would provide Orange County residents with an additional 50 MGD of drought-resistant water supply. A contractual agreement is in place for the City of Huntington Beach to receive 5 cubic feet per second (cfs) under normal conditions, equating to about 9 percent of the City's current average demand. The project has met major milestones including the EIR certified by the City Council on September 6, 2005. The Seawater Desalination Project is expected to be online by 2011.

3.2 Water Demand

3.2.1 Accounted Demand

The City of Huntington Beach prepared an analysis of accounted for water. The analysis, included in a letter dated April 24, 2008, is provided as an appendix in the WSA/WSV. The property was originally zoned as commercial and was projected to have 1,480 gallons per day per acre (gpd/acre) demand factor per the 2005 Water Master Plan. Based on the project size of 15.85 acres, it is assumed that the UWMP planned for an annual demand of 26 acre-ft per year (AFY).

3.2.2 Proposed Demand

Two development alternatives were considered by the WSA/WSV prepared by Hunsaker and Associates (2008b). For the purposes of determining water supply availability for the proposed project, the higher of the two, GPA/ZTA Option 2, was used and 30,000 sf of restaurant use was assumed.

Based upon current information available to the City, the number of proposed dwelling units, the size of the commercial portion of the development alternatives submitted, the City and State conservation and water efficiency objectives, the following demand factors were used to estimate water demand for the proposed project.

- **Residential:** Density of 2 people per unit, with maximum of 140 gallons per day per dwelling unit
- **Restaurant:** 1.5 gallons per day per square foot
- **Commercial:** 0.15 gallons per day per square foot
- **Aggressive Drought Tolerant Landscaping:** 0.01 gallons per day per square foot.

3.2.3 Net Increase in Demand

The net increase in water demand is the difference between demand on the project site accounted for in the 2005 Urban Water Management Plan and any additional demand required by implementation of the proposed project (see Table 3-1 [Water Demand for the Proposed Project for Water Supply Analysis). As stated in Section 3.2.1, 26 AFY was accounted for in the 2005 UWMP; as such, a net increase of approximately 174 AFY has been estimated by Hunsaker and Associates (2008b).

Table 3-1 Water Demand for the Proposed Project for Water Supply Analysis

Land Use	Quantity	Persons per DU	Demand Factor	Estimated Flow
Residential	538 DU	2	70 gpdc	75,320 gpd
Restaurant	30,000 sf		1.5 gpd/ sf	45,000 gpd
Commercial	384,255 sf		0.15 gpd/ sf	57,638 gpd
Landscape	62,027 sf		0.01 gpd/ sf	620 gpd
Subtotal				*178,578 gpd*
Subtotal				*200 AFY*

SOURCE: Hunsaker and Associates Irvine, Inc. Water Supply Assessment and Water Supply Verification For Bella Terra II. May 6, 2008.
DU = dwelling unit, SF = square feet; gpd = gallons per day; gpdc = gallons per day per capita; AFY = acre-feet per year.

3.2.4 Supply Demand Comparison

The projected water supplies and demands in normal, single dry, and multiple dry years are presented in Table 3-2, Table 3-3, and Table 3-4, respectively. The supply and base demand figures are taken from the 2005 UWMP. The committed demand represents water already made available for other approved developments in the City which were not included in the supply and demand analysis in the 2005 UWMP. Projected demands in dry years fluctuate to reflect climatic variation specific to each dry year scenario.

Table 3-2 Supply Demand Comparison for the Proposed Project in Normal Years (in AFY)

Normal Year	2010	2015	2020	2025	2030
Supply					
MWDOC Imported	13,620	13,320	14,170	13,470	12,780
Groundwater	24,300	24,540	24,790	25,040	25,260
Total Supply	**37,920**	**37,860**	**38,960**	**38,510**	**38,040**
Demand					
2005 UWMP Demand	34,710	35,060	35,410	35,770	36,090
Committed Demand	426	426	426	426	426
The Village at Bella Terra Net Increase	174	174	174	174	174
Total Demand	*35,310*	*35,660*	*36,010*	*36,370*	*36,690*
Supply/Demand Difference	*2,610*	*2,200*	*2,950*	*2,140*	*1,350*

Source: Hunsaker and Associates Irvine, Inc. Water Supply Assessment and Water Supply Verification For Bella Terra II. May 6, 2008.

Table 3-3 Supply Demand Comparison for the Proposed Project in Single Dry Years (in AFY)					
Single Dry Year	***2010***	***2015***	***2020***	***2025***	***2030***
Supply					
MWDOC Imported	12,900	13,870	14,260	13,480	12,920
Groundwater	25,630	25,890	26,150	26,420	26,650
Total Supply	*38,530*	*39,760*	*40,410*	*39,900*	*39,570*
Demand					
2005 UWMP Demand	36,620	36,990	37,360	37,740	38,070
Committed Demand	449	449	449	449	449
The Village at Bella Terra Net Increase	184	184	184	184	184
Total Demand	*37,253*	*37,623*	*37,993*	*38,373*	*38,703*
Supply/Demand Difference	*1,277*	*2,137*	*2,471*	*1,527*	*867*

Source: Hunsaker and Associates Irvine, Inc. Water Supply Assessment and Water Supply Verification For Bella Terra II. May 6, 2008.

The 2028, 2029, and 2030 multiple dry year sequence was provided in the Hunsaker and Associates (2008b) report since it represents the multiple dry year sequence in which the least amount of surplus water is available.

Table 3-4: Supply Demand Comparison for the Proposed Project in Multiple Dry Years (in AFY)					
	Normal Years		***Multiple Dry Years***		
	2026	***2027***	***2028***	***2029***	***2030***
Supply					
MWDOC Imported	13,340	13,190	13,370	13,230	13,090
Groundwater	25,080	25,130	26,860	26,150	26,650
Total Supply	*38,420*	*38,320*	*40,230*	*39,380*	*39,740*
Demand					
2005 UWMP Demand	35,830	35,900	38,370	37,360	38,070
Committed Demand	426	426	455	442	449
The Village at Bella Terra Net Increase	174	174	186	180	184
Total Demand	*36,430*	*36,500*	*39,011*	*37,982*	*38,703*
Supply/Demand Difference	*1,990*	*1,820*	*1,219*	*1,398*	*1,037*

SOURCE: Hunsaker and Associates Irvine, Inc. Water Supply Assessment and Water Supply Verification For Bella Terra II. May 6, 2008.

3.2.5 Water Supply Determination

The WSA/WSV prepared by Hunsaker and Associates (2008b), has been approved by the City, and found that the City of Huntington Beach has an adequate supply of water to serve both the projected and existing customers of the City. Further, the WSA/WSV found that the total water supply available to the City during normal, single dry and multiple dry years within a 20-year

projection will meet the estimated water demand of The Village at Bella Terra development, in addition to the demand of existing and other planned future uses, including agricultural uses.

The WSA/WSV (2008b) includes information related to the December 2007 federal court order, which imposed interim pumping restrictions on State Water Project (SWP) operations in the Sacramento-San Joaquin Delta (Delta). U.S. District Judge Oliver Wanger's decision was made to address protection of the threatened Delta smelt. The pumping restrictions reduce the amount of future import water supplies available to Southern California and eliminate the delivery of replenishment water (In-Lieu Program) indefinitely. Preliminary estimates predict that Metropolitan Water District of Southern California could lose up to 30 percent of its Delta supplies as a result of this decision. The interim pumping restrictions will remain in effect until a new biological opinion is due in September 2008; however, water supply issues will remain and plans to address the Delta's problems are in progress.

The WSA/WSV (2008b) mentions a potential reduction in imported water of up to 30 percent. However, the potential supply reduction is not quantified in the WSA. The supply demand comparisons utilize the City's 2005 UWMP projected supplies, with the addition of project net increase, but do not reflect the potential Metropolitan supply reductions. However, the City's conservation programs and statewide efforts are targeting increased water efficiency and conservation of over 20 percent as discussed in Section 3.1.3. These conservation and efficiency efforts will increase the City's reserve supply and supply reliability.

Additionally, water saving features in residential units could reduce inside residential water demand factors by about 35 percent. The goal of the City is to aim for an inside water use demand factor of 45 gpcd for new projects. Therefore, in addition to City water conservation and education programs, the following project conditions of approval are recommended:

<u>Recommended Project Conditions of Approval:</u>

- Waterless urinals in the commercial and restaurant areas
- Ultra low-flush toilets in the residential units
- Low-flow shower heads and faucet aerators in the residential units
- Aggressive drought tolerant landscape design with the option to use artificial turf
- Efficient irrigation including smart irrigation controllers and separate irrigation meters
- Ultra water efficient clothes washers and other appliances in common areas
- Incentives for new residents to purchase ultra water efficient appliances
- Provide signs throughout the proposed project site to wisely use water
- Make available resources to residents and tenants on how to use water efficiently

The WSA/WSV (2008b) also concludes that the reliable supplies provided by the Groundwater Basin will ensure that the City will be able to provide a reliable source of water to accommodate its existing users and the additional demand on water supplies created by the proposed project for the 20-year projection.

3.3 Water Conveyance and Capacity Determination

Water conveyance and capacity were evaluated with the City's hydraulic water model. The City's model verified whether the City's existing public water infrastructure has sufficient conveyance capacity to meet domestic and fire flow demands for the proposed project. On-site water exhibits for the proposed project for the two development alternatives were provided by Hunsaker and Associates (Appendix A). For the purposes of determining water conveyance capacity for the proposed project, the higher of the two, GPAZTA Option 2 was used.

The demand factors for the capacity analysis are based on daily average flow and may vary from those used for water supply analysis. Conservative demand factors are used for the capacity analysis to ensure adequate pipe sizing meets both domestic and fire flow demands. Based on these demand factors listed below, the existing project site would have a total design average demand of 261 gpm for 15.85 acres of the residential, commercial retail, and office uses. Modeled proposed project domestic demand factors and fire flow distributions are summarized in Table 3-5.

Table 3-5 Design Average Domestic Demand and Fire Flow Distribution for Water Conveyance and Capacity Analysis

Land Use	*Quantity*	*Demand Factor*	*Total Demand (gpm)*	*No. of Locations*	*Demand per Location (gpm)*
Domestic Demand Distribution					
Residential	538 DU	400 gpd/DU	149.4	3	49.8
Subtotal			*149.4*	*3*	*49.8*
Restaurant	30,000 sf	1.5 gpd/sf	31.3	2	15.6
Commercial	384,255 sf	0.3 gpd/sf	80.1	2	40.1
Subtotal			*111.4*	*2*	*55.7*
Total			*260.8*		
Fire Flow Distribution					
N/A	**N/A**	**N/A**	**4,000**	**3**	**1000 or 1500**

SOURCE: Hunsaker and Associates Irvine, Inc. **Bella Terra II Onsite Water Exhibit Alternative 2**. Approved May 21, 2008.

Fire flow demands placed at these proposed on-site fire hydrants were evaluated using the City's hydraulic water model with a total fire flow demand of 4,000 gpm. The modeled statics pressures dropped from 66 to 67 pounds per square inch (psi) to 58 to 59 psi, respectively, with pressure readings recorded at each point of connection to the City's public water system located onsite. Since residual water pressures meet the City of Huntington Beach Fire Department requirements and modeled results satisfy the City's Water Standards design requirements, the City has determined there is sufficient conveyance capacity to meet the domestic water and fire flow demands of the proposed project. Private and public on-site pipelines and appurtenances are required for the proposed project; however, no off-site water improvements to the existing infrastructure located in the public right-of-way are required. The model results and on-site water exhibits (Appendix A) were approved by the City on May 21, 2008.

4.0 Wastewater

The City owns, operates, and maintains a wastewater collection system that includes gravity pipelines, manholes, lift stations and force mains. This system serves over 95 percent of the areas within the City, and several small areas within the cities of Westminster, Seal Beach, Newport Beach, and Fountain Valley. The City's wastewater system would provide service to the proposed project.[9] The City's system connects to a regional trunk sewer system and eventually a treatment system operated by Orange County Sanitation District (OCSD).

4.1 Sewer Conveyance and Capacity

4.1.1 City Collection System

The City's collection system is comprised of approximately 385 miles of wastewater pipelines ranging in size from 6 to 30 inches in diameter. Approximately 85 percent of the City's wastewater pipelines are 8 inches in diameter. Due to the City's generally flat conditions, the City also operates and maintains 28 lift stations ranging in capacity from approximately 80 gallons per minute to 1,350 gallons per minute. These facilities lift sewage from low points in the collection system to manholes at higher locations.[10,11]

The City's local system generally discharges to larger OCSD facilities to convey wastewater to the local treatment plant. Given the growth within OCSD's service area, OCSD is currently upsizing a number of collection system pipelines to provide additional capacity.

4.1.2 Orange County Sanitation District Collection System

Orange County Sanitation District (OCSD) is responsible for receiving, treating, and disposing of the wastewater generated in central and northwest Orange County, including the City's wastewater. In this regional management capacity, OCSD owns, operates and maintains the majority of the "backbone" wastewater collection trunk pipelines. The sewer system consists of 12 trunk sewer systems ranging in size from 12 to 96 inches in diameter and collectively over 500 miles long. Additionally, there are 39 sewer interconnections and 87 diversions to maximize conveyance of flows through the system. Twenty pump stations are used to pump sewage from lower lying areas to the treatment plants.[12]

No existing capacity issues have been identified in the OCSD system, and OCSD has developed engineering plans for plant improvements anticipated to meet area demands to the year 2050.[13]

4.1.3 Proposed Wastewater Generation

The two development alternatives were considered by Hunsaker and Associates in determining the estimates of sewer flow (Appendix B). The estimates of sewer flow are slightly higher than

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9 City of Huntington Beach. Citywide Sewer Master Plan. p. 3.2
10 City of Huntington Beach. Urban Water Management Plan. 2005. p. 8-1.
11 City of Huntington Beach. Citywide Sewer Master Plan. p. 1.1.
12 City of Huntington Beach. Urban Water Management Plan. 2005. p. 8-1.
13 EIP Associates, Pacific City Environmental Impact Report. 2003. p. 3.15-3.

the estimates of water demand. Duty factors used for sewer generation rates were more conservative because they were prepared for sizing the conveyance system and for designing facilities. Actual wastewater generation on the project site would be closer to estimates of water demand. For the purposes of determining the sufficiency of wastewater capacity for the proposed project, the higher of the two, 0.442 MGD for GPA/ZTA Option 2, was used and 30,000 sf of restaurant use was assumed.

Table 4-1 Estimated Sewer Flows for the Proposed Project

Land Use	*Quantity*	*Duty Factor*	*Estimated Flow*
Residential	538 DU	187 gpd/DU	100,608 gpd
Restaurants	30,000 sf	1.5 gpd/sf	45,000 gpd
Commercial	384,255 sf	0.2 gpd/sf	76,851 gpd
Total			*222,457 gpd*
Total			*0.22 MGD*
Peak Hourly Discharge	*$1.78(Q_{ave})$^0.92*		*0.442 MGD*

SOURCE: Hunsaker and Associates Irvine, Inc. **Bella Terra II Estimated Sewer Flows**. May 9, 2008. Appendix B.
DU = dwelling unit, SF = square feet; gpd = gallons per day; MGD = million gallons per day; Q = discharge; ave = average.

4.1.4 Capacity

Currently the site is served by an existing 10-inch sewer lateral that connects to a 10-inch stubout connected to the existing 69-inch OCSD sewer trunk line in the Old Hoover Street alignment. The stubout location is in Edinger Avenue.

Prior to issuance of a building permit for the proposed project, the existing 10-inch stubout connection shall be replaced with a stubout 12-inches in size to the 69-inch OCSD trunk sewer line so that a replacement sewer lateral 12-inches in size can be installed to service the development. In addition, a second 12-inch point of connection may be constructed for additional capacity.

The Orange County Sanitation District has confirmed that there is capacity in the existing 69-inch trunk sewer. The City has a 10-inch connection at Center Avenue and Old Hoover Street at OCSD sewer station 472+50.94, but no permit from the OCSD has been confirmed for this connection. Prior to allowing additional connections to the sewer in Center Street, the condition of the existing manhole will need to be assessed to determine if rehabilitation of the manhole is required, and the capacity of the existing 10-inch sewer in Center Street will need to be confirmed by metering. If an upsized or additional connection is made to this manhole by the City of Huntington Beach, a permit will need to be obtained from OCSD. The City of Huntington Beach will need to be the permittee and applicant for the new or upsized sewer connection, and fees will need to be paid when the permits are obtained for inspection and the connection. Fees will be determined when the improvement plans are submitted by the city. The development will be responsible for the design, construction, and all costs associated with these improvements, including any fees required by the OCSD.

The existing 10-inch lateral that connects to the existing City of Huntington Beach 10-inch sewer line in Edinger Avenue is currently in service and is conveying effluent from the existing Bella Terra I Development. We have not been able to determine if the existing sewer lateral is within

an easement across the old Montgomery Wards property. The capacity of this existing 10-inch sewer lateral will need to be confirmed by metering to determine if upsizing of this existing lateral is necessary. If upsizing is necessary, the development will be required to design and construct these improvements per the requirements of the City Engineer.

The existing city-owned 10-inch sewer line in Edinger Avenue between the existing 10-inch lateral and the manhole on the 69-inch OCSD sewer trunk line is currently over capacity. The short segment (approximately 10 lineal feet) will need to be analyzed to determine the appropriate size for capacity (to 12-inch diameter or larger) to accommodate existing and future flows.

4.2 Wastewater Treatment

Wastewater from the City's service area is collected and treated by OCSD. OCSD has two operating facilities that treat wastewater from residential, commercial and industrial sources in central and northwest Orange County. OCSD's Reclamation Plant No. 1 is located in the City of Fountain Valley about four miles northeast of the ocean and adjacent to the Santa Ana River. The plant provides advanced primary and secondary treatment through an activated sludge system. The secondary effluent is either blended with the advanced primary effluent and routed to the ocean disposal system, or is sent to the Orange County Water District facilities for advanced treatment and recycling.[14] OCSD's Treatment Plant No. 2 is located in the City of Huntington Beach adjacent to the Santa Ana River and about 1,500 feet from the ocean. This plant provides a mix of advanced primary and secondary treatment. The plant receives raw wastewater through five major sewers. Approximately 33 percent of the influent receives secondary treatment through an activated sludge system, and all of the effluent is discharged into the ocean disposal system. OCSD's treated wastewater is discharged through a 120-inch outfall at a depth of about 200 feet below sea level and nearly 5 miles offshore from the mouth of the Santa Ana River.[15]

The proposed project's wastewater flows would be treated by Reclamation Plant No. 1.[16] Current maximum treatment capacity for Reclamation Plant No. 1 is 218 million gallons per day (MGD); on average, the plant treats approximately 120 MGD.[17] The plant is currently designed to provide primary treatment to 218 MGD of wastewater and secondary treatment to 110 MGD. The primary treatment system will be increased to a design capacity of 198 MGD during the current discharge permit term.[18] However, Reclamation Plant No. 1 is currently unable to treat all average daily flows to secondary treatment levels and there are no plans to expand the secondary treatment system.

The quantities of wastewater are generally proportional to the population and water use in the service area. Wastewater generated by the City in 2005 was approximately 21 MGD. By 2030, wastewater generated by the City is expected to increase to nearly 26 MGD.[19]

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14 City of Huntington Beach. Urban Water Management Plan. 2005. p. 8-2.
15 City of Huntington Beach. Urban Water Management Plan. 2005. p. 8-2.
16 Bob Chenoweth. City of Huntington Beach. Engineering Department. Personal communication. June 9, 2008. (714) 962-2411
17 City of Huntington Beach. Urban Water Management Plan. 2005. p. 8-2.
18 California Regional Water Quality Control Board. Santa Ana Region. Waste Discharge Requirements for Orange County Sanitation District's Reclamation Plant No. 1 and Treatment Plant No. 2, Order No. R8-2004-0062, NPDES Permit No. CA0110604.
19 City of Huntington Beach. Urban Water Management Plan. 2005. p. 8-3.

4.2.1 Wastewater Treatment Plant Capacity

Remaining capacity at Reclamation Plant No. 1 is 98 MGD. Remaining capacity at Treatment Plant No. 2 is approximately 24 MGD. As such, it is assumed there would be more than adequate capacity to treat the new increase of 0.442 MGD of wastewater that would be generated by the proposed project. The Orange County Sanitation District has confirmed that there is capacity in the existing 69-inch trunk sewer.

5.0 Stormwater

5.1 Stormwater Conveyance System

The City is responsible for its own subregional and local drainage facilities, which ultimately route runoff into Orange County Flood Control District (OCFCD) facilities. The City's stormwater system would provide service to the proposed project.

The Orange County Flood Control District (OCFCD) is responsible for the design, construction, operation, and maintenance of regional flood control facilities. OCFCD owns and/or maintains approximately 18 miles of storm drain systems within the City. County owned and maintained channels found in the City include the CO-2 (Bolsa Chica), CO-4 (Westminster), CO-5 (East Garden Grove Wintersburg), CO-6 (Oceanview), CO-7 (Sunset), DO-1 (Huntington Beach), DO-2 (Talbert), DO-5 (Fountain Valley), and the EO-1 (Santa Ana River) channels.[20] These channels receive runoff from areas within the City as well as substantial drainage areas in other upstream jurisdictions. It is estimated that runoff from the City makes up about 35–40 percent of the total dry- and wet- weather flows in the channels. Additionally, the County owns and maintains a storm drain pump station located at the head of the DO-1 channel.[21]

The City owns, operates, and maintains approximately 131 miles of storm drainage system for the purpose of conveying storm runoff so as to reduce or eliminate flooding under peak storm flow conditions. The storm drainage system begins with the streets and roads, and includes inlets, storm drains, open channels, pump stations, detention basins, and other appurtenances. Because of the topographic nature of the City, the City operates 15 pump stations, generally located near principal County of Orange drainage channels to pump City storm drain water into the County flood control system. Runoff water is then collected at each pump station site throughout the City's drainage facilities, and then lifted up to the nearest County of Orange channel, which ultimately conveys the runoff from the City to the Pacific Ocean. [22] There are three lakes within the City boundaries that can serve as temporary detention basins in flood conditions: Huntington Lake, Talbert Lake, and Sully-Miller Lake.[23]

Only the eastern-most portion of the City is adjacent to and uses the Santa Ana River Channel, built and operated by the U.S. Army Corps of Engineers. Two City pump stations and a private outlet make use of the Santa Ana River Channel facility. The project site does not drain to the Santa Ana River channel.[24]

The Drainage Element of the Citywide Urban Runoff Management Plan (CHB 2005) incorporates a City-based Master Plan of Drainage (MPD). The MPD is a comprehensive drainage study of the community that identifies and creates an inventory of existing storm drain facilities, identifies those areas where system elements do not meet the latest goals established by the City, ranks the severity of the difference between existing capacity and the capacity needed to achieve those goals, prepares planning level cost opinions for system upgrades, and recommends system improvements to initiate the corrections as funding becomes available.

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[20] City of Huntington Beach. Citywide Urban Runoff Management Plan. 2005. p. 4-5 through 4-7.
[21] City of Huntington Beach. Citywide Urban Runoff Management Plan. 2005. p. 1-1.
[22] EIP Associates. Newland Street Residential Project. Hydrology and Water Quality Technical Report. December 2005. p 6.
[23] City of Huntington Beach. Citywide Urban Runoff Management Plan. 2005. p. 4-5.
[24] City of Huntington Beach. Citywide Urban Runoff Management Plan. 2005. p. 4-7.

The City initiates the individual drainage projects within its budgetary, political, and discretionary constraints.

5.1.1 Site-Specific Conveyance System

Preliminary discussion of site-specific hydrology is limited to a generalization of the existing site hydrology. A more precise analysis will be required in the final Drainage Plan and Hydrology and Hydraulics Study during the design process.

The proposed development site is currently fully developed as a commercial site with an estimated 90 percent impervious surfaces. The Murdy Channel storm drain system (City of Huntington Beach Facility Number C5-SC2) borders the north and west edges of the project site. The project site is within the Westminster Watershed and drainage from the project site sheet flows across the site to low points with inlets adjacent to the Murdy Channel and to Edinger Avenue.

Stormwater from the project site flows primarily southwestwardly toward Edinger Avenue. A portion of flow from the western part of the project site is conveyed to the Murdy Channel through the on-site storm drain system, while overland flow and flow from the eastern portion of the project site flows to a 25-year capacity storm drain system in Edinger Avenue and then discharges into the Murdy Channel. Flow from an existing parking area of the Bella Terra Mall (Existing Parking Area) that would be included in the project site following a lot line adjustment, also drains through an on-site storm drain system to the Murdy Channel through the Bella Terra Mall storm drain system. A preliminary Drainage Review (Appendix C) identified that runoff from the Bella Terra Mall spills over into the northwesterly portion of the project site (Hunsaker and Associates 2008a).

Water flows from east to west in the Murdy Channel north of the project site, and then continues south at the intersection of Center Avenue and the Union Pacific Raiload Right of Way (UPR ROW). At Center Avenue and the UPR ROW, minor detention occurs within the existing on-site system from Bella Terra Mall.[25]

Stormwater that reaches the Edinger Avenue storm drain system flows to the west and into the Murdy Channel. At about the northern terminus of Kim Lane, the Murdy Channel turns west. Just before Magellan Lane, the Murdy Channel turns south again, and continues south to its outfall at the East Garden Grove-Wintersburg Channel (C05). At Heil Avenue, the Heil pump station lifts water in the Murdy Channel so it can discharge to the East Garden Grove-Wintersburg Channel. The East Garden Grove-Wintersburg Channel runs primarily east to west within the project vicinity and discharges to Bolsa Bay, Huntington Harbour, and eventually, the Pacific Ocean.[26]

The project site is currently subject to flooding from deficiencies in the on-site drainage system and the East Garden Grove-Wintersburg Channel during the 100-year flood event (FEMA Zone A).[27] The base flood elevation (BFE) has not been formally determined by FEMA for this site. However, FEMA, the County of Orange, and the City have agreed to use the best engineering

[25] EN Engineering, Inc. 2005. Bella Terra Phase II Huntington Center Remodel Site Plan Review 02-10, City of Huntington Beach, Orange County, California, Hydrology and Hydraulics Basis of Design Report. September 27, 2005.
[26] City of Huntington Beach. 2005. Citywide Urban Runoff Management Plan.
[27] Federal Emergency Management Agency. 2004. FIRM Flood Insurance Rate Map, Orange County, California and Incorporated Areas, Panel 251 of 550, Community Panel Number 06059C0251H. Map revised February 18, 2004.

data available for this site regarding flood impacts. A study by West Engineers estimates the depth of flooding at 1 foot.[28]

All drainage from the project site, including roof drainage, driveway drainage, and other surface drainage, is anticipated to either sheet flow to Edinger Avenue or pipe flow to the Murdy Channel. However, no Preliminary or Conceptual Drainage Plan or Preliminary Hydrology and Hydraulics Study has been prepared; therefore, the existing and proposed drainage systems and drainage areas are unknown and the volume of overflow run-off from the Bella Terra Mall north and east of the project site is unknown. The Existing Parking Area drains to the Bella Terra Mall Laterals S-3-6, S-3-5, S-3-4, and S-3-3 and possibly Line S-3B. These storm drain inlets discharge into the south-flowing Line S-3 (a 16- to 30-inch storm drain) to west- then south-flowing Line S-2 (a 42-inch storm drain) that outlets to the west-flowing 46-inch storm drain in Edinger Avenue (Line S-1A).[29] A detailed drainage area delineation and/or site topographic survey has not been provided.

Proposed development changes to existing conditions hydrology will depend upon the development proposal and plan, and as such, cannot be evaluated for the proposed project. Additionally, portions of the Bella Terra Mall storm drain system are currently under capacity. Some overflow would continue to occur with implementation of the proposed project and must be addressed.

For illustrative purposes, the project Applicant has prepared a Conceptual Site Plan and Preliminary Water Quality Management Plan (PWQMP) that describes some drainage conditions.[30] The PWQMP states that existing runoff is directed to the west-southwest to the Murdy Channel and that discharge is conveyed off-site from the southwest corner of the project site. However, there are three storm drain inlets from the project site to the Murdy Channel on the west side of the project site: two are near the north and another is near the southwest corner. Additionally, without an accurate topographical survey, street flow in local streets to Edinger Avenue cannot be assessed. Furthermore, the existing parking area south of the project site and in the eastern portion of the project site (part of the existing Bella Terra Mall) currently drains to an on-site storm drain system (Bella Terra Mall) and then to the City storm drain system in Edinger Avenue and runoff from Bella Terra Mall, to the north, spills over southerly onto the project site.

The PWMQP assumes that the drainage system would convey all flow from the project site through an underground storm drain system to the Murdy Channel at the southwest corner of the project site. However, a portion of the existing project site (the portion that is an existing parking area for the Bella Terra Mall) drains to a portion of the on-site Bella Terra Mall storm drain system that runs southward, then westward to the Murdy Channel. The PWQMP drainage system, as identified in the PWQMP Exhibit A-1: Site Plan, is not clear as to whether the drainage from this existing parking area would continue to flow to the Bella Terra Mall storm drain system, or The Village at Bella Terra new storm drain system. Additionally, in accordance with this Site Plan, drainage from Block 2 flows as sheet flow to a local street/driveway for The

[28] Jane James. City of Huntington Beach Senior Planner. Email dated May 23, 2008 The Village at Bella Terra PW Comments on WUS to Ruta Thomas, PBS&J.

[29] EN Engineering, Inc. 2005. Bella Terra Phase II Huntington Center Remodel Site Plan Review 02-10, City of Huntington Beach, Orange County, California, Hydrology and Hydraulics Basis of Design Report: Bella Terra Storm Drain Index. September 27, 2005.

[30] Hunsaker & Associates Irvine, Inc. 2008. Preliminary Water Quality Management Plan (WQMP) for “The Village at Bella Terra”. April 23, 2008.

Village at Bella Terra, and then to Edinger Avenue, as opposed to all stormwater being routed to the southwest corner of the project site in the new storm drain system.

5.1.2 Site-Specific Net Increase

It is assumed there would be no net increase in stormwater runoff generated by the overall proposed project because implementation of the proposed project would not increase the amount of impervious surfaces. The site is currently fully developed and is estimated to be at least 90 percent impervious.

The existing site stormwater, along with spillage from Bella Terra Mall, is likely conveyed to the Murdy Channel by an underground storm drain system, sheet flow to the existing streets, and underground storm drains to the Bella Terra Mall storm drain system, which ultimately discharges to the Murdy Channel (Existing Parking Area to be included in the project site).

Any development plan for the proposed project would have to develop and implement a WQMP including site design BMPs to minimize the amount of directly connected impervious area (DCIA), amount of total impervious area, and the runoff coefficient, and to maximize permeability, to the maximum extent practicable. Therefore, proposed project implementation would not likely cause an increase in overall runoff that could adversely affect the overall off-site stormwater conveyance capacity to the Murdy Channel.

The Orange County Flood Control District-approved AES program[31] was used to estimate potential project site peak flow rates. In accordance with the MPD, the site soils are classified as Hydrologic Group C, which means that the pervious area soils have a moderately high runoff rate and somewhat poor infiltration.[32] The existing and proposed project impervious area is assumed to be about 90 percent of the project site. Table 5-1 (Estimated Existing and Proposed Project Total Project Site Flow Rates) lists the estimated stormwater runoff rates from the entire project site, for both existing and proposed project conditions.

Table 5-1 Estimated Existing and Proposed Project Total Project Site Flow Rates

Area	Estimated Slope ft/ft[b]	Flow Rate			
		10-year cfs[b]	25-year cfs[b]	50-year cfs[b]	100-year cfs[b]
Project Site	0.02a	36.1	43.2	48.7	55.2

a. Overall site slope is assumed to be very flat but because finished slopes are unknown, a conservative slope of 0.02 ft/ft was assumed. Less steep slopes would generate lower runoff rates. Storm drain systems within the neighboring Bella Terra Mall area have slopes of about 0.002 ft/ft.
b. ft/ft = feet per feet; cfs = cubic feet per second.
c. Engineering Hydrologic Software Solutions. Advanced Engineering Softwater (AES) RATSCx 2006 v. 13.0 for Orange County. (approved for use in Orange County; based on the Orange County Hydrology Manual, 1986).

However, even though the proposed project would not likely result in greater overall stormwater runoff, the proportion and rate of flow to the different drainage systems may be altered. This could increase the amount of runoff to one or more of the existing off-site storm drain systems,

31 Engineering Hydrologic Software Solutions. Advanced Engineering Softwater (AES) RATSCx 2006 v. 13.0 for Orange County. (approved for use in Orange County; based on the Orange County Hydrology Manual, 1986)

32 Highest infiltration and lowest runoff is associated with Hydrologic Group A, and lowest infiltration and highest runoff is associated with soil Hydrologic Group D

including streets, for the 10-year, 25-year, 50-year, and/or 100-year storm events, compared to those assessed in the MPD. Additionally, based on actual measured existing impervious areas and the development plan impervious areas, changes in overall net runoff may occur.

The PWQMP estimates that the existing impervious area is 99 percent of the project site; however, no actual calculations or measurements have been provided. Therefore, assuming an existing impervious area of 90 percent is reasonable and would be conservative for determining potential impacts from the development plan described in the PWQMP. If the existing amount of impervious area was assumed to be higher, then reducing the impervious area to 90 percent would reduce overall runoff and potential impacts associated with development would be lower. Typical commercial developments have impervious percents of 80 to 100 percent with an average of 90 percent (County of Orange Environmental Services Agency 1986).

The Village at Bella Terra PWQMP estimates that the re-developed impervious area would be about 90 percent, which is a reasonable assumption for the type of development proposed. The PWQMP has assumed additional landscaping and open space areas, as well as perimeter trees and landscaping along the Murdy Channel and the access road/driveway from Center Avenue. These features would likely reduce the amount of directly connected impervious surfaces compared to existing conditions.

5.1.3 Site-Specific Conveyance Capacity

According to the MPD, there are no current off-site system capacity deficiencies in the City storm drain system. Conclusions provided in the original Bella Terra Mall drainage study, which provided for significant on-site attenuation, were included in the MPD. However, not all of the stormwater detention required for Bella Terra Mall was implemented and stormwater runoff from Bella Terra Mall spills onto the project site and contributes to runoff conveyed from the project site. Therefore, actual existing street flow capacity, storm drain system capacity, and area runoff is not provided for in the MPD. Additionally, the County of Orange East Garden Grove-Wintersburg Channel is subject to flooding during the 100-year storm event as identified by FEMA. Consequently, the City storm drain system can only be assumed to have sufficient capacity for its design conditions, the 25-year storm event. The East Garden Grove-Wintersburg Channel conveyance capacity is acknowledged to be currently deficient in some reaches.

Furthermore, if the proportion of flow (e.g., change in area, impervious fraction, and/or routing) to the different drainage systems (direct to Murdy Channel, flow to Edinger Avenue, or local Bella Terra Mall storm drain system to Edinger Avenue storm drain system) is altered, it could increase the amount of runoff to one or more of the existing off-site storm drain systems for the 10-year, 25-year, 50-year, and/or 100-year storm events, compared to existing conditions.

Because the overall runoff from the project site would not be expected to increase with implementation of the proposed project, it is not expected that overall flow to the Murdy Channel would be substantially altered. However, the stormwater detention mitigation measures for the Bella Terra Mall development were not implemented, and therefore, the MPD does not reflect actual conditions of the existing storm drainage system capacity. Consequently, stormwater runoff from the project site could exceed the existing system's conveyance capacity, even if overall runoff rates are not increased compared to existing conditions. Without details on existing and proposed project drainage areas, area runoff characteristics, and flow patterns, and information on the on-site storm drain system capacity and street drainage design, stormwater conveyance capacity limitations of the Murdy Channel, Bella Terra Mall storm drain system, and

Edinger Avenue storm drain systems are unknown, and therefore, on- or off-site flooding impacts are potentially substantial.

5.1.4 Required Improvements and/or Detention

Although the proposed project would not likely increase overall stormwater runoff, no Preliminary Hydrology and Hydraulics Study or Preliminary Drainage Plan has been prepared for the proposed project/project site. Because the proposed project is a GPA/ZTA, the effect of development on the project site cannot be assessed until a development plan has been proposed and associated Hydrology and Hydraulic Study performed. Therefore, the effect of the proposed project on stormwater conveyance system capacity is unknown and effects are potentially significant. Additionally, because the project site is located in a FEMA-defined 100-year flood hazard area, the proposed project will be required to implement improvements and design standards in accordance with the minimum FEMA development requirements and City requirements for development within a floodplain. Section 5.1.5 lists required Mitigation Measures to mitigate the deficiencies in hydrology information and address floodplain development.

Stormwater detention possibilities are limited for the project site because it is currently mostly impervious surfaces and will remain mostly impervious surfaces; the soils are not suitable for infiltration (Hydrologic Group C and slowly percolating impervious surfaces); and the groundwater table may be within five feet of the ground surface within this area (Geotechnical Report 2006). Some stormwater runoff storage could be provided by: maximizing use of pervious paving materials (e.g., porous concrete or porous asphalt) that are capable of increasing stormwater storage within the pavement void spaces; using tree filters to store runoff and maximize uptake; diverting rooftop runoff to underground cisterns, tanks, or piping to store runoff; and/or storm drain pipe detention. Because most of the parking for the area would be below-grade or within parking structures, the use of microswales within the parking lot to store runoff would not be feasible. The use of porous concrete for sidewalk paving and porous asphalt for driveways and some internal roads would increase the amount of pervious surfaces and runoff to be stored, but could reduce stormwater runoff. Use of these pervious pavement features would be dependant upon the Geotechnical Engineer's approval and the structural requirements that must be met to maximize the useful life of the improvements.

The project site is currently subject to flooding from the East Garden Grove-Wintersburg Channel during the 100-year flood event (FEMA Zone A).[33] The base flood elevation (BFE) has not been determined by FEMA for this site, however, FEMA, the County of Orange, and the City have agreed to use best engineering data available for this site regarding flood impacts. The best engineering data in this case is a study by West Engineers, which estimates the depth of flooding at 1 foot.[34]

Because the potential proposed project effect on the storm drain system capacity cannot be determined at this time, the following Mitigation Measures are required to mitigate potential impacts.

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[33] Federal Emergency Management Agency. 2004. FIRM Flood Insurance Rate Map, Orange County, California and Incorporated Areas, Panel 251 of 550, Community Panel Number 06059C0251H. Map revised February 18, 2004.

[34] Jane James. City of Huntington Beach Senior Planner. Email dated May 23, 2008 The Village at Bella Terra PW Comments on WUS to Ruta Thomas, PBS&J.

5.1.5 Mitigation Measures

Prior to receiving a precise grading permit, the developer shall:

- Prepare a Site Development and Drainage Plan

- Prepare an existing and proposed project Hydrology and Hydraulics Study based on the Site Development and Drainage Plan. The existing hydrology shall include an evaluation of run-on to the project site because of spillage from the Bella Terra Mall drainage system, north of the Montgomery Ward Site.

- Implement stormwater detention BMPs, based on the Hydrology and Hydraulics Study, for all storm events up to the 100-year storm event, to ensure that peak flow rates from the project site to the off-site storm drain system do not exceed the existing 25-year storm event peak flow rate.

- Analyze existing street flow capacity to determine exceedence of any design criteria and guidelines from the City's MPD.

- Additionally, stormwater detention BMPs shall be implemented such that areas draining to the existing piped storm drain systems do not exceed existing peak flow rates for the 10- and 25-year storm events and that peak flows to local streets do not exceed MPD and City design guidelines:

    - In accordance with the MPD, streets must be designed to leave at least one-lane free of ponded water in each direction for conveyance of the 10-year storm event, must be contained within the curbs for the 25-year storm event, cannot exceed 0.2 foot above the street curbs for the 50-year storm event, and cannot exceed 0.5 foot above the street curbs for the 100-year storm event.

    - The internal storm drain system must be adequate to detain sufficient stormwater runoff such that the street flow requirements are not exceeded.

    - Surface ponding or sump areas on the site will be limited to a maximum depth of 8-inches, and shall be distributed to areas away from building pads and to remote areas of parking lots.

    - Surface ponding or sump areas shall not exceed 1/3 of the proposed parking area in surface area.

    - Underground parking shall not be used for stormwater detention unless approved by the Director of Public Works.

- Stormwater retention areas shall be analyzed for back to back 24-hour 100-year storm events per the requirements of the Orange County Flood Control Manual.

- The final Hydrology and Hydraulics Study shall identify and evaluate the routing through the project site in relation to the new buildings, landscaping, utilities, and other features. Sufficient detention, provided to mitigate constrained capacities in the Bella Terra Mall drainage system, shall be implemented for run-on from the north onto the project site.

- The final Hydrology and Hydraulics Study shall incorporate all NPDES requirements in effect at the time that the precise grading permit is anticipated to be issued or when the study is accepted as complete.

- Precise grading and street improvement plans and studies shall be submitted to the Public Works Department for review and approval. The project developer shall incorporate into a Final Drainage Plan all recommendations and requirements identified by the Public Works Department based on a review of the Final Hydrology and Hydraulics Study and identified stormwater detention requirements/features.

Following grading, excavation, and installation of utilities, the Public Works Department shall:

- Inspect the project site and verify that project site drainage is in accordance with the Final Drainage Plan and that required detention/storm drain system improvements have been implemented.

The development plan shall also conform with floodplain development requirements using a best-available flood elevation depth of 1 foot. Therefore, the project developer shall comply with the following and the City of Huntington Beach shall review the development plan/design to ensure that requirements are met:

- Residential uses (including basements) must be elevated such that the lowest floor would be constructed 2 feet above highest existing grade (as required by FEMA and Chapter 222 of the City of Huntington Beach Zoning and Subdivision Ordinance).

- Non-residential structures, including utilities and sanitary facilities must be elevated or flood-proofed to below the flood depth and capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy as required by Chapter 222 of the City of Huntington Beach Zoning and Subdivision Ordinance.

- It should be noted that the use of enclosed areas below the lowest floor in a residential building is limited to parking, building access, and limited-storage areas. Therefore, the use of underground parking within the project site would be considered an acceptable use, even though it would be below the flood level. However, underground electrical, heating, ventilation, plumbing, and air conditions equipment or other service facilities could not be located below the ground surface and floodproofing and hydrostatic pressure mitigation must be provided.

The City of Huntington Beach shall:[35]

- Review the proposed new development to determine whether it would be reasonably safe from flooding. If a development proposal is in a flood-prone area, any such proposals shall be reviewed to assure that (i) all such proposals are consistent with the need to minimize flood damage within the flood-prone area, (ii) all public utilities and facilities, such as sewer, gas, electrical, and water systems are located and constructed

[35] Federal Code of Regulations Title 44 Emergency Management and Assistance Section 60.3 Flood plain management criteria for flood-prone areas.

to minimize or eliminate flood damage, and (iii) adequate drainage is provided to reduce exposure to flood hazards;

5.2 Stormwater Quality

The Santa Ana Regional Water Quality Control Board (SARWQCB) developed the Water Quality Control Plan (Basin Plan) for the Santa Ana Region in 1975, with subsequent updates in 1983, 1995, 2002, and 2008 under Resolution 94-1. The Basin Plan guides conservation and enhancement of water resources and establishes beneficial uses of inland surface waters, tidal prisms, harbors, and groundwater basins within the Santa Ana Region. The Basin Plan contains both numerical and narrative water quality objectives that are intended to allow designated beneficial uses to be protected. The Basin Plan also contains an Implementation Plan that is intended to achieve the overall objectives of the Basin Plan.

Generally, in the City, dry weather pollutants of concern include bacteria, pesticides, petroleum hydrocarbons, metals, and nutrients. Wet weather pollutants of concern include bacteria, trash and debris, suspended solids, metals, nutrients, and hydrocarbons/oil and grease.

Huntington Harbour is listed in the 2006 303(d) list as impaired by chlordane, copper, lead, nickel, pathogens, PCBs, and sediment toxicity. For those pollutants contributing to impairment, Total Maximum Daily Loads (TMDLs) will be required. Proposed TMDL completion for the identified pollutants is 2019.[36]

The project must comply with Order No. R8-2002-0010 (NPDES No. CAS618030), Waste Discharge Requirements (WDRs) for the County of Orange, Orange County Flood Control District and The Incorporated Cities of Orange County Within the Santa Ana Region Areawide Urban Storm Water Runoff Orange County (Municipal NPDES Permit). Compliance will include implementation of site design, source control, and treatment Best Management Practices (BMPs), as defined in the County of Orange Drainage Area Master Plan (DAMP).

New development and significant redevelopment have been defined in the NPDES permit as the following:

- All significant re-development projects, where significant re-development is defined as the addition of 5,000 or more square feet of impervious surface on an already developed site. This includes additional buildings and/or structures, extension of existing footprint of a building, construction of parking lots, etc.
- Home subdivisions of 10 units or more. This includes single family residences, multi-family residences, condominiums, apartments, etc.
- Commercial and industrial developments of 100,000 sf or more. This includes non-residential developments such as hospitals, educational institutions (to the extent the permitees have the authority to regulate these developments), recreational facilities, mini-malls, hotels, office buildings, warehouses, and light and heavy industrial facilities.
- Automotive repair shops (with SIC codes 5013, 5014, 5541, 7532-7534, 7536-7539).
- Restaurants where the land area of development is 5,000 sf or more.

[36] Fuscoe Engineering. Letter dated October 26, 2007 Re: The Ripcurl Development Preliminary WQMP prepared for AMSTAR / Red Oak Huntington Beach, LLC.

- All hillside developments on 10,000 sf or more, which are located on areas with known erosive soil conditions or where the natural slope is twenty-five percent or more.
- Developments of 2,500 sf of impervious surface or more adjacent to (within 200 feet) or discharging directly into environmentally sensitive areas, such as areas designated in the Ocean Plan as areas of special biological significance or water bodies listed on the CWA Section 303(d) list of impaired waters.
- Parking lots of 5,000 sf or more exposed to storm water. Parking lost is defined as a land area or facility for the temporary storage of motor vehicles.

A new Draft NPDES Permit is being prepared and will likely be out for public comment by the end of July 2008. The new permit would not differ significantly from the current permit in terms of post construction BMPs, but the Regional Water Quality Control Board review and enforcement provisions would likely increase.[37]

The proposed project residential and retail (commercial) components qualify the proposed project as a Priority project, requiring a Water Quality Management Plan (WQMP). The WQMP shall include BMPs for site design, source control, pollution prevention, and/or structural treatment BMPs. For all structural treatment and source control BMPs, the WQMP shall identify the responsible party, such as a Master Residential Association and Master Commercial Association or property owner, for maintenance of the treatment system, and a funding source or sources for its operation and maintenance. The term Association refers to the responsible party for implementing the WQMP, including operations and maintenance responsibilities of structural and non-structural BMPs.

The PWQMP includes residential, retail (commercial), restaurants, and parking that serve to qualify the development as a Priority project (corresponding DAMP Table 7.II-1 priority project categories 1, 2, 4, and 7).

5.2.1 Design Criteria

Because the proposed project is a GPA/ZTA, exact stormwater quality designs and the sizing of stormwater quality BMPs will depend upon the actual development plan for the project site.

New development and significant redevelopment provides a key opportunity to incorporate new approaches that, taken collectively, can begin to make a substantial difference in water quality, and potentially water quantity, over a long period of time as more land in the City develops or redevelops. Design principles that should be considered include:

- Minimize directly connected impervious areas
- Incorporate zero discharge areas
- Include self-treatment areas
- Incorporate runoff reduction areas

Guidelines have been developed to address post-construction urban runoff and stormwater pollution from all new development and significant redevelopment projects. The goal of these guidelines is to ensure that new development and significant redevelopment do not increase

[37] Personal Communication. Marc Brown. Environmental Scientist. RWQCB. 951-321-4584, June, 10, 2008.

pollutant loads from a project site, or contribute to increased urban runoff flow rates or velocities. This goal may be achieved through practicable and enforceable site-specific project-based controls, or a combination of project-based and regional or watershed-based controls.[38]

In accordance with the NPDES permit, water quality treatment BMPs must be numerically sized:

Volume–based BMPs shall be designed to infiltrate, filter, or treat either:

1. The volume of runoff produced from a 24-hour, 85th percentile storm event, as determined from the local historical rainfall record; or,

2. The volume of annual runoff produced by the 85th percentile, 24-hour rainfall event, determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87 (1998); or,

3. The volume of annual runoff based on unit basin storage volume, to achieve 80 percent or more volume treatment by the method recommended in California Stormwater Best Management Practices Handbook—Industrial/Commercial (1993); or,

4. The volume of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile, 24-hour runoff event;

Flow-based BMPs shall be designed to infiltrate, filter, or treat either:

1. The maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour; or,

2. The maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity, as determined from the local historical rainfall record, multiplied by a factor of two; or,

3. The maximum flow rate of runoff, as determined from the local historical rainfall record that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile hourly rainfall intensity multiplied by a factor of two.

Additionally, groundwater protection is required such that any structural infiltration BMPs shall meet the following minimum requirements:

1. Use of structural infiltration treatment BMPs shall not cause or contribute to an exceedance of groundwater water quality objectives.

2. Source control and pollution prevention control BMPs shall be implemented to protect groundwater quality.

3. Structural infiltration treatment BMPs shall not cause a nuisance or pollution, as defined in Water Code Section 13050.

[38] A Cooperative Project of the County of Orange, the Cities of Orange County and the Orange County Flood Control District. Drainage Area Management Plan. Exhibit 7.II. Model Water Quality Management Plan (WQMP).

The County of Orange has prepared a template for preparing WQMPs for complying with the NPDES permit requirements, which includes sections on Site Description, Best Management Practices, and Plot Plans (http://pdsd.oc.ca.gov/documents.htm).

5.2.2 Site-Specific Stormwater Quality

The land use within the project site would be greatly altered with the proposed project compared to existing conditions; new residential, commercial, and likely open space/landscaping would replace existing vacant retail, auto service, and parking/other vacant areas. Because the proposed project is a GPA/ZTA, detailed analysis of site-specific stormwater quality conditions cannot be performed because the exact WQMP requirements and characteristics will depend upon the development plan for the area. Consequently, Section 5.2.3 lists requirements for the project Water Quality Management Plan to mitigate potential impacts of development.

The proposed project would most likely result in more trash and debris (from increased human use and landscaping), bacteria (from pet and wildlife waste associated with residential uses, landscaping, and open space areas), and landscaping chemicals (for maintenance of landscaped areas). Increased bacteria from leaking/degraded sanitary sewer systems are not likely because development of the proposed project would likely require new or improved infrastructure. Oil and grease (petroleum hydrocarbons) could increase with more active use of surface parking and traffic in the area; the project site currently has existing parking that is limited to the Existing Parking Area because the rest of the historic parking areas are currently vacant and likely not substantially used. Metals carried by stormwater may increase based on construction materials used and maintenance of impervious areas (e.g., street sweeping). Nutrients and pesticides would likely increase because of landscaping incorporated into the developed project site. The existing landscaping is not likely maintained because the commercial area is not in use; therefore, it likely contributes to little nutrients or pesticides in stormwater runoff. However, more landscaped areas and/or active maintenance of landscaping would result in more nutrients and pesticides used on the project site. Sediment (from impervious surfaces), organic compounds (from automotive fluids, pesticides, and fertilizers), and oxygen-demanding substances (from litter, biodegradable organic material, and various chemicals) may also increase with development of the proposed project. More active use of the currently vacant land and increased traffic/parking could contribute to increases in these pollutants in stormwater runoff. The amount of offsite- and aerially-deposited nutrients, metals, particulates, and suspended sediment in stormwater runoff would likely remain the same because the amount of impervious surfaces is not expected to be greatly altered.

In order to comply with the Municipal NPDES Permit conditions, water quality BMPs, in accordance with an approved WQMP, are required. Furthermore, in accordance with the NPDES permit, treatment BMPs must be numerically sized based on flow rate or flow volume as specified in Section 2.2.1 of this report. Consequently, the water quality treatment volume for the project site would be about 0.70 acre-feet[39] and the water quality treatment flow rate would be about 2.63 cfs.[40]

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[39] Basin Sizer v. 1.46 85th percentile storm for Newport Beach Harbor is 0.64 inches per acre. Assume runoff coefficient = 0.83 (Table A-139). Therefore, the amount of runoff = runoff coefficient * rainfall * area = 0.83 * 0.64 inches/12 inches per foot * 15.85 acres = 0.70 acre-feet

[40] Rainfall intensity of 0.2 inches per hour (Municipal NPDES Permit). Runoff coefficient from footnote 10. The rate of runoff = runoff coefficient * intensity * area = 0.83 * 0.2 * 15.85 acres = 2.63 cfs.

The Village at Bella Terra Conceptual Plan would also contain restaurants, surface parking, underground parking, and a spa/pool area. In the PWQMP, this development proposal uses the first numeric criteria (rainfall intensity of 0.2 inches per hour) for determining the flow rate required for a flow-based BMP for two catchments covering the majority of the project site. The northern catchment (6.9 acres) would require treatment of 1.09 cfs and the southern catchment (7.2 acres) would require treatment of 1.14 cfs using a runoff coefficient of C = 0.79. However, Table A-1 of the DAMP[41] requires a runoff coefficient of C = 0.83 for an area with 90 percent impervious surfaces, not 0.79 as used in the PWQMP.

5.2.3 Water Quality Management Plan Requirements

The proposed project's primary pollutants of concern, based on the potential for proposed project impacts, existing receiving water impairments, and general City pollutants of concern include: trash and debris, oil and grease, metals, pesticides, nutrients, sediment, pathogens, and PCBs. A WQMP must be prepared to minimize the primary pollutants of concern in stormwater runoff from the project site and to mitigate potential water quality impacts.

The PWQMP identifies organic compounds and oxygen-demanding substances in addition to the above mentioned pollutants of concern but does not include PCBs as a pollutant of concern.

Prior to obtaining a precise grading permit, the developer shall develop and implement a WQMP that shall conform with the City WQMP guidelines and template from the County of Orange DAMP, including the following minimum requirements:

5.2.3.1 Project and Site Characterization Requirements

- Entitlement Application numbers and site address shall be included on the title sheet of the WQMP.
- In the project description section, explain whether proposed uses include on-site food preparation, eating areas (if not please state), outdoor activities to be expected, vehicle maintenance, service, washing cleaning (if prohibited on site, please state), and others.
- All potential pollutants of concern for the proposed project land use type as per Table 7.II-1 of the Orange County Model Water Quality Management Plan shall be identified.
- A narrative describing how all potential pollutants of concern will be addressed through the implementation of BMPs and describing how site design BMP concepts were selected and how they will be considered and incorporated into the project design shall be included.
- Existing soil types and estimated percentages of pervious-ness for existing and proposed conditions shall be identified

[41] County of Orange. Orange County Stormwater Program Exhibit 7.II -Model Water Quality Management Plan: Table A-1 C Values Based on Impervious/Pervious Area Ratios. September 26, 2003.

- In Section I of the WQMP, state verbatim, the included mitigation measures, conditions of approval, and applicable code requirements from the Planning Department's letter to the applicant. Give the prefacing text and all related WQMP requirements in this section from both "Prior to issuance of a Precise Grading Permit…" and "Prior to Final Inspection/ Certificate of Occupancy…" portions of the aforementioned letter.

- Depending upon the potential for substantial increases in pollutant loads based on the development plan, potential pollutant loads for existing and post-construction conditions shall be estimated using the Simple Method (CWP 2000), or better water quality model, and Los Angeles County Event Mean Concentration data for land use categories (LADPW 2001). Other pollutant concentration data can be used if available, more applicable to the proposed project characteristics, and approved by the City of Huntington Beach.

- A figure showing the selected treatment BMPs and drainage areas shall be included in the WQMP.

PWQMP Compliance with Requirements

The PWQMP adequately characterizes the project site and proposed development characteristics in accordance with the DAMP requirements. In the final WQMP, Mitigation Measures, Conditions of Approval, and Code Requirements from the Planning Department must be included in the WQMP. It is not necessary that the PWQMP determine pre- and post-construction pollutant loads because the selected treatment BMPs and design characteristics would likely be sufficient to reduce potential loads to existing conditions levels or lower.

5.2.3.2 Site Design BMPs

- The development plan shall minimize directly connected impervious areas (DCIA). This can be accomplished through the direction of drainage to landscaped area, use of pervious concrete or asphalt where approved by the geotechnical engineer structural requirements of the improvements, incorporation of swales or other bioretention/biofilter areas, and minimizing the use of pavement and building footprints.

- Runoff reduction areas may be implemented where groundwater protection and vector control is ensured. However, because the project site soils have a low infiltration capacity (Hydrologic Group C) and standing water may be precluded by vector-control issues, this project design feature is not likely practicable.

- The development plan shall also minimize impervious area, maximize permeability and reduce the C-factor (runoff coefficient) of the project site.

PWQMP Compliance with Requirements

The PWQMP identifies minimization of DCIA and the runoff coefficient through use of multifamily residential housing, thereby reducing the overall footprint associated with the residential component. Additionally, roof drainage, sidewalks, and driveways would be directed

to landscaped areas, where feasible. Other landscaped areas, commercial planters, the pedestrian corridor, courtyards, park areas, and open space are used to break up areas of imperviousness.

However, the PWQMP map does not indicate that much rooftop drainage could be directed to identified landscaped areas. Most of the landscaped areas are along the western edge of the project site, and most surface flow is directed away from this area into the underground storm drain. The likely park area, shown where the existing parking area portion of the project site (eastern edge) is located, is in the upper portion of the catchment(s). This means that stormwater runoff from most of the project site would not be routed to/through this landscaped/park area; surface runoff drains away from this feature according to the PWQMP.

Additionally, the pedestrian corridor, courtyards, and other open space areas could help break up DCIA and reduce impervious area if they incorporate pervious pavement or other pervious surfaces or detention devices. There is no indication that these features would incorporate pervious pavement or other pervious surfaces. If porous pavement blocks are used, they could reduce runoff and increase infiltration, if properly maintained (C-factor reduction). However, porous pavement blocks are not truly pervious surfaces and can clog over time, reducing their effectiveness. Dry vacuum sweeping, identified in the PWQMP “Other Non-Structural BMPs” for pet waste clean-up could be used on these areas to minimize clogging if porous pavement blocks are used. These blocks would contribute to a C-factor reduction, but would not reduce the amount of DCIA. Use of porous concrete or asphalt are pervious surfaces and would contribute to reducing the DCIA and C-factor, but must be suited to their structural requirements and be approved by the Geotechnical Engineer.

The PWQMP also indicates that “zero discharge” areas would be incorporated into the site design, however, none are identified in the following text description. Planter boxes and bioretention areas could be used for “zero discharge” depending upon their design characteristics. Because of the potentially high groundwater table (within 5 feet of the surface), they may not be feasible or very effective as zero discharge areas.

5.2.3.3 Routine Non-Structural BMPs—DAMP Requirements

- Education for Property Owners, Tenants and Occupants—For developments with Property Owners Association (POA), both residential and commercial, project conditions of approval will require that the POA provide environmental awareness education materials, made available by the municipalities, to all members periodically. Among other things, these materials will describe the use of chemicals (including household type) that should be limited to the property, with no discharge of wastes via hosing or other direct discharge to gutters, catch basins, and storm drains.

- Activity Restrictions—Conditions, covenants and restrictions (CCRs) shall be prepared by the developer for the purpose of surface water quality protection. Use restrictions may be developed by a building operator through lease terms, and others. These restrictions must be included in the Project WQMP and the Project WQMP must be included in the CCRs.

- Common Area Landscape Management - on-going maintenance shall be consistent with County Water Conservation Resolution and the City of Huntington Beach Water Ordinance, and per the City Arboricultural and Landscape Standards and Specifications

plus fertilizer and/or pesticide usage consistent with Management Guidelines for Use of Fertilizers (DAMP Section 5.5) is required. Statements regarding the specific applicable guidelines shall be included in the Project WQMP.

- BMP Maintenance—Identify responsibility for implementation of each non-structural BMP and scheduled cleaning and/or maintenance of all structural BMP facilities.

- Title 22 California Code of Regulations Compliance—Compliance with Title 22 of the California Code of Regulations and relevant sections of the California Health & Safety Code regarding hazardous waste management shall be enforced by County Environmental Health on behalf of the State. The Project WQMP must describe how the development will comply with the applicable hazardous waste management section(s) of Title 22.

- Local Water Quality Permit Compliance—The City of Huntington Beach, under the Water Quality Ordinance, may issue permits to ensure clean stormwater discharges from fuel dispensing areas and other areas of concern to public properties.

- Spill Contingency Plan—Prepared by building operator for use by specified types of building or suite occupancies and which mandates stockpiling of cleanup materials, notification of responsible agencies, disposal of cleanup materials, documentation, and others.

- Underground Storage Tank Compliance—Compliance with State regulations dealing with underground storage tanks, enforced by County Environmental Health on behalf of State.

- Hazardous Materials Disclosure Compliance—Compliance with City of Huntington Beach ordinances typically enforced by respective fire protection agency for the management of hazardous materials. The Orange County, health care agencies, and/or other appropriate agencies (i.e. Department of Toxics Substances Control) are typically responsible for enforcing hazardous materials and hazardous waste handling and disposal regulations.

- Uniform Fire Code Implementation—Compliance with Article 80 of the Uniform Fire Code enforced by fire protection agency.

- Common Area Litter Control—For industrial/commercial developments and for developments with POA(s), both residential and commercial, the owner/POA shall be required to implement trash management and litter control procedures in the common areas aimed at reducing pollution of drainage water. The owner/POA may contract with their landscape maintenance firms to provide this service during regularly scheduled maintenance, which should consist of litter patrol, emptying of trash receptacles in common areas, and noting trash disposal violations by tenants/homeowners or businesses and reporting the violations to the owner/POA for investigation.

- Employee Training—Education program described above as it would apply to future employees of individual businesses. Developer either prepares manual(s) for initial purchasers of business site or for development that is constructed for an unspecified use

makes a commitment on behalf of POA. Education programs shall be updated and enhanced by future business owners new to the site.

- Housekeeping of Loading Docks—Loading docks typically found at large retail and warehouse-type commercial and industrial facilities shall be kept in a clean and orderly condition through a regular program of sweeping and litter control and immediate cleanup of spills and broken containers. Cleanup procedures should minimize or eliminate the use of water. If wash down water is used, it must be disposed of in an approved manner and not discharged to the storm drain system. If there are no other alternatives, discharge of non-stormwater flow to the sanitary sewer may be considered only if allowed by the local sewerage agency through a permitted connection.

- Common Area Catch Basin Inspection—For industrial/commercial developments and for developments with privately maintained drainage systems, the owner is required to have at least 80 percent of drainage facilities inspected, cleaned and maintained on an annual basis with 100 percent of the facilities included in a two-year period. Cleaning should take place in the late summer/early fall prior to the start of the rainy season. Drainage facilities include catch basins (storm drain inlets) detention basins, retention basins, sediment basins, open drainage channels and lift stations.

- Street Sweeping Private Streets and Parking Lots—Streets and parking lots are required to be swept in late summer or early fall prior to the start of the rainy season.

- Commercial Vehicle Washing—This BMP Has Been Removed.

- Retail Gasoline Outlets—Retail gasoline outlets (RGOs) are required to follow operations and maintenance best management practices shown in the California Stormwater Quality Association (CASQA, formerly California Stormwater Quality Task Force) Best Management Practice Guide for Retail Gasoline Outlets.

PWQMP Compliance with Requirements

The PWQMP includes Homeowner/Tenant Education, Activity Restrictions, Common Area Landscape Management, BMP Maintenance, Title 22 California Code of Regulations Compliance, Spill Contingency Plan, Hazardous Materials Disclosure Compliance, Uniform Fire Code Implementation, Common Area Litter Control, Employee Training, Housekeeping of Loading Docks, Common Area Catch Basin Inspection, Street Sweeping Private Streets and Parking Lots, and Commercial Vehicle Washing BMPs. Detailed BMP fact sheets have been provided for building maintenance, landscape maintenance, parking and storage area maintenance, pool and fountain cleaning, spill prevention and cleanup, eating and drinking establishments, and fire sprinkler testing/maintenance. Educational information for pet waste disposal is provided, and general fact sheet for site design and landscape planning, efficient irrigation, storm drain signage, maintenance bays and docks, trash storage areas, vehicle washing areas, and media filter treatment BMPs have also been provided.

The PWQMP identified that a Master Residential Association (MRA) and Master Commercial Association (MCA) would be formed to manage common areas and implement and maintain BMPs, which would serve as appropriate responsible parties (Association) for ensuring implementation of the WQMP including operations and maintenance of structural and non-structural BMPs. The Association would be provided with environmental awareness educational

materials and they would ensure that all homeowners and commercial tenants receive a copy of the recorded Conditions, Covenants, and Restrictions (CCRs). The Association would also establish requirements for implementation of a community awareness program to inform home buyers and business owners of the impacts of dumping oil, paints, solvents, or other potentially harmful chemicals into the storm drain; the proper use and management of fertilizer and pesticides; and the impacts of littering and improper watering. An annual employee training/education program would be established by the developer and Property Management Corporation. The Association would be responsible for employees engaged in maintenance activities.

The PWQMP also requires that the developer develop CCRs for activity restrictions including nuisances, parking and vehicular restrictions, animal regulations, drainage, and pollution control. Draft residential CCRs are included in the PWQMP and commercial CCRs would be included when they become available. The CCRs would also identify the Association as the responsible party for implementation of each non-structural BMP, and inspection scheduling and maintenance cleaning of all applicable structural BMPs.

Deficiencies:

- In accordance with DAMP requirements, the CCRs must also describe chemicals that would be limited to the property with no discharge of wastes to the storm drain system, and

- The developer must also prepare a training/education manual for known commercial uses or make the commitment for a future, unspecified business owner to prepare one that can be incorporated into the WQMP for the project site.

- The WQMP must be included in the CCRs for the Association, and must be updated as needed to conform with current regulatory requirements.

In the PWQMP, management programs for landscape and common areas would be established by the Association and would include mitigation for pesticide and fertilizer uses. Ongoing maintenance would be consistent with the City of Huntington Beach Water Efficient Landscape Requirements and County Water Conservation Resolution, although no details have been provided. A landscape maintenance contractor would be responsible for inspection and maintenance activities in the landscape areas.

Deficiencies:

- However, the DAMP requires a statement regarding specific applicable guidelines that has not been included in the PWQMP.

- Additionally, the landscape management program must be in compliance with the City of Huntington Beach Arboricultural and Landscape Standards and Specifications. Compliance with the City of Huntington Beach Arboricultural and Landscape Standards and Specifications is noted in the PWQMP project description section, but must also be included in the BMP text.

- In accordance with the City of Huntington Beach, the Association shall have the power and duty to establish, oversee, guide, and require proper maintenance and tree trimming

procedures per the ANSI A-300 Standards as established by the International Society of Arborist. However, the Association shall also require that all trees be trimmed by or under the direct observation/direction of a licensed/certified Arborist, for the entire project site. The Association shall establish minimum standards for maintenance for the total community, and establish enforcement thereof for the total community. The Association shall also rectify problems arising from incorrect tree trimming, chemical applications, and other maintenance within the total community.

- Furthermore, the Association shall dictate minimum landscape maintenance standards and tree trimming requirements for the total project site. Landscape maintenance must be performed by a qualified landscape maintenance company or individual in accordance with a Chemical Management Plan detailing chemical application methods, chemical handling procedures, and worker training. Pesticide application shall be performed by a certified applicator. No chemicals shall be stored on-site unless in a covered and contained area and in accordance with an approved Materials Management Plan. Application rates shall not exceed labeled rates for pesticides, and shall not exceed soil test rates for nutrients. Slow release fertilizers shall be used to prevent excessive nutrients in runoff or irrigation waters.

The PWQMP identifies responsibility for implementation of each non-structural BMP and scheduled cleaning and/or maintenance of all structural BMP facilities. A maintenance contractor, under the management of the Association, would control, contain, and dispose of debris and other water pollutants in a proper manner. The maintenance contractor would also be responsible for weekly sweeping and trash pick-up within the project site. The maintenance contractor would also conduct daily inspection of trash and pick up improperly disposed debris. Common area catch basins would be maintained by the developer until responsibility is passed over to the Association. Maintenance would be done on twice a year and prior to the storm season each year. All private storm drains in the common area would be owned and maintained by the Association. Project site streets would be vacuum swept on a weekly basis by the developer or their contractor until management is turned over the Association. Sweeping would occur on a more frequent basis prior to the beginning of the rainy season.

- These BMPs meet the DAMP requirements. Weekly vacuum sweeping is an effective source control BMP.

Deficiencies:

- However, the maintenance responsibilities and schedules should include a description of what “regularly” means and any responsibilities that are not directly Association responsibilities must be identified and confirmed.

- A Maintenance Plan must be developed by the Association to ensure that “proper manner” of disposal and maintenance duties and “regular” inspection and maintenance are explicitly defined.

- Additionally, the WQMP shall address parking garage maintenance. In the Structural BMPs section, a oil/water separator is indicated for treatment of nuisance flows prior to discharge to the sanitary sewer system. Acceptability by OCSD must be confirmed. Additionally, the WQMP shall address how the floors will be cleaned/maintained and

how seepage and runoff water that might enter through the doorways during a rain event will be treated and disposed of.

The PWQMP states that a spill contingency plan would be prepared by the Association for proposed pool areas including notification to responsible agencies, disposal of cleanup materials, documentation, and others as noted in the included BMP fact sheet.

Deficiencies:

- In accordance with the DAMP, the spill contingency plan must also include how it would apply with the applicable hazardous waste and materials management section of Title 22.

In the PWQMP, it is noted that all hazardous materials would be contained in spill proof containers that are locked in protective storage areas. These areas would be covered and all required signage in place. All onsite facilities that generate, store, or dispose of hazardous materials would also be required to be compliant with Article 80 of the Uniform Fire Code enforced by the local fire protection agency.

Deficiencies:

- However, the project description states that there will be no material storage on-site. This needs to be reconciled.

- Additionally, there is no mention of disposal and use management practices. If hazardous materials would be stored on-site, the Association must prepare a Hazardous Materials and Waste Management Plan identifying the correct procedures for proper handling, use, storage, and disposal of any hazardous materials stored on-site.

In accordance with the PWQMP, loading docks would be kept clean of trash, liter and debris at all times and minimal water would be used for cleaning. Spills and broken containers would be cleaned up immediately. If wash-down water is used, rinse water would be disposed of in an approved manner and not discharged to the storm drain system. Discharge to the sanitary sewer system would be allowed if authorized by the Orange County Sanitation District.

Deficiencies:

- However, if disposal to sanitary sewer system is not allowed, there is no contingency mentioned in the PWQMP.

- The Association must prepare and implement a Management Plan that clearly defines what the “approved” or “proper” manner is for disposal of all wastes, including wash-water. This shall include an agreement for sanitary sewer disposal from the sewerage authority of wash-water or another, approved disposal method.

The PWQMP states that no commercial vehicle washing would occur on-site and no underground storage tanks are proposed and therefore, these BMPs are not applicable, which is in accordance with the DAMP requirements. However, there could be a community car wash facility ultimately proposed. Compliance with DAMP requirements for this facility will be addressed in Section 5.2.3.4—Routine Structural BMPs—DAMP Requirements.

Additional PWQMP Non-Structural BMPs:

Building maintenance—As part of the development's ongoing maintenance program, facility maintenance personnel would properly collect and dispose of wash water when washing buildings, rooftops, and other large objects. No wash water would be allowed to drain to the storm drain system. All wash water would be directed to the sanitary sewer or disposed of offsite at a wastewater recycling facility. Work areas would be prepared before conducting building maintenance and all materials generated and used would be properly disposed of.

Deficiencies:

- However, if disposal to sanitary sewer system is not allowed, there is no contingency mentioned in the PWQMP.

- The Association must prepare and implement a Management Plan that clearly defines what the "approved" or "proper" manner is for disposal of all wastes, including wash-water. This shall include an agreement for sanitary sewer disposal from the sewerage authority of wash-water or another, approved disposal method.

The parking lot would be inspected daily and cleaned on a bi-weekly basis or as necessary. All wash water would be properly contained, collected, and disposed of. No wash water would be allowed to drain to the storm drain system. Use of absorbent materials to clean up vehicle related spills and leaks would be removed and disposed of off-site.

Deficiencies:

- The Association must prepare and implement a Management Plan that clearly defines what the "approved" or "proper" manner is for disposal of all wastes, including wash-water. This shall include an agreement for sanitary sewer disposal from the sewerage authority of wash-water or another, approved disposal method.

- The WQMP or Management Plan must state how wash water would be prevented from reaching the storm drain system, or areas of porous or pervious pavement.

Gardening wastes would be properly stored, disposed of, and/or recycled. Irrigation runoff would be properly handled and over-watering prevented. All fertilizers, mulch, and pesticides would be used sparingly and stored properly, if allowed onsite, and disposed of properly.

Deficiencies:

- See above for management programs for landscape and common areas requirements.

- If overwatering is prevented, then there should be no irrigation runoff. The WQMP should reconcile this.

Regular cleaning of the pool and adequate chlorine to control algae would be required. Additionally, pool filters would be cleaned and inspected regularly. Pool water would be properly discharged to the sanitary sewer system. Prior to draining, the local wastewater treatment facility would be notified to ensure that they are aware of the volume of discharge and the potential effects of chlorine. Diatomaceous earth used in pool filters would not be disposed of in

surface waters, on the ground, or into the storm drain system. Pool filter material would be dried out as much as possible, bagged in plastic, and disposed of at an approved offsite landfill.

Deficiencies:

- The Association must prepare and implement a Management Plan that clearly defines what the "approved" or "proper" manner is for disposal of all wastes, including wash-water. This shall include and agreement for sanitary sewer disposal of pool water from the sewerage authority or another, approved disposal method.

- Or, pool maintenance shall be provided by a licensed and bonded pool contractor and shall comply with a Wastewater Management Plan to prevent discharge of pool water to the storm drain system, Spill Prevention and Clean-up Plan, and adequate worker training to ensure proper handling of chemicals and wastewater to prevent contamination of the storm drain system.

Testing of fire sprinklers would be conducted on non-rainy days and for the shortest duration necessary to minimize discharge volume. All flow paths would be inspected and debris removed as necessary. Flows would be directed towards landscaped areas, whenever possible, in a manner that is safe and would not cause erosion. Sprinklers would also be directed into the sanitary sewer system with permission from the appropriate sewer authority.

Deficiencies:

- The WQMP should also coordinate sprinkler testing with street sweeping such that streets would be cleaned of sediment as well as gross debris.

Common areas would be inspected daily for pet waste. Waste would be removed of and disposed of into trash receptacles. Sweeping would be used to clean the area; areas would not be washed unless necessary. If washing is required, water would be directed to infiltrate in landscaped areas. Wash water would not be allowed to drain to the storm drain system. Violations would be reported to the Association. "Mutt mitts", or the equivalent, would be provided in areas where pets are allowed.

Deficiencies:

- There are many areas identified on the PWQMP Site Exhibit where landscaping would not necessarily be close enough to receive wash water. Alternative strategies to prevent discharge to the storm drain system for these areas shall be addressed in the WQMP.

- Additionally, pet waste stations, including a waste receptacles and pick up material shall be installed.

5.2.3.4 Routine Structural BMPs—DAMP Requirements

- Provide Storm Drain System Stenciling and Signage—Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language and/or graphical icons to discourage illegal dumping; 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; maintain legibility of stencils and signs.

- Design Outdoor Hazardous Material Storage Areas To Reduce Pollutant Introduction - Hazardous materials with the potential to contaminate urban runoff shall either be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the municipal storm drain system; or (2) protected by secondary containment structures (not double wall containers) such as berms, dikes, or curbs; the storage area shall be paved and sufficiently impervious to contain leaks and spills; the storage area shall have a roof or awning to minimize direct precipitation and collection of stormwater within the secondary containment area; any stormwater retained within the containment structure must not be discharged to the street or storm drain system; location(s) of installations of where these preventative measures will be employed must be included on the map or plans identifying BMPs.

- Design Trash Storage Areas To Reduce Pollutant Introduction—All trash container areas shall meet the following requirements: paved with an impervious surface, designed not to allow runon from adjoining areas, designed to divert drainage from adjoining roofs and pavements diverted around the area, screened or walled to prevent off-site transport of trash; provide attached lids on all trash containers that exclude rain, or roof or awning to minimize direct precipitation; and connection of trash area drains to the municipal storm drain system is prohibited.

- Use Efficient Irrigation Systems and Landscape Design—Projects shall design the timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the municipal storm drain system. The following methods to reduce excessive irrigation runoff shall be considered, and incorporated on common areas of development and other areas where determined applicable and feasible by the City of Huntington Beach: employing rain shutoff devices to prevent irrigation after precipitation; designing irrigation systems to each landscape area's specific water requirements; using flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines; implementing landscape plan consistent with County Water Conservation Resolution or city equivalent, which may include provision of water sensors, programmable irrigation times (for short cycles), and others; the timing and application methods of irrigation water shall be designed to minimize the runoff of excess irrigation water into the municipal storm drain system; employing other comparable, equally effective, methods to reduce irrigation water runoff; group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species).

- Protect Slopes and Channels—Project plans shall include Source Control BMPs to decrease the potential for erosion of slopes and/or channels, consistent with local codes and ordinances and with the approval of all agencies with jurisdiction, e.g., the U.S. Army Corps of Engineers, the Regional Boards and the California Department of Fish and Game.

- Loading Dock Areas—Loading/unloading dock areas shall include the following: cover loading dock areas, or design drainage to preclude urban runon and runoff; direct connections to the municipal storm drain system from below grade loading docks (truck

wells) or similar structures are prohibited. Stormwater can be discharged through a permitted connection to the storm drain system with a Treatment Control BMP applicable to the use; other comparable and equally effective features that prevent unpermitted discharges to the municipal storm drain system.

- Maintenance Bays—Maintenance bays shall include the following: repair/maintenance bays shall be indoors; or, designed to preclude urban runon and runoff; design a repair/maintenance bay drainage system to capture all wash water, leaks and spills. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around repair bays to prevent spilled materials and wash-down waters from entering the storm drain system. Connect drains to a sump for collection and disposal. Discharge from the repair/maintenance bays to the municipal storm drain system is prohibited. If there are no other alternatives, discharge of non-stormwater flow to the sanitary sewer may be considered, but only when allowed by the local sewering agency through permitted connection; other comparable and equally effective features that prevent discharges to the municipal storm drain system.

- Vehicle Wash Areas—Projects that include areas for washing/steam cleaning of vehicles shall use the following: self-contained or covered with a roof or overhang; equipped with a wash racks constructed in accordance with the guidelines in Attachment C, and with the prior approval of the sewering agency (Note: Discharge monitoring may be required by the sewering agency; equipped with a clarifier or other pretreatment facility; other comparable and equally effective features that prevent unpermitted discharges, to the municipal storm drain system.

- Outdoor Processing Areas—Outdoor process equipment operations, such as rock grinding or crushing, painting or coating, grinding or sanding, degreasing or parts cleaning, landfills, waste piles, and wastewater and solid waste handling, treatment, and disposal, and other operations determined to be a potential threat to water quality by the City of Huntington Beach shall adhere to the following requirements: cover or enclose areas that would be the sources of pollutants; or, slope the area toward a sump that will provide infiltration or evaporation with no discharge; or, if there are no other alternatives, discharge of non-stormwater flow to the sanitary sewer may be considered only when allowed by the local sewering agency through permitted; grade or berm area to prevent run-on from surrounding areas; installation of storm drains in areas of equipment repair is prohibited; other comparable or equally effective features that prevent unpermitted discharges to the municipal storm drain system; where wet material processing occurs (e.g. electroplating), secondary containment structures (not double wall containers) shall be provided to hold spills resulting from accidents, leaking tanks or equipment, or any other unplanned releases (Note: If these are plumbed to the sanitary sewer, the structures and plumbing shall be in accordance with Section 7.II-Attachment C, and with the prior approval of the sewering agency). See also Section 7.II-3.4.2, N10. Design of secondary containment structures shall be consistent with Design of Outdoor Material Storage Areas To Reduce Pollutant Introduction. Some of these land uses (e.g. landfills, waste piles, wastewater and solid waste handling, treatment and disposal) may be subject to other permits including Phase I Industrial Permits that may require additional BMPs.

- Equipment Wash Areas—Outdoor equipment/accessory washing and steam cleaning activities shall use the following: be self-contained or covered with a roof or overhang;

design an equipment wash area drainage system to capture all wash water. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around equipment wash areas to prevent wash-down waters from entering the storm drain system. Connect drains to a sump for collection and disposal. Discharge from equipment wash areas to the municipal storm drain system is prohibited. If there are no other alternatives, discharge of non-stormwater flow to the sanitary sewer may be considered, but only when allowed by the local sewering agency through a permitted connection; other comparable or equally effective features that prevent unpermitted discharges to the municipal storm drain system.

- Fueling Areas-Fuel dispensing areas shall contain the following: at a minimum, the fuel dispensing area must 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; the fuel dispensing area shall be paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete shall be prohibited; the fuel dispensing area shall have an appropriate slope (2–4 percent) to prevent ponding, and must be separated from the rest of the site by a grade break that prevents runon of stormwater; an overhanging roof structure or canopy shall be provided. The cover's minimum dimensions must be equal to or greater than the area of the fuel dispensing area in #1 above. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across the fueling area. The fueling area shall drain to the project's Treatment Control BMP(s) prior to discharging to the municipal storm drain system.

- Wash Water Controls For Food Preparation Areas—Food establishments (per State Health & Safety Code 27520) shall have either contained areas or sinks, each with sanitary sewer connections for disposal of wash waters containing kitchen and food wastes. If located outside, the contained areas or sinks shall also be structurally covered to prevent entry of stormwater. Adequate signs shall be provided and appropriately placed stating the prohibition of discharging wash water to the storm drain system.

- Community Car Wash Racks—In complexes larger than 100 dwelling units where car washing is allowed, a designated car wash area that does not drain to a storm drain system shall be provided for common usage. Wash waters from this area may be directed to the sanitary sewer (in accordance with Attachment C, and with the prior approval of the sewering agency); to an engineered infiltration system; or to an equally effective alternative. Pre-treatment may also be required. Signage shall be provided prohibiting discharges of washwater outside of the designated area.

PWQMP Compliance with Requirements

In accordance with the PWQMP, all common area landscaping would be designed with similar planting materials with similar water requirements to reduce excess irrigation runoff and promote surface filtration. Water efficient irrigation, in accordance with the City of Huntington Beach Water Efficient Landscape Requirements and the Orange County Water Conservation Resolution would be employed using, but not limited to, water sensors, programmable irrigation times, and others.

- The use of similar planting materials is in compliance with the DAMP.

Deficiencies:

- However, the use of drought-tolerant planting materials has not been specified but will be required. This shall be implemented to the maximum extent practicable.

- The project description notes that landscape management would also be in accordance with the City of Huntington Beach Arboricultural and Landscape Standards and Specifications, but this is not listed in the text description of BMPs. This discrepancy must be reconciled.

- Additionally, in compliance with the DAMP, the WQMP must include consideration of rain shut-off devices, pressure drop flow reducers/shut-off valves, timing and application to minimize runoff, and low irrigation requirement plantings.

The PWQMP states that catch basins would include signage and the Association would routinely inspect (twice yearly) and re-label the private catch basins as necessary. Public catch basins would also be inspected and maintained until the City of Huntington Beach accepts maintenance responsibilities.

In accordance with the PWQMP, loading dock areas would be covered and drainage designed to prevent runon and runoff. Runoff would not be allowed to enter the storm drain systems. Dock areas would be kept clean in accordance with the non-structural BMPs. Trash enclosures would be provided in designated areas. The enclosures would be covered to prevent contact with wind and rain. The areas would also be designed to prevent run-on and drainage from the area and would not be allowed to drain to the storm drain system. Waste areas would be inspected daily by the Association in accordance with non-structural BMPs.

Deficiencies:

- There is no information provided regarding where any runoff from these areas would be discharged to or how it would be treated. This must be included.

- In accordance with the City requirements, roofs or awnings to minimize direct precipitation on trash containers would be required. Attached lids on all trash containers that exclude rain would not be accepted.

- Locations of these facilities must be included on the WQMP site plan.

This section of the PWQMP states that no commercial or private vehicle washing would be allowed on site.

Deficiencies:

- However, In the Non-Structural BMPs section and project description, the PWQMP states that there would be on-site vehicle wash areas for residential uses. The project description states that the community car wash areas would not drain to the storm drain system, but would be directed to the sanitary sewer system or to an engineered infiltration system, or equally effective alternative as approved by the City Engineer.

- Additionally, the DAMP requires on-site vehicle wash areas for residential areas with more than 100 units.

- The on-site vehicle wash system must be included in this section of the WQMP.

Additionally, this section of the PWQMP and the project description state that there would be no hazardous materials stored on site.

Deficiencies:

- However, the Non-Structural BMPs section states that there would be on-site hazardous material storage. The on-site storage of hazardous materials must be made consistent between sections.

- Protective storage areas must be paved in accordance with the DAMP and would be covered and locked in accordance with the Non-Structural BMPs section of this PWQMP.

- No discharge shall be allowed to the storm drain system for compliance with the DAMP

- No locations have yet been identified for compliance with the DAMP.

In accordance with the PWQMP, good house keeping practices would be used in the kitchen food preparation area. All wash water of the kitchen area would be kept indoors and prevented from reaching storm drains. Wash water would be directed into the sanitary sewer system. All grease, oil, and trash materials would be recycled or disposed of properly. Additionally, grease interceptors would be required in all restaurant and food services establishments. Outdoor eating areas would be swept or vacuumed on a daily basis. Pavement areas, including 'drive-through' areas, parking lots, sidewalks, and dumpster storage areas would be dry swept frequently. All outside areas would be kept free of trash and debris.

Deficiencies:

- Signage prohibiting discharge of wash water to the storm drain system is also required for compliance with the DAMP.

- In accordance with the PWQMP, grease interceptors would be inspected to ensure correct operation. However, there is no indication how often this would occur, or what maintenance would be required in the event of failure (e.g., clean-out, replacement, other). The Management Plan shall also include the grease interceptor inspection schedule and maintenance practices.

No outdoor processing areas, maintenance bays, equipment wash areas, or fueling areas are proposed, and therefore, these BMPs are not required.

Additional PWQMP Source Control BMPs

- Storage of any pool chemicals shall be located off-site to prevent potential spills and transport in stormwater runoff or in accordance with the DAMP BMPs for hazardous materials storage.

- The proposed project shall not use zinc or copper downspouts for roof drains to reduce metals in rooftop runoff.

- All exposed metal surfaces shall be painted to prevent metal corrosion and transport of metals in stormwater runoff

- Existing PCB-containing transformers shall be removed and new/replacement transformers shall not contain PCBs. Potentially PCB-contaminated soil and pavement shall be removed and disposed of at an approved facility in accordance with the Construction Hazardous Waste and Materials Management Plan.

PWQMP Compliance with Requirements

Deficiencies:

- The WQMP shall comply with the above listed additional source control BMPs to reduce potential pollutants of concern in stormwater runoff, including bacteria/pathogens, oxygen-demanding substances, metals, and PCBs.

5.2.3.5 Structural Treatment BMPs

- Infiltration-type BMPs would not be suitable or feasible for the project site because, as mentioned above, the project site soils have a slow infiltration rate and shallow depth to seasonal high groundwater.

- Dry and wet surface detention basins and constructed wetlands are not recommended for the project site because of the amount of area required for treatment and potential impacts to shallow groundwater. Additionally, wet detention basins would require approval by the vector control agency.

- Structural treatment BMPs shall be sited, designed, and implemented in accordance with the NPDES permit numeric design criteria and guidelines identified in the DAMP, City of Huntington Beach guidelines, California Stormwater Quality Association BMP Handbooks (2003), or other City-accepted design standards. If proprietary devices are used, they shall be sited and designed also in compliance with the manufacturers design criteria.

- If the proposed project may increase the mean annual load of a particular pollutant of concern, BMPs must be implemented to reduce pollutant loads to at least the existing conditions levels.

- Wet swales and grassed channels are not recommended because of the slow infiltration rates of project site soils.

- A dry swale treatment system could be used if sufficient area, slope gradient, and length of swale could be incorporated into the project design. Dry swales are distinguished from a simple drainage/grassed channel by the addition of carefully selected, highly permeable soil (usually sandy loam soils), check dams, and an underdrain system. These design features ensure that infiltration of stormwater will not depend only on the

infiltration rate of the existing natural soils. Only in special circumstances where natural soil and groundwater conditions consistently provide high infiltration will a traditional drainage/grassed channel design provide the same water quality benefits as a dry swale design. The underdrain outlet can be configured to allow for complete drainage within a certain time-frame to prevent stagnant water and provide for some stormwater detention. Dry swales would remove 65 percent of total phosphorus (TP), 50 percent of total nitrogen (TN), 80 to 90 percent total suspended solids (TSS) removal, and between 80 and 90 percent of metals. In addition, these swales designs should effectively remove petroleum hydrocarbons based on the performance reported for grass channels (FHWA n.d.).

- Use of proprietary treatment devices must be effective for removal of the pollutants of concern for which they are targeted as a part of the entire suite of BMPs included in the WQMP.

  The StormFilter™, using a ZPG media, was found to remove 46 percent of total suspended solids, 38 percent of total phosphorous, and 6 percent of dissolved phosphorous (RWMWD 2006). A full StormFilter™ system (a more extensive system than the Flume Filter including an inlet bay, flow spreader, cartridge bay, overflow baffle, and outlet bay, housed in a 12 foot by 6 foot pre-cast concrete vault using ZPG media) resulted in a load reduction of 46 percent for total suspended solids, 92 percent for total solids, 38 percent for total phosphorous, 6 percent for dissolved phosphorous, 85 percent for total magnesium, 79 percent for total calcium, 59 percent for total copper, 16 percent for dissolved copper, 64 percent for total lead, 64 percent for total zinc, 17 percent for dissolved zinc, and 16 percent for chemical oxygen demanding substances. Removals for total dissolved solids and dissolved chlorides were artifacted by salting roads for ice removal and were both over 150 percent removal (e.g., more than 150 percent net increase in load) (USEPA 2004).

- Use of pervious asphalt or concrete should be used to the maximum extent practicable (where approved by the Geotechnical engineer). This will reduce pollutants in stormwater runoff as well as provide some detention within the material void space. If porous paver blocks are used, they must be adequately maintained to provide continued porosity (effectiveness).

- Directing roof top runoff to landscapes areas would contribute somewhat to reducing pollutants in stormwater runoff. Additionally, unless biofiltration or bioretention is used as part of the landscaping that would receive roof-top runoff, there may not be sufficient retention of stormwater (not wide enough or long enough to allow for much water quality treatment.

  Filter strips effectiveness in pollutant removal depends on the width/length of the filter strip. An 18 foot travel length can provide 27 percent removal of total suspended solids, 22 percent removal of total phosphorous, 6 percent removal of nitrate, 2 percent removal of lead, and 17 percent removal of zinc (FHWA n.d.b). A travel length of 50 feet increases removal effectiveness to 67 percent of total suspended solids, 22 percent of total phosphorous, 8 percent of nitrate, 18 percent of lead, and 46 percent removal of zinc (FHWA n.d.b). Design considerations include sheet flow along the filter strip and no more than 75 feet of travel along the impervious area draining into the filter strip

(FHWA n.d.b). A 580 foot width with 75 foot travel length would be required to manage 1 acre of impervious surface (FWHA n.d.b).

Other filter options should be explored to treat rooftop runoff, e.g., downspout filters or proprietary filter systems with published effectiveness.

PWQMP Compliance with Requirements

The PWQMP intends to implement StormFilters™ to treat the water quality flow rate from the majority of the project site.

Deficiencies:

- However, the PWQMP development plan indicates that some project site flows would not be treated by the StormFilter™: a portion of the northwest corner of the project site, the southeast corner of the project site, the west edge local road, and potentially portions of Block 2 and the existing parking area.

- The StormFilter™ flow rate was designed using a runoff coefficient of 0.79, which is lower than the runoff coefficient for an area that is 90 percent impervious surfaces (0.83).[42] Consequently, these units may be undersized to treat runoff from the project site.

In accordance with the PWQMP, nuisance/non-stormwater flow from the underground parking structure would not be allowed to drain to the storm drain system, but rather, would be treated with an oil/water separator prior to discharge to the sanitary sewer. Sump pumps would be used to remove runoff from the underground parking areas.

Deficiencies:

- The WQMP must ensure that discharge to the sanitary sewer system is acceptable after treatment with an oil/water separator.

- The WQMP shall also address how seepage and incidental runoff waters would be treated and disposed of.

5.2.3.6 Operations and Maintenance BMPs

An Association shall be formed as previously stated in Section 5.2.3.3—Routine Non-Structural BMPs—DAMP Requirements and shall fund and implement operations and maintenance BMPs that include:

- The Association shall dictate minimum landscape maintenance standards and tree trimming requirements for the total project site. Landscape maintenance must be performed by a qualified landscape maintenance company or individual in accordance with a Chemical Management Plan detailing chemical application methods, chemical

42 County of Orange Environmental Management Agency. 1986. Orange County Hydrology Manual. October, 1986; with a soil Hydrologic Group of C and rainfall intensity of 0.2 inches per hour.

handling procedures, and worker training. Pesticide application shall be performed by a certified applicator. No chemicals shall be stored on-site unless in a covered and contained area and in accordance with an approved Materials Management Plan. Application rates shall not exceed labeled rates for pesticides, and shall not exceed soil test rates for nutrients. Slow release fertilizers shall be used to prevent excessive nutrients in runoff or irrigation waters.

The Association shall have the power and duty to establish, oversee, guide, and require proper maintenance and tree trimming procedures per the ANSI A-300 Standards as established by the International Society of Arborist. The Association shall require that all trees be trimmed by or under the direct observation/direction of a licensed/certified Arborist, for the entire GPA/ZTA project site. The Association shall establish minimum standards for maintenance for the total community, and establish enforcement thereof for the total community. The Association shall rectify problems arising from incorrect tree trimming, chemical applications and other maintenance within the total community.

- Landscape irrigation shall be performed in accordance with an Irrigation Management Plan to minimize excess irrigation contributing to dry- and wet-weather runoff. If automated sprinklers are used, they shall be inspected at least quarterly and adjusted yearly to minimize potential excess irrigation flows. Landscape irrigation maintenance shall be performed in accordance with the approved irrigation plans, the City Water Ordinance, and per the City Arboricultural and Landscape Standards and Specifications.

- Pool maintenance shall be provided by a licensed and bonded pool contractor and shall comply with a Wastewater Management Plan to prevent discharge of pool water to the storm drain system, Spill Prevention and Clean-up Plan, and adequate worker training to ensure proper handling of chemicals and wastewater to prevent contamination of the storm drain system.

- BMP Operations and Maintenance: A BMP Operations and Maintenance Plan/Program shall be prepared including inspection, clean-out, repair, and replacement scheduling/practices. The Association shall hire a qualified contractor to perform BMP maintenance.

- Maintenance of any proprietary treatment devices shall be in accordance with the manufacturer's recommended maintenance plan of cleaning, debris removal, filter media replacement (where applicable). Filter media material shall be disposed of at an appropriate facility for handling petroleum hydrocarbons and metals (if used).

- Maintenance of non-proprietary treatment shall be in accordance with DAMP, City of Huntington Beach, and/or California Stormwater Quality Association BMP Handbooks (2003).

- Pet waste stations will be checked weakly by the maintenance crew and bags replaced as needed as part of the regular maintenance duties including sweeping and trash pickup

- Signage, enforcement of pet waste controls, and public education would improve use and compliance, and therefore, effectiveness of this BMP. The Association shall prepare

and install appropriate signage, disseminate information to residents and retail businesses, and include pet waste controls in the CCRs.

- No discharge of building or parking lot wash water shall be allowed to enter the storm drain system unless treated and approved by the City of Huntington Beach.

- The Association, in coordination with the City, shall define the Street Sweeping Program, including equipment used and sweeping frequency.

- The Association shall prepare an annual report and submit the annual report to the City of Huntington Beach documenting the BMPs operations and maintenance conducted that year. The annual report shall also address the potential system deficiencies and corrective actions taken or planned.

PWQMP Compliance with Requirements

The PWQMP is in compliance with these BMPs, except

- As noted in the other sections

Deficiencies:

- The Association must prepare an annual report and submit the report to the City of Huntington Beach documenting the BMPs operations and maintenance conducted that year. The annual report shall also address the potential system deficiencies and corrective actions taken or planned.

6.0 References

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APPENDICES

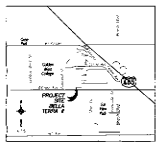
A. Bella Terra II Onsite Water Exhibits
B. Bella Terra II Estimated Sewer Flows
C. The Village at Bella Terra Preliminary Drainage Review

Appendix A

Bella Terra II Onsite Water Exhibits

BELLA TERRA II

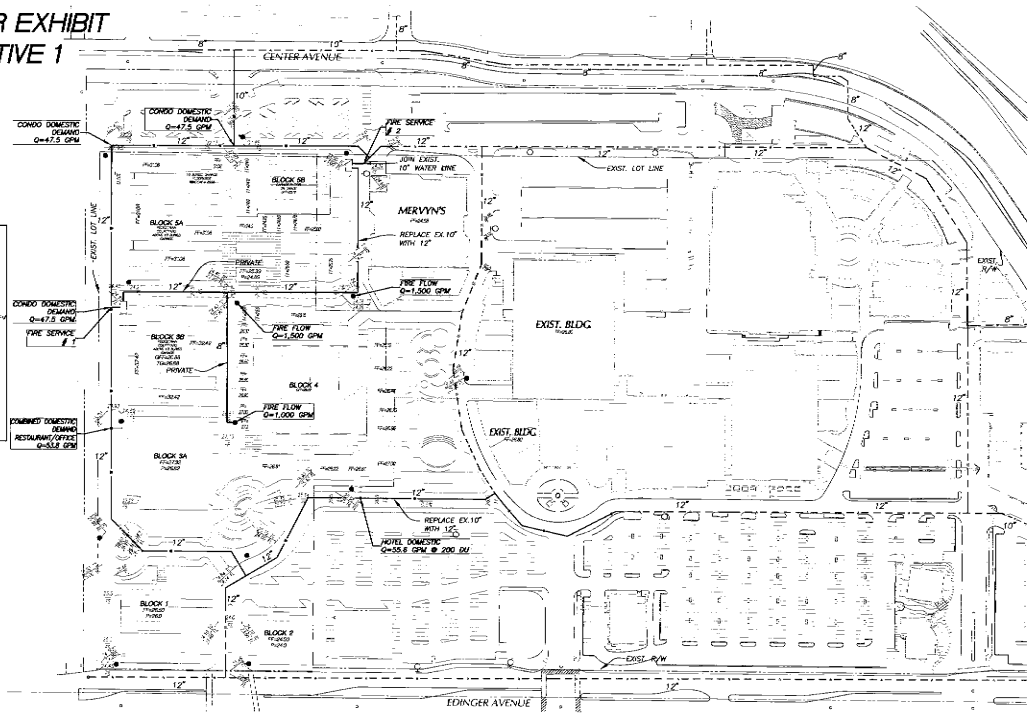
ONSITE WATER EXHIBIT
ALTERNATIVE 1



DOMESTIC DEMAND DISTRIBUTION

FIRE FLOW DISTRIBUTION

PRESSURE READINGS



LEGEND

- PUBLIC WATER LINE
- PRIVATE WATER LINE
- EXISTING WATER LINE
- PROPOSED FIRE HYDRANT
- EXISTING FIRE HYDRANT

SCALE: 1" = 100'

MAP DATE IDENTIFIER
05/13/08 BY: JC
05/14/08

"THIS EXHIBIT ILLUSTRATES THE CONCEPTUAL DESIGN OF THE PROPOSED PUBLIC WATER SYSTEM FOR THE PURPOSE OF EVALUATING THE WATER SUPPLY AVAILABILITY TO THE DEVELOPMENT AND ADDRESS EIR REQUIREMENTS. THE FINAL WATER PIPELINE ALIGNMENT AND REPLACEMENT OF EXISTING PIPELINES SHALL BE ANALYZED FURTHER UNDER A SEPARATE REVIEW PROCESS AND APPROVED BY THE CITY."

REQUIRED FIRE FLOW = 4,000 GPM (TO BE PROVIDED BY 3 HYDRANTS)
(8,000 GPM WITH 50% REDUCTION FOR SPRINKLERS)

Approved by Lisa Hernandez 5/21/08

PREPARED BY:
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PLANNING • ENGINEERING • SURVEYING
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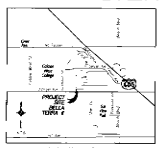
5 14 2008

BELLA TERRA II

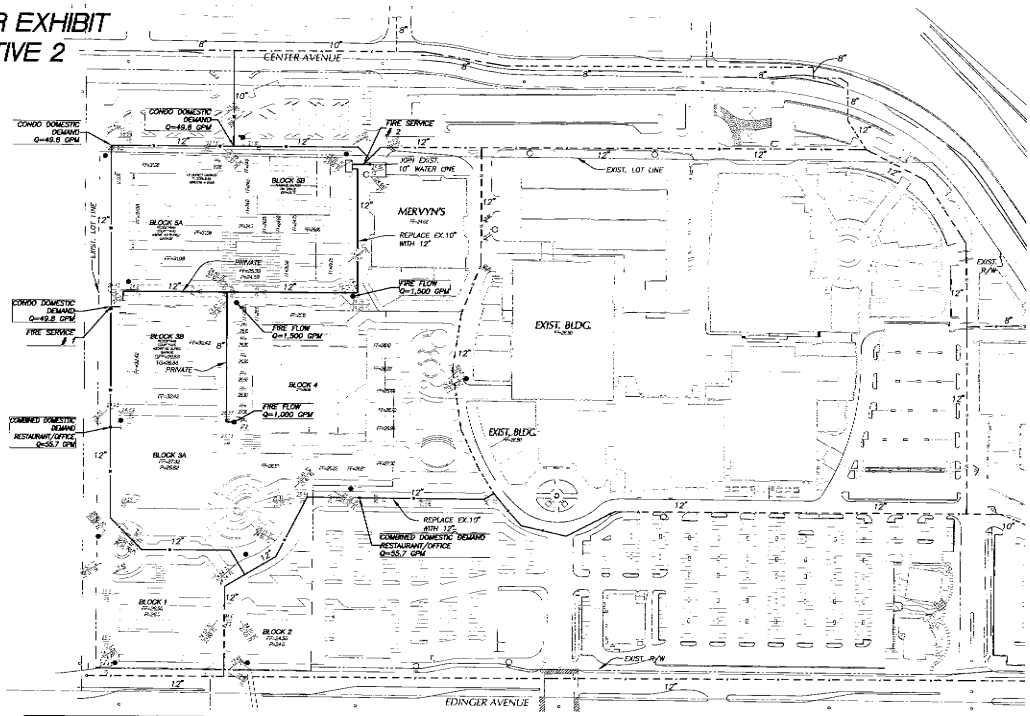
ONSITE WATER EXHIBIT
ALTERNATIVE 2



DOMESTIC DEMAND DISTRIBUTION

FIRE FLOW DISTRIBUTION

PRESSURE READINGS



LEGEND

- PUBLIC WATER LINE
- PRIVATE WATER LINE
- EXISTING WATER LINE
- PROPOSED FIRE HYDRANT
- EXISTING FIRE HYDRANT

SCALE: 1" = 100'

MAP DATE IDENTIFIER
05/14/08 BY: JC
05/14/08

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REQUIRED FIRE FLOW = 4,000 GPM (TO BE PROVIDED BY 3 HYDRANTS)
(8,000 GPM WITH 50% REDUCTION FOR SPRINKLERS)

Approved by Lisa Hernandez 5/21/08

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5 14 2008

Appendix B

Bella Terra II Estimated Sewer Flows

Bella Terra II Estimated Sewer Flows
5/9/08

Estimated Sewer Flow Calculations
Alternate #1

Land Use	Quantity	Duty Factor	Estimated Flow
Condominiums	713 DU's	187 gpd/DU	133,331
Restaurants	30,000 SF	1.5 gpd/SF	45,000
Office	108,085 SF	0.2 gpd/SF	21,617
Total			**199,948 gpd**
Total			**0.20 mgd**
Peak Hour Q	**1.78 (Q_{ave})^0.92**		**0.405 mgd**

Summary of Estimated Sewer Flows

- Estimated Average Sewer Flow = 0.20 mgd
- Estimated Peak Sewer Flow = 0.405 mgd

Estimated Sewer Flow Calculations
Alternate #2

Land Use	Quantity	Duty Factor	Estimated Flow
Condominiums	538 DU's	187 gpd/DU	100,606
Restaurants	30,000 SF	1.5 gpd/SF	45,000
Office	384,255 SF	0.2 gpd/SF	76,851
Total			**222,457 gpd**
Total			**0.22 mgd**
Peak Hour Q	**1.78 (Q_{ave})^0.92**		**0.442 mgd**

Summary of Estimated Sewer Flows

- Estimated Average Sewer Flow = 0.22 mgd
- Estimated Peak Sewer Flow = 0.442 mgd

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Appendix C

The Village at Bella Terra Preliminary Drainage Review

HUNSAKER & ASSOCIATES
IRVINE, INC.

PLANNING
ENGINEERING
SURVEYING
GOVERNMENT RELATIONS

IRVINE
LOS ANGELES
RIVERSIDE
SAN DIEGO

FOUNDING PARTNERS:
RICHARD HUNSAKER
TOM R. McGANNON
JOHN A. MICHLER
DOUGLAS G. SNYDER

PRINCIPALS:
DAVID FRATTONE
FRED GRAYLEE
BRADLEY HAY
PAUL HUDDLESTON
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May 21, 2008

Ms. Jane James, Senior Planner
CITY OF HUNTINGTON BEACH
Planning Department
2000 Main Street
Huntington Beach, CA 92648

Subject: **The Village at Bella Terra**
Preliminary Drainage Review

Dear Jane:

Pursuant to previous discussions during our latest status meeting, we have reviewed the Hydrology and Hydraulic analysis for the existing phase of Bella Terra and the resulting impacts on the existing Montgomery Ward site; the location of the proposed Village at Bella Terra.

The original Hydrology Analysis for the existing phase of Bella Terra indicates that a retention vault in the northwest portion of the site was removed and equal or more storage volume was provided by the storm drain pipe for the new development (existing phase of Bella Terra). The original storm drain plans called for two storm-drain lines: Line N-2 and Line A-1, which were later eliminated with a revision to plans. This change was also reflected in the retention storage calculations.

Our review was based on the hydrology and hydraulic report prepared by EN Engineering, Inc., dated 10/10/05, and precise grade and storm drain plans also prepared by EN Engineering. Our review of the documents included a review of the WSPG hydraulic calculations included in (Appendix D) based on a 100-year storm event, and comparing the hydraulic grade elevations (water surface) at drainage inlets to the finish surface elevations from the precise grading for the existing Bella Terra site.

It was determined that the water surface at the inlets on the east side of the Montgomery Ward site was below the existing surface of the parking lot or slightly above the surface with minor ponding, depth less that 8", and did not spill over onto the existing Montgomery Ward site. However, the storm drain system at the northerly boundary of the Montgomery Ward site has water surface elevations that are higher than the existing pavement elevations and will spill over to the south onto the existing Montgomery Ward site.

The volume of water that spills onto the Montgomery Ward site will need to be quantified with a hydrology and hydraulic analysis as part of any future site development application. The drainage runoff from the north will need to be mitigated by storage or retention facilities or other means that will produce storm run-off volumes equal to or less than the existing Montgomery Ward site.

The total obligation for mitigating storm runoff would include any increase from onsite development that would be determined with a hydrology analysis with a site development application, in addition to mitigating the offsite spill over coming from the north that would be generated from the existing phase of Bella Terra.

When looking at the existing Montgomery Ward site and the proposed land use, we expect that the site will not increase storm-flow runoff from the site. This expectation is based on the fact that the existing land coverage has minimal pervious area as it is nearly entirely covered with buildings or pavement. In addition, the drainage patterns have a fairly direct path to Edinger Avenue or the existing Huntington Beach Channel on the west boundary. The proposed land use and preliminary site exhibits for the Village at Bella Terra, have a slight increase in landscaped/pervious area and drainage areas that are more broken up with a less direct drainage path to the off-site drainage facilities. These conditions would often result in a lower flow rate. As previously stated, a drainage analysis would be required to provide specific conclusions for comparing existing and proposed flow rates from storm flows.

If there are any questions regarding or if further discussion is required, please contact me at your convenience.

Sincerely,

HUNSAKER & ASSOCIATES IRVINE, INC.

Philip D. Dowty
Project Manager
RCE 42038, Exp. 3/31/10

PD:ca
xc: Terri Elliot, City of Huntington Beach
Robert Righetti, City of Huntington Beach
Becky Sullivan, DJM Capital Partners
Steve Barnhart, Hunsaker & Associates
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PRELIMINARY

WATER QUALITY MANAGEMENT PLAN (WQMP)

FOR

"THE VILLAGE AT BELLA TERRA"

TENTATIVE TRACT MAP NO. 17261
7777 EDINGER AVENUE
Huntington Beach, CA 92648

Prepared for

DJM CAPITAL PARTNERS
109 South La Cumbre Lane
Santa Barbara, CA 93105
(805) 565-3365

Prepared by

Hunsaker and Associates Irvine, Inc.
Three Hughes
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(949) 583-1010

Prepared: April 23, 2008

WO # 3337-1T

Preliminary
Water Quality Management Plan
(WQMP)

For:

"THE VILLAGE AT BELLA TERRA"

TENTATIVE TRACT NO. 17261
7777 EDINGER AVENUE
HUNTINGTON BEACH, CALIFORNIA
EIR NO. 2007-002

CITY OF HUNTINGTON BEACH
DEPARTMENT OF PUBLIC WORKS
ACCEPTED
DATE: 4/29/08 BY: JRW

Prepared for:
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REGISTERED PROFESSIONAL ENGINEER
PHILIP D. DOWTY
No. 42038
Exp. 3/31/10
CIVIL
STATE OF CALIFORNIA
4/28/08

Date Prepared: April 23, 2008

W.O. 3337-1T

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SECTION 1

Section I Discretionary Permit(s) and Water Quality Conditions

This Water Quality Management Plan is intended to comply with the requirements of the City of Huntington Beach Municipal Code Requirements for The Village at Bella Terra, Tentative Tract 17261 requiring the preparation of a Water Quality Management Plan and coverage under the Statewide National Pollution Discharge Elimination System (NPDES) General Permit for Construction Activities.

Tentative Tract Map 17261 is not approved at this time and there are no City approved Conditions of Approval at this time applicable to the project. When Tentative Tract 17261 is approved by the City, Conditions of Approval applicable to this project will be included in the final WQMP, as appropriate.

SECTION 2

Section II Project Description

The project, known as "The Village at Bella Terra", Tentative Tract Map 17261, is a mixed-use commercial center redevelopment located on a 15.9 acre existing commercial development of buildings and parking lots on the north side of Edinger Avenue. The Project is located southwest of the intersection of Center Drive and Huntington Village Lane. Streets bound the project to the north (Center Drive) and to the south (Edinger Avenue). An existing railroad right-of-way and flood control channel area at the project's west boundary and existing Bella Terra shopping plaza is at the project's east boundary. The project location is shown in Section VI, Exhibits B.

The project includes mixed commercial use facilities as follows:

- Approximately 60,000 SF grocery
- Approximately 70,000 SF soft/hard goods (i.e. Crate & Barrel, Apple, Anthropologie, etc.)
- Approximately 20,000-30,000 SF restaurants
- Approximately 8,000-10,000 SF services oriented (i.e. business services office, laundry, gym for residences and community center for residences)
- Approximately 3,000-5,000 SF sales/marketing office and residential management office
- Multi level parking structures

The site shall also include storm drains and associated utility improvements for the project. All proposed main storm drain improvements are provided in Section VI, Exhibits A.

Additional improvements include residential development units, for sale and for rent, including two 10-story residential tower, common areas located throughout the development, a community park located at the mid-eastern boundary of the development, two swimming pools, fountains, multi-level parking structures, and landscaping. The project currently proposes two development alternatives. Development Alternative 1 is as follows:

BLDG/ BLOCK	AREA				PARKING	
	Retail	Residential	# Units	Total (Excl Pkng)	REQUIRED	PROVIDED
1	21,000 SF	70,600 SF		91,600 SF	271	224
2	28,430 SF	N/A		28,430 SF	142	N/A
3a	46,500 SF	87,360 SF		133,860 SF	490	406
3b	N/A	121,350 SF		121,350 SF		
4	40,980 SF	187,680 SF		228,660 SF	205	1,101
5a	N/A	259,537 SF		259,537 SF	499	497
5b	N/A	253,736 SF		253,736 SF		
Surface Replacement	N/A	N/A		N/A	250	N/A
Curb Parking	N/A	N/A		N/A	N/A	74
TOTAL	156,955 SF	680,410 SF	713	840,190 SF	1,803	2,302

Residential Unit Mix

Proposed residential units are as follows and are subject to change:

UNIT TYPE	AREA	% TOTAL	# UNITS
Studio	600 SF	5 %	36
1 BDRM	750 SF	30 %	214
2 BDRM	1,100 SF	55 %	392
3 BDRM	1,250 SF	10 %	71
TOTAL	--	100 %	713

Program Summary

Retail space ..... 156,955 SF
Housing units ..... 713 units
Parking spaces ..... 2,302 spaces

Summary of Development Alternative 2 is as follows:

Land Use	Quantity
Residential	538 DU
Restaurant	30,000 SF
Commercial	384,255 SF
Landscape	62,027 SF

Residential Unit Mix

Currently, information regarding the unit types is not known.

Program Summary

Retail space ..... 384,255 SF
Housing units ..... 538 units
Parking spaces ..... TBD

Paved areas include the project streets, sidewalks and concrete foundations for dwelling units and the commercial area. Parking in the residential area shall be provided by below grade and multi-level residence parking garages at the base of Buildings 3, 4 and 5. Parking in the commercial portion of the project will consist of below grade and multi-level parking structures at the base of Buildings 4, and 5 with separate parking entrance gates and attendant booths as applicable.

Landscaped areas for the project shall include lawns, gardens, landscaped planters and a 365' long community park adjacent and east of Building 4. Although privately maintained, the park area will be available for public use. Landscape regions are shown in Section VI, Exhibit A-1 and A-2 of this WQMP. Detailed landscape improvements will be shown in project landscape plans, incorporated by reference.

All landscaping shall be equipped with efficient irrigation systems and landscaped design in compliance with the City of Huntington Beach Arboricultural and Landscape Standards and Specifications.

Anticipated activities within the mixed commercial use facilities include working and business activities, grocery shopping, spa and fitness activities, dining, indoor/outdoor entertainment, sales and marketing various carts and kiosks, valet service, shopping and related services. Activities for the residential development and park area include swimming, relaxing, exercising, picnicking, jogging, community meetings, walking, pet walking and other outdoor activities.

Outdoor storage of materials will not be permitted onsite. No fueling bays or vehicle maintenance and repair areas are proposed. A vehicle wash area that does not drain into a storm drainage system shall be provided for common residential usage. Wash water from this area will be directed to the sanitary sewer (in accordance with City requirements and with prior approval of the sewering agency), to an engineered infiltration system, or to an equally effective alternative as approved by the City Engineer.

Delivery and trash areas for the site will be will be provided for commercial and residential use. The trash enclosure area shall be covered or roofed over with a solid, impervious material. Connection of trash area drains to the storm drain system is prohibited. If feasible, the trash enclosure area shall be connected to the sanitary sewer system. Currently, the locations of the proposed trash enclosures have not been determined. Known delivery areas (currently only two locations in the southern portion of the site) are provided in the WQMP Site Plan. Once all information is available, the locations of these improvements will be included in this preliminary WQMP or the final WQMP.

All common areas within the residential community shall be owned and maintained by the Master Residential Association (MRA). Common areas within the commercial development shall be improved, owned and maintained by the Master Commercial Association (MCA).

All project streets surrounding the commercial center and residential area are public streets (Edinger Avenue and Center Drive). All other streets are private and shall be maintained by either the Master Residential Association or the Master Commercial Association per the CC&Rs and the "Maintenance License Agreement" Exhibit and the "Mutual Benefit Exhibit" included at the end of Section V, "Inspection and Maintenance Responsibility for BMPs". Exhibits A and E in Section VI refer.

The formation of the Master Residential Association (MRA) and the Master Commercial Association (MCA) shall be established by the developer, DJM Capital Partners, Inc. The MRA and MCA will fulfill the project's requirements and responsibilities for long term maintenance of common areas. DJM Capital Partners, Inc. will act in lieu of the MRA and MCA prior to its creation. DJM Capital Partners, Inc. shall serve as the in-lieu MRA/MCA contact at (805) 565-3365 or (805) 962-4300. Once the MRA and MCA have been established for the project, the contact information for both property management associations shall be appended to this WQMP.

Fully developed, impermeable surfaces will cover approximately 90% of the project area (14.27 acres). Permeable surfaces will cover approximately 10% of the project area (1.58 acres). These areas are shown in green in Section VI, Exhibit A-1 and A-2.

Daily generation of homeowner related trash and retail commercial shops are anticipated. On a weekly basis, such trash will be collected by each tenant (business/homeowner) and disposed of in designated trash enclosures located throughout the project site to be removed by the local, private waste management company for proper disposal to a central trash disposal facility offsite.

All restaurants and shops located within the commercial area and providing food services will be required to route sewer drains from food preparation areas through a grease interceptor prior to entering the public sewer system. An indoor grease storage unit will also be provided. The locations of these facilities are currently not known and will be provided in the final WQMP.

Pollutants of Concern

The potential stormwater or urban runoff pollutants reasonably expected to be associated with this project are:

1. *Sediment.* Driveways, parking areas, roads and roof-tops are expected to be common sources of sediment due to wear.
2. *Organic Compounds.* These compounds can be expected to be derived from automotive fluids, pesticides, and fertilizers.
3. *Nutrients.* Nutrients, including nitrogen, phosphorous, and other compounds can be anticipated to be generated by or founding organic litter, fertilizers, food waste, sewage and sediment.
4. *Metals.* Potential sources of trace metals (copper, lead, cadmium, chromium, nickel and zinc) include motor vehicles, re-roofing and hardscape/construction materials, and chemicals.
5. *Bacteria and viruses.* Anticipated sources include animal excrement (found in areas where pets are often walked), sanitary sewer overflow, restaurant service (food disposal), outdoor dining area, and trash container handling areas.
6. *Oil and Grease.* Potential sources of oil and grease include motor vehicles.
7. *Oxygen-Demanding Substances.* Potential sources include biodegradable organic materials and various household chemicals, which deplete dissolved oxygen levels in water courses.
8. *Pesticides.* Sources of pesticides include household bug-spray, weed killers and other household sources.
9. *Trash and Debris.* These sources include common litter, biodegradable organic matter such as leaves, grass cuttings and food wastes from landscaped areas.

The Standard Industrial Classification (SIC) Code for the commercial/retail center includes, but is not limited to, the following: office buildings (6512), restaurants (5812), night clubs (5813), parking stations and garages (7521) and valet services (7212).

This project is classified as a Priority Project, Categories 1, 2, 4 and 7 per Table 7.II-1 of the Countywide Orange County Storm Water Program. Therefore, treatment control BMPs are required to remove pollutants typically associated with urban runoff.

Table 7.II-1
Priority Projects Categories

1.	Residential development of 10 units or more
2.	Commercial and industrial development greater than 100,000 square feet including parking area
3.	Automotive repair shops (SIC codes 5013, 5014, 5541, 7532-7534, and 7536-7539)
4.	Restaurants where the land area of development is 5,000 square feet or more including parking area (SIC code 5812)
5.	*For San Diego Region* - Hillside development greater than 5,000 square feet *For Santa Ana Region* - Hillside developments on 10,000 square feet or more, which are located on areas with known erosive soil conditions or where natural slope is twenty-five percent or more
6.	Impervious surface of 2,500 square feet or more located within, directly adjacent to (within 200 feet), or discharging directly to receiving waters within Environmentally Sensitive Areas
7.	Parking Lots 5,000 square feet or more, or with 15 parking spaces or more, and potentially exposed to urban stormwater runoff.
8.	*For San Diego Region* - Streets, roads, highways, and freeways which would create a new paved surface that is 5,000 square feet or greater
9.	*For Santa Ana Region* - All significant redevelopment projects, where significant redevelopment is defined as the addition of 5,000 or more square feet of impervious surface on an already developed site.

SECTION 3

Section III Site Description

The Village at Bella Terra is located at 7777 Edinger Avenue in the City of Huntington Beach, at the southwest intersection of Center Drive and Huntington Village Lane. The project location is shown on the vicinity map, Exhibit B. The total project onsite area is approximately 15.85 acres.

The site is located within the western portion of the former Huntington Beach Mall and currently designated as Commercial Regional (CR), 0.50 Permitted Density (F2), Specific Plan Overlay (SP) and Mixed Use (MU) with 0.5 Permitted Density for commercial/25 dwelling units/acre residential per the General Plan. Surrounding land uses consist primarily of commercial facilities.

The site is bound to the west by existing railroad tracks and a commercial plaza beyond; to the north by Central Avenue and Old World Village center (commercial) beyond; to the east by existing Bella Terra shopping plaza and Beach Boulevard beyond; and to the south by Edinger Avenue and a retail shopping center beyond.

The site currently consists of paved parking areas, empty building structures, and a dirt lot. In general, the site slopes gently to the west/southwest. The site resides within the northern/northwestern portion of the Peninsular Ranges Geomorphic Province of Southern California. This province is characterized by northwest-southeast trending faults, folds, and mountain ranges.

Based on the Natural Resources Conservation Service's Web Soil Survey, onsite soils consist primarily of Bolsa Silt Loam and Bolsa Silt Clay, which are considered in Hydrologic Soil Group C, characterized as having slow infiltration rate when thoroughly wet. Per the geotechnical investigation prepared for Bella Terra (GPI Geotechnical Professionals Inc., January 2004), onsite groundwater is relatively shallow, ranging from 5' to 13' below existing grades, with subsurface soils consisting predominantly of silty sands, clays and mixtures thereof.

Pre-construction, the proposed site is approximately 99% impervious and approximately 1% pervious. Post-construction, the proposed site will consist of approximately 90% impervious surface and 10% pervious surface.

The project resides within the jurisdiction of the Santa Ana Region Water Quality Control Board (SARWQCB).

The site is located in the Westminster Watershed (Orange county Watershed "C"). The Watershed District has an overall area of approximately 90 square miles and is comprised of multiple tributary areas that contribute urban run-off along existing drainage channels. Two main tributaries drain most of this watershed: on the northern side, the Bolsa Chica Flood Control Channel (BCFCC), with its principal tributaries (Anaheim-Barber City Channel and Westminster Channel), drains to Huntington Harbour prior to emptying to the Pacific Ocean. On the southern side, the East-Garden Grove Wintersburg Channel (EGGWC), with its principal tributary (Ocean View Channel), drains to Bolsa Bay prior to discharging to the Pacific Ocean. The project site is located within the southern portion of the watershed, draining to the EGGWC.

Existing Drainage

All onsite surface flows are currently directed to the west-southwest to a north to south flowing 5' x 6' channel located along the project's western boundary and adjacent to the existing railroad line. During storm events with an intensity of the 100-year storm or greater, overflows from the adjacent offsite area located to the north will occur and sheet flow, as run-on flows, to the project site. The discharge is conveyed from the project's southwest corner offsite and to the southwest by Orange County Master Plan facility C05 (East-Garden Grove Wintersburg Channel) and eventually to Bolsa Bay at the Pacific Ocean. Refer to Appendix D in Section VI.

Post-Construction Drainage

Storm Flows

In the developed condition, project surface flows drain generally to the south and west to area drains and the main storm drain systems. Runoff is then conveyed to a 5' x 6' channel prior to discharging to Edinger Avenue at the southwest corner of the project site to the existing storm drain system. In general, water quality flows and related treatment issues deal with low intensity storm events up to the 2 year intensity range. Therefore, run-on flows from northerly offsite (Phase 1) during a 100-year storm event will not affect water quality treatment of anticipated project pollutants. However, the project hydrology and onsite storm drain system shall address and be designed, respectively, to completely mitigate onsite the potential flooding hazard anticipated to be caused by the run on flows which sheet flow onto the project site from the adjacent offsite area to the north whenever a 100-year storm, or greater, occurs.

First Flush

Project first flush runoff flows are diverted onsite to two offline Stormfilter BMP systems for treatment control of project pollutants. One storm filter is located on the west side of the project to the north. The other Stormfilter is located on the west side of the project to the south. For reference, see Exhibit A-1 Site Plan in Section VI.

Parking Structure Drainage

Underground parking areas will not be allowed to drain to the storm drain system. Any non-stormwater nuisance flows will be treated by an oil/water separator to remove vehicle related pollutants and pollutants characteristic of parking areas prior to discharging to the sanitary sewer system. Pumps will be used to remove runoff from the underground parking area and directed into the sanitary sewer.

303(d) Water Bodies

This project is located within the jurisdiction of the Santa Ana Regional Water Quality Control Board and within the Westminster Watershed (County of Orange Watershed C) and ultimately discharges to the Pacific Ocean via Bolsa Chica. The 2006 CWA 303(d) list indicates that Bolsa Chica is impaired for Copper and Nickel. Total Maximum Daily Load (TMDL) standards for Copper and Nickel are proposed to be completed in 2019. The site does not contain nor impact any "environmentally sensitive areas" as defined by the 2003 Orange County Drainage Area Management Plan (DAMP) and the Water Quality Control Plan for the Santa Ana Basin (Basin Plan).[1]

[1] Based on information obtained from the project's Environmental Impact Report.

Hydrologic Conditions of Concern

Hydrologic Conditions of Concern for any development such as the proposed project may include potential water quality degradation; increased runoff volume and velocity; reduced infiltration; increased flow frequency, duration and peaks; and faster time to reach peak flow resulting from development. As a result of the project's development (i.e., the upstream development), it has been determined by the preliminary project hydrology and water quality analysis prepared by Hunsaker & Associates Irvine, Inc. (H&A) that neither a significant potential for erosive conditions nor alteration of habitat of the downstream streams and channels would occur.

In H&A discussions with Orange County staff (who drafted the language for the latest Countywide Model WQMP jointly with representatives from all Orange County Cities), it has been determined that the "downstream channel" (referenced in Item No. 1 of Section 7.II-3.2.4 of the Model WQMP) refers to the direct discharge point of the subject project. The intent of said section of the Model WQMP is to identify projects that have direct discharges to fully natural or partially improved channels. The proposed project does not have direct discharges to fully natural or partially improved channels. Rather, the proposed project will discharge to the existing, fully improved East-Garden Grove Wintersburg Channel.

Based on the information above and our consultation with the County of Orange, it is our opinion that Items 2 – 4 of Section 7.II-3.2.4 of the Model WQMP, which relate to preparation of a drainage report, field reconnaissance and computations for critical hydrologic conditions for the "downstream channel," do not apply to this project.

SECTION 4

Section IV Best Management Practices (BMPs)

BMPs are structural devices, procedures, rules or methods which, when implemented and followed, should reduce and/or eliminate the specific source of pollution of which the BMP is targeted. This section describes how each of these BMPs were developed and will be implemented for the proposed project. For those routine BMPs that are not applicable to this project, an explanation is included as to why that is the case. All BMPs indicated in this WQMP will be maintained in good and effective condition.

By means of recorded community CC&R's, the MRA and MCA shall establish requirements for (a) ownership/maintenance of and/or maintenance easements for community common areas in the project and (b) implementation of community pollution prevention on BMPs, including community awareness programs.

This WQMP identifies Best Management Practices (BMPs) that will be used onsite to control predictable pollutant runoff, and identifies, at a minimum, the measures specified in the Countywide Water Quality Management Plan (WQMP) and NPDES Drainage Area Management Plan (DAMP), the assignment of long-term maintenance responsibilities, and the locations(s) of all structural BMPs.

Routine Source Control BMPs are required to be incorporated in all new development and redevelopment projects unless not applicable. In the tables provided, all BMPs to be incorporated in the project are indicated. For those designated as not applicable, a brief reason why is stated.

All source control BMPs listed for specific land use/type of project in the following Countywide Water Quality Management Plan tables have been discussed and considered for utilization to the extent that they are appropriate for the site and project.

IV.1 Site Design BMPs

Site design BMPs refer to design principles that seek to minimize pollutant sources by minimizing the project footprint. These BMPs are also intended to create a hydrologically functional project design that attempts to mimic the natural regime. The following table shows site design BMPs that are included in this project. A brief description of each BMP also follows:

Table IV.1. Site Design BMPs

Technique	Included?		If no, state justification.
	Yes	No	
Minimize Directly Connected Impervious Areas (DCIAs) (C-Factor Reduction)	✓		
Create Reduced or "Zero Discharge" Areas (Runoff Volume Reduction)[1]	✓		
Minimize Impervious Area/Maximize Permeability (C-Factor Reduction)[2]	✓		
Conserve Natural Areas (C-Factor Reduction)		✓	Project is a redevelopment. No natural areas left to be conserved.

1 Detention and retention areas incorporated into landscape design provide areas for retaining and detaining stormwater flows, resulting in lower runoff rates and reductions in volume due to limited infiltration and evaporation. Such Site Design BMPs may reduce the size of Treatment Control BMPs.

2 The "C Factor" is a representation of the ability of a surface to produce runoff. Surfaces that produce higher volumes of runoff are represented by higher C Factors. By incorporating more pervious, lower C Factor surfaces into a development, lower volumes of runoff will be produced. Lower volumes and rates of runoff translate directly to lowering treatment requirements.

Directly connected impervious areas (DCIAs) will be reduced throughout the project in a variety of ways. Roof drainage, sidewalks and driveways will be directed to landscaped areas where feasible. Other landscaped areas, commercial planters, the pedestrian corridor, park areas, and open space are used to break up areas of imperviousness.

Multi-story residential units have been incorporated into the project design, increasing overall living space but reducing unit footprint and thus reducing impervious space.

Although no "natural" areas exist onsite open space, courtyards, planters and pedestrian corridors are being provided that will serve to reduce impervious areas and thus reduce the project's C-Factor.

IV.2 Source Control BMPs

Source Control BMPs are intended to minimize the contact between potential pollutant sources and urban runoff. All source control BMPs listed for specific land use/type of project in the following Countywide Water Quality Management Plan tables have been discussed and considered for utilization to the extent that they are appropriate for the site and project. For a BMP listed in the table following not used for the project, this section of the WQMP has explained why this source control BMP is not appropriate for the project.

IV.2.1 Routine Non-Structural BMPs

Routine non-structural BMPs are geared towards operational procedures, such as maintenance activities (i.e. good housekeeping practices). The following table shows routine non-structural BMPs included in this project and those that were not included.

Table IV.2.1 Routine Non-Structural BMPs

Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
N1	Education for Property Owners, Tenants and Occupants	✓		
N2	Activity Restrictions	✓		
N3	Common Area Landscape Management	✓		
N4	BMP Maintenance	✓		
N5	Title 22 CCR Compliance (How development will comply)	✓		

Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
N6	Local Water Quality Permit Compliance		✓	The City of Huntington Beach does not issue water quality permits
N7	Spill Contingency Plan	✓		
N8	Underground Storage Tank Compliance		✓	None proposed for project.
N9	Hazardous Materials Disclosure Compliance	✓		
N10	Uniform Fire Code Implementation	✓		
N11	Common Area Litter Control	✓		
N12	Employee Training	✓		
N13	Housekeeping of Loading Docks	✓		
N14	Common Area Catch Basin Inspection	✓		
N15	Street Sweeping Private Streets and Parking Lots	✓		
N16	Commercial Vehicle Washing		✓	No commercial or private vehicle washing will be allowed onsite

Routine Non-Structural BMPs

(N1) Homeowners/Tenant Education

Environmental awareness education materials, including, but not limited to those included in Section VII of this WQMP, shall be provided to all members of the MRA and MCA, at the close of escrow, and for the commercial tenants, at the signing of the lease, and annually thereafter by the MRA and MCA, respectively. Residential materials will include information regarding landscape maintenance, maintenance of irrigation systems, proper disposal of pet wastes and illegal dumping of toxic substances (oil, paints, electronics, etc.). Commercial and restaurant materials will include information regarding spill prevention and cleanup, fats, oils & greases (FOG), exterior cleaning, and building maintenance.

The MRA and MCA will insure that all homeowners and commercial tenants will be given a copy of the recorded CC&Rs which will contain a section outlining the environmental awareness education materials. The MRA and MCA will establish requirements for the implementation of a community awareness program that informs home buyers and business owners of the impacts of dumping oil, paints, solvents or other potentially harmful chemicals into the storm drain; the proper use and management of fertilizers, pesticides and herbicides in home landscaping and gardening practices; the impacts of littering and improper watering (see Section V, Table 1, Figure "D").

(N2) Activity Restrictions

Within the CC&Rs that will been prepared by DJM Capital Partners, Inc., for Tentative Tract Map 17261, The Village at Bella Terra, language will be included to identify surface water quality protection required of The MRA and MCA. Surface water quality activities will also be conducted in conformance with the WQMP as it relates to the handling and disposal of contaminants. The Draft Residential CC&Rs are included in this WQMP as Appendix B. This document addresses Use Restriction including nuisances, parking and vehicular restrictions, animal regulations, drainage and pollutant control. The Commercial CC&Rs will be included in this WQMP at such time as they become available.

(N3) Common Area Landscape Management

Management programs will be designed and established by the MRA and MCA, which will own and maintain all common areas within the project site. These programs will include how to mitigate the potential dangers of fertilizer and pesticide usage. Ongoing maintenance will be consistent with the Huntington Beach City Water Efficient Landscape Requirements, the County Water Conservation Resolution (Ordinance. No. 3802) and the State of California Model Water-Efficient Landscape Ordinance. Fertilizer and Pesticide usage shall be consistent with County Management Guidelines for use of Fertilizers and Pesticides. The Educational Materials in Section VII includes copies of these requirements and ordinances.

(N4) BMP Maintenance

As indicated in (N2) above, the CC&Rs shall identify the MRA and MCA as being responsible for implementation of each applicable non-structural BMP as well as scheduling inspection and maintenance cleaning of all applicable structural BMP facilities. The MRA and MCA, through the landscape maintenance contractor, will be responsible for inspection and maintenance activities in landscape areas (See Section VI, Exhibit A-1 and A-2). Debris and other water pollutants will be controlled, contained and disposed of in a proper manner by the maintenance contractor. See Section V Inspection/Maintenance Responsibility for BMPs for further information.

(N5) Title 22 CCR Compliance

The MRA and MCA shall comply with Title 22 of California Code of Regulations and relevant sections of the California Health and Safety Code regarding hazardous waste management, which will be enforced by County Environmental Health on behalf of the State. All materials considered as hazardous must be properly handled and disposed of by an approved disposal facility. Pool chemicals for water purification and cleaning that are considered hazardous by California Code of Regulations, Title 22, §66261.162, Appendix X may include but are not limited to: Bromine (toxic, corrosive, ignitable), Calcium hypochlorite (toxic, corrosive, ignitable, reactive), and Chlorine (toxic, corrosive, ignitable, reactive).

(N7) Spill Contingency Plan

This requirement generally applies to commercial or industrial developments that fuel, store or dispense hazardous materials. A spill contingency plan shall be prepared by MRA and MCA for the proposed pool areas as it relates to notification of responsible agencies, disposal of cleanup materials, documentation, etc. with regards to County of Orange fact sheet "Spill Prevention, Control & Cleanup" IC-17.

(N9) Hazardous Materials Disclosure Compliance

This BMP applies to commercial and industrial facilities that generate, store or dispose of hazardous materials. Compliance with Permittee ordinances are typically enforced by respective fire protection agency for the management of hazardous materials. Orange County, health care agencies, and/or other appropriate agencies (i.e. Department of Toxics Substances Control are typically responsible for enforcing hazardous materials and hazardous waste handling and disposal regulations. All hazardous materials such as chemicals, fertilizers, pesticides and medical use related materials shall be contained in spill proof containers that are locked in protective storage areas. These areas must be covered. All required signage regarding materials on hand shall be in place per requirements.

(N10) Uniform Fire Code Implementation (N10)

All onsite facilities that generate, store or dispose of hazardous materials will be required to be compliant with Article 80 of the Uniform Fire Code enforced by the local fire protection agency.

(N11) Common Area Litter Control (N11)

The MRA and MCA, through the site maintenance contractor, will be required to maintain weekly sweeping and trash pick-up within the project area. Daily inspection will be made of trash receptacles to make sure lids are closed and pick-up of any excess trash on the ground has occurred. DJM Capital Partners, Inc. shall be responsible for common area litter control until the responsibility is accepted by the MRA and MCA. Pursuant to Figure "D", responsibility shall include the emptying of trash receptacles, noting of disposal violations by commercial tenants and homeowners, and reporting such violations to the MRA and MCA for investigation, as appropriate.

(N12) Employee Training

An annual employee training/education program will be established by DJM Capital Partners, Inc. and the Property Management Corporation and would apply to future employees, contractors and volunteers of The Village at Bella Terra, the MRA and MCA to inform and train employees engaged in maintenance activities regarding the impact of dumping oil, paints, solvents or other potentially harmful chemicals into storm drain; the proper use of fertilizers and pesticides in landscaping maintenance practices; and the impacts of littering and improper water disposal (see attached Matrix & Section VII Educational Materials). DJM Capital Partners, Inc. will be responsible for these activities as they relate to DJM Capital Partners, Inc. employees, subcontractors, and contractors. The MRA and MCA shall also be responsible for providing commercial tenants and homeowners with educational materials regarding the impact of dumping oil, paints, solvents or other potentially harmful chemicals into storm drain; the proper use of fertilizers and pesticides in landscaping maintenance practices; and the impacts of littering and improper waste disposal.

(N13) Housekeeping of Loading Docks

Loading areas shall be kept clean and clear of trash, litter and debris at all times. Use of water shall be minimized in clean up procedures. Spills and broken containers shall be cleaned up immediately. If wash-down water is used, rinse water must be disposed of in an approved manner and not discharged to the storm drain system. Discharge into sanitary sewer will be allowed if authorized by Orange County Sanitation District (OCSD).

(N14) Common Area Catch Basin Inspection

Prior to the acceptance of the project's proposed storm drain mainline by the City of Huntington Beach for ownership and maintenance, along with its catch basins, DJM Capital Partners, Inc. will be responsible for maintaining these improvements. Maintenance activities will be done on a regular basis, and prior to the storm season, no later than October 1st of each year. Any private storm drain systems located in common areas will be owned and maintained by the MRA and MCA.

(N15) Street Sweeping Private Streets and Parking Lots

Prior to the acceptance of the project streets for maintenance by either the MRA or the MCA as shown on the Operation and Maintenance Plan (O&M) at the end of Section V, DJM Capital Partners, Inc. will have all streets and paved areas vacuum swept on a weekly basis. This procedure will be intensified around October 1st of each year prior to the "first flush" storm.

(N16) Commercial Vehicle Washing

A vehicle wash area for common residential usage will be installed onsite. However this is not a commercial facility.

IV.2.2 Routine Structural BMP's

Structural BMPs are physical, structural or mechanical devices or facilities targeted at preventing pollutants from entering the storm drain system. Structural BMPs shall be installed initially by DJM Capital Partners, Inc. the developer, through the construction and development of the project. For instance; slope planting and irrigation systems shall be designed by licensed landscape architects and installed by qualified contractors to specifications and standards of the County of Orange. The structural BMPs used for this project are summarized in Section V, "Inspection and Maintenance Responsibility for BMPs".

Table IV.2.2 Routine Structural BMPs

Identifier	Check One		If not applicable, state brief reason
	Included	Not Applicable	
Provide storm drain system stenciling and signage	✓		
Design and construct outdoor material storage areas to reduce pollution introduction		✓	No outdoor material storage areas proposed.
Design and construct trash and waste storage areas to reduce pollution introduction	✓		
Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	✓		
Protect slopes and channels and provide energy dissipation	✓		Landscaped slopes will be stabilized with vegetation as required by the City'. Project discharges into fully improved channels.

Identifier	Check One		If not applicable, state brief reason
	Included	Not Applicable	
Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)		✓	Project resides in the jurisdiction of the Santa Ana RWQCB, not the San Diego RWQCB.
a. Dock areas	✓		
b. Maintenance bays		✓	No maintenance bays required for proposed project.
c. Vehicle wash areas	✓		
d. Outdoor processing areas		✓	Applies to a industrial project. This project is residential and commercial.
e. Equipment wash areas		✓	Equipment washing prohibited onsite.
f. Fueling areas		✓	No fueling areas allowed onsite.
g. Hillside landscaping		✓	Project will not have hillside landscaping.
h. Wash water control for food preparation areas	✓		
i. Community car wash racks	✓		

1. **Common Area Runoff - Minimizing Landscape Design (CASQA BMP SD-10)**

As a part of the design of all common area landscape areas, similar planting material with similar water requirements will be used in order to reduce excess irrigation runoff and promote surface filtration. Such common areas will be maintained by the MRA or MCA (Section V "Inspection and Maintenance Responsibility for BMPs"). Prior to the appropriate property management corporation's takeover of maintenance responsibilities, DJM Capital Partners, Inc. will be responsible for installation and maintenance of these common areas.

2. **Common Area Efficient Irrigation (CASQA BMP SD-12)**

As a part of the design of all common area landscape irrigation, implementation of the City of Huntington Beach Water Efficient Landscape Requirements, Municipal Code §14.52 and the Orange County Water Conservation Resolution (Ord. No. 3802) including, but not limited to, such provisions as water sensors, programmable irrigation times (for short cycles), etc., will be used. Such common areas will be maintained by the MRA or MCA (Section V "Inspection and Maintenance Responsibility for BMPs").

3. **Catch Basin Signage (CASQA BMP SD-13)**

All Thermoplastic markers (or other city-approved alternative) bearing the message "No Dumping – Drains to Ocean" will be used on all of the project's catch basins. This will be done in a location that can be clearly seen by all and will be routinely inspected and re-labeled, as required, until the City of Huntington Beach accepts maintenance responsibility for the public catch basins.

Thereafter, the MRA or MCA will routinely inspect and re-label the private catch basins, as necessary. Catch basin labels will be inspected twice a year and relabeled as necessary to maintain legibility.

4. **Maintenance Bays and Dock Areas (CASQA BMP SD-31, IC-10)**

There are no maintenance bays proposed. Loading dock areas shall be covered. Drainage shall be designed to preclude urban run-on and runoff. Runoff from dock areas shall be prohibited from entering storm drains. Dock areas shall be kept clean at all times. All maintenance activities must be consistent with BMP N13, Housekeeping of Loading Docks.

5. **Trash Enclosures (CASQA BMP SD-32 and DAMP IC-22)**

Trash enclosures shall be provided in designated areas of the commercial development and the residential development. The enclosures will be covered to prevent contact with wind and rain. The areas will also be designed to prevent contact with storm run-on. Drainage from the trash enclosure areas will be prohibited to enter the storm drain. Waste areas will be inspected daily and kept in an orderly manner by the MRA and MCA.

6. **Vehicle Washing Areas/Community Car Wash Racks (CASQA BMP SD-33)**

Not applicable. No commercial or private vehicle washing allowed onsite.

7. **Outdoor Material Storage Areas (CASQA BMP SD-34)**

Not applicable. No outdoor storage of materials allowed onsite.

8. **Outdoor Processing Areas (CASQA BMP SD-35)**

Not applicable. No outdoor processing areas proposed.

9. **Eating and Drinking Establishments (DAMP BMP IC-22)**

Good house keeping practices shall be used in the kitchen food preparation area. All wash water of the kitchen area will be kept indoors and prevented from reaching storm drains. Wash water shall be directed to sanitary sewers. All grease materials, oil and trash shall be recycled or disposed of properly. Additionally, grease interceptors shall be required in all restaurant and food services establishments.

Outdoor eating areas will be swept or vacuumed on a daily basis. Pavement areas including "drive-thru" areas, parking lots, sidewalks, and dumpster storage areas will be dry swept frequently. All outside areas will be kept free of trash & debris.

IV.3 Treatment BMPs

Treatment control BMPs are engineered systems that are designed and constructed to remove pollutatns from urban runoff. The following table shows treatment BMPs that are included in this project. A brief description of each BMP also follows:

Table IV.3. Treatment BMPs

Name	Included?		If not applicable, state brief reason
	Yes	No	
Vegetated (Grass) Strips		✓	StormFilter employed.
Vegetated (Grass) Swales		✓	StormFilter employed.
Proprietary Control Measures		✓	StormFilter employed.
Dry Detention Basin		✓	StormFilter employed.
Wet Detention Basin		✓	StormFilter employed.
Constructed Wetland		✓	StormFilter employed.
Detention Basin/Sand Filter		✓	StormFilter employed.
Porous Pavement Detention		✓	StormFilter employed.
Porous Landscape Detention		✓	StormFilter employed.
Infiltration Basins		✓	StormFilter employed.
Infiltration Trench		✓	StormFilter employed.
Media Filter	✓		

Treatment BMPs evaluated for this WQMP included: StormFilter®

Media Filter (StormFilter)

Treatment will be achieved through the use of two onsite StormFilters designed offline from the storm drain system. See Section VI, Exhibit A-1.

The StormFilter is a premier filtration system widely recognized as a versatile BMP for removing a variety of pollutants. The StormFilter cartridges are filled with an array of media, selected to treat specific pollutant loadings at each site. These site-specific media options give the StormFilter the ability to remove high levels of storm water pollutants such as sediments, oil and grease, soluble heavy metals, organics and soluble nutrients.

The StormFilter is unique in its ability to meet current and future pollution challenges. No other system offers this degree of excellence and versatility. It is important to note the Contech's pollutant treatment claims are supported by independent third party testing and evaluation. For further details, refer to Section VI, Exhibit F or see http://www.contech-cpi.com/stormwater/13.

The StormFilter units consists of multiple filter cartridges housed in a buried concrete vault that is installed offline from the storm drain system. Pollutant removal is primarily accomplished by percolating accumulated storm water through the filter cartridges. A typical unit consists of an inlet bay where floatables, oils, and surface scum are trapped; a filter bay for the cartridges; and an outlet bay. Water from the inlet bay ponds in the filter cartridge bay and infiltrates the filter media, after which the treated water moves into the outlet bay and into the storm drainage system. The unit's filter cartridges will be installed with an even mix of ZPG media (ie., Zeolite, Perlite and GAC) to treat the pollutants anticipated by this project's intended land use.

Design Criteria

All onsite treatment systems are flow-based systems, and therefore, are sized by estimating the Design Flow associated with the design storm determined in accordance with the Drainage Area Management Plan. This concept proposes systems to treat the two on-site areas. See Exhibits A and C in Section VI for reference.

The Storm Water Quality Design Flow (SQDF) calculated for Area "A" is 1.09 cfs (C = 0.79, I = 0.2 in/hr; A = 6.9 acres). The stormfilter system for Area "A" will be an in-series system consisting of an approximately 6'W x 12'L pre-cast (10 cartridges) and an approximately 8'W x 16'L pre-cast (26 cartridges). These will handle the low-flow and first flush treatment requirement for this drainage.

The Storm Water Quality Design Flow (SQDF) calculated for Area "B" is 1.14 cfs (C = 0.73, I = 0.2 in/hr; A = 7.2 acres). The StormFilter sizing for Area "B" will accommodate this flow rate. Area "B" will be serviced by an in series stormfilter system similar to the system used for Area A. This unit will handle the first flush and low flow treatment requirement for drainage.

Both of the on-site areas will have first flush and dry weather flows treated by the above systems. The first flush and dry weather flows will be treated and then discharged to the city storm drain system. All storm filter system sizing is preliminary and subject to change, pending entry approval of final improvement plans.

Nuisance/non-stormwater flows from the underground parking structure will not be allowed to drain into the storm drain system, but rather, will be treated with an oil/water separator to remove vehicle related pollutants and pollutants characteristic of parking areas prior to discharging to the sanitary sewer. Sump pumps will be used to remove runoff from the underground parking area.

Treatment of Anticipated Pollutants

StormFilter

The selected BMPs are anticipated to provide treatment for the majority of the project's pollutants of concern. Impacts from pesticides, nutrients and bacteria/viruses will also be minimized using routine non-structural and structural BMPs, such as common area efficient irrigation, landscape/pesticide use management, fertilizer management and daily clean up of pet wastes and food wastes.

Pollutant of Concern	Media FilterMP-40 StormFilter®
Sediment	High
Organic Compounds	Medium
Nutrients	Medium
Metals	Low/Medium*
Bacteria and Viruses	Low*
Oil and Grease	High
Oxygen Demanding Substances	Low*
Pesticides	Low*
Trash and Debris	High

* Pollutants not in bound forms. Please note that these pollutants are usually found in bound forms, which allow for higher removal rates.

StormFilter media can be customized by blending different filter media to target site specific media. "ZPG" (Zeolite, Perlite, and GAC) which targets a wide range of pollutants will be used in vault cartridges.

Media Options

The StormFilter can be customized using different filter media to target site-specific pollutants. A combination of media is often recommended to maximize pollutant removal effectiveness.

Pollutant	Perlite	CSF	MetalRx	Zeolite	GAC
Sediments	✓	✓			
Oil and Grease	✓	✓	✓		
Soluble Metals		✓	✓	✓	
Organics		✓	✓		✓
Nutrients	✓	✓	✓	✓	
Ammonium				✓	

Perlite is naturally occurring puffed volcanic ash. Its porous, multi-cellular structure and rough edges make it effective for removing TSS, oil and grease.

CSF® Leaf Media and MetalRx™ are created from deciduous leaves processed into granular, organic media. CSF is most effective for removing soluble metals, TSS, oil and grease, and neutralizing acid rain. MetalRx, a finer gradation, is used for higher levels of metal removal.

Zeolite is a naturally occurring mineral used in a variety of water filtration applications. It is used to remove soluble metals, ammonium and some organics.

GAC (Granular Activated Carbon) has a micro porous structure with an extensive surface area to provide high levels of adsorption. It is primarily used to remove oil and grease and organics such as herbicides and pesticides.

Additional BMPs

The following non-structural BMPs shall also be incorporated into this project:

1. **Building Maintenance (DAMP IC-3)**

   As part of the project's ongoing maintenance program, facility maintenance personnel shall properly collect and dispose of wash water when washing buildings, rooftops and other large objects. **No wash water will be allowed to drain into the project storm drains.** All wash water shall be directed to the sanitary sewer or disposed offsite to a waste water recycling facility. Work areas shall be prepared before conducting building maintenance and all materials generated and used shall be properly disposed.

2. **Landscape Maintenance (DAMP IC-7)**

   Gardening wastes shall be properly stored or disposed of and/or recycled. Irrigation runoff shall be properly handled and over-watering prevented. All fertilizers, mulch and pesticides shall be used sparingly and stored properly if allowed onsite and disposed of properly.

3. **Parking and Storage Area Maintenance (DAMP IC-15)**

   The parking lot shall be inspected daily and cleaned on a biweekly basis or as necessary. All wash water shall be properly contained, collected and disposed. **No wash water will be allowed to drain into the project storm drains.** All wash water shall be directed to the sanitary sewer or disposed offsite to a waste water recycling facility. Parking lot shall be kept in a clean and orderly state. Use of absorbent materials to clean up vehicle related spills and leaks shall be disposed and removed offsite at an approved landfill facility.

4. **Pool and Fountain Cleaning (DAMP IC-16)**

   Regular cleaning of the pool and adequate chlorine to control algae shall be required. Additionally, pool filters shall be cleaned and inspected regularly. Pool water shall be discharged of properly, into the sanitary sewer.

   Nutrients, pH, and chlorine can adversely affect fish and wildlife in water bodies. The following BMPs will ensure the cleanliness of the pool facility and the environment.

   Pool water will be discharged to the sanitary sewer. Prior to draining, the local wastewater treatment plant will be notified to ensure they are aware of the volume of discharge and the potential effects of chlorine levels

   Diatomaceous earth used in pool filters will not be disposed of in surface waters, on the ground, into storm drainage systems or septic systems. It will be dried out as much as possible, bagged in plastic, and dispose of at an approved offsite landfill.

5. **Fire Sprinkler Testing (DAMP IC-23)**

   Testing of fire sprinklers shall be conducted on non-rainy days and for the shortest duration possible to minimize discharge volume. All flow paths will be inspected and debris removed as necessary. Flows will be directed toward landscaped areas whenever possible in a manner that is safe and would not cause erosion. Sprinklers will also be directed into sanitary sewer with permission from the appropriate sewer agency.

6. **Disposal of Pet Wastes (DAMP R-5)**

   Inspect common areas daily for pet wastes. Remove and dispose of wastes into trash receptacles. Use sweeping in lieu of washing to clean areas. If washing is required, let wash water infiltrate into landscaped areas. Wash water is prohibited from entering the storm drain. Report any violations to the MRA. Provide "mutt mitts" or equivalent in areas where pets are allowed.

SECTION 5

Section V Inspection/Maintenance Responsibility for BMPs

Maintenance and inspection activities for the identified BMPs will be performed as indicated on the following BMP Maintenance Responsibility/Frequency Matrix. The maintenance and inspection responsibilities beyond the sale of the units will become the primary responsibility of the Master Residential Association (MRA) and the Master Commercial Association (MCA) for common areas and any common area private storm drains.

The MCA shall be responsible for all common commercial areas, the commercial parking garage, and inspecting and maintenance of the proposed StormFilter® water quality treatment systems per the Operation and Maintenance Plan (Table 1 and 2) included at the end of this section.

The MRA will be responsible for community park area and all maintenance and inspection responsibilities for residential common areas, area drains, catch basins, open space private aisles, residential parking garages and parking lots within the residential development.

Until such time as the MRA and the MCA are established, DJM Capital Partners, Inc. shall serve as the responsible party. The contact person is Becky Sullivan, DJM Capital Partners, Inc., 109 South La Cumbre Lane, Santa Barbara, CA at (805) 565-3365.

The City of Huntington Beach Public Works Department will be responsible for maintenance of all offsite public storm channels. Contact address for the Public Works Department is 2000 Main Street, Huntington Beach, CA 92648. The Public Works Dispatch telephone number is (714) 960-8861.

Please note that BMP N4 is not included in the following matrix, since the matrix itself is BMP N4. The MRA shall be responsible for all maintenance and inspection responsibilities for any common areas, area drains, catch basins, private streets and parking lots within the residential development. **The MRA and the MCA shall be the mechanisms to ensure long-term maintenance of all structural and non-structural BMP's. They shall retain all maintenance records for a period of three years after the recorded inspection date for the lifetime of the project. The records shall be made readily available for review by government agencies.**

Additionally, the MRA and the MCA shall be responsible for the long-term funding of all activities, as required by this WQMP, to ensure that all structural, non-structural, and treatment BMPs are operating effectively and as described in this WQMP.

A Notice of Transfer of Responsibility shall be submitted to the City of Huntington Beach in the event that responsibility for the Water Quality Management Plan (WQMP) for the subject property identified in this WQMP, and the implementation of this plan, is being transferred from the existing owner of the site (or a portion thereof) to a new owner. A copy of the Notice of Transfer of Responsibility form is provided at the end of this section.

TABLE NO. 1
NON-STRUCTURAL BMP MAINTENANCE
RESPONSIBILITY/FREQUENCY MATRIX

	BMP	RESPONSIBILITY	FREQUENCY
N1, N2	Homeowner or Tenant Education, Activity Restrictions and Employee Training	DJM Capital Partners, Inc. until turnover to the MRA and MCA.	Ongoing. Information to be provided to commercial tenants and homeowners.
N-3	Common Area Landscape Management	DJM Capital Partners, Inc. until turnover to the MRA and MCA, who will be responsible through the landscape maintenance contractor.	Monthly during regular maintenance, manage landscaping in accordance with the County of Orange Water Conservation Ordinance No. 3802 and with management guidelines for use of fertilizers and pesticides.
N4	BMP Maintenance	DJM Capital Partners, Inc. until turnover to the MRA and MCA for implementation of each non-structural BMP and scheduled cleaning of all structural BMP facilities.	Table 1 hereon.
N5	Title 22 CCR Compliance	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Continuous
N7	Spill Contingency	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Continuous for applicable commercial areas and pool area and equipment room. Ensure that all spills are cleaned up immediately and properly disposed of. Inspect for potential hazards and leaks of chlorine and other pool chemicals.

TABLE NO. 1
NON-STRUCTURAL BMP MAINTENANCE
RESPONSIBILITY/FREQUENCY MATRIX

	BMP	RESPONSIBILITY	FREQUENCY
N9	Hazardous Materials Disclosure Compliance	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Continuous. Disclose to the local fire department of any hazardous materials stored and disposed, including pool chemicals and pesticides, etc.
N10	Uniform Fire Code Implementation	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Continuous to remain in compliance with Article 80 of the Uniform Fire Code where applicable.
N11	Litter Control	DJM Capital Partners, Inc. until turnover to the MRA and MCA., through site maintenance contractor, and through enforcement of CC&R provisions, post construction.	Weekly sweeping and trash pick up landscaped and other common areas. Daily inspection of trash receptacles to ensure that lids are closed and pick up any excess trash on the ground, noting trash disposal violations by tenants and homeowners and reporting the violations to the MRA and MCA as applicable for investigation.
N12	Employee Training	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Upon first hire and then annual employee training program for all employees of the developer, the MRA and MCA.
N-13	Housekeeping of Loading Docks	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Daily inspection of loading areas for trash, litter and debris. All spills shall be cleaned up immediately. All wash water must be disposed of properly and not discharged into the storm drain system.

TABLE NO. 1
NON-STRUCTURAL BMP MAINTENANCE
RESPONSIBILITY/FREQUENCY MATRIX

	BMP	RESPONSIBILITY	FREQUENCY
N14	Common Area Catch Basin Inspection	DJM Capital Partners, Inc. until turnover to the MRA and MCA, for all drains located within public streets. The MRA and MCA shall be responsible for all drains located onsite.	Biannually to clean debris and silt in bottom of catch basins. Intensified around October 1st of each year, prior to "first flush" storm.
N-15	Street Sweeping Private Streets and Parking Lots	DJM Capital Partners, Inc.; and by the City of Huntington Beach for all public streets and the MRA and MCA for all private streets and parking areas, post construction.	Streets will be vacuum-swept using City-approved equipment on a weekly basis. This procedure will be intensified around October 1st of each year prior to the "first flush" storm.
IC-3	Building Maintenance	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Ongoing. Properly collect and dispose of water when washing buildings, rooftops and other large objects. Prepare work area before conducting building maintenance and properly dispose of all materials generated and used.
IC-7	Landscape Maintenance	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Inspect all landscaped areas regularly for trash, litter and debris and repair landscape areas as needed. Inspect all irrigation connections weekly for damage.
IC-15	Parking Area and Storage Maintenance	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Inspect parking lot daily and clean lot regularly. Clean up any automobile fluid leaks as soon as possible and dispose of all materials properly. Wash water and cleanup materials shall not be allowed to enter the storm drain system.

TABLE NO. 1
NON-STRUCTURAL BMP MAINTENANCE
RESPONSIBILITY/FREQUENCY MATRIX

	BMP	RESPONSIBILITY	FREQUENCY
IC-16	Pool and Fountain Cleaning	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Regular cleaning and adequate chlorine to control algae. Regular inspection and cleaning of filters. Discharge pool water properly, into the sanitary sewer.
IC-22	Eating and Drinking Establishments	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Daily inspection of food preparation areas to ensure kitchen is clean and all wash water kept indoors and prevented from reaching storm drains. Ensure grease interceptors are working properly, and all grease materials, oil and trash are recycled or disposed of properly and never into the storm drain system.
IC-23	Fire Sprinkler Testing/Maintenance	DJM Capital Partners, Inc.	Regular testing and maintenance as required by the City, local Fire Department or the Orange County Fire Authority. Conduct testing/maintenance on non-rainy days for the shortest duration possible. Direct all discharge to landscaped areas or the sanitary sewer, with permission from the appropriate sewer agency.
R-5	Disposal of Pet Wastes	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Inspect all common areas daily for pet wastes. Dispose of wastes properly.

TABLE NO. 2
STRUCTURAL BMP MAINTENANCE
RESPONSIBILITY/FREQUENCY MATRIX

	BMP	RESPONSIBILITY	FREQUENCY
SD-10	Common Area Runoff Efficient Landscape	DJM Capital Partners, Inc. through its landscaping maintenance contractor prior to acceptance by the MRA and MCA; by the MRA and MCA, post construction.	In conjunction with maintenance operations and prior to finalizing any replanting schemes. Verify that plants continue to be grouped according to similar water requirements in order to reduce excess irrigation runoff.
SD-12	Common Area Efficient Irrigation	DJM Capital Partners, Inc. through its landscaping maintenance contractor; After acceptance, and post-construction by the MRA and MCA.	Once a week, in conjunction with maintenance activities. Verify that runoff minimizing landscape design continues to function by checking that water sensors are functioning properly, that irrigation heads are adjusted properly to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, weather and day or night time temperatures.
SD-13	Catch Basin Signage	DJM Capital Partners, Inc. until turnover to the MRA and MCA.; by the City of Huntington Beach for all offsite public storm drains and the MRA and MCA, as indicated for all private storm drains, post construction.	Catch basin labels will be inspected twice a year and relabeled as necessary to maintain legibility. Thermoplastic markers (or other city-approved alternative) bearing the message "No Dumping -- Drains to Ocean" will be used.
SD-31	Dock Areas	DJM Capital Partners, Inc. prior to take over by the MCA, through its site maintenance contractor.	Daily inspection and removal of debris, litter, and trash.

TABLE NO. 2
STRUCTURAL BMP MAINTENANCE
RESPONSIBILITY/FREQUENCY MATRIX

	BMP	RESPONSIBILITY	FREQUENCY
SD-32	Trash Enclosures	DJM Capital Partners, Inc. prior to take over by the MRA and MCA, through its site maintenance contractor.	Daily inspection and removal of debris, litter, and trash. Ensure all lids are closed and any trash/debris located on the ground are removed and disposed of properly. Ensure enclosures are secure.
	StormFilter Water Quality Units	DJM Capital Partners, Inc. prior to take over by the MCA (with cooperation of the MRA), through the site maintenance contractor.	Inspect filters prior to start of rainy season (Oct. 1st) and after significant storm events. Remove accumulated sediment and debris as necessary. Maintain in conformance with the manufacturer's guidelines (See Exhibit F).

Water Quality Management Plan
Notice of Transfer of Responsibility

Tracking No. Assigned by the City of Huntington Beach: _____

Submission of this Notice of Transfer of Responsibility constitutes notice to the City of Huntington Beach that responsibility for the Water Quality Management Plan ("WQMP") for the subject property identified below, and implementation of that plan, is being transferred from the Previous Owner (and his/her agent) of the site (or a portion thereof) to the New Owner, as further described below.

I. Previous Owner/Previous Responsible Party Information

Company/Individual Name		Contact Person	
Title			
Street Address			
City	State	Zip	Phone

II. Information about Site Transferred

Name of Project (if applicable)		Contact Person	
Title of WQMP Applicable to Site			
Planning Area (PA) and/or Tract Number(s) for Site Lot Numbers (if Site is a portion of a tract)			
Date WQMP Prepared (and revised if applicable)			
Street Address of Site			
City	State	Zip	Phone

III. New Owner/New Responsible Party Information

Company/Individual Name		Contact Person	
Title			
Street Address			
City	State	Zip	Phone

IV. Ownership Transfer Information

General Description of Site Transferred to New Owner
General Description of Portion of Project/Parcel Subject to WQMP Retained by Owner (if any)
Lot/Tract Numbers of Site Transferred to New Owner
Remaining Lot/Tract Numbers Subject to WQMP Still Held by Owner (if any)
Date of Ownership Transfer

Note: When the Previous Owner is transferring a Site that is a portion of a larger project/parcel addressed by the WQMP, as opposed to the entire project/parcel addressed by the WQMP, the General Description of the Site transferred and the remainder of the project/parcel not transferred shall be set forth as maps attached to this notice. These maps shall show those portions of a project/parcel addressed by the WQMP that are transferred to the New Owner (the Transferred Site), those portions retained by the Previous Owner, and those portions previously transferred by Previous Owner. Those portions retained by Previous Owner shall be labeled "Previous Owner," and those portions previously transferred by Previous Owner shall be labeled as "Previously Transferred."

V. Purpose of Notice of Transfer

The purposes of this Notice of Transfer of Responsibility are: 1) to track transfer of responsibility for implementation and amendment of the WQMP when property to which the WQMP is transferred from the Previous Owner to the New Owner, and 2) to facilitate notification to a transferee of property subject to a WQMP that such New Owner is now the Responsible Party of record for the WQMP for those portions of the site that it owns.

VI. Certifications

A. Previous Owner

I certify under penalty of law that I am no longer the owner of the Transferred Site as described in Section II above. I have provided the New Owner with a copy of the WQMP applicable to the Transferred Site that the New Owner is acquiring from the Previous Owner.

Printed Name of Previous Owner Representative	Title
Signature of Previous Owner	Date

B. New Owner

I certify under penalty of law that I am the owner of the Transferred Site, as described in Section II above, that I have been provided a copy of the WQMP, and that I have informed myself and understand the New Owner's responsibilities related to the WQMP, its implementation, and Best Management Practices associated with it. I understand that by signing this notice, the New Owner is accepting all ongoing responsibilities for implementation and amendment of the WQMP for the Transferred Site, which the New Owner has acquired from the Previous Owner.

Printed Name of New Owner Representative	Title
Signature	Date

SECTION 6

Section VI Location Map, Plot Plan & BMP Details

Exhibit A Site Plan Exhibits

Exhibit B Vicinity Map

Exhibit C Proposed Preliminary Water Quality Exhibit and Qbmp Calculations

Exhibit D Referenced Master Plan of Drainage Facilities

Exhibit E Project Exhibits – Eye Level Perspective and Aerial View

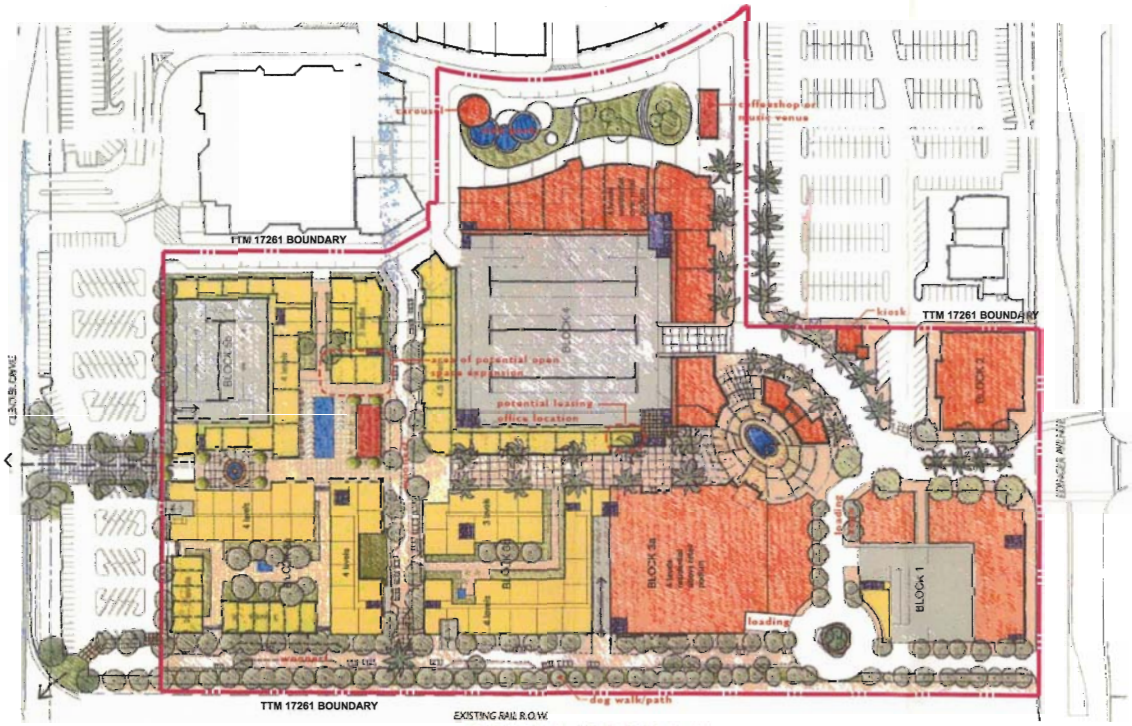
Exhibit F Manufacturer's Recommended Operation & Maintenance – Contech Stormfilter

Exhibit G BMP Fact Sheets

SECTION A

EXHIBIT A

SITE PLAN EXHIBITS



BELLA TERRA II

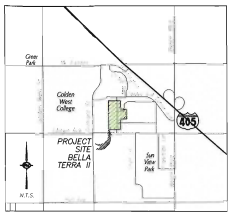
HUNTINGTON BEACH, CALIFORNIA

DJM CAPITAL PARTNERS INC

Perkowitz+Ruth ARCHITECTS

ILLUSTRATIVE SITE PLAN
GROUND LEVEL
WQMP EXHIBIT A-2

1



VICINITY MAP
NOT TO SCALE

LEGEND

- TRACT BOUNDARY
- LIMITS OF WORK
- NAP — NOT A PART
- DIRECTION OF SURFACE FLOW (ONSITE)
- DIRECTION OF SURFACE FLOW (OFFSITE)
- EXISTING STORM DRAIN (PRIVATE)
- PROPOSED STORM DRAIN (PRIVATE)
- PROPOSED PRIVATE CATCH BASIN (MAINTAINED BY MRA/MCA) LOCATIONS TO BE DETERMINED SD-13 CATCH BASIN STENCILING
- LANDSCAPE AREAS (PRIVATE) WITH BMP's: (MAINTAINED BY MRA/MCA) SD-10 SITE DESIGN/LANDSCAPE PLANNING SD-12 EFFICIENT IRRIGATION IC-7 LANDSCAPE MAINTENANCE R-3 PET WASTE DISPOSAL
- BUILDING STRUCTURES IC-3 BUILDING MAINTENANCE
- POOL/WATER FEATURES IC-16 POOL AND FOUNTAIN CLEANING
- STORMFILTER WATER QUALITY TREATMENT CONTROL BMP
- IC-10, SD-31 LOADING AREAS
- IC-15 PARKING/STORAGE AREA MAINTENANCE REMAINING LOCATIONS TO BE DETERMINED
- SD-32, IC-22 TRASH ENCLOSURES (MAINTAINED BY MRA/MCA) LOCATIONS TO BE DETERMINED.

GRAPHIC SCALE 1"=200'

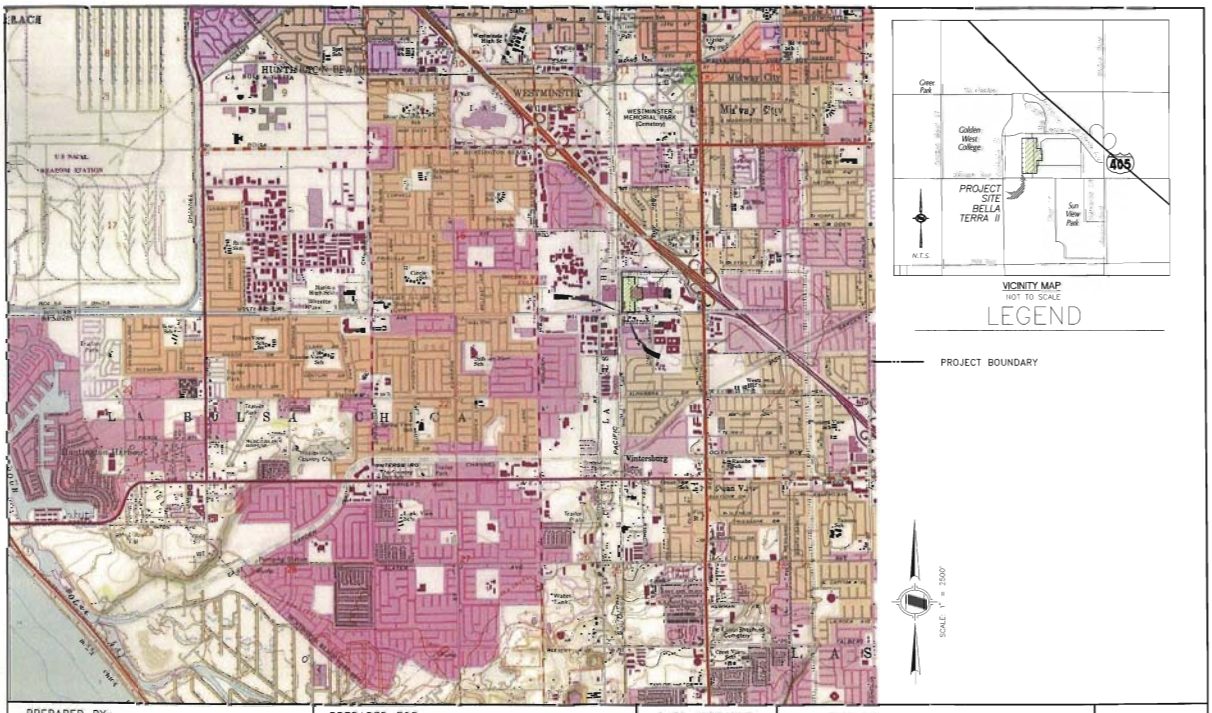
PREPARED BY:	PREPARED FOR:	DATE PREPARED: 4/23/08	THE VILLAGE AT BELLA TERRA TTM 17261 7777 EDINGER AVENUE HUNTINGTON BEACH, CA 92647	WQMP EXHIBIT A-1 SITE PLAN
HUNSAKER & ASSOCIATES IRVINE, INC. PLANNING • ENGINEERING • SURVEYING Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759	DJM CAPITAL PARTNERS 109 SOUTH LA CUMBRE LANE SANTA BARBARA, CALIFORNIA 93105 (805) 565 – 3365	WO # 3337-1T		

F:\0145\Engineering\WQ\WQMP-A.dwg

SECTION B

EXHIBIT B

VICINITY MAP



PREPARED BY:	PREPARED FOR:	DATE PREPARED: 4/11/08	THE VILLAGE AT BELLA TERRA TTM 17261 7777 EDINGER AVENUE HUNTINGTON BEACH, CA 92647	WQMP EXHIBIT B VICINITY MAP
HUNSAKER & ASSOCIATES IRVINE, INC. PLANNING • ENGINEERING • SURVEYING Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759	*DJM CAPITAL PARTNERS* 109 SOUTH LA CUMBRE LANE SANTA BARBARA, CALIFORNIA 93105 (805) 565 – 3365	WO # 3337-1T		

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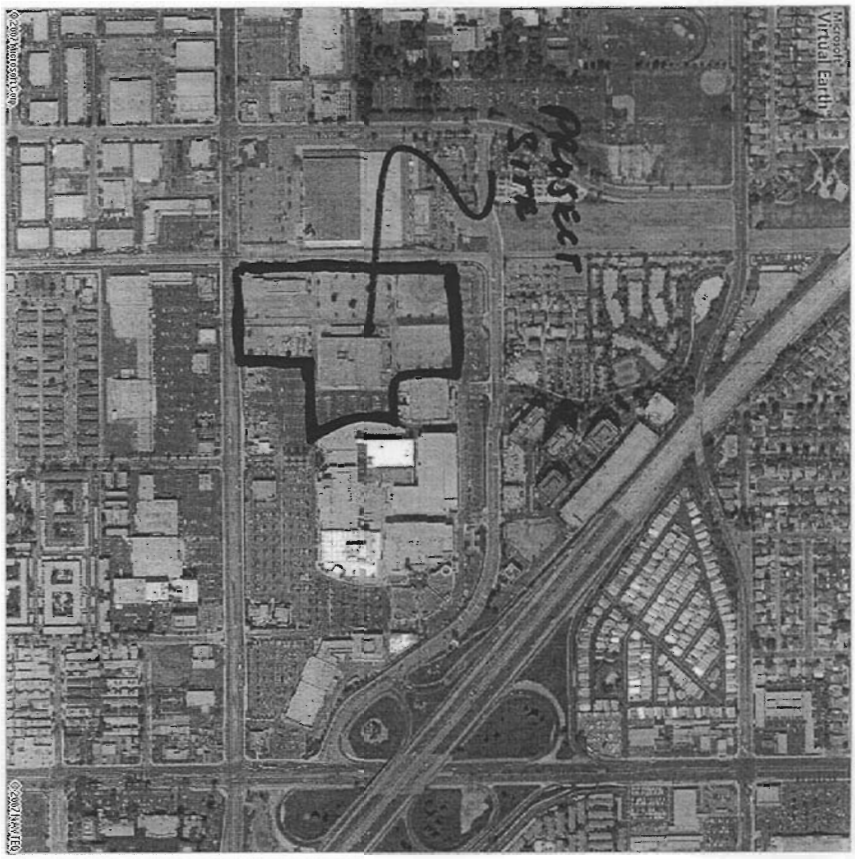
Live Search Maps



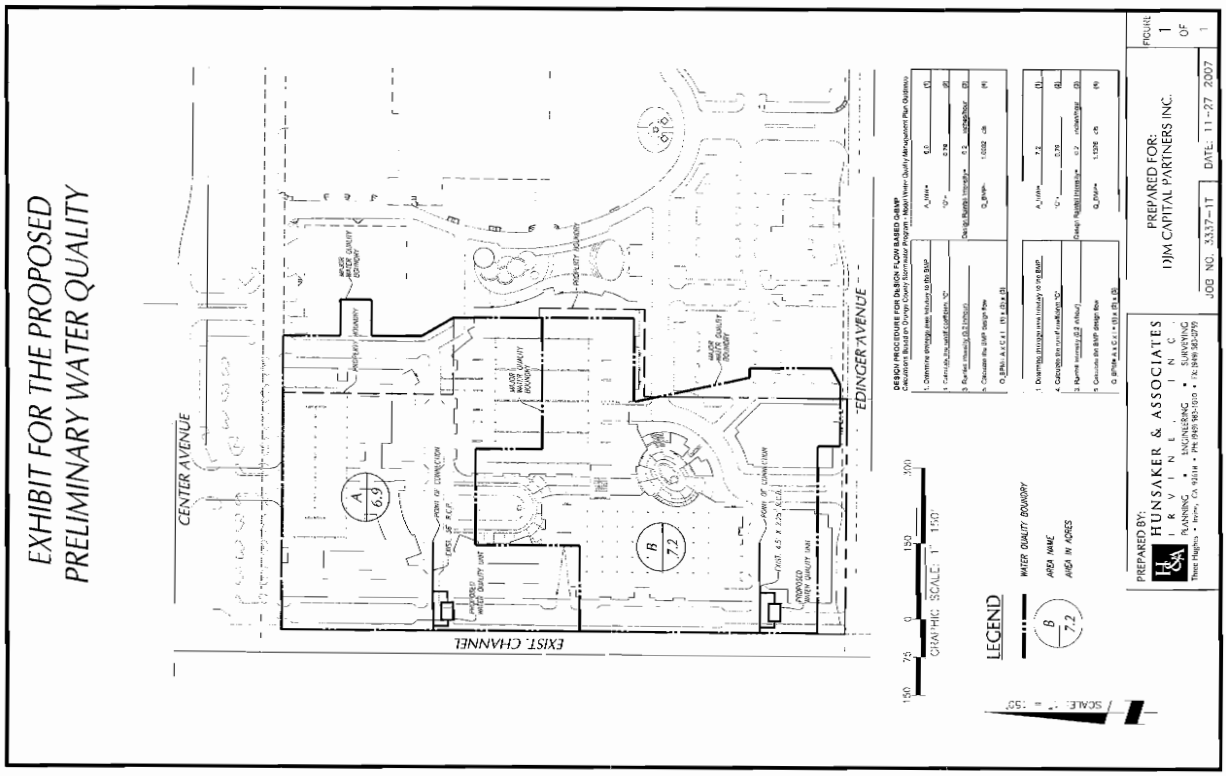
SECTION C

EXHIBIT C

WATER QUALITY SYSTEMS

AND

Qbmp WATER QUALITY CALCULATIONS



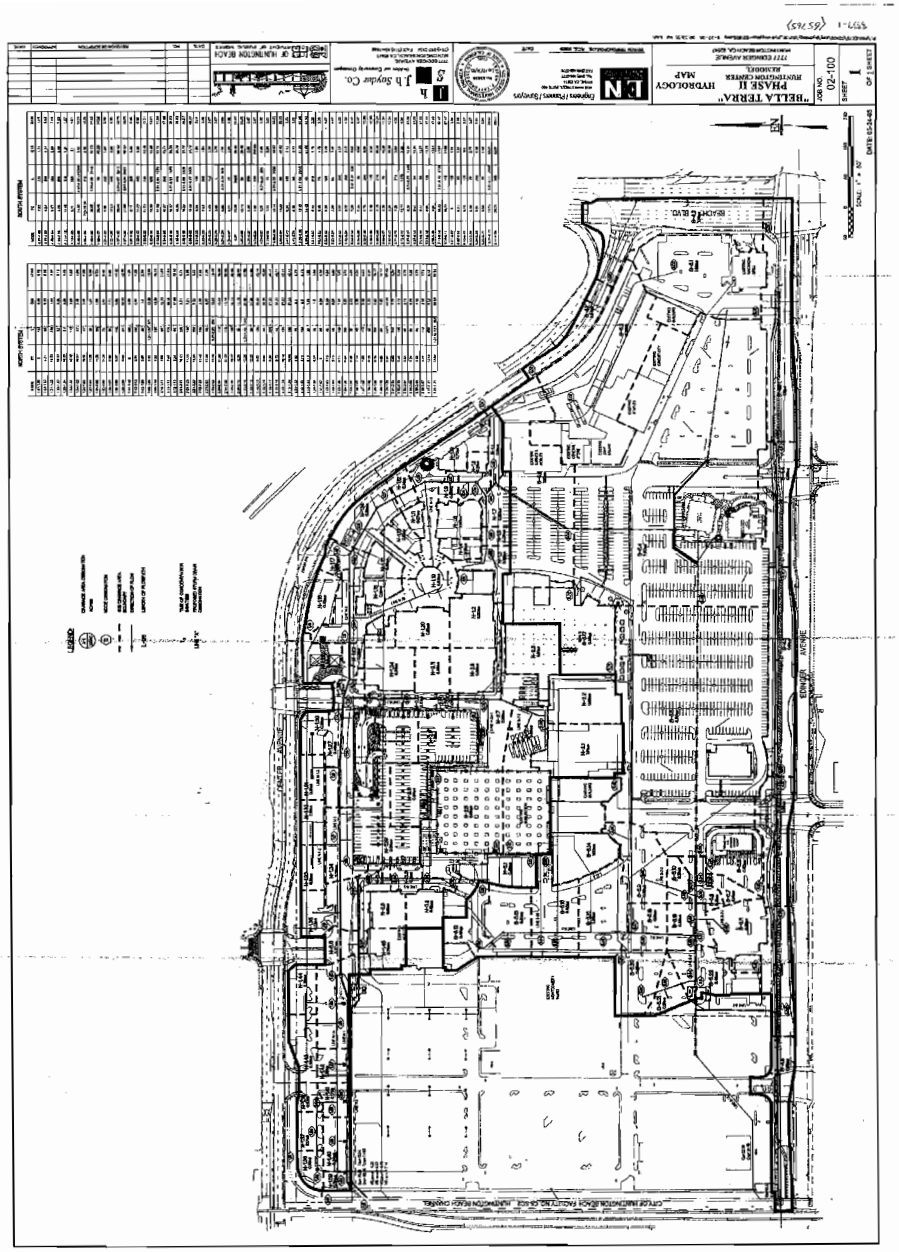
DESIGN PROCEDURE FOR DESIGN FLOW BASED Q-BMP

Calculations Based on Orange County Stormwater Program - Model Water Quality Management Plan Guidance

Designer: N.M.
Project: Bella Terra II
Location: City of Huntington Beach, County of Orange
Date: 11/27/07

1. Determine drainage area tributary to the BMP	A_total=	6.9		(1)
4. Calculate the runoff coefficient "C"	"C"=	0.79		(2)
3. Rainfall Intensity (0.2 in/hour)	Design Rainfall Intensity=	0.2	inches/hour	(3)
5. Calculate the BMP design flow Q_BPM= A x C x I = **(1) x (2) x (3)**	Q_BMP=	1.0902	cfs	(4)

1. Determine drainage area tributary to the BMP	A_total=	7.2		(1)
4. Calculate the runoff coefficient "C"	"C"=	0.79		(2)
3. Rainfall Intensity (0.2 in/hour)	Design Rainfall Intensity=	0.2	inches/hour	(3)
5. Calculate the BMP design flow Q_BPM= A x C x I = **(1) x (2) x (3)**	Q_BMP=	1.1376	cfs	(4)



ATTACHMENT A

DESIGN OF TREATMENT CONTROL BMPs USING THE STORMWATER QUALITY DESIGN FLOW(SQDF) OR THE STORMWATER QUALITY DESIGN VOLUME (SQDV)

Unlike flood control measures that are designed to handle peak flow rates, stormwater Treatment Control BMPs are designed to treat the more frequent, lower-flow rate storm events, or the first flush portions of runoff from larger storm events (typically referred to as the first-flush events). Small, frequent storm events represent most of the total average annual rainfall for the area. The flow rate and volume from such small events is targeted for treatment.

The primary control strategy for designing Treatment Control BMPs is to treat the Stormwater Quality Design Flow (SQDF) or the Stormwater Quality Design Volume (SQDV) of the stormwater runoff. This section explains how to calculate the SQDF or the SQDV of the stormwater runoff. In addition, Treatment Control BMPs must be designed to safely convey or bypass peak design storms.

The methods presented in this appendix are intended to be used for sizing of project-based Treatment Control BMPs in Project WQMPs, or determining the required SQDV or SQDF contribution from an individual project in allocating capacity in a regional or watershed BMP program. Methods for estimating hydrology from larger watershed for the sizing of regional or watershed BMPs that address larger areas may require alternative approaches for determining appropriate sizing of BMPs.

Stormwater Quality Design Flow (SQDF) Calculations

The Stormwater Quality Design Flow (SQDF) is defined by the Permits as the maximum flow rate of runoff produced from a rainfall intensity of 0.2-inch of rainfall per hour[8].

Calculation Procedure

1. The Stormwater Quality Design Flow in Orange County is defined as $Q_{P,SQDF}$.

[8] As defined in Section XII.B.3.B of the California Regional Water Quality Control Board, Santa Ana Region, Waste Discharge Requirements for the County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County within the Santa Ana Region, Urban Stormwater Runoff Management Program, Orange County, Order No. R8-2002-0010, NPDES Permit No. CAS618030; and in Section F.1.b.(2)(c) of the California Regional Water Quality Control Board, San Diego Region, Waste Discharge Requirements for Discharges of Urban Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds of the County of Orange, the Incorporated Cities of Orange County and the Orange County Flood Control District within the San Diego Region, Board Order No. R9-2002-0001, NPDES CAS0108740

2. Calculate the stormwater quality design flow for the site (or each sub-drainage area that will discharge to a separate BMP) produced by 0.2-inch/hour rainfall by using the rational method equation:

$$Q_{P,SQDF} = C * I * A$$

Where:

C = runoff coefficient obtained from **Table A-1**.

I = rainfall intensity (0.2 in/hr)

A = area of the site or sub-drainage area in acres

Table A-1

C Values Based on Impervious/Pervious Area Ratios

% Impervious	% Pervious	C
0	100	0.15
5	95	0.19
10	90	0.23
15	85	0.26
20	80	0.30
25	75	0.34
30	70	0.38
35	65	0.41
40	60	0.45
45	55	0.49
50	50	0.53
55	45	0.56
60	40	0.60
65	35	0.64
70	30	0.68
75	25	0.71
80	20	0.75
85	15	0.79
90	10	0.83
95	5	0.86
100	0	0.90

Example Stormwater Quality Design Flow (SQDF) Calculation

The steps below show an example calculation for a 30-acre site with runoff coefficient of 0.45 (40% impervious).

Step 1:

Design Flow = $Q_{P,SQDF} = C * I * A$

Step 2:

Calculate the peak rate of flow

$Q_{P,SQDF} = 0.45 \times 0.2 \times 30 = 2.7$ cfs = Stormwater Quality Design Flow for the BMP.

Stormwater Quality Design Storm Volume (SQDV) Calculations

Hydrologic calculations for design of volumetric-based stormwater quality BMPs in Orange County shall be in accordance with one of the four following approaches specified in the permits:

i. The volume of runoff produced from a 24-hour 85th percentile storm event, as determined from the local historical rainfall record[9]; or

ii. The volume of runoff produced by the 85th percentile 24-hour runoff event, determined as the maximized capture urban runoff volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual and Report on Engineering Practice No. 87, (1998); or

iii. The volume of annual runoff based on unit basin storage volume, to achieve 80 percent (Santa Ana Permit area), or 90 percent (San Diego Permit area) or more volume treatment by the method recommended in California Stormwater Best Management Practices Handbooks (1993), or

iv. The volume of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile 24-hour runoff event.[10]

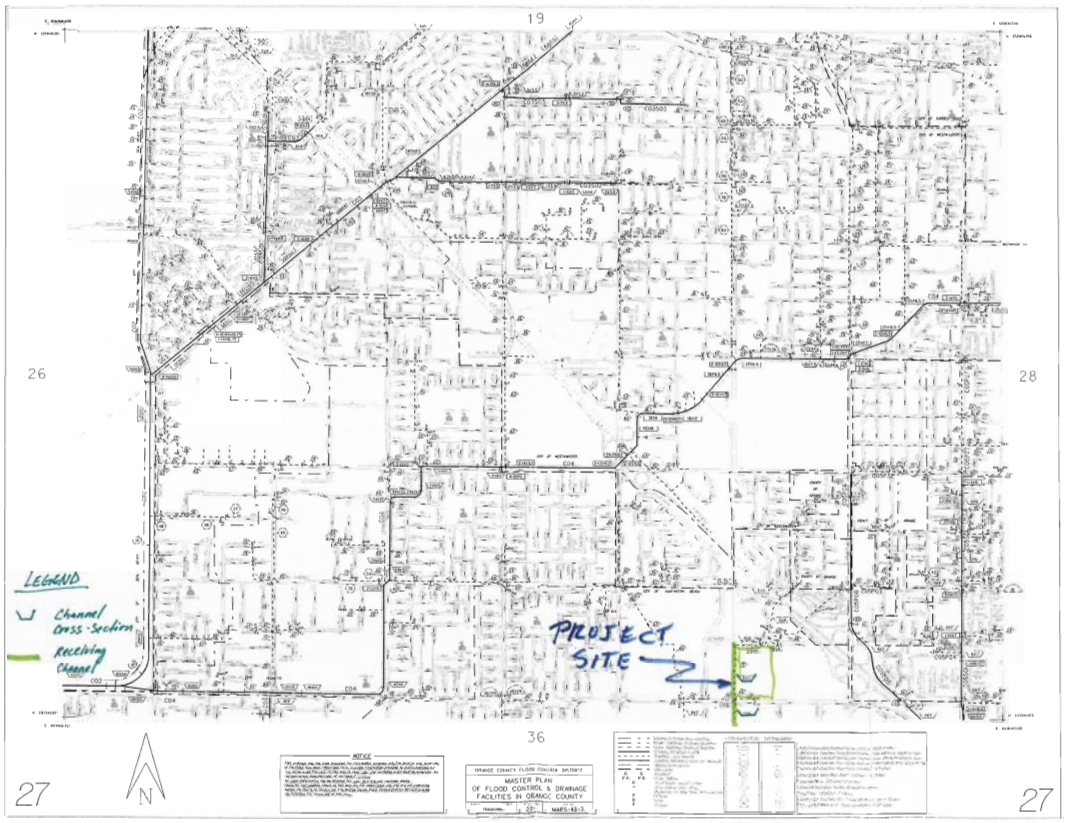
[9] This volume is not a single volume to be applied to all of Orange County. The size of the 85th percentile storm event is different for various parts of the County.

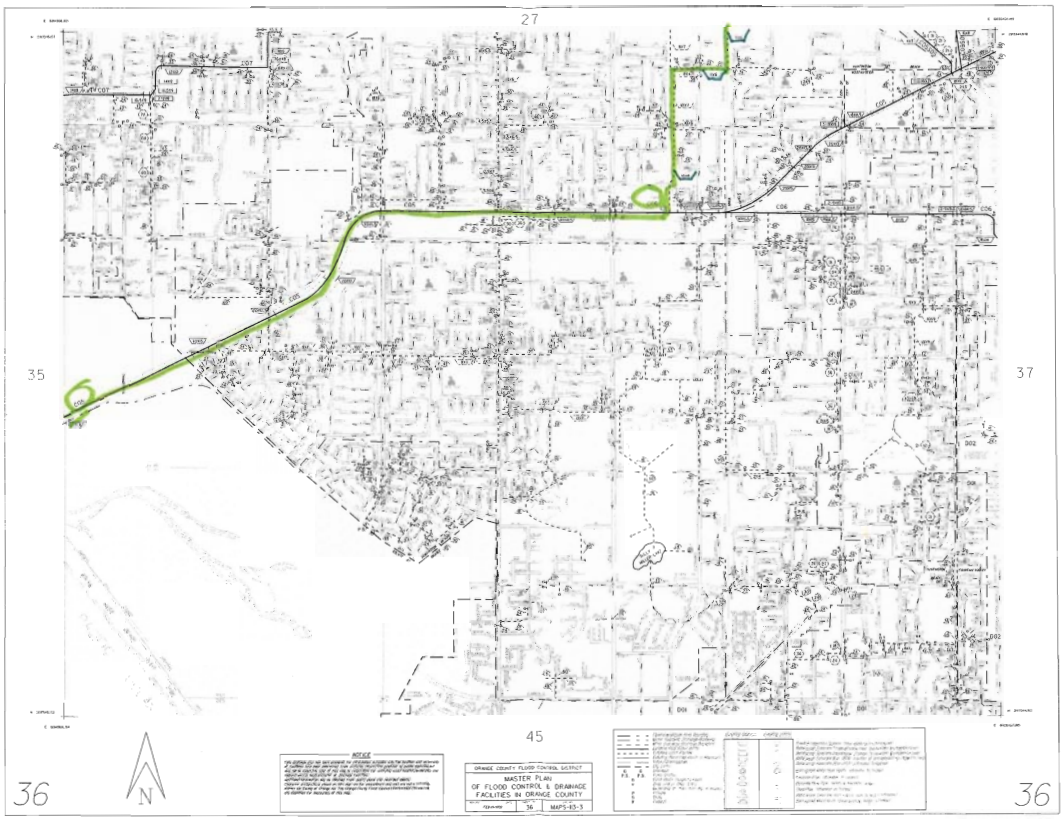
[10] Under this volume criterion, hourly rainfall data may be used to calculate the 85th percentile storm event, where each storm event is identified by its separation from other storm events by at least six hours of no rain. If hourly rainfall data is selected, the Permittees shall describe the method for using hourly rainfall data to calculate the 85th percentile storm event in their local WQMPs.

SECTION D

EXHIBIT D

VICINITY MASTER PLAN OF DRAINAGE FACILITIES


19
26
28
36
27
27
LEGEND
Channel Cross-Section
Receiving Channel
PROJECT SITE
N
ORANGE COUNTY FLOOD CONTROL DISTRICT
MASTER PLAN
OF FLOOD CONTROL & DRAINAGE
FACILITIES IN ORANGE COUNTY
MAPS-83-3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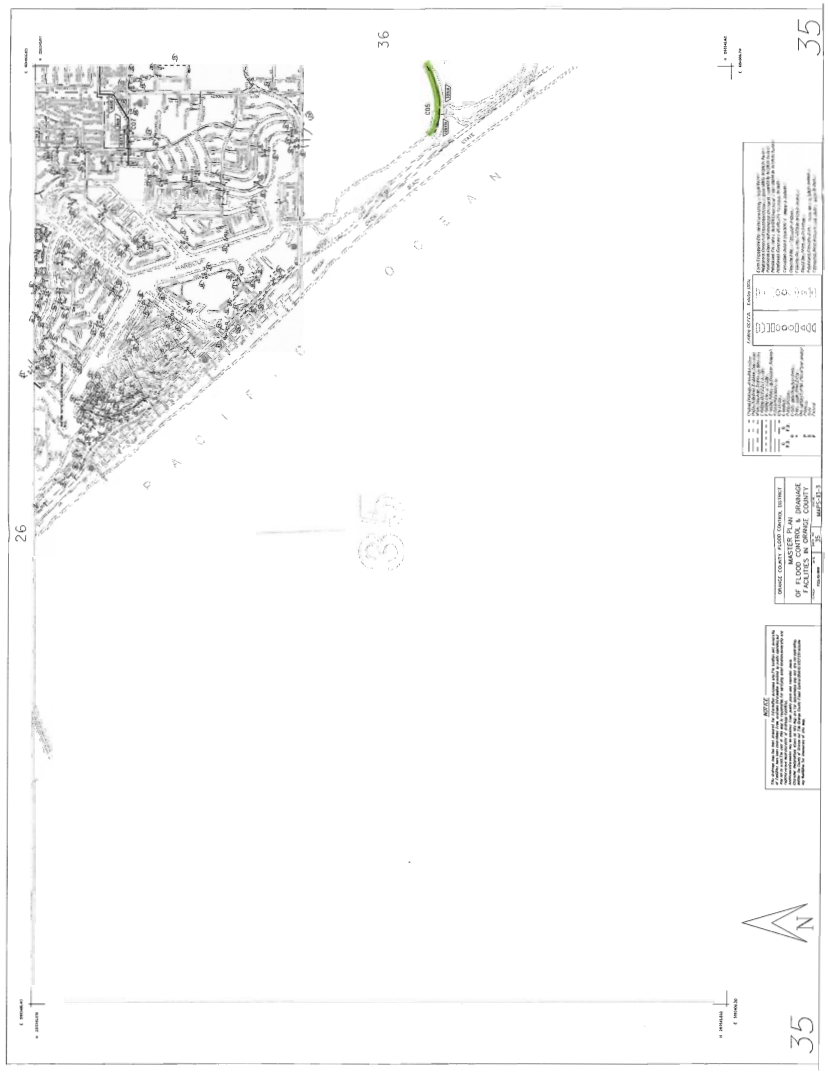
ORANGE COUNTY FLOOD CONTROL DISTRICT
MASTER PLAN
OF FLOOD CONTROL & DRAINAGE
FACILITIES IN ORANGE COUNTY
36
MAPS-83-3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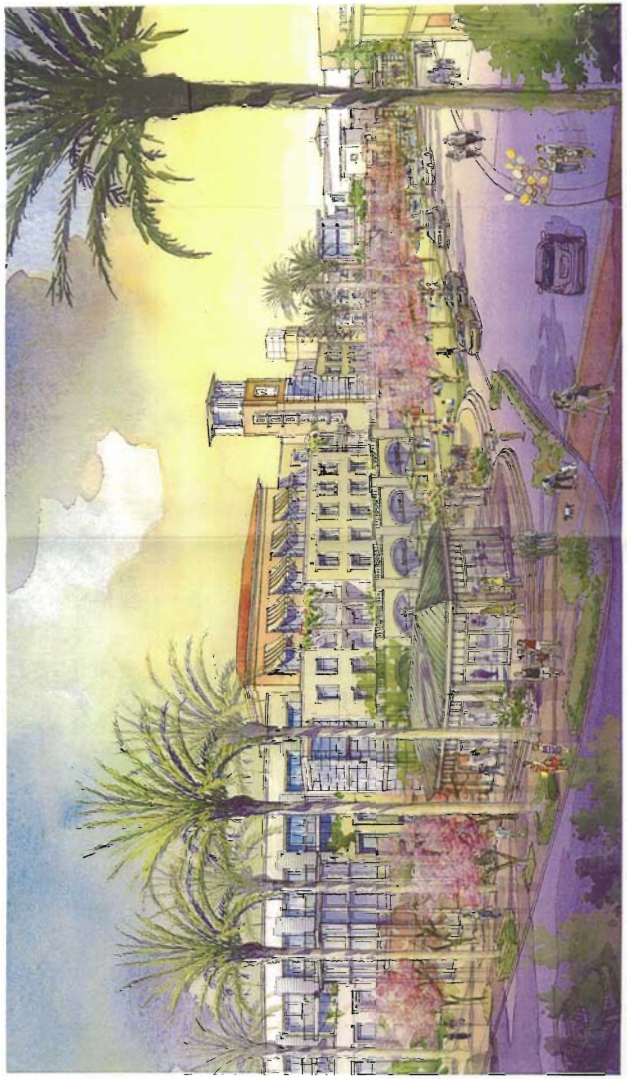
P A C I F I C
O C E A N
C05
N
NOTE
ORANGE COUNTY FLOOD CONTROL DISTRICT
MASTER PLAN
OF FLOOD CONTROL FACILITIES
FOR THE
CITY OF ORANGE, COUNTY
FLOOD CONTROL DISTRICT
35
MAP-D-1

SECTION E

EXHIBIT E

EXHIBITS FOR SITE RELATED EYE LEVEL PERSPECTIVE AND AERIAL VIEW

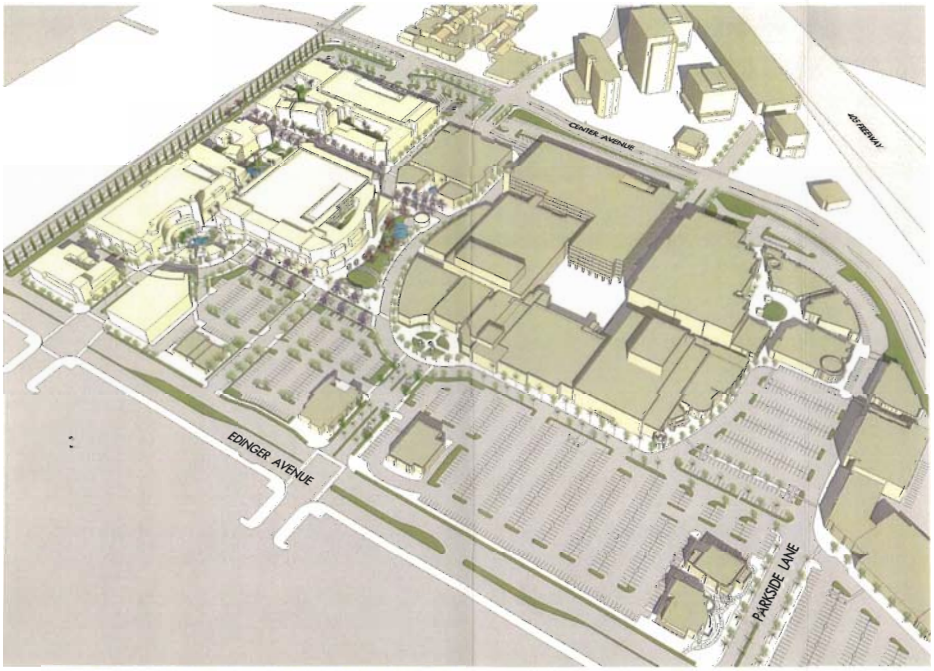


BELLA TERRA II
HUNTINGTON BEACH, CALIFORNIA

Eye Level Perspective
A-07
April 11, 2007

DJM CAPITAL PARTNERS INC.

studio eleven
Pankow+Ruth ARCHITECTS



BELLA TERRA II
HUNTINGTON BEACH, CALIFORNIA

Aerial View
Massing Model

A-06

05-327.10 April 11, 2007

studio 011 at Perkowitz+Ruth Architects 111 W. Ocean Blvd. 17th Floor, Long Beach, CA 90802 [562] 901-1500
Perkowitz + Ruth ARCHITECTS 600 Anton Blvd.16th Floor, Costa Mesa, CA 92626 [714] 850.3400
DJM CAPITAL PARTNERS, INC.
[562] 628.8000 Long Beach, CA [702] 892.8500 Las Vegas, NV [703] 668.0086 Washington, DC [479] 271.8090 Rogers, AR [503] 478.5900 Portland, OR www.prarchitects.com

SECTION F

EXHIBIT F

MANUFACTURER'S RECOMMENDED OPERATION & MAINTENANCE CONTECH STORMFILTER

CONTECH STORMWATER SOLUTIONS INC.

StormFilter Materials Submittal

Project Name: Pacific City Huntington Beach
System Size: 6' x 12' & 8' x 16' with 36 filter cartridges
System Treatment Flow: 1.20 cfs

Filter Cartridge:

- Orifice plate to restrict flow to 15 gpm per cartridge.
- Filter cartridge bottom pan, inner ring, and hood are constructed from linear low-density polyethylene.
- Filter cartridge screen is constructed from 16-gauge galvanized wire. The wire is welded in a ½-inch x 1-inch grid and coated with bonded PVC.
- Internal parts and fittings are constructed from ABS or PVC.
- Siphon float ball valve is constructed from linear high-density polyethylene.
- Miscellaneous screws, nuts, and fasteners are constructed from stainless steel.
- Outer fabric is 10 x 8.5 clear fiberglass mesh filter fabric.
- Inner fabric is 10 x 8.5 clear fiberglass mesh filter fabric over Enkamat 7210.

Zeolite-Perlite-Granular Activated Carbon(ZPG) Filter Media:

- ZPG filter media has an outer layer of perlite and an inner layer of composed of 90% zeolite and 10% granular activated carbon (GAC).
- Perlite is made of natural siliceous volcanic rock.
- Perlite has a bulk density ranging from 6.5 to 8.5 lb/ft^3.
- Perlite particle sizes range from a U.S. Standard #8 sieve to 0.50 inches.
- Zeolite is made of naturally occurring clinoptilolite.
- Zeolite has a bulk density ranging from 44 to 48 lb/ft^3.
- Zeolite particle sizes range from a U.S. Standard #4 sieve to U.S. Standard #6.
- Zeolite has a cation exchange capacity ranging from 1.0 to 2.2 meq/g.
- GAC is made of lignite coal that has been steam activated.
- GAC media has a bulk density ranging from 28 to 31 lb/ft^3.
- GAC particle sizes range from a U.S. Standard #4 sieve to U.S. Standard #8.

Piping:

- Internal piping and fittings are constructed from Schedule 40 PVC and ABS.
- PVC manifold pipe and fittings meets ASTM D1785. ABS manifold pipe and fittings meets ASTM F-628.
- Underdrain manifold detail attached as Exhibit A.

Other:

- Internal flow spreaders are constructed from polyethylene.
- Internal weir box are constructed from polyethylene.
- Internal energy dissipators are constructed from polyolefins.
- Cast iron frame and cover conforms ASTM A-48, Class 35B by D&L Foundry, model no. A-2003 (detail attached as Exhibit B).
- 3'-0" X 6'-0" torsion hinged 3/16" plate covers and frames by Oldcastle Precast (attached as Exhibit C).
- Concrete vault is constructed per Oldcastle Precast in Fontana, CA per ASTM C-857 (attached as Exhibit D).

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contechstormwater.com
12021-B NE Airport Way, Portland OR 97220
Toll-free: 800.548.4667 Fax: 800.561.1271

StormFilter Materials Submittal

Project Name: Pacific City Huntington Beach
System Size: 14' x 42' StormFilter with 114 filter cartridges
System Treatment Flow: 3.81 cfs

Filter Cartridge:

- Orifice plate to restrict flow to 15 gpm per cartridge.
- Filter cartridge bottom pan, inner ring, and hood are constructed from linear low-density polyethylene.
- Filter cartridge screen is constructed from 16-gauge galvanized wire. The wire is welded in a ½-inch x 1-inch grid and coated with bonded PVC.
- Internal parts and fittings are constructed from ABS or PVC.
- Siphon float ball valve is constructed from linear high-density polyethylene.
- Miscellaneous screws, nuts, and fasteners are constructed from stainless steel.
- Outer fabric is 10 x 8.5 clear fiberglass mesh filter fabric.
- Inner fabric is 10 x 8.5 clear fiberglass mesh filter fabric over Enkamat 7210.

Zeolite-Perlite-Granular Activated Carbon(ZPG) Filter Media:

- ZPG filter media has an outer layer of perlite and an inner layer of composed of 90% zeolite and 10% granular activated carbon (GAC).
- Perlite is made of natural siliceous volcanic rock.
- Perlite has a bulk density ranging from 6.5 to 8.5 lb/ft^3.
- Perlite particle sizes range from a U.S. Standard #8 sieve to 0.50 inches.
- Zeolite is made of naturally occurring clinoptilolite.
- Zeolite has a bulk density ranging from 44 to 48 lb/ft^3.
- Zeolite particle sizes range from a U.S. Standard #4 sieve to U.S. Standard #6.
- Zeolite has a cation exchange capacity ranging from 1.0 to 2.2 meq/g.
- GAC is made of lignite coal that has been steam activated.
- GAC media has a bulk density ranging from 28 to 31 lb/ft^3.
- GAC particle sizes range from a U.S. Standard #4 sieve to U.S. Standard #8.

Piping:

- Internal piping and fittings are constructed from Schedule 40 PVC and ABS.
- PVC manifold pipe and fittings meets ASTM D1785. ABS manifold pipe and fittings meets ASTM F-628.
- Underdrain manifold detail attached as Exhibit A.

Other:

- Internal flow spreaders are constructed from polyethylene.
- Internal energy dissipators are constructed from polyolefins.

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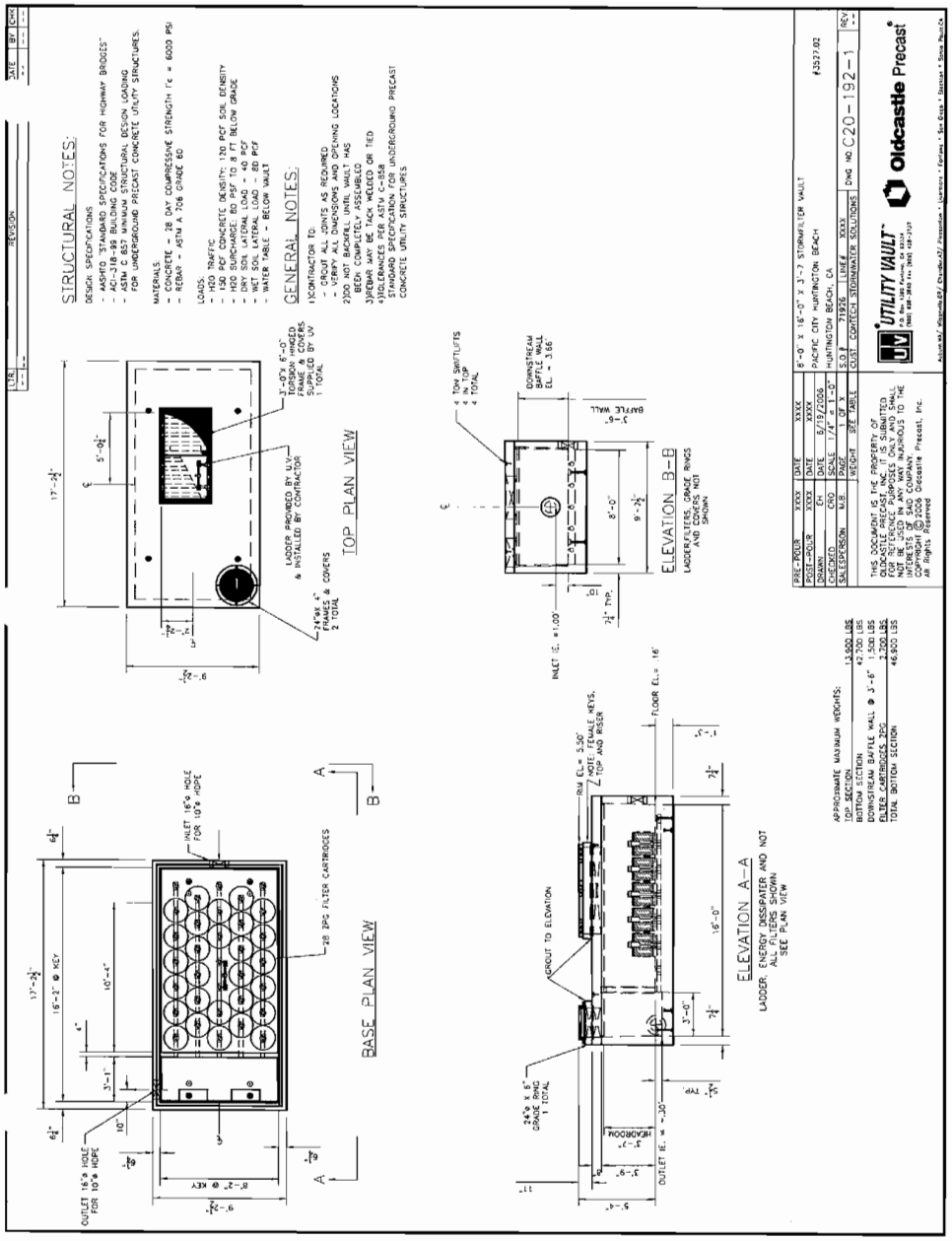
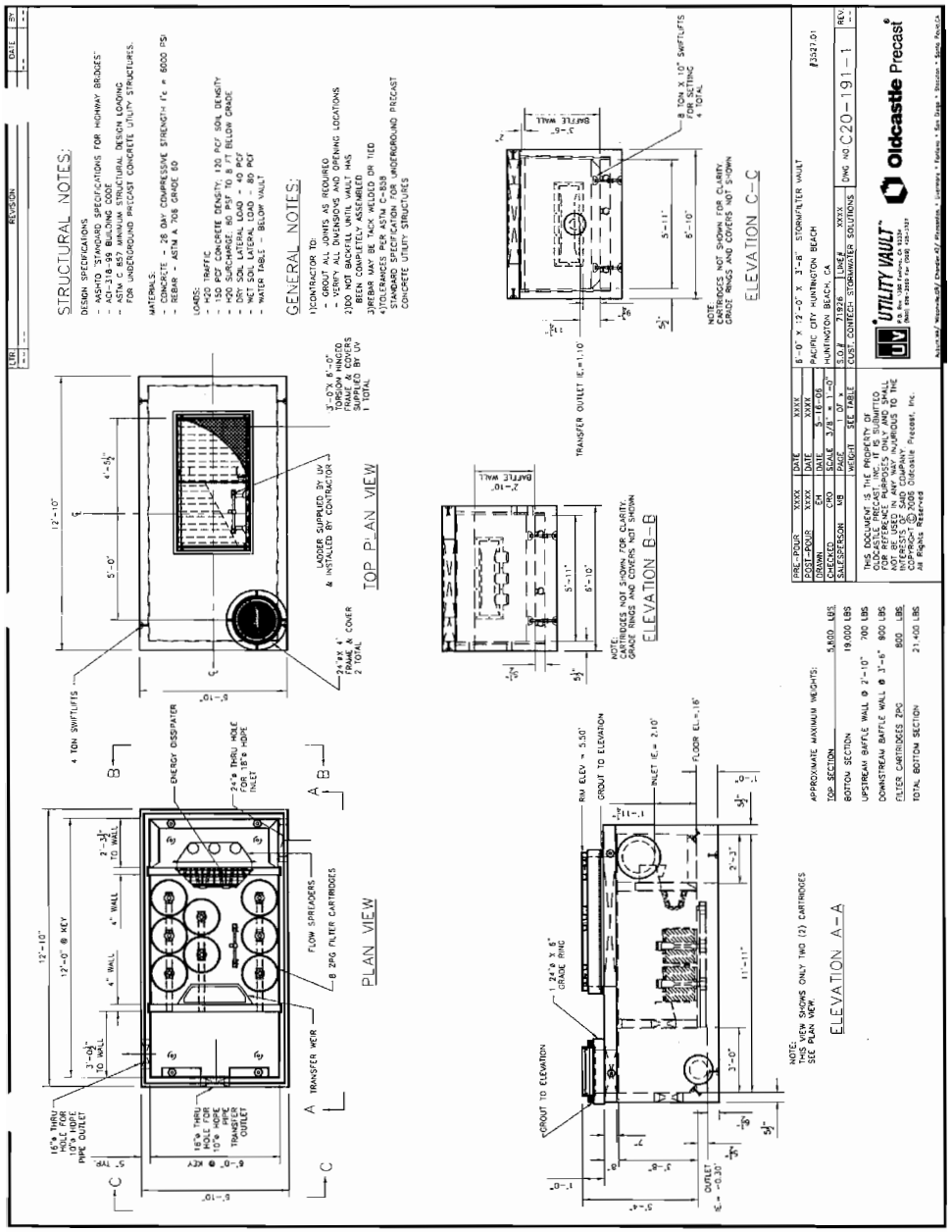
contechstormwater.com

12021-B NE Airport Way, Portland OR 97220
Toll-free: 800.548.4667 Fax: 800.561.1271





CONTECH® STORMWATER SOLUTIONS™

Operation and Maintenance

The Stormwater Management StormFilter®

Vault, Cast-In-Place, and Linear Units

Important: These guidelines should be used as a part of your site stormwater management plan.

Description

The Stormwater Management StormFilter® (StormFilter) is a passive, flow-through, stormwater filtration system. The system is comprised of one or more vaults that house rechargeable, media-filled, filter cartridges. The StormFilter works by passing stormwater through the media-filled cartridges, which trap particulates and adsorb materials such as dissolved metals and hydrocarbons. Once filtered through the media, the treated stormwater is directed to a collection pipe or discharged into an open channel drainage way.

The StormFilter is offered in multiple configurations, including vault, linear, catch basin, manhole, and cast-in-place. The vault, linear, manhole, and catch basin models utilize pre-manufactured units to ease the design and installation processes. The cast-in-place units are customized for larger flows and may be either covered or uncovered underground units.

Purpose

The StormFilter is a passive, flow-through, stormwater filtration system designed to improve the quality of stormwater runoff from the urban environment before it enters receiving waterways. It is intended to function as a Best Management Practice (BMP) to meet federal, state, and local requirements for treating runoff in compliance with the Clean Water Act.

Through independent third party studies, it has been demonstrated that the StormFilter is highly effective for treatment of first flush flows and for treatment of flow-paced flows during the latter part of a storm. In general, the StormFilter's efficiency is highest when pollutant concentrations are highest. The primary non-point source pollutants targeted for removal by the StormFilter are: suspended solids (TSS), oil and grease, soluble metals, nutrients, organics, and trash and debris.

Sizing

The StormFilter is sized to treat the peak flow of a water quality design storm. The peak flow is determined from calculations based on the contributing watershed hydrology and from a design storm magnitude set by the local stormwater management agency. The particular size of a StormFilter unit is determined by the number of filter cartridges (see Figure 1) required to treat this peak flow.

The flow rate through each filter cartridge is adjustable, allowing control over the amount of contact time between the influent and the filter media. The maximum flow rate through each cartridge can be adjusted to between 5 and 15 gpm using a calibrated restrictor disc at the base of each filter cartridge. Adjustments to the cartridge flow rate will affect the number of cartridges required to treat the peak flow.

Basic Function

The StormFilter is designed to siphon stormwater runoff through a filter cartridge containing media. A variety of filter media is available and can be customized for each site to target and remove the desired levels of sediments, dissolved phosphorus, dissolved metals, organics, and oil and grease. In many cases, a combination of media is recommended to maximize the effectiveness of the stormwater pollutant removal.

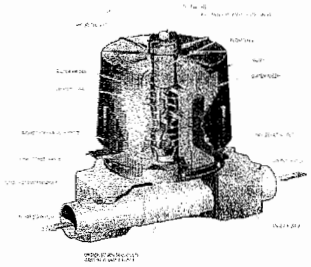


Figure 1. The StormFilter Cartridge

Priming System Function

When stormwater in the StormFilter unit enters a StormFilter cartridge, it percolates horizontally through the cartridge's filter media and collects in the center tube of the cartridge, where the float in the cartridge is in a closed (downward) position.

Water continues to pass through the filter media and into the cartridge's center tube. The air in the cartridge is displaced by the water and purged from beneath the filter hood through the one-way check valve located in the cap. Once the center tube is filled with water (approximately 18 inches deep), there is enough buoyant force on the float to open the float valve and allow the treated water in the center tube to flow into the under-drain manifold. This causes the check valve to close, initiating a siphon that draws polluted water throughout the full surface area and volume of the filter. Thus, the entire filter cartridge is used to filter water throughout the duration of the storm, regardless of the water surface elevation in the unit. This siphon continues until the water surface elevation drops to the elevation of the hood's scrubbing regulators.

The cartridges are connected to the under-drain manifold with a plastic connector. Since some media used is potentially buoyant, a threaded connector affixed to the under-drain manifold (with glue or other adhesive) is necessary to ensure that the cartridge isn't lifted out of place. For the heavier compost media, a slip connector is used.

The StormFilter is also equipped with flow spreaders that trap floating debris and surface films, even during overflow conditions. Depending on individual site characteristics, some systems are equipped with high and/or base flow bypasses. High flow bypasses are installed when the calculated peak storm event generates a flow that overcomes the overflow capacity of the system. This is especially important for precast systems. Base flow bypasses are sometimes installed to bypass continuous inflows caused by ground water seepage, which usually do not require treatment. All StormFilter units are designed with an overflow. The overflow operates when the inflow rate is greater than the treatment capacity of the filter cartridges.

Maintenance Guidelines

The primary purpose of the StormFilter is to filter out and prevent pollutants from entering our waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the StormFilter to its full efficiency and effectiveness.

Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site.

Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. It is also good practice to inspect the system after severe storm events.

Types of Maintenance

Presently, procedures have been developed for two levels of maintenance:

- Inspection/minor maintenance
- Major maintenance.

Inspection/minor maintenance activities are combined since minor maintenance does not require special equipment and typically little or no materials are in need of disposal.

Inspection/minor maintenance typically involves:

- Inspection of the vault itself
- Removal of vegetation and trash and debris.

Major maintenance typically includes:

- Cartridge replacement
- Sediment removal

Important: Applicable safety (OSHA) and disposal regulations should be followed during all maintenance activities.

Maintenance Activity Timing

Two scheduled inspections/maintenance activities should take place during the year.

First, an inspection/minor maintenance activity should be done. During the minor maintenance activity (routine inspection, debris removal), the need for major maintenance should be determined and, if disposal during major maintenance will be required, samples of the sediments and media should be obtained.

Second, if required, a major maintenance activity (replacement of the filter cartridges and associated sediment removal) should be performed.

In addition to these two scheduled activities, it is important to check the condition of the StormFilter unit after major storms for damage caused by high flows and for high sediment accumulation that may be caused by localized erosion in the drainage area. It may be necessary to adjust the maintenance activity schedule depending on the actual operating conditions encountered by the system.

In general, minor maintenance activities will occur late in the rainy season, and major maintenance will occur in late summer to early fall when flows into the system are not likely to be present.

Maintenance Activity Frequency

The primary factor controlling timing of maintenance for the StormFilter is sedimentation.

A properly functioning system will remove solids from water by trapping particulates in the porous structure of the filter media. The flow through the system will naturally decrease as more and more solids are trapped. Eventually the flow through the system will be low enough to require replacement of the cartridges. It may be possible to extend the usable span of the cartridges by removing sediment from upstream trapping devices on an as-needed basis in order to prevent material from being re-suspended and discharged to the system.

Site conditions greatly influence maintenance requirements. StormFilter units located in areas with erosion or active construction should be inspected and maintained more often than those in fully stabilized areas.

The maintenance frequency may be adjusted as additional monitoring information becomes available during the inspection program. Areas that develop known problems should be inspected more frequently than areas that demonstrate no problems, particularly after large storms.

Ultimately, inspection and maintenance activities should be scheduled based on the historic records and characteristics of an individual StormFilter system. It is recommended that the maintenance agency develop a database to properly manage StormFilter maintenance programs.

Prior to the development of the maintenance database, the following maintenance frequencies should be followed:

Inspection/minor maintenance
- One time per year
- After Major Storms

Major maintenance
- One time per year
- In the event of a chemical spill

Frequencies should be updated as required.

The recommended initial frequency for inspection/minor maintenance is two times per year for precast units. StormFilter units should be inspected after all major storms. Sediment removal and cartridge replacement on an annual basis is recommended until further knowledge is gained about a particular system.

Once an understanding of site characteristics has been established, maintenance may not be needed for one to two years, but inspection is warranted.

Maintenance Methods

Inspection/Minor Maintenance

The primary goal of a maintenance inspection is to assess the condition of the cartridges relative to the level of sediment loading. It may be desirable to conduct this inspection during a storm to observe the relative flow through the filter cartridges. If the submerged cartridges are severely plugged, large amounts of sediments will be present and very little flow will be discharged from the drainage pipes. If this is the case, it is likely that the cartridges need to be replaced.

Warning: In the case of a spill, the worker should abort maintenance activities until the proper guidance is obtained. Notify the local hazard control agency and CONTECH Stormwater Solutions immediately.

To conduct an inspection and/or minor maintenance:

Important: Maintenance must be performed by a utility worker familiar with StormFilter units.

1. If applicable, set up safety equipment to protect pedestrians from fall hazards due to open vault doors or when work is being done near walkways or roadways.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.

3. Open the doors to the vault and allow the system to air out for 5-10 minutes.
4. Without entering the vault, inspect the inside of the unit, including components.
5. Take notes about the external and internal condition of the vault.

   Be sure to record the level of sediment build-up on the floor of the vault, in the forebay, and on top of the cartridges. If flow is occurring, note the level of water and estimate the flow rate per drainage pipe. Record all observations.
6. Remove large loose debris and trash using a pole with a grapple or net on the end.
7. Close and fasten the door.
8. Remove safety equipment.
9. Make notes about the local drainage area relative to ongoing construction, erosion problems, or high loading of other materials to the system.
10. Finally, review the condition reports from the previous minor and major maintenance visits, and schedule cartridge replacement if needed.

Major Maintenance

Depending on the configuration of the particular system, a worker may be required to enter the vault to perform some tasks.

Important: If vault entry is required, OSHA rules for confined space entry must be followed.

Filter cartridge replacement should occur during dry weather. It may be necessary to plug the filter inlet pipe if base flows exist. Standing water present in the vault should be regarded as polluted and should be contained during this operation by temporarily capping the manifold connectors.

Replacement cartridges will be delivered to the site. Information concerning how to obtain the replacement cartridges is available from CONTECH Stormwater Solutions.

Warning: In the case of a spill, the worker should abort maintenance activities until the proper guidance is obtained. Notify the local hazard control agency and CONTECH Stormwater Solutions immediately.

To conduct cartridge replacement and sediment removal maintenance:

1. If applicable, set up safety equipment to protect pedestrians from fall hazards due to open vault doors or when work is being done near walkways or roadways.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the doors to the vault and allow the system to air out for 5-10 minutes.
4. Without entering the vault, give the inside of the unit, including components, a general condition inspection.
5. Make notes about the external and internal condition of the vault.

   Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.
6. Remove large loose debris and trash using a pole with a grapple or net on the end.
7. Using a boom, crane, or other device (dolly and ramp), offload the replacement cartridges (up to 150 lbs. each) and set aside.
8. Remove used cartridges from the vault using one of the following methods:

Important: This activity will require that workers enter the vault to remove the cartridges from the drainage system.

Method 1:

a. Using an appropriate sling, attach the cable from the boom, crane, or tripod to the cartridge being removed. Contact CONTECH Stormwater Solutions for specifications on appropriate attachment devices.

This activity will require that workers enter the vault to remove the cartridges from the drainage system and place them under the vault opening for lifting.

Important: Note that cartridges containing media other than the leaf media require unscrewing from their threaded connectors. Take care not to damage the manifold connectors. This connector should remain installed in the manifold and capped if necessary.

b. Remove the used cartridges (250 lbs. each) from the vault.

Important: Care must be used to avoid damaging the cartridges during removal and installation. The cost of repairing components damaged during maintenance will be the responsibility of the owner unless CONTECH Stormwater Solutions performs the maintenance activities and damage is not related to discharges to the system.

c. Set the used cartridge aside or load onto the hauling truck.

d. Continue steps a through c until all cartridges have been removed.

Method 2:

a. Unscrew the cartridge cap.

b. Remove the cartridge hood.

c. Tip the cartridge on its side.

Important: Note that cartridges containing media other than the leaf media require unscrewing from their threaded connectors. Take care not to damage the manifold connectors. This connector should remain installed in the manifold and capped if necessary.

d. Empty the cartridge onto the vault floor.

e. Set the empty, used cartridge aside or load onto the hauling truck.

f. Continue steps a through e until all cartridges have been removed.

9. Remove deposited sediment from the floor of the vault and, if large amounts are present, from the forebay. This can usually be accomplished by shoveling the sediment into containers, which, once full, are lifted mechanically from the vault and placed onto the hauling truck. If Method 2 in Step 8 is used to empty the cartridges, or in cases of extreme sediment loading, a vactor truck may be required.

10. Once the sediments are removed, assess the condition of the vault and the condition of the manifold and connectors. The connectors are short sections of 2-inch schedule 40 PVC, or threaded schedule 80 PVC that should protrude above the floor of the vault.
    a. If required, apply a light coating of FDA approved silicon grease to the outside of the exposed portion of the connectors. This ensures a watertight connection between the cartridge and the drainage pipe.
    b. Replace any damaged connectors.
11. Using the boom, crane, or tripod, lower and install the new cartridges. Once again, take care not to damage connections.

12. Close and fasten the door.

13. Remove safety equipment.

14. Make notes about the local drainage area relative to ongoing construction, erosion problems, or high loadings of other materials to the system.

15. Finally, dispose of the residual materials in accordance with applicable regulations. Make arrangements to return the used cartridges to CONTECH Stormwater Solutions.

Related Maintenance Activities
(Performed on an as-needed basis)

StormFilter units are often just one of many components in a more comprehensive stormwater drainage and treatment system. The entire system may include catch basins, detention vaults, sedimentation vaults and manholes, detention/retention ponds, swales, artificial wetlands, and other miscellaneous components.
In order for maintenance of the StormFilter to be successful, it is imperative that all other components be properly maintained. The maintenance/repair of upstream facilities should be carried out prior to StormFilter maintenance activities.

In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil and grease loading, and discharges of inappropriate materials.

Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in a manner that will not allow the material to affect surface or ground water. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily traveled roads.

Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. It is not appropriate to discharge untreated materials back to the stormwater drainage system.

Part of arranging for maintenance to occur should include coordination of disposal of solids (landfill coordination) and liquids (municipal vacuum truck decant facility, local wastewater treatment plant, on-site treatment and discharge).

Owners should contact the local public works department and inquire about how the department disposes of their street waste residuals. CONTECH Stormwater Solutions will determine disposal methods or reuse of the media contained in the cartridges. If the material has been contaminated with any unusual substance, the cost of special handling and disposal will be the responsibility of the owner.

StormFilter Minor Maintenance and Inspection Data Sheet

Date: _____ **Personnel:** _____

Location: _____ **System Size:** _____

System Type: Vault Cast-In-Place Linear

System Observations

Media Months in Service: _____

Oil and Grease in Forebay: **Yes** **No** _____

Sediment Depth in Forebay: _____

Sediment Depth on Vault Floor: _____

Structural Damage: _____

Estimated Flow from Drainage Pipes (if available): _____

Cartridges Submerged: **Yes** **No** How Deep: _____

StormFilter Minor Maintenance Activities (check off if done and give description)

Trash and Debris Removal: _____

Minor Structural Repairs: _____

Drainage Area Report

Excessive Oil and Grease Loading: **Yes** **No** Source: _____

Sediment Accumulation on Pavement: **Yes** **No** Source: _____

Erosion of Landscaped Areas: **Yes** **No** Source: _____

Items Needing Further Work: _____

Other Comments: _____

Review the condition reports from the previous minor and major maintenance visits.

StormFilter Major Maintenance/Cartridge Replacement Data Sheet

Date: _____ **Personnel:** _____

Location: _____ **System Size:** _____

System Type: Vault Cast-In-Place Linear

List Safety Procedures and Equipment Used: _____

_____

_____

System Observations

Media Months in Service: _____

Oil and Grease in Forebay: **Yes** **No** _____

Sediment Depth in Forebay: _____

Sediment Depth on Vault Floor: _____

Structural Damage: _____

Drainage Area Report

Excessive Oil and Grease Loading: **Yes** **No** Source: _____

Sediment Accumulation on Pavement: **Yes** **No** Source: _____

Erosion of Landscaped Areas: **Yes** **No** Source: _____

StormFilter Cartridge Replacement Maintenance Activities

Remove Trash and Debris: **Yes** **No** Details: _____

Replace Cartridges: **Yes** **No** Details: _____

Sediment Removed: **Yes** **No** Details: _____

Quantity of Sediment Removed (estimate?): _____

Minor Structural Repairs: **Yes** **No** Details: _____

Residuals (debris, sediment) Disposal Methods: _____

Notes: _____

SECTION G

EXHIBIT G

BMP FACT SHEETS

IC3. BUILDING MAINTENANCE

Best Management Practices (BMPs)

A BMP is a technique, measure or structural control that is used for a given set of conditions to improve the quality of the stormwater runoff in a cost effective manner[1]. The minimum required BMPs for this activity are outlined in the box to the right. Implementation of pollution prevention/good housekeeping measures may reduce or eliminate the need to implement other more costly or complicated procedures. Proper employee training is key to the success of BMP implementation.

The BMPs outlined in this fact sheet target the following pollutants:

Targeted Constituents	
Sediment	x
Nutrients	x
Floatable Materials	
Metals	x
Bacteria	x
Oil & Grease	
Organics & Toxicants	
Pesticides	
Oxygen Demanding	

MINIMUM BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping

- Properly collect and dispose of water when pressure washing buildings, rooftops, and other large objects.
- Properly prepare work area before conducting building maintenance.
- Properly clean and dispose of equipment and wastes used and generated during building maintenance.
- Store toxic material under cover when not in use and during precipitation events.

Stencil storm drains

Training

- Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
- Provide on-going employee training in pollution prevention.

Provided below are specific procedures associated with each of the minimum BMPs along with procedures for additional BMPs that should be considered if this activity takes place at a facility located near a sensitive waterbody. In order to meet the requirements for medium and high priority facilities, the owners/operators must select, install and maintain appropriate BMPs on site. Since the selection of the appropriate BMPs is a site-specific process, the types and numbers of additional BMPs will vary for each facility.

1. **Properly collect and dispose of water when pressure washing buildings, rooftops, and other large objects.**
   - If pressure washing where the surrounding area is paved, use a water collection device that enables collection of wash water and associated solids. Use a sump pump, wet vacuum or similarly effective device to collect the runoff and loose materials. Dispose of the collected runoff and solids properly.
   - If pressure washing on a landscaped area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the landscaping and not drain to pavement.
2. **Properly prepare work area before conducting building maintenance.**
   - Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
   - Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
3. **Properly clean and dispose of equipment and wastes used and generated during building maintenance.**

[1] EPA " *Preliminary Data Summary of Urban Stormwater Best Management Practices*"

   - Clean paint brushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.
   - Properly dispose of wash water, sweepings, and sediments.
   - Properly store equipment, chemicals, and wastes.
   - Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.

   OPTIONAL:
   - Recycle residual paints, solvents, lumber, and other materials to the maximum extent practicable
4. **Employ soil erosion and stabilization techniques when exposing large areas of soil.**
   - Confine excavated materials to pervious surfaces away from storm drain inlets, sidewalks, pavement, and ditches. Material must be covered if rain is expected.
   - Use chemical stabilization or geosynthetics to stabilize bare ground surfaces.
5. **Store toxic material under cover when not in use and during precipitation events.**
6. **Properly dispose of fluids from air conditioning, cooling tower, and condensate drains.**
7. **Regularly inspect air emission control equipment under AQMD permit.**
8. **Switch to non-toxic chemicals for maintenance when possible.**
   - If cleaning agents are used, select biodegradable products whenever feasible
   - Consider using a waterless and non-toxic chemical cleaning method for graffiti removal (e.g. gels or spray compounds).
9. **Use chemicals that can be recycled.**
   - Buy recycled products to the maximum extent practicable

Training

1. **Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.**
2. **Train employees on proper spill containment and cleanup.**
   - Establish training that provides employees with the proper tools and knowledge to immediately begin cleaning up a spill.
   - Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
   - BMP IC17 discusses Spill Prevention and Control in detail.
3. **Establish a regular training schedule, train all new employees, and conduct annual refresher training.**
4. **Use a training log or similar method to document training.**

Stencil storm drains

Storm drain system signs act as highly visible source controls that are typically stenciled directly adjacent to storm drain inlets. Stencils should read "No Dumping Drains to Ocean".

References

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Stormwater Management Manual for Western Washington. Volume IV Source Control BMPs. Prepared by Washington State Department of Ecdogy Water Quality Program. Publication No. 99-14. August 2001.

For additional information contact:

County of Orange
Watershed & Coastal Resources
Stormwater Program
(714)567-6363
or visit our website at:
www.ocwatersheds.com

IC7. LANDSCAPE MAINTENANCE

Best Management Practices (BMPs)

A BMP is a technique, measure or structural control that is used for a given set of conditions to improve the quality of the stormwater runoff in a cost effective manner[1]. The minimum required BMPs for this activity are outlined in the box to the right. Implementation of pollution prevention/good housekeeping measures may reduce or eliminate the need to implement other more costly or complicated procedures. Proper employee training is key to the success of BMP implementation.

MINIMUM BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping

- Properly store and dispose of gardening wastes.
- Use mulch or other erosion control measures on exposed soils.
- Properly manage irrigation and runoff.
- Properly store and dispose of chemicals.
- Properly manage pesticide and herbicide use.
- Properly manage fertilizer use.

Stencil storm drains

Training

- Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
- Provide on-going employee training in pollution prevention.

The BMPs outlined in this fact sheet target the following pollutants:

Targeted Constituents	
Sediment	x
Nutrients	x
Floatable Materials	x
Metals	
Bacteria	x
Oil & Grease	
Organics & Toxicants	
Pesticides	x
Oxygen Demanding	x

Provided below are specific procedures associated with each of the minimum BMPs along with procedures for additional BMPs that should be considered if this activity takes place at a facility located near a sensitive waterbody. In order to meet the requirements for medium and high priority facilities, the owners/operators must select, install and maintain appropriate BMPs on site. Since the selection of the appropriate BMPs is a site-specific process, the types and numbers of additional BMPs will vary for each facility.

1. **Take steps to reduce landscape maintenance requirements.**
   - Where feasible, retain and/or plant native vegetation with features that are determined to be beneficial. Native vegetation usually requires less maintenance than planting new vegetation.
   - When planting or replanting consider using low water use flowers, trees, shrubs, and groundcovers.
   - Consider alternative landscaping techniques such as naturescaping and xeriscaping.
2. **Properly store and dispose of gardening wastes.**
   - Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage at a permitted landfill or by composting.
   - Do not dispose of gardening wastes in streets, waterways, or storm drainage systems.
   - Place temporarily stockpiled material away from watercourses and storm drain inlets, and berm and/or cover.
3. **Use mulch or other erosion control measures on exposed soils.**

[1] EPA " *Preliminary Data Summary of Urban Stormwater Best Managem ent Practices*"

4. **Properly manage irrigation and runoff.**
    - Irrigate slowly or pulse irrigate so the infiltration rate of the soil is not exceeded.
    - Inspect irrigation system regularly for leaks and to ensure that excessive runoff is not occurring.
    - If re-claimed water is used for irrigation, ensure that there is no runoff from the landscaped area(s).
    - If bailing of muddy water is required (e.g. when repairing a water line leak), do not put it in the storm drain; pour over landscaped areas.
    - Use automatic timers to minimize runoff.
    - Use popup sprinkler heads in areas with a lot of activity or where pipes may be broken. Consider the use of mechanisms that reduce water flow to broken sprinkler heads.
5. **Properly store and dispose of chemicals.**
    - Implement storage requirements for pesticide products with guidance from the local fire department and/or County Agricultural Commissioner.
    - Provide secondary containment for chemical storage.
    - Dispose of empty containers according to the instructions on the container label.
    - Triple rinse containers and use rinse water as product.
6. **Properly manage pesticide and herbicide use.**
    - Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of pesticides and herbicides and training of applicators and pest control advisors.
    - Follow manufacturers' recommendations and label directions.
    - Use pesticides only if there is an actual pest problem (not on a regular preventative schedule). When applicable use less toxic pesticides that will do the job. Avoid use of copper-based pesticides if possible. Use the minimum amount of chemicals needed for the job.
    - Do not apply pesticides if rain is expected or if wind speeds are above 5 mph.
    - Do not mix or prepare pesticides for application near storm drains. Prepare the minimum amount of pesticide needed for the job and use the lowest rate that will effectively control the targeted pest.
    - Whenever possible, use mechanical methods of vegetation removal rather than applying herbicides. Use hand weeding where practical.
    - Do not apply any chemicals directly to surface waters, unless the application is approved and permitted by the state. Do not spray pesticides within 100 feet of open waters.
    - Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.
    - When conducting mechanical or manual weed control, avoid loosening the soil, which could lead to erosion.
    - Purchase only the amount of pesticide that you can reasonably use in a given time period.
    - Careful soil mixing and layering techniques using a topsoil mix or composted organic material can be used as an effective measure to reduce herbicide use and watering.
7. **Properly manage fertilizer use.**
    - Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers.
    - Follow manufacturers' recommendations and label directions.
    - Employ techniques to minimize off-target application (e.g. spray drift) of fertilizer, including consideration of alternative application techniques. Calibrate fertilizer distributors to avoid excessive application.
    - Periodically test soils for determining proper fertilizer use.
    - Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
    - Sweep pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
    - Use slow release fertilizers whenever possible to minimize leaching
    -

8. **Incorporate the following integrated pest management techniques where appropriate:**
    - Mulching can be used to prevent weeds where turf is absent.
    - Remove insects by hand and place in soapy water or vegetable oil. Alternatively, remove insects with water or vacuum them off the plants.
    - Use species-specific traps (e.g. pheromone-based traps or colored sticky cards).
    - Sprinkle the ground surface with abrasive diatomaceous earth to prevent infestations by soft-bodied insects and slugs. Slugs also can be trapped in small cups filled with beer that are set in the ground so the slugs can get in easily.
    - In cases where microscopic parasites, such as bacteria and fungi, are causing damage to plants, the affected plant material can be removed and disposed of (pruning equipment should be disinfected with bleach to prevent spreading the disease organism).
    - Small mammals and birds can be excluded using fences, netting, and tree trunk guards.
    - Promote beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seedhead weevils, and spiders that prey on detrimental pest species.

Training

1. **Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.**
2. **Educate and train employees on the use of pesticides and pesticide application techniques. Only employees properly trained to use pesticides can apply them.**
3. **Train and encourage employees to use integrated pest management techniques.**
4. **Train employees on proper spill containment and cleanup.**
    - Establish training that provides employees with the proper tools and knowledge to immediately begin cleaning up a spill.
    - Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
    - BMP IC17 discusses Spill Prevention and Control in detail.
5. **Establish a regular training schedule, train all new employees, and conduct annual refresher training.**
6. **Use a training log or similar method to document training.**

Stencil storm drains

Storm drain system signs act as highly visible source controls that are typically stenciled directly adjacent to storm drain inlets. Stencils should read "No Dumping Drains to Ocean".

References

California Storm Water Best Management Practice Handbook. Industrial and Commercial. 2003. www.cabmphandbooks.com

California Storm Water Best Management Practice Handbooks. Industrial/Commercial Best Management Practice Handbook. Prepared by Camp Dresser& McKee, Larry Walker Associates, Uribe and Associates, Resources Planning Associates for Stormwater Quality Task Force. March 1993.

King County Stormwater Pollution Control Manual. Best Management Practices for Businesses. King County Surface Water Management. July 1995. On-line: http://dnr.metrokc.gov/wlr/dss/spcm.htm

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Water Quality Handbook for Nurseries. Oklahoma Cooperative Extension Service. Division of Agricultural Sciences and Natural Resources. Oklahoma State University. E-951. September 1999.

For additional information contact:

County of Orange
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Stormwater Program
(714)567-6363
or visit our website at:
www.ocwatersheds.com

IC15. PARKING AND STORAGE AREA MAINTENANCE

Best Management Practices (BMPs)

A BMP is a technique, measure or structural control that is used for a given set of conditions to improve the quality of the stormwater runoff in a cost effective manner[1]. The minimum required BMPs for this activity are outlined in the box to the right. Implementation of pollution prevention/good housekeeping measures may reduce or eliminate the need to implement other more costly or complicated procedures. Proper employee training is key to the success of BMP implementation.

MINIMUM BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping

- Conduct regular cleaning.
- Properly collect and dispose of wash water.
- Keep the parking and storage areas clean and orderly.
- Use absorbent materials and properly dispose of them when cleaning heavy oily deposits.
- When conducting surface repair work cover materials and clean paintbrushes and tools appropriately.

Stencil storm drains

Training

- Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
- Provide on-going employee training in pollution prevention.

The BMPs outlined in this fact sheet target the following pollutants:

Targeted Constituents	
Sediment	x
Nutrients	x
Floatable Materials	x
Metals	x
Bacteria	x
Oil & Grease	x
Organics & Toxicants	x
Pesticides	x
Oxygen Demanding	x

Provided below are specific procedures associated with each of the minimum BMPs along with procedures for additional BMPs that should be considered if this activity takes place at a facility located near a sensitive waterbody. In order to meet the requirements for medium and high priority facilities, the owners/operators must select, install and maintain appropriate BMPs on site. Since the selection of the appropriate BMPs is a site-specific process, the types and numbers of additional BMPs will vary for each facility.

1. **Conduct regular cleaning.**
   - Sweeping or vacuuming the parking facility is encouraged over other methods.
   - Sweep all parking lots at least once before the onset of the wet season.
   - Establish frequency of sweeping based on usage and field observations of waste accumulation.
2. **Properly collect and dispose of wash water.**
   - Block the storm drain or contain runoff.
   - Wash water should be collected and pumped to the sanitary sewer or discharged to a pervious surface, do not allow wash water to enter storm drains. **DO NOT** discharge wash water to sanitary sewer until contacting the local sewer authority to find out if pretreatment is required.
   - Dispose of parking lot sweeping debris and dirt at a landfill.
3. **Consider use of source treatment BMPs to treat runoff.**
   - Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
   - Utilize sand filters or oleophilic collectors for oily waste in low quantities.
4. **Keep the parking and storage areas clean and orderly.**

[1] EPA " *Preliminary Data Summary of Urban Stormwater Best Management Practices*"

- Clean out and cover litter receptacles frequently to prevent spillage.
- Remove debris in a timely fashion.

OPTIONAL:

- Post "No Littering" signs.

5. **When cleaning heavy oily deposits:**
   - If possible, clean oily spots with absorbent materials.
   - Do not allow discharges to the storm drain.
   - Appropriately dispose of spilled materials and absorbents.
6. **When conducting surface repair work:**
   - Pre-heat, transfer or load hot bituminous material away from storm drain inlets.
   - Conduct surface repair work during dry weather to prevent contamination from contacting stormwater runoff.
   - Cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and clean any debris for proper disposal.
   - To avoid runoff, use only as much water as necessary for dust control.
   - Use drip pans or absorbent material to catch drips from paving equipment that is not in use. Dispose of collected material and absorbents properly.
7. **Conduct inspections on a regular basis.**
   - Designate personnel to conduct inspections of the parking facilities and stormwater conveyance systems associated with them.
   - Inspect cleaning equipment/sweepers for leaks on a regular basis.
8. **Keep accurate maintenance logs to evaluate materials removed/stored and improvements made.**
9. **Arrange rooftop drains to prevent drainage directly onto paved surfaces.**

Training

1. **Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.**
2. **Train employees on proper spill containment and cleanup.**
   - Establish training that provides employees with the proper tools and knowledge to immediately begin cleaning up a spill.
   - Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
   - BMP IC17 discusses Spill Prevention and Control in detail.
3. **Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.**
4. **Establish a regular training schedule, train all new employees, and conduct annual refresher training.**
5. **Use a training log or similar method to document training.**

Stencil storm drains

Storm drain system signs act as highly visible source controls that are typically stenciled directly adjacent to storm drain inlets. Stencils should read "No Dumping Drains to Ocean".

References

California Storm Water Best Management Practice Handbook. Industrial and Commercial. 2003. www.cabmphandbooks.com

California Storm Water Best Management Practice Handbooks. Industrial/Commercial Best Management Practice Handbook. Prepared by Camp Dresser& McKee, Larry Walker Associates, Uribe and Associates, Resources Planning Associates for Stormwater Quality Task Force. March 1993.

King County Stormwater Pollution Control Manual. Best Management Practices for Businesses. King County Surface Water Management. July 1995. On-line: http://dnr.metrokc.gov/wlr/dss/spcm.htm

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July 1998 (Revised February 2002 by the California Coastal Commission).

Stormwater Management Manual for Western Washington. Volume IV Source Control BMPs. Prepared by Washington State Department of Ecology Water Quality Program. Publication No. 99-14. August 2001.

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IC16. POOL AND FOUNTAIN CLEANING

Best Management Practices (BMPs)

A BMP is a technique, measure or structural control that is used for a given set of conditions to improve the quality of the stormwater runoff in a cost effective manner[1]. The minimum required BMPs for this activity are outlined in the box to the right. Implementation of pollution prevention/good housekeeping measures may reduce or eliminate the need to implement other more costly or complicated procedures. Proper employee training is key to the success of BMP implementation.

MINIMUM BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping

- Prevent algae problems with regular cleaning, consistent adequate chlorine levels, and well-maintained water filtration and circulation systems.
- Discharge pool and fountain water properly.

Stencil storm drains

Training

- Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
- Provide on-going employee training in pollution prevention.

The BMPs outlined in this fact sheet target the following pollutants:

Targeted Constituents	
Sediment	x
Nutrients	x
Floatable Materials	x
Metals	
Bacteria	x
Oil & Grease	
Organics & Toxicants	x
Pesticides	x
Oxygen Demanding	x

Provided below are specific procedures associated with each of the minimum BMPs along with procedures for additional BMPs that should be considered if this activity takes place at a facility located near a sensitive waterbody. In order to meet the requirements for medium and high priority facilities, the owners/operators must select, install and maintain appropriate BMPs on site. Since the selection of the appropriate BMPs is a site-specific process, the types and numbers of additional BMPs will vary for each facility.

1. **Prevent algae problems with regular cleaning, consistent adequate chlorine levels, and well-maintained water filtration and circulation systems.**
   - Do not use copper-based algaecides.
   - Control algae with chlorine or other alternatives, such as sodium bromide.
2. **Manage pH and water hardness to minimize corrosion of copper pipes.**
3. **Discharge pool and fountain water properly.** Consider hiring a professional pool-draining service to collect all pool water for off-site disposal. If this is not feasible, adhere to the following:
   - When draining pools or fountains never discharge water to a street or storm drain, discharge to the sanitary sewer if permitted to do so.
   - If draining a pool to the sanitary sewer, prevent backflow by maintaining an "air gap" between the discharge line and the sewer line (do not seal the connection between the hose and sewer line). Be sure to call the local sewer authority for guidance on flow rate restrictions, backflow prevention, and handling special cleaning waste (such as acid wash). Keep discharge flows to the low levels. Higher flow rates may be prohibited by local ordinance.

[1] EPA " *Preliminary Data Summary of Urban Stormwater Best Management Practices*"

   - If water is dechlroinated with a neutralizing chemical or by allowing chlorine to dissipate for a few days (do not use the facility during this time), the water may be recycled/reused by draining it gradually onto a landscaped area. Water must be tested prior to discharge to ensure that chlorine is not present.
   - Provide drip pans or buckets beneath drain pipe connections to catch leaks. This will be especially pertinent if pool or spa water that has not been dechlorinated is pumped through piping to a discharge location.
4. **Properly clean and/or dispose of filters.**
   - Never clean a filter in the street or near a storm drain.
   - Rinse cartridge filters onto a dirt area, and work filter residue into soil.
   - Backwash diatomaceous earth filters onto dirt. Dispose of spent diatomaceous earth in the garbage. Diatomaceous earth cannot be discharged to surface waters, storm drainage systems, septic systems, or on the ground.
   - If there is not a suitable dirt area, discharge filter backwash or rinsewater to the sanitary sewer if permitted to do so by the local sewering agency.

Training

1. **Train employees on these BMPs, storm water discharge p rohibitions, and wastewater discharge requirements.**
2. **Train employees on proper spill containment and cleanup.**
   - Establish training that provides employees with the proper tools and knowledge to immediately begin cleaning up a spill.
   - Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
   - BMP IC17 discusses Spill Prevention and Control in detail.
3. **Train maintenance personnel on the proper techniques for testing chlorine levels and applying neutralizing chemicals.**
4. **Establish a regular training schedule, train all new employees, and conduct annual refresher training.**
5. **Use a training log or similar method to document training.**

Stencil storm drains

Storm drain system signs act as highly visible source controls that are typically stenciled directly adjacent to storm drain inlets. Stencils should read "No Dumping Drains to Ocean".

References

California Storm Water Best Management Practice Handbook. Industrial and Commercial. 2003. www.cabmphandbooks.com

King County Stormwater Pollution Control Manual. Best Management Practices for Businesses. 1995. King County Surface Water Management. July. On-line: http://dnr.metrokc.gov/wlr/dss/spcm.htm

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For additional information contact:

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or visit our website at:
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IC17. SPILL PREVENTION AND CLEANUP

Best Management Practices (BMPs)

A BMP is a technique, measure or structural control that is used for a given set of conditions to improve the quality of the stormwater runoff in a cost effective manner[1]. The minimum required BMPs for this activity are outlined in the box to the right. Implementation of pollution prevention/good housekeeping measures may reduce or eliminate the need to implement other more costly or complicated procedures. Proper employee training is key to the success of BMP implementation.

MINIMUM BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping

- Develop procedures to prevent/mitigate spills to storm drain systems.
- Post "No Dumping" signs with a phone number for reporting illegal dumping and disposal.
- Conduct routine cleaning, inspections, and maintenance.
- Properly store and handle chemical materials.
- Protect materials stored outside from stormwater runon.
- Secure drums stored in an area where unauthorized persons may gain access to prevent accidental spillage, pilferage, or any unauthorized use.
- Identify key spill response personnel.
- Clean up leaks and spills immediately.
- Report and track spills.

Stencil storm drains

Training

- Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
- Provide on-going employee training in pollution prevention.

The BMPs outlined in this fact sheet target the following pollutants:

Targeted Constituents	
Sediment	x
Nutrients	x
Floatable Materials	x
Metals	x
Bacteria	x
Oil & Grease	x
Organics & Toxicants	x
Pesticides	x
Oxygen Demanding	x

Provided below are specific procedures associated with each of the minimum BMPs along with procedures for additional BMPs that should be considered if this activity takes place at a facility located near a sensitive waterbody. In order to meet the requirements for medium and high priority facilities, the owners/operators must select, install and maintain appropriate BMPs on site. Since the selection of the appropriate BMPs is a site-specific process, the types and numbers of additional BMPs will vary for each facility.

Spill Prevention

1. **Develop procedures to prevent/mitigate spills to storm drain systems.**
   Standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.
2. **Post "No Dumping" signs with a phone number for reporting illegal dumping and disposal.**
3. **Conduct routine cleaning, inspections, and maintenance**
   - Sweep and clean storage areas consistently at a designated frequency (e.g. weekly, monthly). **DO NOT** hose down areas to storm drains.
   - Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Reuse, recycle, or properly dispose of any collected liquids or soiled absorbent materials.
   - Check tanks (and any containment sumps) frequently for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating with tanks in good condition. Collect all spilled liquids and properly dispose of them.

[1] EPA " *Preliminary Data Summary of Urban Stormwater Best Management Practices*"

- Check for external corrosion of material containers, structural failures, spills and overfills due to operator error, failure of piping system, etc.
- Inspect tank foundations, connections, coatings, and tank walls and piping system.

4. **Properly store and handle chemical materials.**
   - Designate a secure material storage area that is paved with Portland cement concrete, free of cracks and gaps, and impervious in order to contain leaks and spills.
   - Do not store chemicals, drums, or bagged materials directly on the ground. Place these items in secondary containers.
   - Keep chemicals in their original containers, if feasible.
   - Keep containers well labeled according to their contents (e.g., solvent, gasoline).
   - Label hazardous substances regarding the potential hazard (corrosive, radioactive, flammable, explosive, poisonous).
   - Prominently display required labels on transported hazardous and toxic materials (per US DOT regulations).
5. **Utilize secondary containment systems for liquid materials.**
   - Surround storage tanks with a berm or other secondary containment system.
   - Slope the area inside the berm to a drain.
   - Drain liquids to the sanitary sewer if available. **DO NOT** discharge wash water to sanitary sewer until contacting the local sewer authority to find out if pretreatment is required
   - Pass accumulated stormwater in petroleum storage areas through an oil/water separator.
   - Use catch basin filtration inserts.
6. **Protect materials stored outside from stormwater runon.** Construct a berm around the perimeter of the material storage area to prevent the runon of uncontaminated stormwater from adjacent areas as well as runoff of stormwater from the material.
7. **Secure drums stored in an area where unauthorized persons may gain access to prevent accidental spillage, pilferage, or any unauthorized use.**

Spill Control and Cleanup Activities

8. **Identify key spill response personnel.**
9. **Adopt the Orange County Hazardous Materials Area Plan or an equivalent plan, which includes a set of planned responses to hazardous materials emergencies. The plan should include:**
   - Description of the facility, owner and address, activities and chemicals present
   - Facility map
   - Notification and evacuation procedures
   - Cleanup instructions
   - Identification of responsible departments
10. **Clean up leaks and spills immediately.**
    - Place a stockpile of spill cleanup materials where they will be readily accessible (e.g. near storage and maintenance areas).
    - Utilize dry cleaning methods to clean up spills to minimize the use of water. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste. Physical methods for the cleanup of dry chemicals include the use brooms, shovels, sweepers, or plows.
    - Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
    - Clean up chemical materials with absorbents, gels, and foams. Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
    - For larger spills, a private spill cleanup company or Hazmat team may be necessary.

11. **Reporting**
    1. **Report spills that pose an immediate threat to human health or the environment to local agencies, such as the fire department, and the Regional Water Quality Control Board.**
    2. **Establish a system for tracking incidents. The system should be designed to identify the following:**
       - Types and quantities (in some cases) of wastes
       - Patterns in time of occurrence (time of day/night, month, or year)
       - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
       - Responsible parties
    3. **Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).**

Training

1. **Educate employees about spill prevention and cleanup.**
   - Establish training that provides employees with the proper tools and knowledge to immediately begin cleaning up a spill.
   - Educate employees on aboveground storage tank requirements.
   - Train all employees upon hiring and conduct annual refresher training.
2. **Train employees responsible for aboveground storage tanks and liquid transfers on the Spill Prevention Control and Countermeasure Plan.**

Stencil storm drains

Storm drain system signs act as highly visible source controls that are typically stenciled directly adjacent to storm drain inlets. Stencils should read "No Dumping Drains to Ocean".

References

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California Storm Water Best Management Practice Handbooks. Industrial/Commercial Best Management Practice Handbook. Prepared by Camp Dresser& McKee, Larry Walker Associates, Uribe and Associates, Resources Planning Associates for Stormwater Quality Task Force. March 1993.

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IC22. EATING AND DRINKING ESTABLISHMENTS

Best Management Practices (BMPs)

A BMP is a technique, measure or structural control that is used for a given set of conditions to improve the quality of the stormwater runoff in a cost effective manner[1]. The minimum required BMPs for this activity are outlined in the box to the right. Implementation of pollution prevention/good housekeeping measures may reduce or eliminate the need to implement other more costly or complicated procedures. Proper employee training is key to the success of BMP implementation.

The BMPs outlined in this fact sheet target the following pollutants:

Targeted Constituents	
Sediment	
Nutrients	x
Floatable Materials	x
Metals	
Bacteria	x
Oil & Grease	x
Organics & Toxicants	x
Pesticides	x
Oxygen Demanding	x

MINIMUM BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping

- Use dry cleaning methods instead of water
- Clean equipment (floor mats, grease filters, grills, garbage cans, etc.) indoors or in a covered outdoor wash area that is plumbed to the sanitary sewer or in an area that will contain the wash water.
- Recycle and/or properly dispose of grease and oil.
- Block the storm drain when hosing or steam/pressure washing outside dumpster areas, sidewalks, and common areas.

Stencil storm drains

Training

- Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
- Provide on-going employee training in pollution prevention.

Provided below are specific procedures associated with each of the minimum BMPs along with procedures for additional BMPs that should be considered if this activity takes place at a facility located near a sensitive waterbody. In order to meet the requirements for medium and high priority facilities, the owners/operators must select, install and maintain appropriate BMPs on site. Since the selection of the appropriate BMPs is a site-specific process, the types and numbers of additional BMPs will vary for each facility.

1. **Practice good housekeeping.**
   - Conduct regular sweeping or vacuuming of outdoor areas: Dry sweep pavement areas including "drive-thru" areas, parking lots, sidewalks, outdoor eating areas and dumpster storage areas frequently.
   - Keep outside areas free of trash & debris.
   - Do not hose out dumpsters or fill them with liquid waste.
   - Regularly inspect, repair, and/or replace dumpsters.
2. **Clean equipment (floor mats, grease filters, grills, garbage cans, etc.) indoors or in a covered outdoor wash area that is plumbed to the sanitary sewer.**
   - Clean equipment in a mop sink if possible (never in a food preparation sink). If there is no mop sink, dedicate an indoor cleaning area where a drain is plumbed to the sanitary sewer.
   - Dispose mop water from cleaning floors in a mop sink, toilet or other drain that is plumbed to the sanitary sewer.
   - Do not pour wash water outside or into a street, gutter, or storm drain.
   - Dispose of all wastewater containing oil and grease in a grease trap or interceptor.

[1] EPA " *Preliminary Data Summary of Urban Stormwater Best Management Practices"*

3. **Recycle and/or properly dispose of grease and oil.** Collect and dispose of concentrated waste oil and grease and disposed of by a certified waste grease hauler. NEVER pour grease or oil into a sink, floor drain, storm drain or dumpster.
4. **Block storm drain(s) when cleaning (hosing or steam/pressure washing) outside dumpster areas, sidewalks, and common areas with hot water, soap, or other cleaning agent.** Collect water/waste and discharge to the sanitary sewer (with approval of the local sanitation district).

Training

1. **Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.**
2. **Train employees on proper spill containment and cleanup.**
   - Establish training that provides employees with the proper tools and knowledge to immediately begin cleaning up a spill.
   - Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
   - BMP IC17 discusses Spill Prevention and Control in detail.
3. **Establish a regular training schedule, train all new employees, and conduct annual refresher training.**
4. **Use a training log or similar method to document training.**

Stencil storm drains

Storm drain system signs act as highly visible source controls that are typically stenciled directly adjacent to storm drain inlets. Stencils should read "No Dumping Drains to Ocean".

References

California Storm Water Best Management Practice Handbook. Industrial and Commercial. 2003. www.cabmphandbooks.com

Carlsbad Jurisdictional Urban Runoff Management Plan. Best Management Practices for Restaurants. City of Carlsbad. February 2002. On-line: http://www.ci.carlsbad.ca.us/cserv/jurmp.html

Orange County Stormwater Program. 2001. Water Quality Guidelines for Exterior Restaurant Cleaning Operations. Brochure. June.

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For additional information contact:

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or visit our website at:
www.ocwatersheds.com

IC23. FIRE SPRINKLER TESTING/MAINTENANCE

Best Management Practices (BMPs)

A BMP is a technique, measure or structural control that is used for a given set of conditions to improve the quality of the stormwater runoff in a cost effective manner[1]. The minimum required BMPs for this activity are outlined in the box to the right. Implementation of pollution prevention/good housekeeping measures may reduce or eliminate the need to implement other more costly or complicated procedures. Proper employee training is key to the success of BMP implementation.

Provided below are specific procedures associated with this activity. In order to meet the requirements for medium and high priority facilities, the owners/operators must select, install and maintain appropriate BMPs on site. Since the selection of the appropriate BMPs is a site-specific process, the types and numbers of additional BMPs will vary for each facility.

MINIMUM BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping

- Conduct activity on non-rainy days and for the shortest duration possible to minimize discharge volume.
- Inspect flow path and remove all debris and materials prior to testing or maintenance.

Training

- Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
- Provide on-going employee training in pollution prevention.

The BMPs outlined in this fact sheet target the following pollutants:

Targeted Constituents	
Sediment	
Nutrients	
Floatable Materials	
Metals	x
Bacteria	
Oil & Grease	x
Organics & Toxicants	
Pesticides	
Oxygen Demanding	

Best Management Practices

1. **Contain flows onsite** and/or direct the water flows to landscaped or green areas whenever possible and safe to do so without causing damage or erosion.
2. **Divert sprinkler system flows to the sewer**, when practicable and with the permission of the local sewer agency.
3. **Training**
   a. Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
   b. Establish a regular training schedule, train all new employees, and conduct annual refresher training.
   c. Use a training log or similar method to document training.

References

California Storm Water Best Management Practice Handbooks. Industrial/Commercial Best Management Practice Handbook. Prepared by Camp Dresser& McKee, Larry Walker Associates for California Stormwater Quality Association. January 2003.

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[1] EPA " *Preliminary Data Summary of Urban Stormwater Best Management Practices"*

R-5
DISPOSAL OF PET WASTES

Pet wastes left in the environment may introduce solids, bacteria, and nutrients to the storm drain. The type and quantity of waste will dictate the proper disposal method. Small quantities of waste are best disposed with regular trash or flushed down a toilet. Large quantities of wastes from herbivore animals may be composted for subsequent use or disposal to landfill.

The activities outlined in this fact sheet target the following pollutants:	
Sediment	x
Nutrients	x
Bacteria	x
Foaming Agents	
Metals	
Hydrocarbons	
Hazardous Materials	
Pesticides and Herbicides	
Other	

Pick up after your pet! It's as easy as 1-2-3. 1) Bring a bag. 2) Clean it up. 3) Dispose of it properly (toilet or trash). The pollution prevention activities outlined in this fact sheets are used to prevent the discharge of pollutants to the storm drain system.

Think before you dispose of any pet wastes. Remember - The ocean starts at your front door.

Required Activities

- All pet wastes must be picked up and properly disposed of. Pet waste should be disposed of in the regular trash, flushed down a toilet, or composted as type and quantities dictate.
- Properly dispose of unused flea control products (shampoo, sprays, or collars).
- Manure produced by livestock in uncovered areas should be removed at least daily for composting, or storage in water-tight container prior to disposal. Never hose down to stream or storm drain. Composting or storage areas should be configured and maintained so as not to allow contact with runoff. Compost may be donated to greenhouses, nurseries, and botanical parks. Topsoil companies and composting centers may also accept composted manure.
- Line waste pits or trenches with an impermeable layer, such as thick plastic sheeting.
- When possible, allow wash water to infiltrate into the ground, or collect in an area that is routed to the sanitary sewer.
- Confine livestock in fenced in areas except during exercise and grazing times. Restrict animal access to creeks and streams, preferably by fencing.

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- Install gutters that will divert roof runoff away from livestock areas.

Recommended Activities

- In order to properly dispose of pet waste, carry bags, pooper-scooper, or equivalent to safely pick up pet wastes while walking with pets.
- Bathe pets indoors and use less toxic shampoos. When possible, have pets professionally groomed.
- Properly inoculate your pet in order to maintain their health and reduce the possibility of pathogens in pet wastes.
- Maintain healthy and vigorous pastures with at least three inches of leafy material.
- Consider indoor feeding of livestock during heavy rainfall, to minimize manure exposed to potential runoff.
- Locate barns, corrals, and other high use areas on portions of property that either drain away from or are located distant form nearby creeks or storm drains.

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Site Design & Landscape Planning SD-10

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.
- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.
- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

SD-10 Site Design & Landscape Planning

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

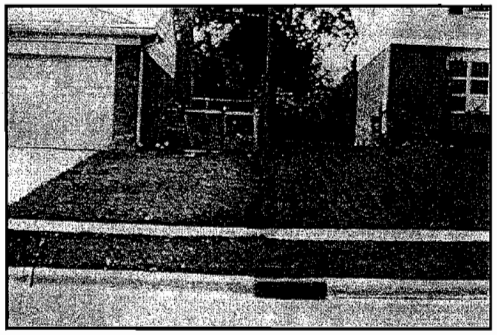
Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Efficient Irrigation SD-12



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Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

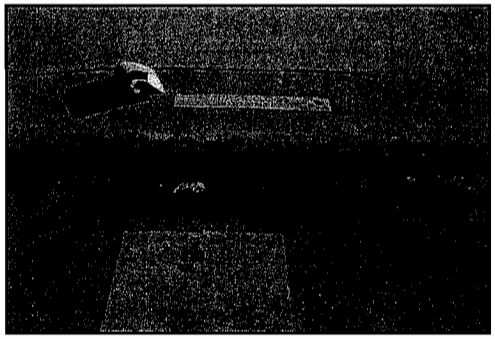
Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.



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Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include "NO DUMPING

– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.
- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

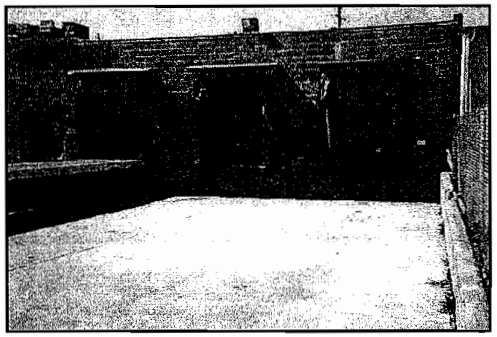
Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.



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Description

Several measures can be taken to prevent operations at maintenance bays and loading docks from contributing a variety of toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to the stormwater conveyance system.

Approach

In designs for maintenance bays and loading docks, containment is encouraged. Preventative measures include overflow containment structures and dead-end sumps. However, in the case of loading docks from grocery stores and warehouse/distribution centers, engineered infiltration systems may be considered.

Suitable Applications

Appropriate applications include commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for vehicle maintenance and repair are governed by Building and Fire Codes, and by current local agency ordinances, and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code requirements.

Designing New Installations

Designs of maintenance bays should consider the following:

- Repair/maintenance bays and vehicle parts with fluids should be indoors; or designed to preclude urban run-on and runoff.
- Repair/maintenance floor areas should be paved with Portland cement concrete (or equivalent smooth impervious surface).

- Repair/maintenance bays should be designed to capture all wash water leaks and spills. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around repair bays to prevent spilled materials and wash-down waters form entering the storm drain system. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.
- Other features may be comparable and equally effective.

The following designs of loading/unloading dock areas should be considered:

- Loading dock areas should be covered, or drainage should be designed to preclude urban run-on and runoff.
- Direct connections into storm drains from depressed loading docks (truck wells) are prohibited.
- Below-grade loading docks from grocery stores and warehouse/distribution centers of fresh food items should drain through water quality inlets, or to an engineered infiltration system, or an equally effective alternative. Pre-treatment may also be required.
- Other features may be comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

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Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Maintenance Considerations

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

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Vehicle Washing Areas SD-33

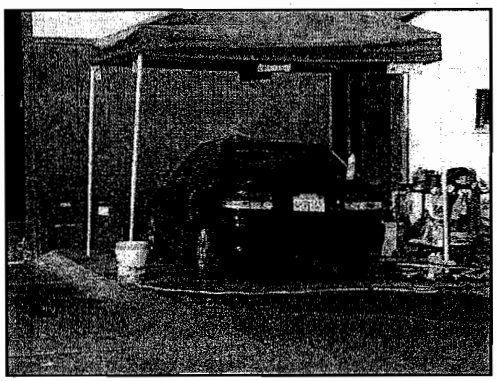

Photo Credit: Geoff Brosseau

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Description

Vehicle washing, equipment washing, and steam cleaning may contribute high concentrations of metals, oil and grease, solvents, phosphates, and suspended solids to wash waters that drain to stormwater conveyance systems.

Approach

Project plans should include appropriately designed area(s) for washing-steam cleaning of vehicles and equipment. Depending on the size and other parameters of the wastewater facility, wash water may be conveyed to a sewer, an infiltration system, recycling system or other alternative. Pretreatment may be required for conveyance to a sanitary sewer.

Suitable Applications

Appropriate applications include commercial developments, restaurants, retail gasoline outlets, automotive repair shops and others.

Design Considerations

Design requirements for vehicle maintenance are governed by Building and Fire Codes, and by current local agency ordinances, and zoning requirements. Design criteria described in this fact sheet are meant to enhance and be consistent with these code requirements.

Designing New Installations

Areas for washing/steam cleaning should incorporate one of the following features:

- Be self-contained and/or covered with a roof or overhang
- Be equipped with a clarifier or other pretreatment facility
- Have a proper connection to a sanitary sewer

- Include other features which are comparable and equally effective

CAR WASH AREAS - Some jurisdictions' stormwater management plans include vehicle-cleaning area source control design requirements for community car wash racks in complexes with a large number of dwelling units. In these cases, wash water from the areas may be directed to the sanitary sewer, to an engineered infiltration system, or to an equally effective alternative. Pre-treatment may also be required.

Depending on the jurisdiction, developers may be directed to divert surface water runoff away from the exposed area around the wash pad (parking lot, storage areas), and wash pad itself to alternatives other than the sanitary sewer. Roofing may be required for exposed wash pads.

It is generally advisable to cover areas used for regular washing of vehicles, trucks, or equipment, surround them with a perimeter berm, and clearly mark them as a designated washing area. Sumps or drain lines can be installed to collect wash water, which may be treated for reuse or recycling, or for discharge to the sanitary sewer. Jurisdictions may require some form of pretreatment, such as a trap, for these areas.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment.

Additional Information

Maintenance Considerations

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

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Description

Stormwater media filters are usually two-chambered including a pretreatment settling basin and a filter bed filled with sand or other absorptive filtering media. As stormwater flows into the first chamber, large particles settle out, and then finer particles and other pollutants are removed as stormwater flows through the filtering media in the second chamber.

There are currently three manufacturers of stormwater filter systems. Two are similar in that they use cartridges of a standard size. The cartridges are placed in vaults; the number of cartridges a function of the design flow rate. The water flows laterally (horizontally) into the cartridge to a centerwell, then downward to an underdrain system. The third product is a flatbed filter, similar in appearance to sand filters.

California Experience

There are currently about 75 facilities in California that use manufactured filters.

Advantages

- Requires a smaller area than standard flatbed sand filters, wet ponds, and constructed wetlands.
- There is no standing water in the units between storms, minimizing but does not entirely eliminate the opportunity for mosquito breeding.
- Media capable of removing dissolved pollutants can be selected.
- One system utilizes media in layers, allowing for selective removal of pollutants.
- The modular concept allows the design engineer to more closely match the size of the facility to the design storm.

Limitations

- As some of the manufactured filter systems function at higher flow rates and/or have larger media than found in flatbed filters, the former may not provide the same level of performance as standard sand filters. However, the level of treatment may still be satisfactory.
- As with all filtration systems, use in catchments that have significant areas of non-stabilized soils can lead to premature clogging.

Design Considerations

- Design Storm
- Media Type
- Maintenance Requirement

Targeted Constituents

- ✓ Sediment
- ✓ Nutrients
- ✓ Trash
- ✓ Metals
- Bacteria
- ✓ Oil and Grease
- ✓ Organics

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

CASQA California Stormwater Quality Association

Design and Sizing Guidelines

There are currently three manufacturers of stormwater filter systems.

Filter System A: This system is similar in appearance to a slow-rate sand filter. However, the media is cellulose material treated to enhance its ability to remove hydrocarbons and other organic compounds. The media depth is 12 inches (30 cm). It operates at a very high rate, 20 gpm/ft2 at peak flows. Normal operating rates are much lower assuming that the stormwater covers the entire bed at flows less than the peak rate. The system uses vortex separation for pretreatment. As the media is intended to remove sediments (with attached pollutants) and organic compounds, it would not be expected to remove dissolved pollutants such as nutrients and metals unless they are complexed with the organic compounds that are removed.

Filter System B: It uses a simple vertical filter consisting of 3 inch diameter, 30 inch high slotted plastic pipe wrapped with fabric. The standard fabric has nominal openings of 10 microns. The stormwater flows into the vertical filter pipes and out through an underdrain system. Several units are placed vertically at 1 foot intervals to give the desired capacity. Pretreatment is typically a dry extended detention basin, with a detention time of about 30 hours. Stormwater is retained in the basin by a bladder that is automatically inflated when rainfall begins. This action starts a timer which opens the bladder 30 hours later. The filter bay has an emptying time of 12 to 24 hours, or about 1 to 2 gpm/ft2 of filter area. This provides a total elapsed time of 42 to 54 hours. Given that the media is fabric, the system does not remove dissolved pollutants. It does remove pollutants attached to the sediment that is removed.

Filter System C: The system use vertical cartridges in which stormwater enters radially to a center well within the filter unit, flowing downward to an underdrain system. Flow is controlled by a passive float valve system, which prevents water from passing through the cartridge until the water level in the vault rises to the top of the cartridge. Full use of the entire filter surface area and the volume of the cartridge is assured by a passive siphon mechanism as the water surface recedes below the top of the cartridge. A balance between hydrostatic forces assures a more or less equal flow potential across the vertical face of the filter surface. Hence, the filter surface receives suspended solids evenly. Absent the float valve and siphon systems, the amount of water treated over time per unit area in a vertical filter is not constant, decreasing with the filter height; furthermore, a filter would clog unevenly. Restriction of the flow using orifices ensures consistent hydraulic conductivity of the cartridge as a whole by allowing the orifice, rather than the media, whose hydraulic conductivity decreases over time, to control flow.

The manufacturer offers several media used singly or in combination (dual- or multi-media). Total media thickness is about 7 inches. Some media, such as fabric and perlite, remove only suspended solids (with attached pollutants). Media that also remove dissolved include compost, zeolite, and iron-infused polymer. Pretreatment occurs in an upstream unit and/or the vault within which the cartridges are located.

Water quality volume or flow rate (depending on the particular product) is determined by local governments or sized so that 85% of the annual runoff volume is treated.

Construction/Inspection Considerations

- Inspect one or more times as necessary during the first wet season of operation to be certain that it is draining properly.

Performance

The mechanisms of pollutant removal are essentially the same as with public domain filters (TC -40) if of a similar design. Whether removal of dissolved pollutants occurs depends on the media. Perlite and fabric do not remove dissolved pollutants, whereas for examples, zeolites, compost, activated carbon, and peat have this capability.

As most manufactured filter systems function at higher flow rates and have larger media than found in flatbed filters, they may not provide the same level of performance as standard sand filters. However, the level of treatment may still be satisfactory.

Siting Criteria

There are no unique siting criteria.

Additional Design Guidelines

Follow guidelines provided by the manufacturer.

Maintenance

- Maintenance activities and frequencies are specific to each product. Annual maintenance is typical.
- Manufactured filters, like standard filters (TC-40), require more frequent maintenance than most standard treatment systems like wet ponds and constructed wetlands, typically annually for most sites.
- Pretreatment systems that may precede the filter unit should be maintained at a frequency specified for the particular process.

Cost

Manufacturers provide costs for the units including delivery. Installation costs are generally on the order of 50 to 100 % of the manufacturer's costs.

Cost Considerations

- Filters are generally more expensive to maintain than swales, ponds, and basins.
- The modularity of the manufactured systems allows the design engineer to closely match the capacity of the facility to the design storm, more so than with most other manufactured products.

References and Sources of Additional Information

Minton, G.R., 2002, Stormwater Treatment: Biological, Chemical, and Engineering Principles, RPA Press, 416 pages.

SECTION 7

Section VII Educational Materials

The following is a list of educational materials to be included in the Final WQMP:

1. The Ocean begins at your front door.
2. Ten Ways that you Will Save the Most
3. Your Home. Your Community. Your Environment
4. Household Tips to Help Ocean Pollution
5. After the Storm
6. Blueprint for a Clean Ocean
7. Information on What You and Your Community Can Do to Use Water More Efficiently
8. Sewage Spill Reference Guide
9. Proper Maintenance Practices for Your Business
10. Water Quality Guidelines for Pool Maintenance
11. Water Quality Guidelines for Permitted Lot and Pool Drains
12. A Guide for Food Service Facilities
13. Water Quality Guidelines for Exterior Restaurant Cleaning Operations
14. Water Quality Guidelines for Landscaping and Gardening
15. Healthy Lawn Healthy Environment
16. EPA Citizen's Guide to Pest Control and Pesticide Safety
17. Integrated Waste Management Collection Centers
18. Waste Oil Collection Centers – Central Orange County
19. Using Pest Control Products
20. County of Orange Public Facilities & Resources Department "Management Guidelines for the Use of Fertilizers and Pesticides"
21. State of California Model Landscape Ordinance
22. County of Orange Water Quality Ordinance
23. City of Huntington Beach "Stormwater and Urban Runoff Management", Water Quality Ordinance 3364, Municipal Code §14.25
24. City of Huntington Beach "Water Efficient Landscape Requirements", Water Quality Ordinance 3183, Municipal Code §14.52

Section VII

Educational Materials

To Be Provided in Final WQMP
(Not a Preliminary WQMP Requirement)

SECTION A

Appendix A

Conditions of Approval
(To Be Provided When Available)

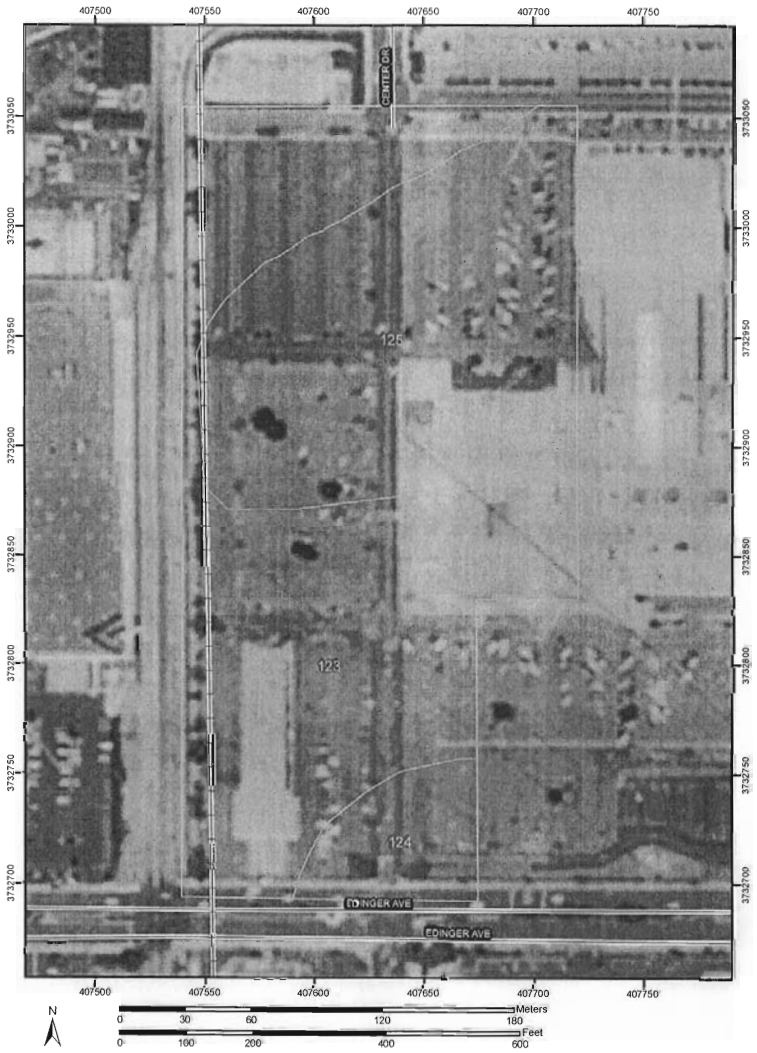
SECTION B

Appendix B

Soil Map and Hydrology Soil Group

Based on the Natural Resources Conservation Service's Web Soil Survey, onsite soils consist primarily of Bolsa Silt Loam and Bolsa Silt Clay, which are considered in Hydrologic Soil Group C, characterized as having slow infiltration rate when thoroughly wet.

Soil Map–Orange County and Part of Riverside County, California
(Bella Terra II)



Natural Resources Conservation Service
Web Soil Survey 2.0
National Cooperative Soil Survey
1/9/2008
Page 1 of 3

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features

Municipalities
- Cities
- Urban Areas

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County and Part of Riverside County, California
Survey Area Data: Version 4, Jan 3, 2008

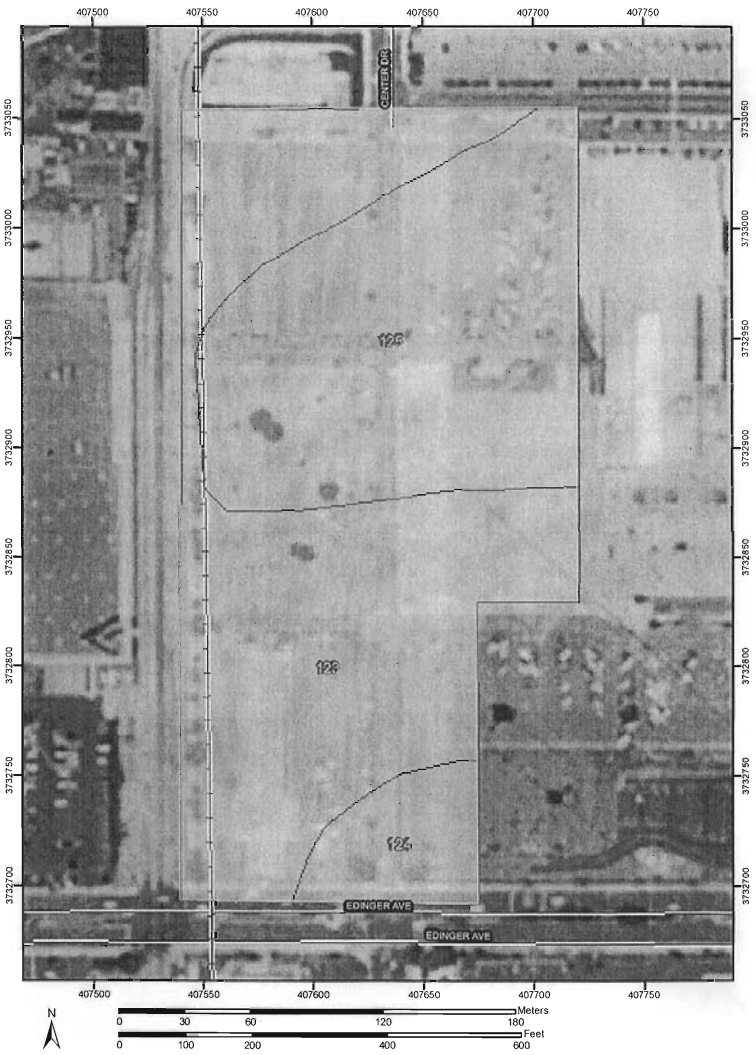
Date(s) aerial images were photographed: 5/31/1994; 6/1/1994; 10/3/1995

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Orange County and Part of Riverside County, California (CA678)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
123	BOLSA SILT LOAM, DRAINED	7.8	53.2%
124	BOLSA SILTY CLAY LOAM	1.0	6.9%
125	BOLSA SILTY CLAY LOAM, DRAINED	5.8	39.9%
Totals for Area of Interest (AOI)		14.6	100.0%

Hydrologic Soil Group–Orange County and Part of Riverside County, California
(Bella Terra II)



Hydrologic Soil Group–Orange County and Part of Riverside County, California
(Bella Terra II)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Soil Ratings
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Political Features

Municipalities
- Cities
- Urban Areas

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

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Date(s) aerial images were photographed: 5/31/1994; 6/1/1994; 10/3/1995

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Orange County and Part of Riverside County, California				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
123	BOLSA SILT LOAM, DRAINED	C	7.8	53.2%
124	BOLSA SILTY CLAY LOAM	C	1.0	6.9%
125	BOLSA SILTY CLAY LOAM, DRAINED	C	5.8	39.9%
Totals for Area of Interest (AOI)			14.6	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

PRELIMINARY

WATER QUALITY MANAGEMENT PLAN (WQMP)

FOR

"THE VILLAGE AT BELLA TERRA"

TENTATIVE TRACT MAP NO. 17261
7777 EDINGER AVENUE
Huntington Beach, CA 92648

Prepared for

DJM CAPITAL PARTNERS
109 South La Cumbre Lane
Santa Barbara, CA 93105
(805) 565-3365

Prepared by

Hunsaker and Associates Irvine, Inc.
Three Hughes
Irvine, CA 92618
(949) 583-1010

Prepared: April 23, 2008

WO # 3337-1T

Preliminary Water Quality Management Plan (WQMP)

For:

"THE VILLAGE AT BELLA TERRA"

TENTATIVE TRACT NO. 17261
7777 EDINGER AVENUE
HUNTINGTON BEACH, CALIFORNIA
EIR NO. 2007-002

CITY OF HUNTINGTON BEACH
DEPARTMENT OF PUBLIC WORKS
ACCEPTED
DATE: 4/29/08 BY: JRW

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CIVIL
STATE OF CALIFORNIA
4/28/08

Date Prepared: April 23, 2008

W.O. 3337-1T

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Exhibit B Vicinity Map
Exhibit C Proposed Preliminary Water Quality Exhibit and Qbmp Calculations
Exhibit D Referenced Master Plan of Drainage Facilities
Exhibit E Project Exhibits – Eye Level Perspective and Aerial View
Exhibit F Manufacturer's Recommended Operation & Maintenance – Contech Stormfilter
Exhibit G BMP Fact Sheets

Section VII **Educational Materials**

Appendix

A. Notice of Action, Conditions of Approval, and Development Requirements (Not Applicable)
B. Soil Map and Hydrologic Soil Group

SECTION 1

Section I Discretionary Permit(s) and Water Quality Conditions

This Water Quality Management Plan is intended to comply with the requirements of the City of Huntington Beach Municipal Code Requirements for The Village at Bella Terra, Tentative Tract 17261 requiring the preparation of a Water Quality Management Plan and coverage under the Statewide National Pollution Discharge Elimination System (NPDES) General Permit for Construction Activities.

Tentative Tract Map 17261 is not approved at this time and there are no City approved Conditions of Approval at this time applicable to the project. When Tentative Tract 17261 is approved by the City, Conditions of Approval applicable to this project will be included in the final WQMP, as appropriate.

SECTION 2

Section II Project Description

The project, known as "The Village at Bella Terra", Tentative Tract Map 17261, is a mixed-use commercial center redevelopment located on a 15.9 acre existing commercial development of buildings and parking lots on the north side of Edinger Avenue. The Project is located southwest of the intersection of Center Drive and Huntington Village Lane. Streets bound the project to the north (Center Drive) and to the south (Edinger Avenue). An existing railroad right-of-way and flood control channel area at the project's west boundary and existing Bella Terra shopping plaza is at the project's east boundary. The project location is shown in Section VI, Exhibits B.

The project includes mixed commercial use facilities as follows:

- Approximately 60,000 SF grocery
- Approximately 70,000 SF soft/hard goods (i.e. Crate & Barrel, Apple, Anthropologie, etc.)
- Approximately 20,000-30,000 SF restaurants
- Approximately 8,000-10,000 SF services oriented (i.e. business services office, laundry, gym for residences and community center for residences)
- Approximately 3,000-5,000 SF sales/marketing office and residential management office
- Multi level parking structures

The site shall also include storm drains and associated utility improvements for the project. All proposed main storm drain improvements are provided in Section VI, Exhibits A.

Additional improvements include residential development units, for sale and for rent, including two 10-story residential tower, common areas located throughout the development, a community park located at the mid-eastern boundary of the development, two swimming pools, fountains, multi-level parking structures, and landscaping. The project currently proposes two development alternatives. Development Alternative 1 is as follows:

BLDG/ BLOCK	AREA				PARKING	
	Retail	Residential	# Units	Total (Excl Pkng)	REQUIRED	PROVIDED
1	21,000 SF	70,600 SF		91,600 SF	271	224
2	28,430 SF	N/A		28,430 SF	142	N/A
3a	46,500 SF	87,360 SF		133,860 SF	490	406
3b	N/A	121,350 SF		121,350 SF		
4	40,980 SF	187,680 SF		228,660 SF	205	1,101
5a	N/A	259,537 SF		259,537 SF	499	497
5b	N/A	253,736 SF		253,736 SF		
Surface Replacement	N/A	N/A		N/A	250	N/A
Curb Parking	N/A	N/A		N/A	N/A	74
TOTAL	156,955 SF	680,410 SF	713	840,190 SF	1,803	2,302

Residential Unit Mix

Proposed residential units are as follows and are subject to change:

UNIT TYPE	AREA	% TOTAL	# UNITS
Studio	600 SF	5 %	36
1 BDRM	750 SF	30 %	214
2 BDRM	1,100 SF	55 %	392
3 BDRM	1,250 SF	10 %	71
TOTAL	--	100 %	713

Program Summary

Retail space ..... 156,955 SF
Housing units ..... 713 units
Parking spaces ..... 2,302 spaces

Summary of Development Alternative 2 is as follows:

Land Use	Quantity
Residential	538 DU
Restaurant	30,000 SF
Commercial	384,255 SF
Landscape	62,027 SF

Residential Unit Mix

Currently, information regarding the unit types is not known.

Program Summary

Retail space ..... 384,255 SF
Housing units ..... 538 units
Parking spaces ..... TBD

Paved areas include the project streets, sidewalks and concrete foundations for dwelling units and the commercial area. Parking in the residential area shall be provided by below grade and multi-level residence parking garages at the base of Buildings 3, 4 and 5. Parking in the commercial portion of the project will consist of below grade and multi-level parking structures at the base of Buildings 4, and 5 with separate parking entrance gates and attendant booths as applicable.

Landscaped areas for the project shall include lawns, gardens, landscaped planters and a 365' long community park adjacent and east of Building 4. Although privately maintained, the park area will be available for public use. Landscape regions are shown in Section VI, Exhibit A-1 and A-2 of this WQMP. Detailed landscape improvements will be shown in project landscape plans, incorporated by reference.

All landscaping shall be equipped with efficient irrigation systems and landscaped design in compliance with the City of Huntington Beach Arboricultural and Landscape Standards and Specifications.

Anticipated activities within the mixed commercial use facilities include working and business activities, grocery shopping, spa and fitness activities, dining, indoor/outdoor entertainment, sales and marketing various carts and kiosks, valet service, shopping and related services. Activities for the residential development and park area include swimming, relaxing, exercising, picnicking, jogging, community meetings, walking, pet walking and other outdoor activities.

Outdoor storage of materials will not be permitted onsite. No fueling bays or vehicle maintenance and repair areas are proposed. A vehicle wash area that does not drain into a storm drainage system shall be provided for common residential usage. Wash water from this area will be directed to the sanitary sewer (in accordance with City requirements and with prior approval of the sewering agency), to an engineered infiltration system, or to an equally effective alternative as approved by the City Engineer.

Delivery and trash areas for the site will be will be provided for commercial and residential use. The trash enclosure area shall be covered or roofed over with a solid, impervious material. Connection of trash area drains to the storm drain system is prohibited. If feasible, the trash enclosure area shall be connected to the sanitary sewer system. Currently, the locations of the proposed trash enclosures have not been determined. Known delivery areas (currently only two locations in the southern portion of the site) are provided in the WQMP Site Plan. Once all information is available, the locations of these improvements will be included in this preliminary WQMP or the final WQMP.

All common areas within the residential community shall be owned and maintained by the Master Residential Association (MRA). Common areas within the commercial development shall be improved, owned and maintained by the Master Commercial Association (MCA).

All project streets surrounding the commercial center and residential area are public streets (Edinger Avenue and Center Drive). All other streets are private and shall be maintained by either the Master Residential Association or the Master Commercial Association per the CC&Rs and the "Maintenance License Agreement" Exhibit and the "Mutual Benefit Exhibit" included at the end of Section V, "Inspection and Maintenance Responsibility for BMPs". Exhibits A and E in Section VI refer.

The formation of the Master Residential Association (MRA) and the Master Commercial Association (MCA) shall be established by the developer, DJM Capital Partners, Inc. The MRA and MCA will fulfill the project's requirements and responsibilities for long term maintenance of common areas. DJM Capital Partners, Inc. will act in lieu of the MRA and MCA prior to its creation. DJM Capital Partners, Inc. shall serve as the in-lieu MRA/MCA contact at (805) 565-3365 or (805) 962-4300. Once the MRA and MCA have been established for the project, the contact information for both property management associations shall be appended to this WQMP.

Fully developed, impermeable surfaces will cover approximately 90% of the project area (14.27 acres). Permeable surfaces will cover approximately 10% of the project area (1.58 acres). These areas are shown in green in Section VI, Exhibit A-1 and A-2.

Daily generation of homeowner related trash and retail commercial shops are anticipated. On a weekly basis, such trash will be collected by each tenant (business/homeowner) and disposed of in designated trash enclosures located throughout the project site to be removed by the local, private waste management company for proper disposal to a central trash disposal facility offsite.

All restaurants and shops located within the commercial area and providing food services will be required to route sewer drains from food preparation areas through a grease interceptor prior to entering the public sewer system. An indoor grease storage unit will also be provided. The locations of these facilities are currently not known and will be provided in the final WQMP.

Pollutants of Concern

The potential stormwater or urban runoff pollutants reasonably expected to be associated with this project are:

1. *Sediment.* Driveways, parking areas, roads and roof-tops are expected to be common sources of sediment due to wear.
2. *Organic Compounds.* These compounds can be expected to be derived from automotive fluids, pesticides, and fertilizers.
3. *Nutrients.* Nutrients, including nitrogen, phosphorous, and other compounds can be anticipated to be generated by or founding organic litter, fertilizers, food waste, sewage and sediment.
4. *Metals.* Potential sources of trace metals (copper, lead, cadmium, chromium, nickel and zinc) include motor vehicles, re-roofing and hardscape/construction materials, and chemicals.
5. *Bacteria and viruses.* Anticipated sources include animal excrement (found in areas where pets are often walked), sanitary sewer overflow, restaurant service (food disposal), outdoor dining area, and trash container handling areas.
6. *Oil and Grease.* Potential sources of oil and grease include motor vehicles.
7. *Oxygen-Demanding Substances.* Potential sources include biodegradable organic materials and various household chemicals, which deplete dissolved oxygen levels in water courses.
8. *Pesticides.* Sources of pesticides include household bug-spray, weed killers and other household sources.
9. *Trash and Debris.* These sources include common litter, biodegradable organic matter such as leaves, grass cuttings and food wastes from landscaped areas.

The Standard Industrial Classification (SIC) Code for the commercial/retail center includes, but is not limited to, the following: office buildings (6512), restaurants (5812), night clubs (5813), parking stations and garages (7521) and valet services (7212).

This project is classified as a Priority Project, Categories 1, 2, 4 and 7 per Table 7.II-1 of the Countywide Orange County Storm Water Program. Therefore, treatment control BMPs are required to remove pollutants typically associated with urban runoff.

Table 7.II-1
Priority Projects Categories

1.	Residential development of 10 units or more
2.	Commercial and industrial development greater than 100,000 square feet including parking area
3.	Automotive repair shops (SIC codes 5013, 5014, 5541, 7532-7534, and 7536-7539)
4.	Restaurants where the land area of development is 5,000 square feet or more including parking area (SIC code 5812)
5.	*For San Diego Region* - Hillside development greater than 5,000 square feet *For Santa Ana Region* - Hillside developments on 10,000 square feet or more, which are located on areas with known erosive soil conditions or where natural slope is twenty-five percent or more
6.	Impervious surface of 2,500 square feet or more located within, directly adjacent to (within 200 feet), or discharging directly to receiving waters within Environmentally Sensitive Areas
7.	Parking Lots 5,000 square feet or more, or with 15 parking spaces or more, and potentially exposed to urban stormwater runoff.
8.	*For San Diego Region* - Streets, roads, highways, and freeways which would create a new paved surface that is 5,000 square feet or greater
9.	*For Santa Ana Region* - All significant redevelopment projects, where significant redevelopment is defined as the addition of 5,000 or more square feet of impervious surface on an already developed site.

SECTION 3

Section III Site Description

The Village at Bella Terra is located at 7777 Edinger Avenue in the City of Huntington Beach, at the southwest intersection of Center Drive and Huntington Village Lane. The project location is shown on the vicinity map, Exhibit B. The total project onsite area is approximately 15.85 acres.

The site is located within the western portion of the former Huntington Beach Mall and currently designated as Commercial Regional (CR), 0.50 Permitted Density (F2), Specific Plan Overlay (SP) and Mixed Use (MU) with 0.5 Permitted Density for commercial/25 dwelling units/acre residential per the General Plan. Surrounding land uses consist primarily of commercial facilities.

The site is bound to the west by existing railroad tracks and a commercial plaza beyond; to the north by Central Avenue and Old World Village center (commercial) beyond; to the east by existing Bella Terra shopping plaza and Beach Boulevard beyond; and to the south by Edinger Avenue and a retail shopping center beyond.

The site currently consists of paved parking areas, empty building structures, and a dirt lot. In general, the site slopes gently to the west/southwest. The site resides within the northern/northwestern portion of the Peninsular Ranges Geomorphic Province of Southern California. This province is characterized by northwest-southeast trending faults, folds, and mountain ranges.

Based on the Natural Resources Conservation Service's Web Soil Survey, onsite soils consist primarily of Bolsa Silt Loam and Bolsa Silt Clay, which are considered in Hydrologic Soil Group C, characterized as having slow infiltration rate when thoroughly wet. Per the geotechnical investigation prepared for Bella Terra (GPI Geotechnical Professionals Inc., January 2004), onsite groundwater is relatively shallow, ranging from 5′ to 13′ below existing grades, with subsurface soils consisting predominantly of silty sands, clays and mixtures thereof.

Pre-construction, the proposed site is approximately 99% impervious and approximately 1% pervious. Post-construction, the proposed site will consist of approximately 90% impervious surface and 10% pervious surface.

The project resides within the jurisdiction of the Santa Ana Region Water Quality Control Board (SARWQCB).

The site is located in the Westminster Watershed (Orange county Watershed "C"). The Watershed District has an overall area of approximately 90 square miles and is comprised of multiple tributary areas that contribute urban run-off along existing drainage channels. Two main tributaries drain most of this watershed: on the northern side, the Bolsa Chica Flood Control Channel (BCFCC), with its principal tributaries (Anaheim-Barber City Channel and Westminster Channel), drains to Huntington Harbour prior to emptying to the Pacific Ocean. On the southern side, the East-Garden Grove Wintersburg Channel (EGGWC), with its principal tributary (Ocean View Channel), drains to Bolsa Bay prior to discharging to the Pacific Ocean. The project site is located within the southern portion of the watershed, draining to the EGGWC.

Existing Drainage

All onsite surface flows are currently directed to the west-southwest to a north to south flowing 5′ x 6′ channel located along the project's western boundary and adjacent to the existing railroad line. During storm events with an intensity of the 100-year storm or greater, overflows from the adjacent offsite area located to the north will occur and sheet flow, as run-on flows, to the project site. The discharge is conveyed from the project's southwest corner offsite and to the southwest by Orange County Master Plan facility C05 (East-Garden Grove Wintersburg Channel) and eventually to Bolsa Bay at the Pacific Ocean. Refer to Appendix D in Section VI.

Post-Construction Drainage

Storm Flows

In the developed condition, project surface flows drain generally to the south and west to area drains and the main storm drain systems. Runoff is then conveyed to a 5′ x 6′ channel prior to discharging to Edinger Avenue at the southwest corner of the project site to the existing storm drain system. In general, water quality flows and related treatment issues deal with low intensity storm events up to the 2 year intensity range. Therefore, run-on flows from northerly offsite (Phase 1) during a 100-year storm event will not affect water quality treatment of anticipated project pollutants. However, the project hydrology and onsite storm drain system shall address and be designed, respectively, to completely mitigate onsite the potential flooding hazard anticipated to be caused by the run on flows which sheet flow onto the project site from the adjacent offsite area to the north whenever a 100-year storm, or greater, occurs.

First Flush

Project first flush runoff flows are diverted onsite to two offline Stormfilter BMP systems for treatment control of project pollutants. One storm filter is located on the west side of the project to the north. The other Stormfilter is located on the west side of the project to the south. For reference, see Exhibit A-1 Site Plan in Section VI.

Parking Structure Drainage

Underground parking areas will not be allowed to drain to the storm drain system. Any non-stormwater nuisance flows will be treated by an oil/water separator to remove vehicle related pollutants and pollutants characteristic of parking areas prior to discharging to the sanitary sewer system. Pumps will be used to remove runoff from the underground parking area and directed into the sanitary sewer.

303(d) Water Bodies

This project is located within the jurisdiction of the Santa Ana Regional Water Quality Control Board and within the Westminster Watershed (County of Orange Watershed C) and ultimately discharges to the Pacific Ocean via Bolsa Chica. The 2006 CWA 303(d) list indicates that Bolsa Chica is impaired for Copper and Nickel. Total Maximum Daily Load (TMDL) standards for Copper and Nickel are proposed to be completed in 2019. The site does not contain nor impact any "environmentally sensitive areas" as defined by the 2003 Orange County Drainage Area Management Plan (DAMP) and the Water Quality Control Plan for the Santa Ana Basin (Basin Plan).[1]

[1] Based on information obtained from the project's Environmental Impact Report.

Hydrologic Conditions of Concern

Hydrologic Conditions of Concern for any development such as the proposed project may include potential water quality degradation; increased runoff volume and velocity; reduced infiltration; increased flow frequency, duration and peaks; and faster time to reach peak flow resulting from development. As a result of the project's development (i.e., the upstream development), it has been determined by the preliminary project hydrology and water quality analysis prepared by Hunsaker & Associates Irvine, Inc. (H&A) that neither a significant potential for erosive conditions nor alteration of habitat of the downstream streams and channels would occur.

In H&A discussions with Orange County staff (who drafted the language for the latest Countywide Model WQMP jointly with representatives from all Orange County Cities), it has been determined that the "downstream channel" (referenced in Item No. 1 of Section 7.II-3.2.4 of the Model WQMP) refers to the direct discharge point of the subject project. The intent of said section of the Model WQMP is to identify projects that have direct discharges to fully natural or partially improved channels. The proposed project does not have direct discharges to fully natural or partially improved channels. Rather, the proposed project will discharge to the existing, fully improved East-Garden Grove Wintersburg Channel.

Based on the information above and our consultation with the County of Orange, it is our opinion that Items 2 – 4 of Section 7.II-3.2.4 of the Model WQMP, which relate to preparation of a drainage report, field reconnaissance and computations for critical hydrologic conditions for the "downstream channel," do not apply to this project.

SECTION 4

Section IV Best Management Practices (BMPs)

BMPs are structural devices, procedures, rules or methods which, when implemented and followed, should reduce and/or eliminate the specific source of pollution of which the BMP is targeted. This section describes how each of these BMPs were developed and will be implemented for the proposed project. For those routine BMPs that are not applicable to this project, an explanation is included as to why that is the case. All BMPs indicated in this WQMP will be maintained in good and effective condition.

By means of recorded community CC&R's, the MRA and MCA shall establish requirements for (a) ownership/maintenance of and/or maintenance easements for community common areas in the project and (b) implementation of community pollution prevention on BMPs, including community awareness programs.

This WQMP identifies Best Management Practices (BMPs) that will be used onsite to control predictable pollutant runoff, and identifies, at a minimum, the measures specified in the Countywide Water Quality Management Plan (WQMP) and NPDES Drainage Area Management Plan (DAMP), the assignment of long-term maintenance responsibilities, and the locations(s) of all structural BMPs.

Routine Source Control BMPs are required to be incorporated in all new development and redevelopment projects unless not applicable. In the tables provided, all BMPs to be incorporated in the project are indicated. For those designated as not applicable, a brief reason why is stated.

All source control BMPs listed for specific land use/type of project in the following Countywide Water Quality Management Plan tables have been discussed and considered for utilization to the extent that they are appropriate for the site and project.

IV.1 Site Design BMPs

Site design BMPs refer to design principles that seek to minimize pollutant sources by minimizing the project footprint. These BMPs are also intended to create a hydrologically functional project design that attempts to mimic the natural regime. The following table shows site design BMPs that are included in this project. A brief description of each BMP also follows:

Table IV.1. Site Design BMPs

Technique	Included?		If no, state justification.
	Yes	No	
Minimize Directly Connected Impervious Areas (DCIAs) (C-Factor Reduction)	✓		
Create Reduced or "Zero Discharge" Areas (Runoff Volume Reduction)[1]	✓		
Minimize Impervious Area/Maximize Permeability (C-Factor Reduction)[2]	✓		
Conserve Natural Areas (C-Factor Reduction)		✓	Project is a redevelopment. No natural areas left to be conserved.

1 Detention and retention areas incorporated into landscape design provide areas for retaining and detaining stormwater flows, resulting in lower runoff rates and reductions in volume due to limited infiltration and evaporation. Such Site Design BMPs may reduce the size of Treatment Control BMPs.

2 The "C Factor" is a representation of the ability of a surface to produce runoff. Surfaces that produce higher volumes of runoff are represented by higher C Factors. By incorporating more pervious, lower C Factor surfaces into a development, lower volumes of runoff will be produced. Lower volumes and rates of runoff translate directly to lowering treatment requirements.

Directly connected impervious areas (DCIAs) will be reduced throughout the project in a variety of ways. Roof drainage, sidewalks and driveways will be directed to landscaped areas where feasible. Other landscaped areas, commercial planters, the pedestrian corridor, park areas, and open space are used to break up areas of imperviousness.

Multi-story residential units have been incorporated into the project design, increasing overall living space but reducing unit footprint and thus reducing impervious space.

Although no "natural" areas exist onsite open space, courtyards, planters and pedestrian corridors are being provided that will serve to reduce impervious areas and thus reduce the project's C-Factor.

IV.2 Source Control BMPs

Source Control BMPs are intended to minimize the contact between potential pollutant sources and urban runoff. All source control BMPs listed for specific land use/type of project in the following Countywide Water Quality Management Plan tables have been discussed and considered for utilization to the extent that they are appropriate for the site and project. For a BMP listed in the table following not used for the project, this section of the WQMP has explained why this source control BMP is not appropriate for the project.

IV.2.1 Routine Non-Structural BMPs

Routine non-structural BMPs are geared towards operational procedures, such as maintenance activities (i.e. good housekeeping practices). The following table shows routine non-structural BMPs included in this project and those that were not included.

Table IV.2.1 Routine Non-Structural BMPs

Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
N1	Education for Property Owners, Tenants and Occupants	✓		
N2	Activity Restrictions	✓		
N3	Common Area Landscape Management	✓		
N4	BMP Maintenance	✓		
N5	Title 22 CCR Compliance (How development will comply)	✓		

Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
N6	Local Water Quality Permit Compliance		✓	The City of Huntington Beach does not issue water quality permits
N7	Spill Contingency Plan	✓		
N8	Underground Storage Tank Compliance		✓	None proposed for project.
N9	Hazardous Materials Disclosure Compliance	✓		
N10	Uniform Fire Code Implementation	✓		
N11	Common Area Litter Control	✓		
N12	Employee Training	✓		
N13	Housekeeping of Loading Docks	✓		
N14	Common Area Catch Basin Inspection	✓		
N15	Street Sweeping Private Streets and Parking Lots	✓		
N16	Commercial Vehicle Washing		✓	No commercial or private vehicle washing will be allowed onsite

Routine Non-Structural BMPs

(N1) Homeowners/Tenant Education

Environmental awareness education materials, including, but not limited to those included in Section VII of this WQMP, shall be provided to all members of the MRA and MCA, at the close of escrow, and for the commercial tenants, at the signing of the lease, and annually thereafter by the MRA and MCA, respectively. Residential materials will include information regarding landscape maintenance, maintenance of irrigation systems, proper disposal of pet wastes and illegal dumping of toxic substances (oil, paints, electronics, etc.). Commercial and restaurant materials will include information regarding spill prevention and cleanup, fats, oils & greases (FOG), exterior cleaning, and building maintenance.

The MRA and MCA will insure that all homeowners and commercial tenants will be given a copy of the recorded CC&Rs which will contain a section outlining the environmental awareness education materials. The MRA and MCA will establish requirements for the implementation of a community awareness program that informs home buyers and business owners of the impacts of dumping oil, paints, solvents or other potentially harmful chemicals into the storm drain; the proper use and management of fertilizers, pesticides and herbicides in home landscaping and gardening practices; the impacts of littering and improper watering (see Section V, Table 1, Figure "D").

(N2) Activity Restrictions

Within the CC&Rs that will been prepared by DJM Capital Partners, Inc., for Tentative Tract Map 17261, The Village at Bella Terra, language will be included to identify surface water quality protection required of The MRA and MCA. Surface water quality activities will also be conducted in conformance with the WQMP as it relates to the handling and disposal of contaminants. The Draft Residential CC&Rs are included in this WQMP as Appendix B. This document addresses Use Restriction including nuisances, parking and vehicular restrictions, animal regulations, drainage and pollutant control. The Commercial CC&Rs will be included in this WQMP at such time as they become available.

(N3) Common Area Landscape Management

Management programs will be designed and established by the MRA and MCA, which will own and maintain all common areas within the project site. These programs will include how to mitigate the potential dangers of fertilizer and pesticide usage. Ongoing maintenance will be consistent with the Huntington Beach City Water Efficient Landscape Requirements, the County Water Conservation Resolution (Ordinance. No. 3802) and the State of California Model Water-Efficient Landscape Ordinance. Fertilizer and Pesticide usage shall be consistent with County Management Guidelines for use of Fertilizers and Pesticides. The Educational Materials in Section VII includes copies of these requirements and ordinances.

(N4) BMP Maintenance

As indicated in (N2) above, the CC&Rs shall identify the MRA and MCA as being responsible for implementation of each applicable non-structural BMP as well as scheduling inspection and maintenance cleaning of all applicable structural BMP facilities. The MRA and MCA, through the landscape maintenance contractor, will be responsible for inspection and maintenance activities in landscape areas (See Section VI, Exhibit A-1 and A-2). Debris and other water pollutants will be controlled, contained and disposed of in a proper manner by the maintenance contractor. See Section V Inspection/Maintenance Responsibility for BMPs for further information.

(N5) Title 22 CCR Compliance

The MRA and MCA shall comply with Title 22 of California Code of Regulations and relevant sections of the California Health and Safety Code regarding hazardous waste management, which will be enforced by County Environmental Health on behalf of the State. All materials considered as hazardous must be properly handled and disposed of by an approved disposal facility. Pool chemicals for water purification and cleaning that are considered hazardous by California Code of Regulations, Title 22, §66261.162, Appendix X may include but are not limited to: Bromine (toxic, corrosive, ignitable), Calcium hypochlorite (toxic, corrosive, ignitable, reactive), and Chlorine (toxic, corrosive, ignitable, reactive).

(N7) Spill Contingency Plan

This requirement generally applies to commercial or industrial developments that fuel, store or dispense hazardous materials. A spill contingency plan shall be prepared by MRA and MCA for the proposed pool areas as it relates to notification of responsible agencies, disposal of cleanup materials, documentation, etc. with regards to County of Orange fact sheet "Spill Prevention, Control & Cleanup" IC-17.

(N9) Hazardous Materials Disclosure Compliance

This BMP applies to commercial and industrial facilities that generate, store or dispose of hazardous materials. Compliance with Permittee ordinances are typically enforced by respective fire protection agency for the management of hazardous materials. Orange County, health care agencies, and/or other appropriate agencies (i.e. Department of Toxics Substances Control are typically responsible for enforcing hazardous materials and hazardous waste handling and disposal regulations. All hazardous materials such as chemicals, fertilizers, pesticides and medical use related materials shall be contained in spill proof containers that are locked in protective storage areas. These areas must be covered. All required signage regarding materials on hand shall be in place per requirements.

(N10) Uniform Fire Code Implementation (N10)

All onsite facilities that generate, store or dispose of hazardous materials will be required to be compliant with Article 80 of the Uniform Fire Code enforced by the local fire protection agency.

(N11) Common Area Litter Control (N11)

The MRA and MCA, through the site maintenance contractor, will be required to maintain weekly sweeping and trash pick-up within the project area. Daily inspection will be made of trash receptacles to make sure lids are closed and pick-up of any excess trash on the ground has occurred. DJM Capital Partners, Inc. shall be responsible for common area litter control until the responsibility is accepted by the MRA and MCA. Pursuant to Figure "D", responsibility shall include the emptying of trash receptacles, noting of disposal violations by commercial tenants and homeowners, and reporting such violations to the MRA and MCA for investigation, as appropriate.

(N12) Employee Training

An annual employee training/education program will be established by DJM Capital Partners, Inc. and the Property Management Corporation and would apply to future employees, contractors and volunteers of The Village at Bella Terra, the MRA and MCA to inform and train employees engaged in maintenance activities regarding the impact of dumping oil, paints, solvents or other potentially harmful chemicals into storm drain; the proper use of fertilizers and pesticides in landscaping maintenance practices; and the impacts of littering and improper water disposal (see attached Matrix & Section VII Educational Materials). DJM Capital Partners, Inc. will be responsible for these activities as they relate to DJM Capital Partners, Inc. employees, subcontractors, and contractors. The MRA and MCA shall also be responsible for providing commercial tenants and homeowners with educational materials regarding the impact of dumping oil, paints, solvents or other potentially harmful chemicals into storm drain; the proper use of fertilizers and pesticides in landscaping maintenance practices; and the impacts of littering and improper waste disposal.

(N13) Housekeeping of Loading Docks

Loading areas shall be kept clean and clear of trash, litter and debris at all times. Use of water shall be minimized in clean up procedures. Spills and broken containers shall be cleaned up immediately. If wash-down water is used, rinse water must be disposed of in an approved manner and not discharged to the storm drain system. Discharge into sanitary sewer will be allowed if authorized by Orange County Sanitation District (OCSD).

(N14) Common Area Catch Basin Inspection

Prior to the acceptance of the project's proposed storm drain mainline by the City of Huntington Beach for ownership and maintenance, along with its catch basins, DJM Capital Partners, Inc. will be responsible for maintaining these improvements. Maintenance activities will be done on a regular basis, and prior to the storm season, no later than October 1st of each year. Any private storm drain systems located in common areas will be owned and maintained by the MRA and MCA.

(N15) Street Sweeping Private Streets and Parking Lots

Prior to the acceptance of the project streets for maintenance by either the MRA or the MCA as shown on the Operation and Maintenance Plan (O&M) at the end of Section V, DJM Capital Partners, Inc. will have all streets and paved areas vacuum swept on a weekly basis. This procedure will be intensified around October 1st of each year prior to the "first flush" storm.

(N16) Commercial Vehicle Washing

A vehicle wash area for common residential usage will be installed onsite. However this is not a commercial facility.

IV.2.2 Routine Structural BMP's

Structural BMPs are physical, structural or mechanical devices or facilities targeted at preventing pollutants from entering the storm drain system. Structural BMPs shall be installed initially by DJM Capital Partners, Inc. the developer, through the construction and development of the project. For instance; slope planting and irrigation systems shall be designed by licensed landscape architects and installed by qualified contractors to specifications and standards of the County of Orange. The structural BMPs used for this project are summarized in Section V, "Inspection and Maintenance Responsibility for BMPs".

Table IV.2.2 Routine Structural BMPs

Identifier	Check One		If not applicable, state brief reason
	Included	Not Applicable	
Provide storm drain system stenciling and signage	✓		
Design and construct outdoor material storage areas to reduce pollution introduction		✓	No outdoor material storage areas proposed.
Design and construct trash and waste storage areas to reduce pollution introduction	✓		
Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	✓		
Protect slopes and channels and provide energy dissipation	✓		Landscaped slopes will be stabilized with vegetation as required by the City'. Project discharges into fully improved channels.

Identifier	Check One		If not applicable, state brief reason
	Included	Not Applicable	
Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)		✓	Project resides in the jurisdiction of the Santa Ana RWQCB, not the San Diego RWQCB.
a. Dock areas	✓		
b. Maintenance bays		✓	No maintenance bays required for proposed project.
c. Vehicle wash areas	✓		
d. Outdoor processing areas		✓	Applies to a industrial project. This project is residential and commercial.
e. Equipment wash areas		✓	Equipment washing prohibited onsite.
f. Fueling areas		✓	No fueling areas allowed onsite.
g. Hillside landscaping		✓	Project will not have hillside landscaping.
h. Wash water control for food preparation areas	✓		
i. Community car wash racks	✓		

1. **Common Area Runoff - Minimizing Landscape Design (CASQA BMP SD-10)**

As a part of the design of all common area landscape areas, similar planting material with similar water requirements will be used in order to reduce excess irrigation runoff and promote surface filtration. Such common areas will be maintained by the MRA or MCA (Section V "Inspection and Maintenance Responsibility for BMPs"). Prior to the appropriate property management corporation's takeover of maintenance responsibilities, DJM Capital Partners, Inc. will be responsible for installation and maintenance of these common areas.

2. **Common Area Efficient Irrigation (CASQA BMP SD-12)**

As a part of the design of all common area landscape irrigation, implementation of the City of Huntington Beach Water Efficient Landscape Requirements, Municipal Code §14.52 and the Orange County Water Conservation Resolution (Ord. No. 3802) including, but not limited to, such provisions as water sensors, programmable irrigation times (for short cycles), etc., will be used. Such common areas will be maintained by the MRA or MCA (Section V "Inspection and Maintenance Responsibility for BMPs").

3. **Catch Basin Signage (CASQA BMP SD-13)**

All Thermoplastic markers (or other city-approved alternative) bearing the message "No Dumping -- Drains to Ocean" will be used on all of the project's catch basins. This will be done in a location that can be clearly seen by all and will be routinely inspected and re-labeled, as required, until the City of Huntington Beach accepts maintenance responsibility for the public catch basins.

Thereafter, the MRA or MCA will routinely inspect and re-label the private catch basins, as necessary. Catch basin labels will be inspected twice a year and relabeled as necessary to maintain legibility.

4. **Maintenance Bays and Dock Areas (CASQA BMP SD-31, IC-10)**

There are no maintenance bays proposed. Loading dock areas shall be covered. Drainage shall be designed to preclude urban run-on and runoff. Runoff from dock areas shall be prohibited from entering storm drains. Dock areas shall be kept clean at all times. All maintenance activities must be consistent with BMP N13, Housekeeping of Loading Docks.

5. **Trash Enclosures (CASQA BMP SD-32 and DAMP IC-22)**

Trash enclosures shall be provided in designated areas of the commercial development and the residential development. The enclosures will be covered to prevent contact with wind and rain. The areas will also be designed to prevent contact with storm run-on. Drainage from the trash enclosure areas will be prohibited to enter the storm drain. Waste areas will be inspected daily and kept in an orderly manner by the MRA and MCA.

6. **Vehicle Washing Areas/Community Car Wash Racks (CASQA BMP SD-33)**

Not applicable. No commercial or private vehicle washing allowed onsite.

7. **Outdoor Material Storage Areas (CASQA BMP SD-34)**

Not applicable. No outdoor storage of materials allowed onsite.

8. **Outdoor Processing Areas (CASQA BMP SD-35)**

Not applicable. No outdoor processing areas proposed.

9. **Eating and Drinking Establishments (DAMP BMP IC-22)**

Good house keeping practices shall be used in the kitchen food preparation area. All wash water of the kitchen area will be kept indoors and prevented from reaching storm drains. Wash water shall be directed to sanitary sewers. All grease materials, oil and trash shall be recycled or disposed of properly. Additionally, grease interceptors shall be required in all restaurant and food services establishments.

Outdoor eating areas will be swept or vacuumed on a daily basis. Pavement areas including "drive-thru" areas, parking lots, sidewalks, and dumpster storage areas will be dry swept frequently. All outside areas will be kept free of trash & debris.

IV.3 Treatment BMPs

Treatment control BMPs are engineered systems that are designed and constructed to remove pollutatns from urban runoff. The following table shows treatment BMPs that are included in this project. A brief description of each BMP also follows:

Table IV.3. Treatment BMPs

Name	Included?		If not applicable, state brief reason
	Yes	No	
Vegetated (Grass) Strips		✓	StormFilter employed.
Vegetated (Grass) Swales		✓	StormFilter employed.
Proprietary Control Measures		✓	StormFilter employed.
Dry Detention Basin		✓	StormFilter employed.
Wet Detention Basin		✓	StormFilter employed.
Constructed Wetland		✓	StormFilter employed.
Detention Basin/Sand Filter		✓	StormFilter employed.
Porous Pavement Detention		✓	StormFilter employed.
Porous Landscape Detention		✓	StormFilter employed.
Infiltration Basins		✓	StormFilter employed.
Infiltration Trench		✓	StormFilter employed.
Media Filter	✓		

Treatment BMPs evaluated for this WQMP included: StormFilter®

Media Filter (StormFilter)

Treatment will be achieved through the use of two onsite StormFilters designed offline from the storm drain system. See Section VI, Exhibit A-1.

The StormFilter is a premier filtration system widely recognized as a versatile BMP for removing a variety of pollutants. The StormFilter cartridges are filled with an array of media, selected to treat specific pollutant loadings at each site. These site-specific media options give the StormFilter the ability to remove high levels of storm water pollutants such as sediments, oil and grease, soluble heavy metals, organics and soluble nutrients.

The StormFilter is unique in its ability to meet current and future pollution challenges. No other system offers this degree of excellence and versatility. It is important to note the Contech's pollutant treatment claims are supported by independent third party testing and evaluation. For further details, refer to Section VI, Exhibit F or see http://www.contech-cpi.com/stormwater/13.

The StormFilter units consists of multiple filter cartridges housed in a buried concrete vault that is installed offline from the storm drain system. Pollutant removal is primarily accomplished by percolating accumulated storm water through the filter cartridges. A typical unit consists of an inlet bay where floatables, oils, and surface scum are trapped; a filter bay for the cartridges; and an outlet bay. Water from the inlet bay ponds in the filter cartridge bay and infiltrates the filter media, after which the treated water moves into the outlet bay and into the storm drainage system. The unit's filter cartridges will be installed with an even mix of ZPG media (ie., Zeolite, Perlite and GAC) to treat the pollutants anticipated by this project's intended land use.

Design Criteria

All onsite treatment systems are flow-based systems, and therefore, are sized by estimating the Design Flow associated with the design storm determined in accordance with the Drainage Area Management Plan. This concept proposes systems to treat the two on-site areas. See Exhibits A and C in Section VI for reference.

The Storm Water Quality Design Flow (SQDF) calculated for Area "A" is 1.09 cfs (C = 0.79, I = 0.2 in/hr; A = 6.9 acres). The stormfilter system for Area "A" will be an in-series system consisting of an approximately 6'W x 12'L pre-cast (10 cartridges) and an approximately 8'W x 16'L pre-cast (26 cartridges). These will handle the low-flow and first flush treatment requirement for this drainage.

The Storm Water Quality Design Flow (SQDF) calculated for Area "B" is 1.14 cfs (C = 0.73, I = 0.2 in/hr; A = 7.2 acres). The StormFilter sizing for Area "B" will accommodate this flow rate. Area "B" will be serviced by an in series stormfilter system similar to the system used for Area A. This unit will handle the first flush and low flow treatment requirement for drainage.

Both of the on-site areas will have first flush and dry weather flows treated by the above systems. The first flush and dry weather flows will be treated and then discharged to the city storm drain system. All storm filter system sizing is preliminary and subject to change, pending entry approval of final improvement plans.

Nuisance/non-stormwater flows from the underground parking structure will not be allowed to drain into the storm drain system, but rather, will be treated with an oil/water separator to remove vehicle related pollutants and pollutants characteristic of parking areas prior to discharging to the sanitary sewer. Sump pumps will be used to remove runoff from the underground parking area.

Treatment of Anticipated Pollutants

StormFilter

The selected BMPs are anticipated to provide treatment for the majority of the project's pollutants of concern. Impacts from pesticides, nutrients and bacteria/viruses will also be minimized using routine non-structural and structural BMPs, such as common area efficient irrigation, landscape/pesticide use management, fertilizer management and daily clean up of pet wastes and food wastes.

Pollutant of Concern	Media FilterMP-40 StormFilter®
Sediment	High
Organic Compounds	Medium
Nutrients	Medium
Metals	Low/Medium*
Bacteria and Viruses	Low*
Oil and Grease	High
Oxygen Demanding Substances	Low*
Pesticides	Low*
Trash and Debris	High

* Pollutants not in bound forms. Please note that these pollutants are usually found in bound forms, which allow for higher removal rates.

StormFilter media can be customized by blending different filter media to target site specific media. "ZPG" (Zeolite, Perlite, and GAC) which targets a wide range of pollutants will be used in vault cartridges.

Media Options

The StormFilter can be customized using different filter media to target site-specific pollutants. A combination of media is often recommended to maximize pollutant removal effectiveness.

Pollutant	Perlite	CSF	MetalRx	Zeolite	GAC
Sediments	✓	✓			
Oil and Grease	✓	✓	✓		
Soluble Metals		✓	✓	✓	
Organics		✓	✓		
Nutrients	✓	✓	✓	✓	
Ammonium				✓	

Perlite is naturally occurring puffed volcanic ash. Its porous, multi-cellular structure and rough edges make it effective for removing TSS, oil and grease.

CSF® Leaf Media and MetalRx™ are created from deciduous leaves processed into granular, organic media. CSF is most effective for removing soluble metals, TSS, oil and grease, and neutralizing acid rain. MetalRx, a finer gradation, is used for higher levels of metal removal.

Zeolite is a naturally occurring mineral used in a variety of water filtration applications. It is used to remove soluble metals, ammonium and some organics.

GAC (Granular Activated Carbon) has a micro porous structure with an extensive surface area to provide high levels of adsorption. It is primarily used to remove oil and grease and organics such as herbicides and pesticides.

Additional BMPs

The following non-structural BMPs shall also be incorporated into this project:

1. **Building Maintenance (DAMP IC-3)**

   As part of the project's ongoing maintenance program, facility maintenance personnel shall properly collect and dispose of wash water when washing buildings, rooftops and other large objects. **No wash water will be allowed to drain into the project storm drains.** All wash water shall be directed to the sanitary sewer or disposed offsite to a waste water recycling facility. Work areas shall be prepared before conducting building maintenance and all materials generated and used shall be properly disposed.

2. **Landscape Maintenance (DAMP IC-7)**

   Gardening wastes shall be properly stored or disposed of and/or recycled. Irrigation runoff shall be properly handled and over-watering prevented. All fertilizers, mulch and pesticides shall be used sparingly and stored properly if allowed onsite and disposed of properly.

3. **Parking and Storage Area Maintenance (DAMP IC-15)**

   The parking lot shall be inspected daily and cleaned on a biweekly basis or as necessary. All wash water shall be properly contained, collected and disposed. **No wash water will be allowed to drain into the project storm drains.** All wash water shall be directed to the sanitary sewer or disposed offsite to a waste water recycling facility. Parking lot shall be kept in a clean and orderly state. Use of absorbent materials to clean up vehicle related spills and leaks shall be disposed and removed offsite at an approved landfill facility.

4. **Pool and Fountain Cleaning (DAMP IC-16)**

   Regular cleaning of the pool and adequate chlorine to control algae shall be required. Additionally, pool filters shall be cleaned and inspected regularly. Pool water shall be discharged of properly, into the sanitary sewer.

   Nutrients, pH, and chlorine can adversely affect fish and wildlife in water bodies. The following BMPs will ensure the cleanliness of the pool facility and the environment.

   Pool water will be discharged to the sanitary sewer. Prior to draining, the local wastewater treatment plant will be notified to ensure they are aware of the volume of discharge and the potential effects of chlorine levels

   Diatomaceous earth used in pool filters will not be disposed of in surface waters, on the ground, into storm drainage systems or septic systems. It will be dried out as much as possible, bagged in plastic, and dispose of at an approved offsite landfill.

5. **Fire Sprinkler Testing (DAMP IC-23)**

   Testing of fire sprinklers shall be conducted on non-rainy days and for the shortest duration possible to minimize discharge volume. All flow paths will be inspected and debris removed as necessary. Flows will be directed toward landscaped areas whenever possible in a manner that is safe and would not cause erosion. Sprinklers will also be directed into sanitary sewer with permission from the appropriate sewer agency.

6. **Disposal of Pet Wastes (DAMP R-5)**

   Inspect common areas daily for pet wastes. Remove and dispose of wastes into trash receptacles. Use sweeping in lieu of washing to clean areas. If washing is required, let wash water infiltrate into landscaped areas. Wash water is prohibited from entering the storm drain. Report any violations to the MRA. Provide "mutt mitts" or equivalent in areas where pets are allowed.

SECTION 5

Section V Inspection/Maintenance Responsibility for BMPs

Maintenance and inspection activities for the identified BMPs will be performed as indicated on the following BMP Maintenance Responsibility/Frequency Matrix. The maintenance and inspection responsibilities beyond the sale of the units will become the primary responsibility of the Master Residential Association (MRA) and the Master Commercial Association (MCA) for common areas and any common area private storm drains.

The MCA shall be responsible for all common commercial areas, the commercial parking garage, and inspecting and maintenance of the proposed StormFilter® water quality treatment systems per the Operation and Maintenance Plan (Table 1 and 2) included at the end of this section.

The MRA will be responsible for community park area and all maintenance and inspection responsibilities for residential common areas, area drains, catch basins, open space private aisles, residential parking garages and parking lots within the residential development.

Until such time as the MRA and the MCA are established, DJM Capital Partners, Inc. shall serve as the responsible party. The contact person is Becky Sullivan, DJM Capital Partners, Inc., 109 South La Cumbre Lane, Santa Barbara, CA at (805) 565-3365.

The City of Huntington Beach Public Works Department will be responsible for maintenance of all offsite public storm channels. Contact address for the Public Works Department is 2000 Main Street, Huntington Beach, CA 92648. The Public Works Dispatch telephone number is (714) 960-8861.

Please note that BMP N4 is not included in the following matrix, since the matrix itself is BMP N4. The MRA shall be responsible for all maintenance and inspection responsibilities for any common areas, area drains, catch basins, private streets and parking lots within the residential development. **The MRA and the MCA shall be the mechanisms to ensure long-term maintenance of all structural and non-structural BMP's. They shall retain all maintenance records for a period of three years after the recorded inspection date for the lifetime of the project. The records shall be made readily available for review by government agencies.**

Additionally, the MRA and the MCA shall be responsible for the long-term funding of all activities, as required by this WQMP, to ensure that all structural, non-structural, and treatment BMPs are operating effectively and as described in this WQMP.

A Notice of Transfer of Responsibility shall be submitted to the City of Huntington Beach in the event that responsibility for the Water Quality Management Plan (WQMP) for the subject property identified in this WQMP, and the implementation of this plan, is being transferred from the existing owner of the site (or a portion thereof) to a new owner. A copy of the Notice of Transfer of Responsibility form is provided at the end of this section.

TABLE NO. 1
NON-STRUCTURAL BMP MAINTENANCE RESPONSIBILITY/FREQUENCY MATRIX

BMP		RESPONSIBILITY	FREQUENCY
N1, N2	Homeowner or Tenant Education, Activity Restrictions and Employee Training	DJM Capital Partners, Inc. until turnover to the MRA and MCA.	Ongoing. Information to be provided to commercial tenants and homeowners.
N-3	Common Area Landscape Management	DJM Capital Partners, Inc. until turnover to the MRA and MCA, who will be responsible through the landscape maintenance contractor.	Monthly during regular maintenance, manage landscaping in accordance with the County of Orange Water Conservation Ordinance No. 3802 and with management guidelines for use of fertilizers and pesticides.
N4	BMP Maintenance	DJM Capital Partners, Inc. until turnover to the MRA and MCA for implementation of each non-structural BMP and scheduled cleaning of all structural BMP facilities.	Table 1 hereon.
N5	Title 22 CCR Compliance	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Continuous
N7	Spill Contingency	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Continuous for applicable commercial areas and pool area and equipment room. Ensure that all spills are cleaned up immediately and properly disposed of. Inspect for potential hazards and leaks of chlorine and other pool chemicals.

Table 1

TABLE NO. 1
NON-STRUCTURAL BMP MAINTENANCE
RESPONSIBILITY/FREQUENCY MATRIX

	BMP	RESPONSIBILITY	FREQUENCY
N9	Hazardous Materials Disclosure Compliance	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Continuous. Disclose to the local fire department of any hazardous materials stored and disposed, including pool chemicals and pesticides, etc.
N10	Uniform Fire Code Implementation	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Continuous to remain in compliance with Article 80 of the Uniform Fire Code where applicable.
N11	Litter Control	DJM Capital Partners, Inc. until turnover to the MRA and MCA., through site maintenance contractor, and through enforcement of CC&R provisions, post construction.	Weekly sweeping and trash pick up landscaped and other common areas. Daily inspection of trash receptacles to ensure that lids are closed and pick up any excess trash on the ground, noting trash disposal violations by tenants and homeowners and reporting the violations to the MRA and MCA as applicable for investigation.
N12	Employee Training	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Upon first hire and then annual employee training program for all employees of the developer, the MRA and MCA.
N-13	Housekeeping of Loading Docks	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Daily inspection of loading areas for trash, litter and debris. All spills shall be cleaned up immediately. All wash water must be disposed of properly and not discharged into the storm drain system.

TABLE NO. 1
NON-STRUCTURAL BMP MAINTENANCE
RESPONSIBILITY/FREQUENCY MATRIX

	BMP	RESPONSIBILITY	FREQUENCY
N14	Common Area Catch Basin Inspection	DJM Capital Partners, Inc. until turnover to the MRA and MCA, for all drains located within public streets. The MRA and MCA shall be responsible for all drains located onsite.	Biannually to clean debris and silt in bottom of catch basins. Intensified around October 1st of each year, prior to "first flush" storm.
N-15	Street Sweeping Private Streets and Parking Lots	DJM Capital Partners, Inc.; and by the City of Huntington Beach for all public streets and the MRA and MCA for all private streets and parking areas, post construction.	Streets will be vacuum-swept using City-approved equipment on a weekly basis. This procedure will be intensified around October 1st of each year prior to the "first flush" storm.
IC-3	Building Maintenance	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Ongoing. Properly collect and dispose of water when washing buildings, rooftops and other large objects. Prepare work area before conducting building maintenance and properly dispose of all materials generated and used.
IC-7	Landscape Maintenance	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Inspect all landscaped areas regularly for trash, litter and debris and repair landscape areas as needed. Inspect all irrigation connections weekly for damage.
IC-15	Parking Area and Storage Maintenance	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Inspect parking lot daily and clean lot regularly. Clean up any automobile fluid leaks as soon as possible and dispose of all materials properly. Wash water and cleanup materials shall not be allowed to enter the storm drain system.

TABLE NO. 1
NON-STRUCTURAL BMP MAINTENANCE
RESPONSIBILITY/FREQUENCY MATRIX

	BMP	RESPONSIBILITY	FREQUENCY
IC-16	Pool and Fountain Cleaning	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Regular cleaning and adequate chlorine to control algae. Regular inspection and cleaning of filters. Discharge pool water properly, into the sanitary sewer.
IC-22	Eating and Drinking Establishments	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Daily inspection of food preparation areas to ensure kitchen is clean and all wash water kept indoors and prevented from reaching storm drains. Ensure grease interceptors are working properly, and all grease materials, oil and trash are recycled or disposed of properly and never into the storm drain system.
IC-23	Fire Sprinkler Testing/Maintenance	DJM Capital Partners, Inc.	Regular testing and maintenance as required by the City, local Fire Department or the Orange County Fire Authority. Conduct testing/maintenance on non-rainy days for the shortest duration possible. Direct all discharge to landscaped areas or the sanitary sewer, with permission from the appropriate sewer agency.
R-5	Disposal of Pet Wastes	DJM Capital Partners, Inc. until turnover to the MRA and MCA once the associations are formed.	Inspect all common areas daily for pet wastes. Dispose of wastes properly.

TABLE NO. 2
STRUCTURAL BMP MAINTENANCE
RESPONSIBILITY/FREQUENCY MATRIX

	BMP	RESPONSIBILITY	FREQUENCY
SD-10	Common Area Runoff Efficient Landscape	DJM Capital Partners, Inc. through its landscaping maintenance contractor prior to acceptance by the MRA and MCA; by the MRA and MCA, post construction.	In conjunction with maintenance operations and prior to finalizing any replanting schemes. Verify that plants continue to be grouped according to similar water requirements in order to reduce excess irrigation runoff.
SD-12	Common Area Efficient Irrigation	DJM Capital Partners, Inc. through its landscaping maintenance contractor; After acceptance, and post-construction by the MRA and MCA.	Once a week, in conjunction with maintenance activities. Verify that runoff minimizing landscape design continues to function by checking that water sensors are functioning properly, that irrigation heads are adjusted properly to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, weather and day or night time temperatures.
SD-13	Catch Basin Signage	DJM Capital Partners, Inc. until turnover to the MRA and MCA.; by the City of Huntington Beach for all offsite public storm drains and the MRA and MCA, as indicated for all private storm drains, post construction.	Catch basin labels will be inspected twice a year and relabeled as necessary to maintain legibility. Thermoplastic markers (or other city-approved alternative) bearing the message "No Dumping -- Drains to Ocean" will be used.
SD-31	Dock Areas	DJM Capital Partners, Inc. prior to take over by the MCA, through its site maintenance contractor.	Daily inspection and removal of debris, litter, and trash.

TABLE NO. 2
STRUCTURAL BMP MAINTENANCE
RESPONSIBILITY/FREQUENCY MATRIX

	BMP	RESPONSIBILITY	FREQUENCY
SD-32	Trash Enclosures	DJM Capital Partners, Inc. prior to take over by the MRA and MCA, through its site maintenance contractor.	Daily inspection and removal of debris, litter, and trash. Ensure all lids are closed and any trash/debris located on the ground are removed and disposed of properly. Ensure enclosures are secure.
	StormFilter Water Quality Units	DJM Capital Partners, Inc. prior to take over by the MCA (with cooperation of the MRA), through the site maintenance contractor.	Inspect filters prior to start of rainy season (Oct. 1st) and after significant storm events. Remove accumulated sediment and debris as necessary. Maintain in conformance with the manufacturer's guidelines (See Exhibit F).

Water Quality Management Plan
Notice of Transfer of Responsibility

Tracking No. Assigned by the City of Huntington Beach: _____

Submission of this Notice of Transfer of Responsibility constitutes notice to the City of Huntington Beach that responsibility for the Water Quality Management Plan ("WQMP") for the subject property identified below, and implementation of that plan, is being transferred from the Previous Owner (and his/her agent) of the site (or a portion thereof) to the New Owner, as further described below.

I. Previous Owner/Previous Responsible Party Information

Company/Individual Name			Contact Person
Title			
Street Address			
City	State	Zip	Phone

II. Information about Site Transferred

Name of Project (if applicable)			Contact Person
Title of WQMP Applicable to Site			
Planning Area (PA) and/or Tract Number(s) for Site Lot Numbers (if Site is a portion of a tract)			
Date WQMP Prepared (and revised if applicable)			
Street Address of Site			
City	State	Zip	Phone

III. New Owner/New Responsible Party Information

Company/Individual Name			Contact Person
Title			
Street Address			
City	State	Zip	Phone

IV. Ownership Transfer Information

General Description of Site Transferred to New Owner
General Description of Portion of Project/Parcel Subject to WQMP Retained by Owner (if any)
Lot/Tract Numbers of Site Transferred to New Owner
Remaining Lot/Tract Numbers Subject to WQMP Still Held by Owner (if any)
Date of Ownership Transfer

Note: When the Previous Owner is transferring a Site that is a portion of a larger project/parcel addressed by the WQMP, as opposed to the entire project/parcel addressed by the WQMP, the General Description of the Site transferred and the remainder of the project/parcel not transferred shall be set forth as maps attached to

this notice. These maps shall show those portions of a project/parcel addressed by the WQMP that are transferred to the New Owner (the Transferred Site), those portions retained by the Previous Owner, and those portions previously transferred by Previous Owner. Those portions retained by Previous Owner shall be labeled "Previous Owner," and those portions previously transferred by Previous Owner shall be labeled as "Previously Transferred."

V. Purpose of Notice of Transfer

The purposes of this Notice of Transfer of Responsibility are: 1) to track transfer of responsibility for implementation and amendment of the WQMP when property to which the WQMP is transferred from the Previous Owner to the New Owner, and 2) to facilitate notification to a transferee of property subject to a WQMP that such New Owner is now the Responsible Party of record for the WQMP for those portions of the site that it owns.

VI. Certifications

A. Previous Owner

I certify under penalty of law that I am no longer the owner of the Transferred Site as described in Section II above. I have provided the New Owner with a copy of the WQMP applicable to the Transferred Site that the New Owner is acquiring from the Previous Owner.

Printed Name of Previous Owner Representative	Title
Signature of Previous Owner	Date

B. New Owner

I certify under penalty of law that I am the owner of the Transferred Site, as described in Section II above, that I have been provided a copy of the WQMP, and that I have informed myself and understand the New Owner's responsibilities related to the WQMP, its implementation, and Best Management Practices associated with it. I understand that by signing this notice, the New Owner is accepting all ongoing responsibilities for implementation and amendment of the WQMP for the Transferred Site, which the New Owner has acquired from the Previous Owner.

Printed Name of New Owner Representative	Title
Signature	Date

SECTION 6

Section VI Location Map, Plot Plan & BMP Details

Exhibit A Site Plan Exhibits

Exhibit B Vicinity Map

Exhibit C Proposed Preliminary Water Quality Exhibit and Qbmp Calculations

Exhibit D Referenced Master Plan of Drainage Facilities

Exhibit E Project Exhibits – Eye Level Perspective and Aerial View

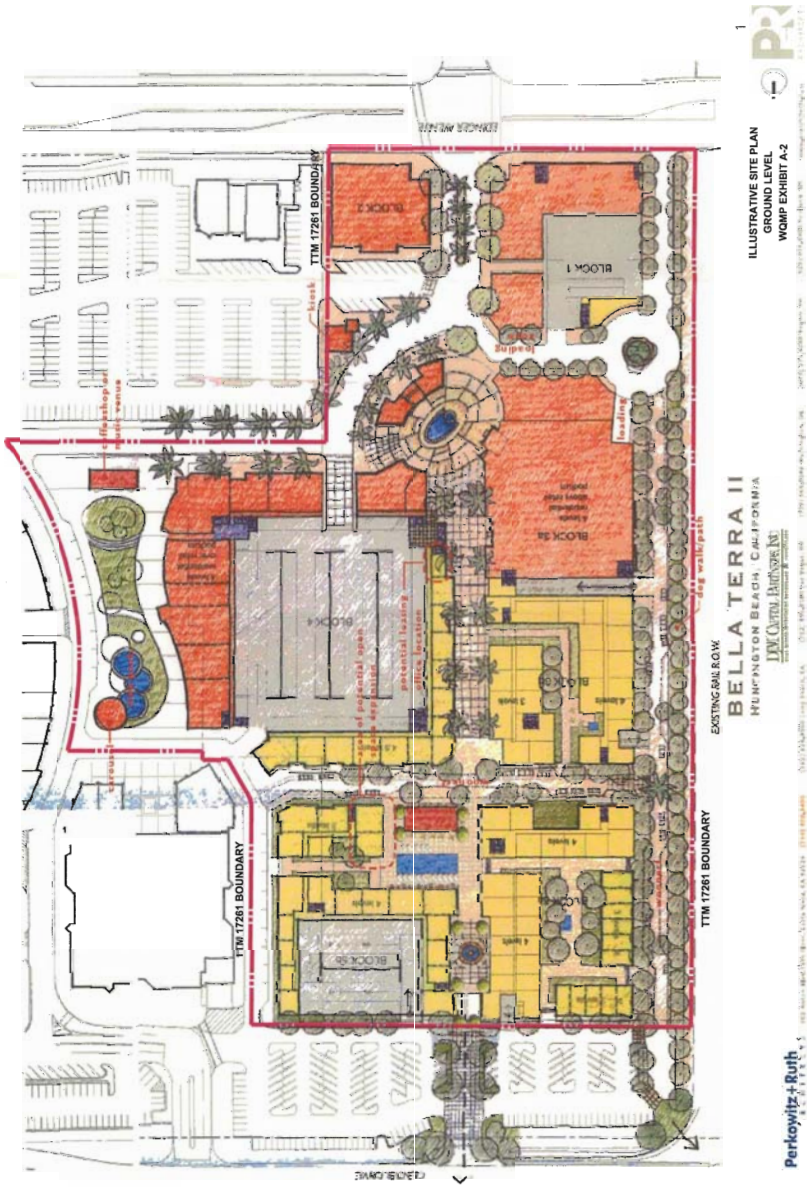
Exhibit F Manufacturer's Recommended Operation & Maintenance – Contech Stormfilter

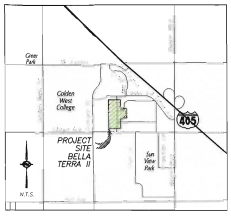
Exhibit G BMP Fact Sheets

SECTION A

EXHIBIT A

SITE PLAN EXHIBITS





VICINITY MAP
NOT TO SCALE

LEGEND

- TRACT BOUNDARY
- LIMITS OF WORK
- NAP — NOT A PART
- DIRECTION OF SURFACE FLOW (ONSITE)
- DIRECTION OF SURFACE FLOW (OFFSITE)
- EXISTING STORM DRAIN (PRIVATE)
- PROPOSED STORM DRAIN (PRIVATE)
- PROPOSED PRIVATE CATCH BASIN (MAINTAINED BY MRA/MCA) LOCATIONS TO BE DETERMINED SD-13 CATCH BASIN STENCILING
- LANDSCAPE AREAS (PRIVATE) WITH BMP's: (MAINTAINED BY MRA/MCA) SD-10 SITE DESIGN/LANDSCAPE PLANNING SD-12 EFFICIENT IRRIGATION IC-7 LANDSCAPE MAINTENANCE R-3 PET WASTE DISPOSAL
- BUILDING STRUCTURES IC-3 BUILDING MAINTENANCE
- POOL/WATER FEATURES IC-16 POOL AND FOUNTAIN CLEANING
- STORMFILTER WATER QUALITY TREATMENT CONTROL BMP
- IC-10, SD-31 LOADING AREAS
- IC-15 PARKING/STORAGE AREA MAINTENANCE REMAINING LOCATIONS TO BE DETERMINED
- SD-32, IC-22 TRASH ENCLOSURES (MAINTAINED BY MRA/MCA) LOCATIONS TO BE DETERMINED.

GRAPHIC SCALE 1"=200'

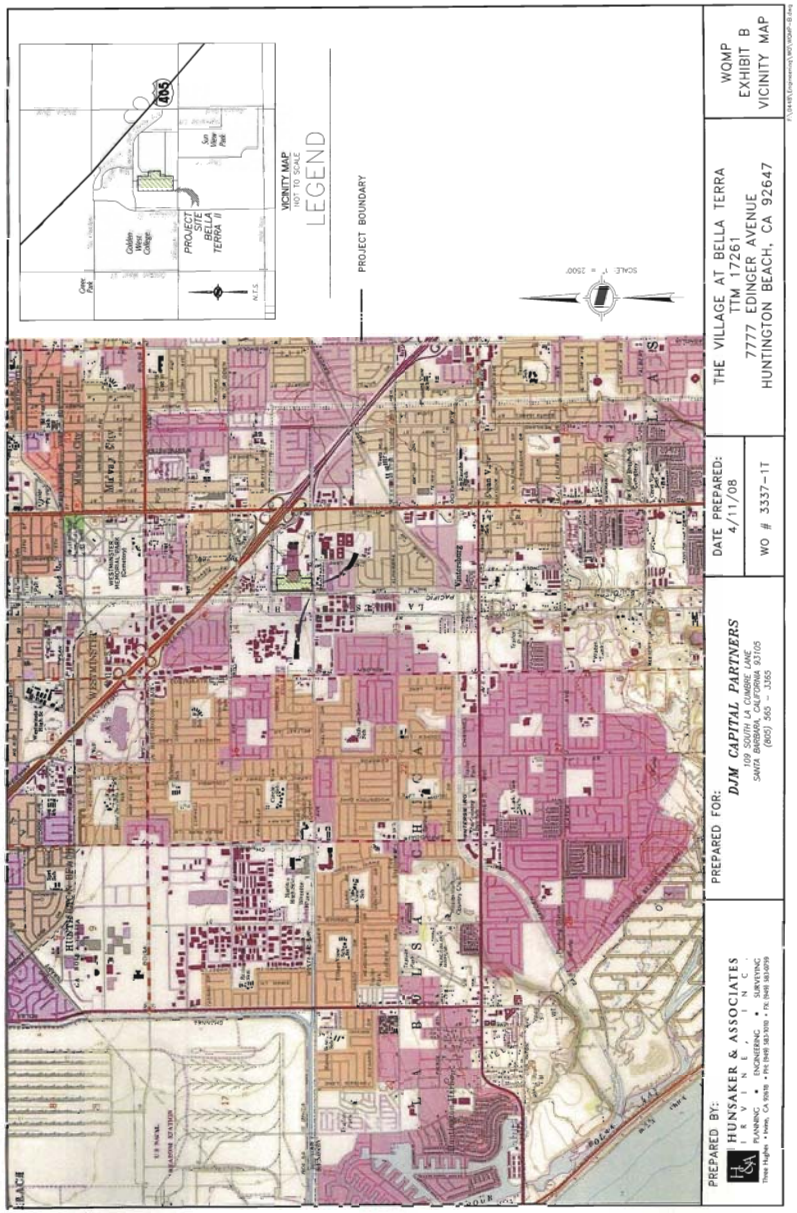
PREPARED BY:	PREPARED FOR:	DATE PREPARED: 4/23/08	THE VILLAGE AT BELLA TERRA TTM 17261 7777 EDINGER AVENUE HUNTINGTON BEACH, CA 92647	WQMP EXHIBIT A-1 SITE PLAN
HUNSAKER & ASSOCIATES IRVINE, INC. PLANNING ▪ ENGINEERING ▪ SURVEYING Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759	*DJM CAPITAL PARTNERS* 109 SOUTH LA CUMBRE LANE SANTA BARBARA, CALIFORNIA 93105 (805) 565 - 3365	WO # 3337-1T		

F:\0449\Engineering\WQ\WQMP-A.dwg

SECTION B

EXHIBIT B

VICINITY MAP



Live Search Maps

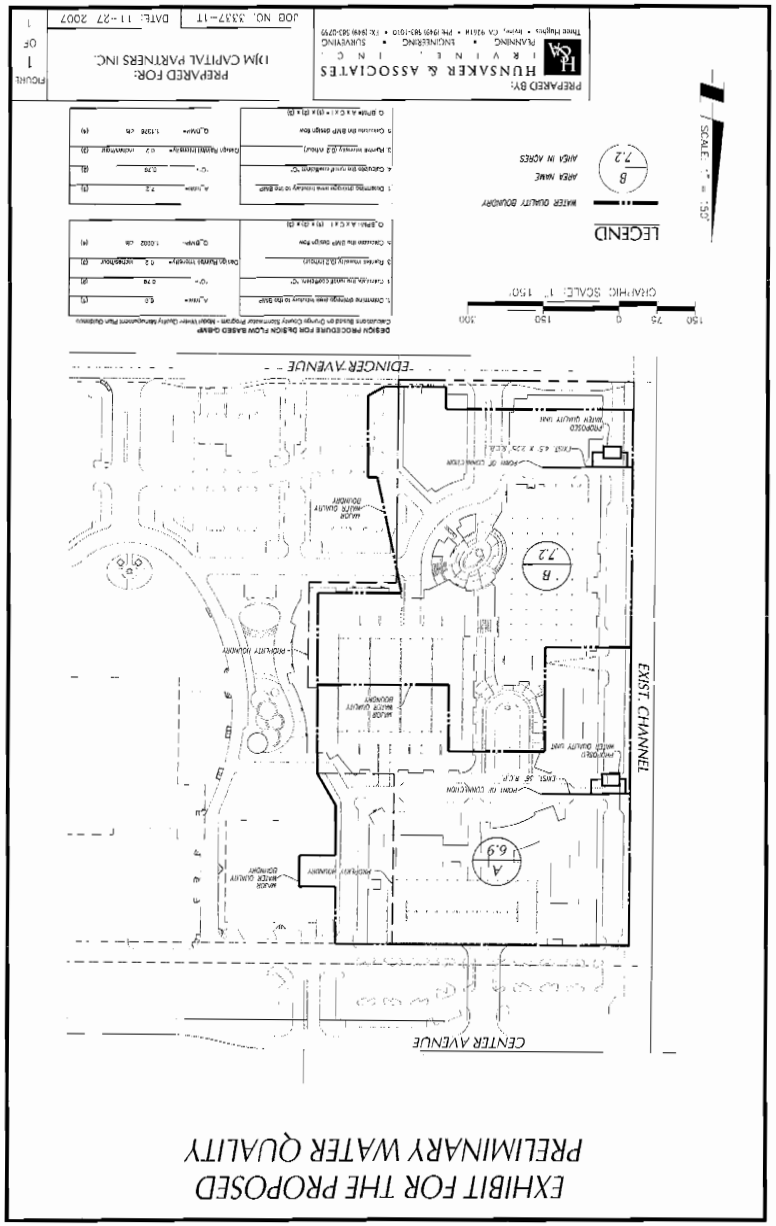
SECTION C

EXHIBIT C

WATER QUALITY SYSTEMS

AND

Qbmp WATER QUALITY CALCULATIONS



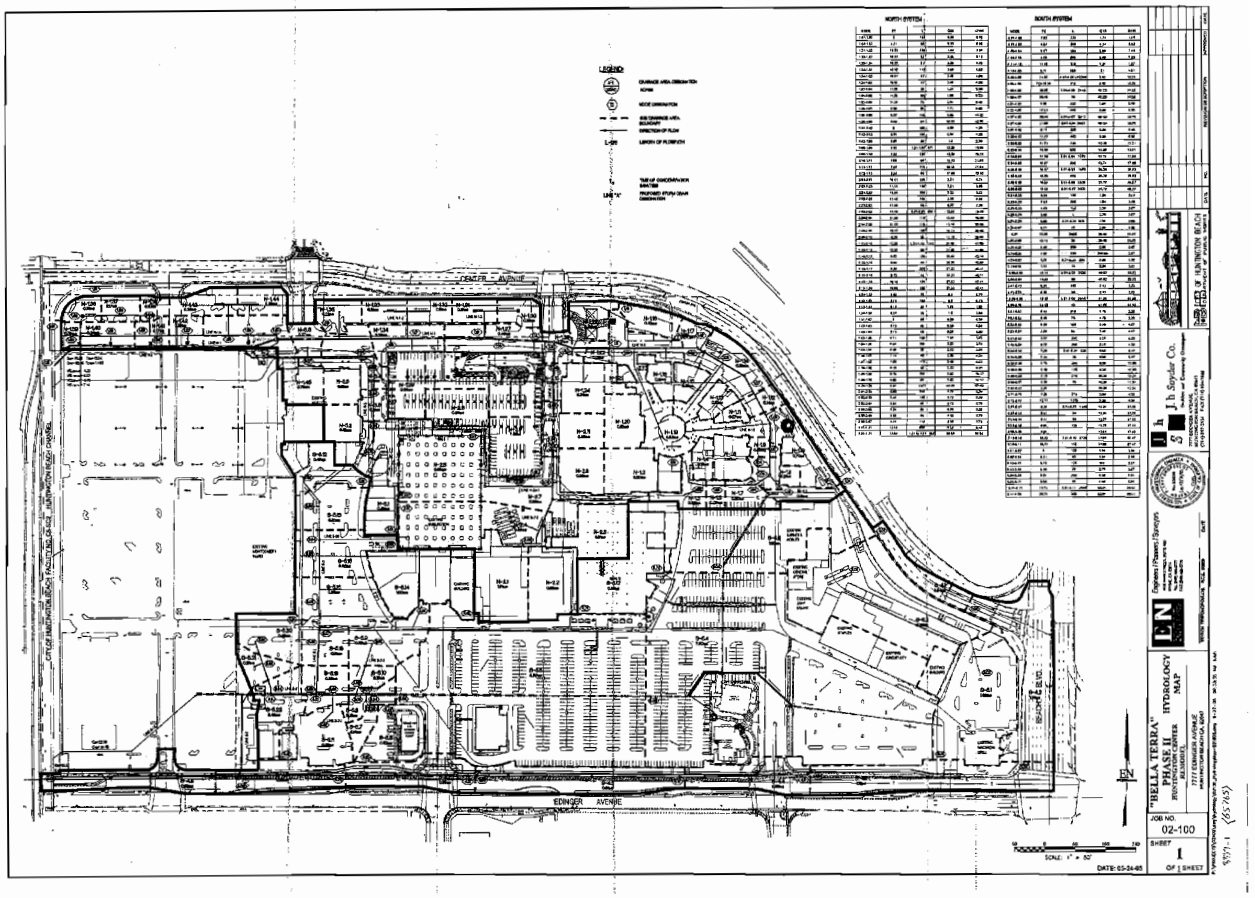
DESIGN PROCEDURE FOR DESIGN FLOW BASED Q-BMP

Calculations Based on Orange County Stormwater Program - Model Water Quality Management Plan Guidance

Designer: N.M.
Project: Bella Terra II
Location: City of Huntington Beach, Couny of Orange
Date: 11/27/07

1. Determine drainage area tributary to the BMP	A_total=	6.9		(1)
4. Calculate the runoff coefficient "C"	"C"=	0.79		(2)
3. Rainfall Intensity (0.2 in/hour)	Design Rainfall Intensity=	0.2	inches/hour	(3)
5. Calculate the BMP design flow Q_BPM= A x C x I = **(1) x (2) x (3)**	Q_BMP=	1.0902	cfs	(4)

1. Determine drainage area tributary to the BMP	A_total=	7.2		(1)
4. Calculate the runoff coefficient "C"	"C"=	0.79		(2)
3. Rainfall Intensity (0.2 in/hour)	Design Rainfall Intensity=	0.2	inches/hour	(3)
5. Calculate the BMP design flow Q_BPM= A x C x I = **(1) x (2) x (3)**	Q_BMP=	1.1376	cfs	(4)



ATTACHMENT A

DESIGN OF TREATMENT CONTROL BMPs USING THE STORMWATER QUALITY DESIGN FLOW(SQDF) OR THE STORMWATER QUALITY DESIGN VOLUME (SQDV)

Unlike flood control measures that are designed to handle peak flow rates, stormwater Treatment Control BMPs are designed to treat the more frequent, lower-flow rate storm events, or the first flush portions of runoff from larger storm events (typically referred to as the first-flush events). Small, frequent storm events represent most of the total average annual rainfall for the area. The flow rate and volume from such small events is targeted for treatment.

The primary control strategy for designing Treatment Control BMPs is to treat the Stormwater Quality Design Flow (SQDF) or the Stormwater Quality Design Volume (SQDV) of the stormwater runoff. This section explains how to calculate the SQDF or the SQDV of the stormwater runoff. In addition, Treatment Control BMPs must be designed to safely convey or bypass peak design storms.

The methods presented in this appendix are intended to be used for sizing of project-based Treatment Control BMPs in Project WQMPs, or determining the required SQDV or SQDF contribution from an individual project in allocating capacity in a regional or watershed BMP program. Methods for estimating hydrology from larger watershed for the sizing of regional or watershed BMPs that address larger areas may require alternative approaches for determining appropriate sizing of BMPs.

Stormwater Quality Design Flow (SQDF) Calculations

The Stormwater Quality Design Flow (SQDF) is defined by the Permits as the maximum flow rate of runoff produced from a rainfall intensity of 0.2-inch of rainfall per hour[8].

Calculation Procedure

1. The Stormwater Quality Design Flow in Orange County is defined as $Q_{P,SQDF}$.

[8] As defined in Section XII.B.3.B of the California Regional Water Quality Control Board, Santa Ana Region, Waste Discharge Requirements for the County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County within the Santa Ana Region, Urban Stormwater Runoff Management Program, Orange County, Order No. R8-2002-0010, NPDES Permit No. CAS618030; and in Section F.1.b.(2)(c) of the California Regional Water Quality Control Board, San Diego Region, Waste Discharge Requirements for Discharges of Urban Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds of the County of Orange, the Incorporated Cities of Orange County and the Orange County Flood Control District within the San Diego Region, Board Order No. R9-2002-0001, NPDES CAS0108740

2. Calculate the stormwater quality design flow for the site (or each sub-drainage area that will discharge to a separate BMP) produced by 0.2-inch/hour rainfall by using the rational method equation:

$$Q_{P,SQDF} = C * I * A$$

Where:

C = runoff coefficient obtained from **Table A-1**.

I = rainfall intensity (0.2 in/hr)

A = area of the site or sub-drainage area in acres

Table A-1

C Values Based on Impervious/Pervious Area Ratios

% Impervious	% Pervious	C
0	100	0.15
5	95	0.19
10	90	0.23
15	85	0.26
20	80	0.30
25	75	0.34
30	70	0.38
35	65	0.41
40	60	0.45
45	55	0.49
50	50	0.53
55	45	0.56
60	40	0.60
65	35	0.64
70	30	0.68
75	25	0.71
80	20	0.75
85	15	0.79
90	10	0.83
95	5	0.86
100	0	0.90

Example Stormwater Quality Design Flow (SQDF) Calculation

The steps below show an example calculation for a 30-acre site with runoff coefficient of 0.45 (40% impervious).

Step 1:

Design Flow = $Q_{P,SQDF} = C * I * A$

Step 2:

Calculate the peak rate of flow

$Q_{P,SQDF} = 0.45 \times 0.2 \times 30 = 2.7$ cfs = Stormwater Quality Design Flow for the BMP.

Stormwater Quality Design Storm Volume (SQDV) Calculations

Hydrologic calculations for design of volumetric-based stormwater quality BMPs in Orange County shall be in accordance with one of the four following approaches specified in the permits:

i. The volume of runoff produced from a 24-hour 85th percentile storm event, as determined from the local historical rainfall record[9]; or

ii. The volume of runoff produced by the 85th percentile 24-hour runoff event, determined as the maximized capture urban runoff volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual and Report on Engineering Practice No. 87, (1998); or

iii. The volume of annual runoff based on unit basin storage volume, to achieve 80 percent (Santa Ana Permit area), or 90 percent (San Diego Permit area) or more volume treatment by the method recommended in California Stormwater Best Management Practices Handbooks (1993), or

iv. The volume of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile 24-hour runoff event.[10]

---

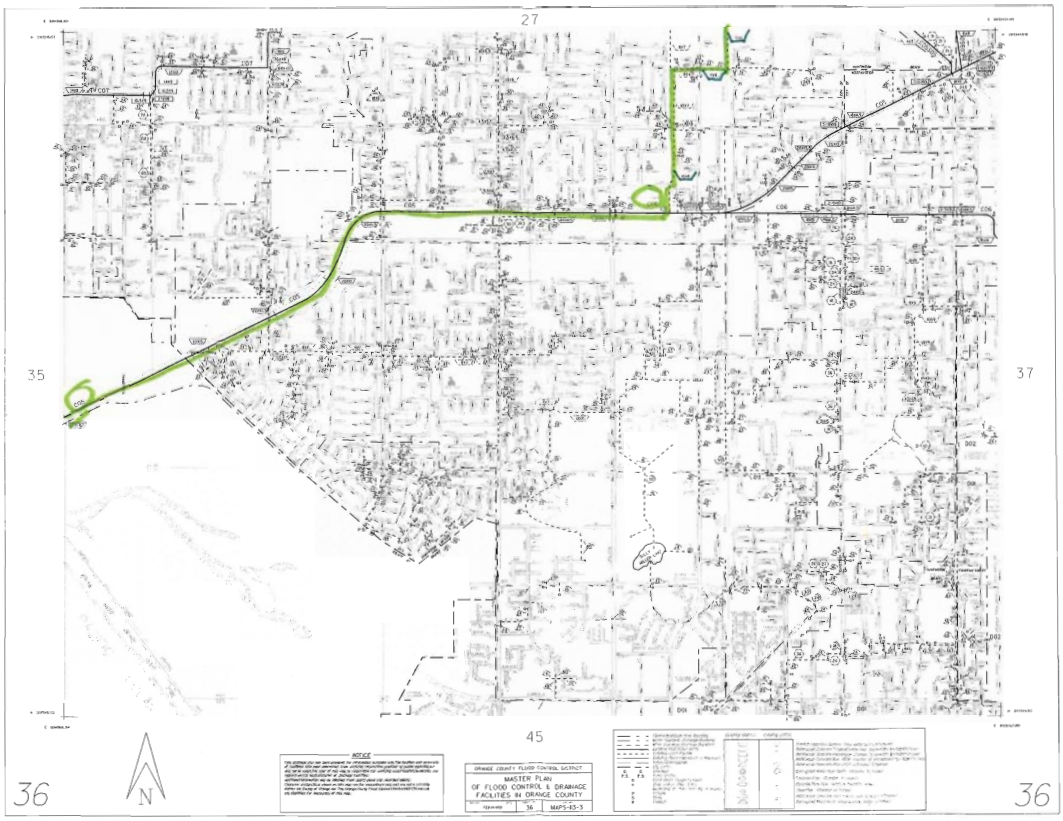
[9] This volume is not a single volume to be applied to all of Orange County. The size of the 85th percentile storm event is different for various parts of the County.

[10] Under this volume criterion, hourly rainfall data may be used to calculate the 85th percentile storm event, where each storm event is identified by its separation from other storm events by at least six hours of no rain. If hourly rainfall data is selected, the Permittees shall describe the method for using hourly rainfall data to calculate the 85th percentile storm event in their local WQMPs.

SECTION D

EXHIBIT D

VICINITY MASTER PLAN OF DRAINAGE FACILITIES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NOTICE
ORANGE COUNTY FLOOD CONTROL DISTRICT
MASTER PLAN
OF FLOOD CONTROL & DRAINAGE
FACILITIES IN ORANGE COUNTY
36
MAPS-83-3

26
35
36
35
35
N
NOTICE
ORANGE COUNTY FLOOD CONTROL DISTRICT
MASTER PLAN
OF FLOOD CONTROL & DRAINAGE
FACILITIES IN ORANGE COUNTY
35
MAPS-83-3

SECTION E

EXHIBIT E

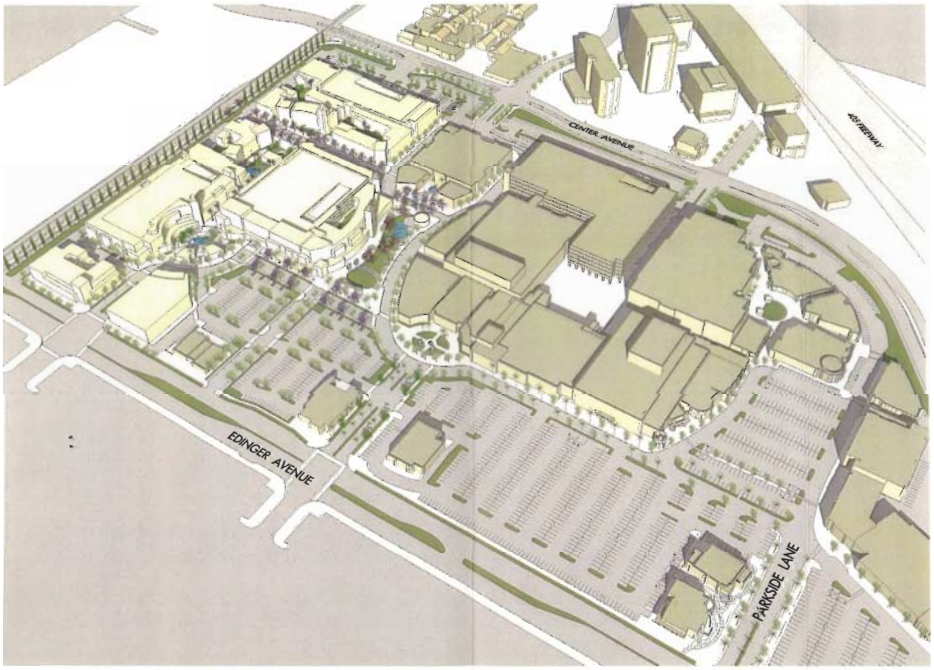
EXHIBITS FOR SITE RELATED EYE LEVEL PERSPECTIVE AND AERIAL VIEW

BELLA TERRA II
HUNTINGTON BEACH, CALIFORNIA

Eye Level Perspective A-07

05-327.10 April 11, 2007

studio one eleven at Perkowitz+Ruth Architects 111 W. Ocean Blvd. 17th Floor, Long Beach, CA 90802 [562] 901-1500
Perkowitz+Ruth ARCHITECTS 600 Anton Blvd.16th Floor, Costa Mesa, CA 92626 [714] 850.3400
DJM CAPITAL PARTNERS, INC. REAL ESTATE INVESTMENT PURCHASING & CONSULTING
[562] 628.8000 Long Beach, CA [702] 892.8500 Las Vegas, NV [703] 668.0086 Washington, DC [479] 271.8090 Rogers, AR [503] 478.9900 Portland, OR www.prarchitects.com



BELLA TERRA II
HUNTINGTON BEACH, CALIFORNIA

Aerial View Massing Model A-06

05-327.10 April 11, 2007

studio one eleven at Perkowitz+Ruth Architects 111 W. Ocean Blvd. 17th Floor, Long Beach, CA 90802 [562] 901-1500
Perkowitz+Ruth ARCHITECTS 600 Anton Blvd.16th Floor, Costa Mesa, CA 92626 [714] 850.3400
DJM CAPITAL PARTNERS, INC. REAL ESTATE INVESTMENT PURCHASING & CONSULTING
[562] 628.8000 Long Beach, CA [702] 892.8500 Las Vegas, NV [703] 668.0086 Washington, DC [479] 271.8090 Rogers, AR [503] 478.9900 Portland, OR www.prarchitects.com

SECTION F

EXHIBIT F

MANUFACTURER'S RECOMMENDED OPERATION & MAINTENANCE CONTECH STORMFILTER

StormFilter Materials Submittal

Project Name: Pacific City Huntington Beach
System Size: 6' x 12' & 8' x 16' with 36 filter cartridges
System Treatment Flow: 1.20 cfs

Filter Cartridge:

- Orifice plate to restrict flow to 15 gpm per cartridge.
- Filter cartridge bottom pan, inner ring, and hood are constructed from linear low-density polyethylene.
- Filter cartridge screen is constructed from 16-gauge galvanized wire. The wire is welded in a ½-inch x 1-inch grid and coated with bonded PVC.
- Internal parts and fittings are constructed from ABS or PVC.
- Siphon float ball valve is constructed from linear high-density polyethylene.
- Miscellaneous screws, nuts, and fasteners are constructed from stainless steel.
- Outer fabric is 10 x 8.5 clear fiberglass mesh filter fabric.
- Inner fabric is 10 x 8.5 clear fiberglass mesh filter fabric over Enkamat 7210.

Zeolite-Perlite-Granular Activated Carbon(ZPG) Filter Media:

- ZPG filter media has an outer layer of perlite and an inner layer of composed of 90% zeolite and 10% granular activated carbon (GAC).
- Perlite is made of natural siliceous volcanic rock.
- Perlite has a bulk density ranging from 6.5 to 8.5 lb/ft^3.
- Perlite particle sizes range from a U.S. Standard #8 sieve to 0.50 inches.
- Zeolite is made of naturally occurring clinoptilolite.
- Zeolite has a bulk density ranging from 44 to 48 lb/ft^3.
- Zeolite particle sizes range from a U.S. Standard #4 sieve to U.S. Standard #6.
- Zeolite has a cation exchange capacity ranging from 1.0 to 2.2 meq/g.
- GAC is made of lignite coal that has been steam activated.
- GAC media has a bulk density ranging from 28 to 31 lb/ft^3.
- GAC particle sizes range from a U.S. Standard #4 sieve to U.S. Standard #8.

Piping:

- Internal piping and fittings are constructed from Schedule 40 PVC and ABS.
- PVC manifold pipe and fittings meets ASTM D1785. ABS manifold pipe and fittings meets ASTM F-628.
- Underdrain manifold detail attached as Exhibit A.

Other:

- Internal flow spreaders are constructed from polyethylene.
- Internal weir box are constructed from polyethylene.
- Internal energy dissipators are constructed from polyolefins.
- Cast iron frame and cover conforms ASTM A-48, Class 35B by D&L Foundry, model no. A-2003 (detail attached as Exhibit B).
- 3'-0" X 6'-0" torsion hinged 3/16" plate covers and frames by Oldcastle Precast (attached as Exhibit C).
- Concrete vault is constructed per Oldcastle Precast in Fontana, CA per ASTM C-857 (attached as Exhibit D).

©2006 CONTECH Stormwater Solutions
contechstormwater.com
12021-B NE Airport Way, Portland OR 97220
Toll-free: 800.548.4667 Fax: 800.561.1271

StormFilter Materials Submittal

Project Name: Pacific City Huntington Beach
System Size: 14' x 42' StormFilter with 114 filter cartridges
System Treatment Flow: 3.81 cfs

Filter Cartridge:

- Orifice plate to restrict flow to 15 gpm per cartridge.
- Filter cartridge bottom pan, inner ring, and hood are constructed from linear low-density polyethylene.
- Filter cartridge screen is constructed from 16-gauge galvanized wire. The wire is welded in a ½-inch x 1-inch grid and coated with bonded PVC.
- Internal parts and fittings are constructed from ABS or PVC.
- Siphon float ball valve is constructed from linear high-density polyethylene.
- Miscellaneous screws, nuts, and fasteners are constructed from stainless steel.
- Outer fabric is 10 x 8.5 clear fiberglass mesh filter fabric.
- Inner fabric is 10 x 8.5 clear fiberglass mesh filter fabric over Enkamat 7210.

Zeolite-Perlite-Granular Activated Carbon(ZPG) Filter Media:

- ZPG filter media has an outer layer of perlite and an inner layer of composed of 90% zeolite and 10% granular activated carbon (GAC).
- Perlite is made of natural siliceous volcanic rock.
- Perlite has a bulk density ranging from 6.5 to 8.5 lb/ft^3.
- Perlite particle sizes range from a U.S. Standard #8 sieve to 0.50 inches.
- Zeolite is made of naturally occurring clinoptilolite.
- Zeolite has a bulk density ranging from 44 to 48 lb/ft^3.
- Zeolite particle sizes range from a U.S. Standard #4 sieve to U.S. Standard #6.
- Zeolite has a cation exchange capacity ranging from 1.0 to 2.2 meq/g.
- GAC is made of lignite coal that has been steam activated.
- GAC media has a bulk density ranging from 28 to 31 lb/ft^3.
- GAC particle sizes range from a U.S. Standard #4 sieve to U.S. Standard #8.

Piping:

- Internal piping and fittings are constructed from Schedule 40 PVC and ABS.
- PVC manifold pipe and fittings meets ASTM D1785. ABS manifold pipe and fittings meets ASTM F-628.
- Underdrain manifold detail attached as Exhibit A.

Other:

- Internal flow spreaders are constructed from polyethylene.
- Internal energy dissipators are constructed from polyolefins.

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contechstormwater.com
12021-B NE Airport Way, Portland OR 97220
Toll-free: 800.548.4667 Fax: 800.561.1271

LTR.	REVISION	DATE	BY	CHK
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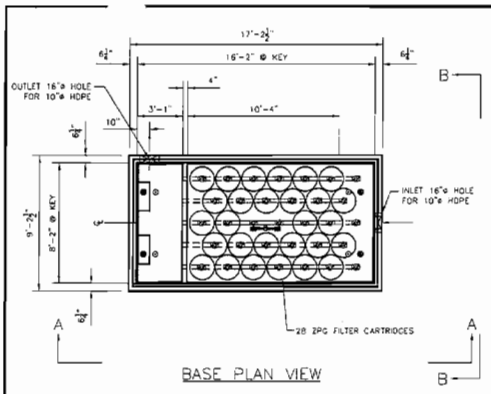
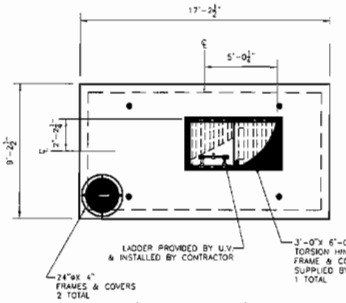


BASE PLAN VIEW



TOP PLAN VIEW

STRUCTURAL NOTES:

DESIGN SPECIFICATIONS

- AASHTO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES"
- ACI-318-99 BUILDING CODE
- ASTM C 857 MINIMUM STRUCTURAL DESIGN LOADING FOR UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES.

MATERIALS:

- CONCRETE - 28 DAY COMPRESSIVE STRENGTH f'c = 6000 PSI
- REBAR - ASTM A 706 GRADE 60

LOADS:

- H20 TRAFFIC
- 150 PCF CONCRETE DENSITY; 120 PCF SOIL DENSITY
- H20 SURCHARGE; 80 PSF TO 8 FT BELOW GRADE
- DRY SOIL LATERAL LOAD - 40 PCF
- WET SOIL LATERAL LOAD - 80 PCF
- WATER TABLE - BELOW VAULT

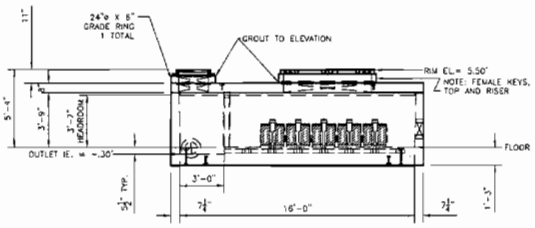
GENERAL NOTES:

1)CONTRACTOR TO:
- GROUT ALL JOINTS AS REQUIRED
- VERIFY ALL DIMENSIONS AND OPENING LOCATIONS

2)DO NOT BACKFILL UNTIL VAULT HAS BEEN COMPLETELY ASSEMBLED

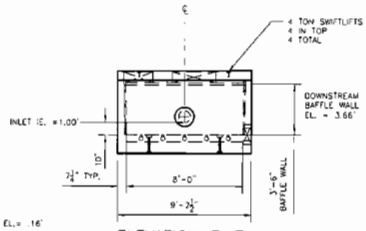
3)REBAR MAY BE TACK WELDED OR TIED

4)TOLERANCES PER ASTM C-858 STANDARD SPECIFICATION FOR UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES



ELEVATION A-A

LADDER, ENERGY DISSIPATER AND NOT ALL FILTERS SHOWN SEE PLAN VIEW



ELEVATION B-B

LADDER,FILTERS, GRADE RINGS AND COVERS NOT SHOWN

APPROXIMATE MAXIMUM WEIGHTS:

TOP SECTION	13,900 LBS
BOTTOM SECTION	42,700 LBS
DOWNSTREAM BAFFLE WALL @ 3'-6"	1,500 LBS
FILTER CARTRIDGES 2PG	2,700 LBS
TOTAL BOTTOM SECTION	46,900 LBS

PRE-POUR	XXXX	DATE	XXXX	8'-0" X 16'-0" X 3'-7 STORMFILTER VAULT	
POST-POUR	XXXX	DATE	XXXX	PACIFIC CITY HUNTINGTON BEACH	#3527.02
DRAWN	EH	DATE	6/19/2006	HUNTINGTON BEACH, CA	
CHECKED	CRO	SCALE	1/4" = 1'-0"		
SALESPERSON	M.B.	PAGE	1 OF X	S.O.# 71926 LINE# XXXX	DWG NO. C20-192-1 REV --
		WEIGHT	SEE TABLE	CUST. CONTECH STORMWATER SOLUTIONS	

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LTR.	REVISION	DATE	BY
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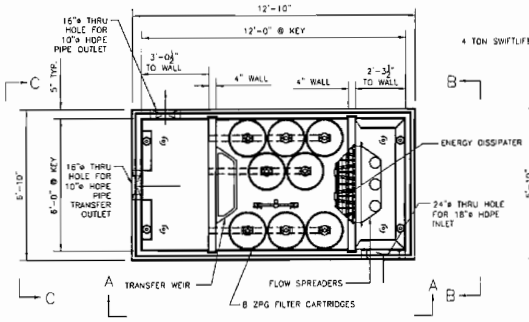
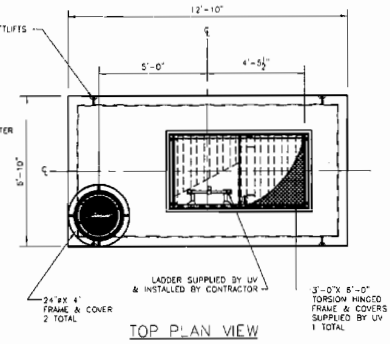


PLAN VIEW



TOP PLAN VIEW

STRUCTURAL NOTES:

DESIGN SPECIFICATIONS

- AASHTO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES"
- ACI-318-99 BUILDING CODE
- ASTM C 857 MINIMUM STRUCTURAL DESIGN LOADING FOR UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES.

MATERIALS:

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- DRY SOIL LATERAL LOAD - 40 PCF
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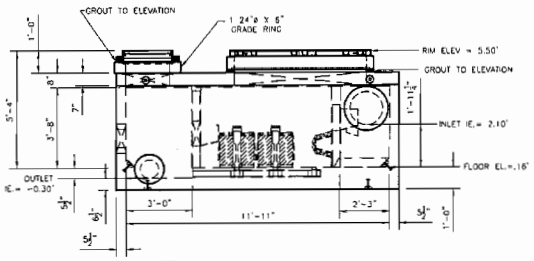
GENERAL NOTES:

1)CONTRACTOR TO:
- GROUT ALL JOINTS AS REQUIRED
- VERIFY ALL DIMENSIONS AND OPENING LOCATIONS

2)DO NOT BACKFILL UNTIL VAULT HAS BEEN COMPLETELY ASSEMBLED

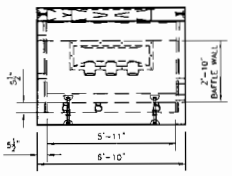
3)REBAR MAY BE TACK WELDED OR TIED

4)TOLERANCES PER ASTM C-858 STANDARD SPECIFICATION FOR UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES



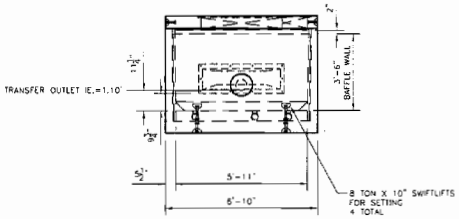
NOTE:
THIS VIEW SHOWS ONLY TWO (2) CARTRIDGES SEE PLAN VIEW.

ELEVATION A-A



NOTE:
CARTRIDGES NOT SHOWN FOR CLARITY. GRADE RINGS AND COVERS NOT SHOWN

ELEVATION B-B



NOTE:
CARTRIDGES NOT SHOWN FOR CLARITY. GRADE RINGS AND COVERS NOT SHOWN

ELEVATION C-C

APPROXIMATE MAXIMUM WEIGHTS:

TOP SECTION	5,800 LBS
BOTTOM SECTION	19,000 LBS
UPSTREAM BAFFLE WALL @ 2'-10"	700 LBS
DOWNSTREAM BAFFLE WALL @ 3'-6"	900 LBS
FILTER CARTRIDGES 2PG	800 LBS
TOTAL BOTTOM SECTION	21,400 LBS

PRE-POUR	XXXX	DATE	XXXX	6'-0" X 12'-0" X 3'-8" STORMFILTER VAULT	
POST-POUR	XXXX	DATE	XXXX	PACIFIC CITY HUNTINGTON BEACH	#3527.01
DRAWN	EH	DATE	5-16-06	HUNTINGTON BEACH, CA	
CHECKED	CRO	SCALE	3/8" = 1'-0"		
SALESPERSON	MB	PAGE	1 OF x	S.O.# 71926 LINE# XXXX	DWG NO. C20-191-1 REV --
		WEIGHT	SEE TABLE	CUST. CONTECH STORMWATER SOLUTIONS	

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Operation and Maintenance

The Stormwater Management StormFilter®

Vault, Cast-In-Place, and Linear Units

Important: These guidelines should be used as a part of your site stormwater management plan.

Description

The Stormwater Management StormFilter® (StormFilter) is a passive, flow-through, stormwater filtration system. The system is comprised of one or more vaults that house rechargeable, media-filled, filter cartridges. The StormFilter works by passing stormwater through the media-filled cartridges, which trap particulates and adsorb materials such as dissolved metals and hydrocarbons. Once filtered through the media, the treated stormwater is directed to a collection pipe or discharged into an open channel drainage way.

The StormFilter is offered in multiple configurations, including vault, linear, catch basin, manhole, and cast-in-place. The vault, linear, manhole, and catch basin models utilize pre-manufactured units to ease the design and installation processes. The cast-in-place units are customized for larger flows and may be either covered or uncovered underground units.

Purpose

The StormFilter is a passive, flow-through, stormwater filtration system designed to improve the quality of stormwater runoff from the urban environment before it enters receiving waterways. It is intended to function as a Best Management Practice (BMP) to meet federal, state, and local requirements for treating runoff in compliance with the Clean Water Act.

Through independent third party studies, it has been demonstrated that the StormFilter is highly effective for treatment of first flush flows and for treatment of flow-paced flows during the latter part of a storm. In general, the StormFilter's efficiency is highest when pollutant concentrations are highest. The primary non-point source pollutants targeted for removal by the StormFilter are: suspended solids (TSS), oil and grease, soluble metals, nutrients, organics, and trash and debris.

Sizing

The StormFilter is sized to treat the peak flow of a water quality design storm. The peak flow is determined from calculations based on the contributing watershed hydrology and from a design storm magnitude set by the local stormwater management agency. The particular size of a StormFilter unit is determined by the number of filter cartridges (see Figure 1) required to treat this peak flow.

The flow rate through each filter cartridge is adjustable, allowing control over the amount of contact time between the influent and the filter media. The maximum flow rate through each cartridge can be adjusted to between 5 and 15 gpm using a calibrated restrictor disc at the base of each filter cartridge. Adjustments to the cartridge flow rate will affect the number of cartridges required to treat the peak flow.

Basic Function

The StormFilter is designed to siphon stormwater runoff through a filter cartridge containing media. A variety of filter media is available and can be customized for each site to target and remove the desired levels of sediments, dissolved phosphorus, dissolved metals, organics, and oil and grease. In many cases, a combination of media is recommended to maximize the effectiveness of the stormwater pollutant removal.

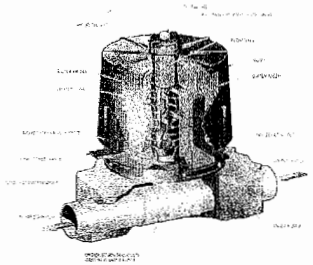

Figure 1. The StormFilter Cartridge

Priming System Function

When stormwater in the StormFilter unit enters a StormFilter cartridge, it percolates horizontally through the cartridge's filter media and collects in the center tube of the cartridge, where the float in the cartridge is in a closed (downward) position.

Water continues to pass through the filter media and into the cartridge's center tube. The air in the cartridge is displaced by the water and purged from beneath the filter hood through the one-way check valve located in the cap. Once the center tube is filled with water (approximately 18 inches deep), there is enough buoyant force on the float to open the float valve and allow the treated water in the center tube to flow into the under-drain manifold. This causes the check valve to close, initiating a siphon that draws polluted water throughout the full surface area and volume of the filter. Thus, the entire filter cartridge is used to filter water throughout the duration of the storm, regardless of the water surface elevation in the unit. This siphon continues until the water surface elevation drops to the elevation of the hood's scrubbing regulators.

The cartridges are connected to the under-drain manifold with a plastic connector. Since some media used is potentially buoyant, a threaded connector affixed to the under-drain manifold (with glue or other adhesive) is necessary to ensure that the cartridge isn't lifted out of place. For the heavier compost media, a slip connector is used.

The StormFilter is also equipped with flow spreaders that trap floating debris and surface films, even during overflow conditions. Depending on individual site characteristics, some systems are equipped with high and/or base flow bypasses. High flow bypasses are installed when the calculated peak storm event generates a flow that overcomes the overflow capacity of the system. This is especially important for precast systems. Base flow bypasses are sometimes installed to bypass continuous inflows caused by ground water seepage, which usually do not require treatment. All StormFilter units are designed with an overflow. The overflow operates when the inflow rate is greater than the treatment capacity of the filter cartridges.

Maintenance Guidelines

The primary purpose of the StormFilter is to filter out and prevent pollutants from entering our waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the StormFilter to its full efficiency and effectiveness.

Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site.

Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. It is also good practice to inspect the system after severe storm events.

Types of Maintenance

Presently, procedures have been developed for two levels of maintenance:

- Inspection/minor maintenance
- Major maintenance.

Inspection/minor maintenance activities are combined since minor maintenance does not require special equipment and typically little or no materials are in need of disposal.

Inspection/minor maintenance typically involves:

- Inspection of the vault itself
- Removal of vegetation and trash and debris.

Major maintenance typically includes:

- Cartridge replacement
- Sediment removal

Important: Applicable safety (OSHA) and disposal regulations should be followed during all maintenance activities.

Maintenance Activity Timing

Two scheduled inspections/maintenance activities should take place during the year.

First, an inspection/minor maintenance activity should be done. During the minor maintenance activity (routine inspection, debris removal), the need for major maintenance should be determined and, if disposal during major maintenance will be required, samples of the sediments and media should be obtained.

Second, if required, a major maintenance activity (replacement of the filter cartridges and associated sediment removal) should be performed.

In addition to these two scheduled activities, it is important to check the condition of the StormFilter unit after major storms for damage caused by high flows and for high sediment accumulation that may be caused by localized erosion in the drainage area. It may be necessary to adjust the maintenance activity schedule depending on the actual operating conditions encountered by the system.

In general, minor maintenance activities will occur late in the rainy season, and major maintenance will occur in late summer to early fall when flows into the system are not likely to be present.

Maintenance Activity Frequency

The primary factor controlling timing of maintenance for the StormFilter is sedimentation.

A properly functioning system will remove solids from water by trapping particulates in the porous structure of the filter media. The flow through the system will naturally decrease as more and more solids are trapped. Eventually the flow through the system will be low enough to require replacement of the cartridges. It may be possible to extend the usable span of the cartridges by removing sediment from upstream trapping devices on an as-needed basis in order to prevent material from being re-suspended and discharged to the system.

Site conditions greatly influence maintenance requirements. StormFilter units located in areas with erosion or active construction should be inspected and maintained more often than those in fully stabilized areas.

The maintenance frequency may be adjusted as additional monitoring information becomes available during the inspection program. Areas that develop known problems should be inspected more frequently than areas that demonstrate no problems, particularly after large storms.

Ultimately, inspection and maintenance activities should be scheduled based on the historic records and characteristics of an individual StormFilter system. It is recommended that the maintenance agency develop a database to properly manage StormFilter maintenance programs.

Prior to the development of the maintenance database, the following maintenance frequencies should be followed:

Inspection/minor maintenance
- One time per year
- After Major Storms

Major maintenance
- One time per year
- In the event of a chemical spill

Frequencies should be updated as required.

The recommended initial frequency for inspection/minor maintenance is two times per year for precast units. StormFilter units should be inspected after all major storms. Sediment removal and cartridge replacement on an annual basis is recommended until further knowledge is gained about a particular system.

Once an understanding of site characteristics has been established, maintenance may not be needed for one to two years, but inspection is warranted.

Maintenance Methods

Inspection/Minor Maintenance

The primary goal of a maintenance inspection is to assess the condition of the cartridges relative to the level of sediment loading. It may be desirable to conduct this inspection during a storm to observe the relative flow through the filter cartridges. If the submerged cartridges are severely plugged, large amounts of sediments will be present and very little flow will be discharged from the drainage pipes. If this is the case, it is likely that the cartridges need to be replaced.

Warning: In the case of a spill, the worker should abort maintenance activities until the proper guidance is obtained. Notify the local hazard control agency and CONTECH Stormwater Solutions immediately.

To conduct an inspection and/or minor maintenance:

Important: Maintenance must be performed by a utility worker familiar with StormFilter units.

1. If applicable, set up safety equipment to protect pedestrians from fall hazards due to open vault doors or when work is being done near walkways or roadways.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.

3. Open the doors to the vault and allow the system to air out for 5-10 minutes.

4. Without entering the vault, inspect the inside of the unit, including components.

5. Take notes about the external and internal condition of the vault.

   Be sure to record the level of sediment build-up on the floor of the vault, in the forebay, and on top of the cartridges. If flow is occurring, note the level of water and estimate the flow rate per drainage pipe. Record all observations.

6. Remove large loose debris and trash using a pole with a grapple or net on the end.

7. Close and fasten the door.

8. Remove safety equipment.

9. Make notes about the local drainage area relative to ongoing construction, erosion problems, or high loading of other materials to the system.

10. Finally, review the condition reports from the previous minor and major maintenance visits, and schedule cartridge replacement if needed.

Major Maintenance

Depending on the configuration of the particular system, a worker may be required to enter the vault to perform some tasks.

Important: If vault entry is required, OSHA rules for confined space entry must be followed.

Filter cartridge replacement should occur during dry weather. It may be necessary to plug the filter inlet pipe if base flows exist. Standing water present in the vault should be regarded as polluted and should be contained during this operation by temporarily capping the manifold connectors.

Replacement cartridges will be delivered to the site. Information concerning how to obtain the replacement cartridges is available from CONTECH Stormwater Solutions.

Warning: In the case of a spill, the worker should abort maintenance activities until the proper guidance is obtained. Notify the local hazard control agency and CONTECH Stormwater Solutions immediately.

To conduct cartridge replacement and sediment removal maintenance:

1. If applicable, set up safety equipment to protect pedestrians from fall hazards due to open vault doors or when work is being done near walkways or roadways.

2. Visually inspect the external condition of the unit and take notes concerning defects/problems.

3. Open the doors to the vault and allow the system to air out for 5-10 minutes.

4. Without entering the vault, give the inside of the unit, including components, a general condition inspection.

5. Make notes about the external and internal condition of the vault.

   Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.

6. Remove large loose debris and trash using a pole with a grapple or net on the end.

7. Using a boom, crane, or other device (dolly and ramp), offload the replacement cartridges (up to 150 lbs. each) and set aside.
8. Remove used cartridges from the vault using one of the following methods:

Important: This activity will require that workers enter the vault to remove the cartridges from the drainage system.

Method 1:

a. Using an appropriate sling, attach the cable from the boom, crane, or tripod to the cartridge being removed. Contact CONTECH Stormwater Solutions for specifications on appropriate attachment devices.

This activity will require that workers enter the vault to remove the cartridges from the drainage system and place them under the vault opening for lifting.

Important: Note that cartridges containing media other than the leaf media require unscrewing from their threaded connectors. Take care not to damage the manifold connectors. This connector should remain installed in the manifold and capped if necessary.

b. Remove the used cartridges (250 lbs. each) from the vault.

Important: Care must be used to avoid damaging the cartridges during removal and installation. The cost of repairing components damaged during maintenance will be the responsibility of the owner unless CONTECH Stormwater Solutions performs the maintenance activities and damage is not related to discharges to the system.

c. Set the used cartridge aside or load onto the hauling truck.

d. Continue steps a through c until all cartridges have been removed.

Method 2:

a. Unscrew the cartridge cap.

b. Remove the cartridge hood.

c. Tip the cartridge on its side.

Important: Note that cartridges containing media other than the leaf media require unscrewing from their threaded connectors. Take care not to damage the manifold connectors. This connector should remain installed in the manifold and capped if necessary.

d. Empty the cartridge onto the vault floor.

e. Set the empty, used cartridge aside or load onto the hauling truck.

f. Continue steps a through e until all cartridges have been removed.

9. Remove deposited sediment from the floor of the vault and, if large amounts are present, from the forebay. This can usually be accomplished by shoveling the sediment into containers, which, once full, are lifted mechanically from the vault and placed onto the hauling truck. If Method 2 in Step 8 is used to empty the cartridges, or in cases of extreme sediment loading, a vactor truck may be required.

10. Once the sediments are removed, assess the condition of the vault and the condition of the manifold and connectors. The connectors are short sections of 2-inch schedule 40 PVC, or threaded schedule 80 PVC that should protrude above the floor of the vault.
    a. If required, apply a light coating of FDA approved silicon grease to the outside of the exposed portion of the connectors. This ensures a watertight connection between the cartridge and the drainage pipe.
    b. Replace any damaged connectors.
11. Using the boom, crane, or tripod, lower and install the new cartridges. Once

again, take care not to damage connections.

12. Close and fasten the door.

13. Remove safety equipment.

14. Make notes about the local drainage area relative to ongoing construction, erosion problems, or high loadings of other materials to the system.

15. Finally, dispose of the residual materials in accordance with applicable regulations. Make arrangements to return the used cartridges to CONTECH Stormwater Solutions.

Related Maintenance Activities
(Performed on an as-needed basis)

StormFilter units are often just one of many components in a more comprehensive stormwater drainage and treatment system. The entire system may include catch basins, detention vaults, sedimentation vaults and manholes, detention/retention ponds, swales, artificial wetlands, and other miscellaneous components.
In order for maintenance of the StormFilter to be successful, it is imperative that all other components be properly maintained. The maintenance/repair of upstream facilities should be carried out prior to StormFilter maintenance activities.

In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil and grease loading, and discharges of inappropriate materials.

Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in a manner that will not allow the material to affect surface or ground water. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily traveled roads.

Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. It is not appropriate to discharge untreated materials back to the stormwater drainage system.

Part of arranging for maintenance to occur should include coordination of disposal of solids (landfill coordination) and liquids (municipal vacuum truck decant facility, local wastewater treatment plant, on-site treatment and discharge).

Owners should contact the local public works department and inquire about how the department disposes of their street waste residuals. CONTECH Stormwater Solutions will determine disposal methods or reuse of the media contained in the cartridges. If the material has been contaminated with any unusual substance, the cost of special handling and disposal will be the responsibility of the owner.

StormFilter Minor Maintenance and Inspection Data Sheet

Date: _____ **Personnel:** _____

Location: _____ **System Size:** _____

System Type: Vault Cast-In-Place Linear

System Observations

Media Months in Service: _____

Oil and Grease in Forebay: **Yes** **No** _____

Sediment Depth in Forebay: _____

Sediment Depth on Vault Floor: _____

Structural Damage: _____

Estimated Flow from Drainage Pipes (if available): _____

Cartridges Submerged: **Yes** **No** How Deep: _____

StormFilter Minor Maintenance Activities (check off if done and give description)

Trash and Debris Removal: _____

Minor Structural Repairs: _____

Drainage Area Report

Excessive Oil and Grease Loading: **Yes** **No** Source: _____

Sediment Accumulation on Pavement: **Yes** **No** Source: _____

Erosion of Landscaped Areas: **Yes** **No** Source: _____

Items Needing Further Work: _____

Other Comments: _____

Review the condition reports from the previous minor and major maintenance visits.

StormFilter Major Maintenance/Cartridge Replacement Data Sheet

Date: _____ **Personnel:** _____

Location: _____ **System Size:** _____

System Type: Vault Cast-In-Place Linear

List Safety Procedures and Equipment Used: _____

_____

_____

System Observations

Media Months in Service: _____

Oil and Grease in Forebay: **Yes** **No** _____

Sediment Depth in Forebay: _____

Sediment Depth on Vault Floor: _____

Structural Damage: _____

Drainage Area Report

Excessive Oil and Grease Loading: **Yes** **No** Source: _____

Sediment Accumulation on Pavement: **Yes** **No** Source: _____

Erosion of Landscaped Areas: **Yes** **No** Source: _____

StormFilter Cartridge Replacement Maintenance Activities

Remove Trash and Debris: **Yes** **No** Details: _____

Replace Cartridges: **Yes** **No** Details: _____

Sediment Removed: **Yes** **No** Details: _____

Quantity of Sediment Removed (estimate?): _____

Minor Structural Repairs: **Yes** **No** Details: _____

Residuals (debris, sediment) Disposal Methods: _____

Notes: _____

SECTION G

EXHIBIT G

BMP FACT SHEETS

IC3. BUILDING MAINTENANCE

Best Management Practices (BMPs)

A BMP is a technique, measure or structural control that is used for a given set of conditions to improve the quality of the stormwater runoff in a cost effective manner[1]. The minimum required BMPs for this activity are outlined in the box to the right. Implementation of pollution prevention/good housekeeping measures may reduce or eliminate the need to implement other more costly or complicated procedures. Proper employee training is key to the success of BMP implementation.

MINIMUM BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping

- Properly collect and dispose of water when pressure washing buildings, rooftops, and other large objects.
- Properly prepare work area before conducting building maintenance.
- Properly clean and dispose of equipment and wastes used and generated during building maintenance.
- Store toxic material under cover when not in use and during precipitation events.

Stencil storm drains

Training

- Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
- Provide on-going employee training in pollution prevention.

The BMPs outlined in this fact sheet target the following pollutants:

Targeted Constituents	
Sediment	x
Nutrients	x
Floatable Materials	
Metals	x
Bacteria	x
Oil & Grease	
Organics & Toxicants	
Pesticides	
Oxygen Demanding	

Provided below are specific procedures associated with each of the minimum BMPs along with procedures for additional BMPs that should be considered if this activity takes place at a facility located near a sensitive waterbody. In order to meet the requirements for medium and high priority facilities, the owners/operators must select, install and maintain appropriate BMPs on site. Since the selection of the appropriate BMPs is a site-specific process, the types and numbers of additional BMPs will vary for each facility.

1. **Properly collect and dispose of water when pressure washing buildings, rooftops, and other large objects.**
   - If pressure washing where the surrounding area is paved, use a water collection device that enables collection of wash water and associated solids. Use a sump pump, wet vacuum or similarly effective device to collect the runoff and loose materials. Dispose of the collected runoff and solids properly.
   - If pressure washing on a landscaped area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the landscaping and not drain to pavement.
2. **Properly prepare work area before conducting building maintenance.**
   - Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
   - Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
3. **Properly clean and dispose of equipment and wastes used and generated during building maintenance.**

[1] EPA " *Preliminary Data Summary of Urban Stormwater Best Management Practices"*

- Clean paint brushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.
- Properly dispose of wash water, sweepings, and sediments.
- Properly store equipment, chemicals, and wastes.
- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.

OPTIONAL:

- Recycle residual paints, solvents, lumber, and other materials to the maximum extent practicable

4. **Employ soil erosion and stabilization techniques when exposing large areas of soil.**
    - Confine excavated materials to pervious surfaces away from storm drain inlets, sidewalks, pavement, and ditches. Material must be covered if rain is expected.
    - Use chemical stabilization or geosynthetics to stabilize bare ground surfaces.
5. **Store toxic material under cover when not in use and during precipitation events.**
6. **Properly dispose of fluids from air conditioning, cooling tower, and condensate drains.**
7. **Regularly inspect air emission control equipment under AQMD permit.**
8. **Switch to non-toxic chemicals for maintenance when possible.**
    - If cleaning agents are used, select biodegradable products whenever feasible
    - Consider using a waterless and non-toxic chemical cleaning method for graffiti removal (e.g. gels or spray compounds).
9. **Use chemicals that can be recycled.**
    - Buy recycled products to the maximum extent practicable

Training

1. **Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.**
2. **Train employees on proper spill containment and cleanup.**
    - Establish training that provides employees with the proper tools and knowledge to immediately begin cleaning up a spill.
    - Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
    - BMP IC17 discusses Spill Prevention and Control in detail.
3. **Establish a regular training schedule, train all new employees, and conduct annual refresher training.**
4. **Use a training log or similar method to document training.**

Stencil storm drains

Storm drain system signs act as highly visible source controls that are typically stenciled directly adjacent to storm drain inlets. Stencils should read "No Dumping Drains to Ocean".

References

California Storm Water Best Management Practice Handbook. Industrial and Commercial. 2003. www.cabmphandbooks.com

California Storm Water Best Management Practice Handbooks. Industrial/Commercial Best Management Practice Handbook. Prepared by Camp Dresser& McKee, Larry Walker Associates, Uribe and Associates, Resources Planning Associates for Stormwater Quality Task Force. March 1993.

King County Stormwater Pollution Control Manual. Best Management Practices for Businesses. King County Surface Water Management. July 1995. On-line: http://dnr.metrokc.gov/wlr/dss/spcm.htm

Stormwater Management Manual for Western Washington. Volume IV Source Control BMPs. Prepared by Washington State Department of Ecology Water Quality Program. Publication No. 99-14. August 2001.

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IC7. LANDSCAPE MAINTENANCE

Best Management Practices (BMPs)

A BMP is a technique, measure or structural control that is used for a given set of conditions to improve the quality of the stormwater runoff in a cost effective manner[1]. The minimum required BMPs for this activity are outlined in the box to the right. Implementation of pollution prevention/good housekeeping measures may reduce or eliminate the need to implement other more costly or complicated procedures. Proper employee training is key to the success of BMP implementation.

MINIMUM BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping

- Properly store and dispose of gardening wastes.
- Use mulch or other erosion control measures on exposed soils.
- Properly manage irrigation and runoff.
- Properly store and dispose of chemicals.
- Properly manage pesticide and herbicide use.
- Properly manage fertilizer use.

Stencil storm drains

Training

- Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
- Provide on-going employee training in pollution prevention.

The BMPs outlined in this fact sheet target the following pollutants:

Targeted Constituents	
Sediment	x
Nutrients	x
Floatable Materials	x
Metals	
Bacteria	x
Oil & Grease	
Organics & Toxicants	
Pesticides	x
Oxygen Demanding	x

Provided below are specific procedures associated with each of the minimum BMPs along with procedures for additional BMPs that should be considered if this activity takes place at a facility located near a sensitive waterbody. In order to meet the requirements for medium and high priority facilities, the owners/operators must select, install and maintain appropriate BMPs on site. Since the selection of the appropriate BMPs is a site-specific process, the types and numbers of additional BMPs will vary for each facility.

1. **Take steps to reduce landscape maintenance requirements.**
   - Where feasible, retain and/or plant native vegetation with features that are determined to be beneficial. Native vegetation usually requires less maintenance than planting new vegetation.
   - When planting or replanting consider using low water use flowers, trees, shrubs, and groundcovers.
   - Consider alternative landscaping techniques such as naturescaping and xeriscaping.
2. **Properly store and dispose of gardening wastes.**
   - Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage at a permitted landfill or by composting.
   - Do not dispose of gardening wastes in streets, waterways, or storm drainage systems.
   - Place temporarily stockpiled material away from watercourses and storm drain inlets, and berm and/or cover.
3. **Use mulch or other erosion control measures on exposed soils.**

[1] EPA " *Preliminary Data Summary of Urban Stormwater Best Managem ent Practices"*

4. **Properly manage irrigation and runoff.**
   - Irrigate slowly or pulse irrigate so the infiltration rate of the soil is not exceeded.
   - Inspect irrigation system regularly for leaks and to ensure that excessive runoff is not occurring.
   - If re-claimed water is used for irrigation, ensure that there is no runoff from the landscaped area(s).
   - If bailing of muddy water is required (e.g. when repairing a water line leak), do not put it in the storm drain; pour over landscaped areas.
   - Use automatic timers to minimize runoff.
   - Use popup sprinkler heads in areas with a lot of activity or where pipes may be broken. Consider the use of mechanisms that reduce water flow to broken sprinkler heads.
5. **Properly store and dispose of chemicals.**
   - Implement storage requirements for pesticide products with guidance from the local fire department and/or County Agricultural Commissioner.
   - Provide secondary containment for chemical storage.
   - Dispose of empty containers according to the instructions on the container label.
   - Triple rinse containers and use rinse water as product.
6. **Properly manage pesticide and herbicide use.**
   - Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of pesticides and herbicides and training of applicators and pest control advisors.
   - Follow manufacturers' recommendations and label directions.
   - Use pesticides only if there is an actual pest problem (not on a regular preventative schedule). When applicable use less toxic pesticides that will do the job. Avoid use of copper-based pesticides if possible. Use the minimum amount of chemicals needed for the job.
   - Do not apply pesticides if rain is expected or if wind speeds are above 5 mph.
   - Do not mix or prepare pesticides for application near storm drains. Prepare the minimum amount of pesticide needed for the job and use the lowest rate that will effectively control the targeted pest.
   - Whenever possible, use mechanical methods of vegetation removal rather than applying herbicides. Use hand weeding where practical.
   - Do not apply any chemicals directly to surface waters, unless the application is approved and permitted by the state. Do not spray pesticides within 100 feet of open waters.
   - Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.
   - When conducting mechanical or manual weed control, avoid loosening the soil, which could lead to erosion.
   - Purchase only the amount of pesticide that you can reasonably use in a given time period.
   - Careful soil mixing and layering techniques using a topsoil mix or composted organic material can be used as an effective measure to reduce herbicide use and watering.
7. **Properly manage fertilizer use.**
   - Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers.
   - Follow manufacturers' recommendations and label directions.
   - Employ techniques to minimize off-target application (e.g. spray drift) of fertilizer, including consideration of alternative application techniques. Calibrate fertilizer distributors to avoid excessive application.
   - Periodically test soils for determining proper fertilizer use.
   - Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
   - Sweep pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
   - Use slow release fertilizers whenever possible to minimize leaching
   -

8. **Incorporate the following integrated pest management techniques where appropriate:**
   - Mulching can be used to prevent weeds where turf is absent.
   - Remove insects by hand and place in soapy water or vegetable oil. Alternatively, remove insects with water or vacuum them off the plants.
   - Use species-specific traps (e.g. pheromone-based traps or colored sticky cards).
   - Sprinkle the ground surface with abrasive diatomaceous earth to prevent infestations by soft-bodied insects and slugs. Slugs also can be trapped in small cups filled with beer that are set in the ground so the slugs can get in easily.
   - In cases where microscopic parasites, such as bacteria and fungi, are causing damage to plants, the affected plant material can be removed and disposed of (pruning equipment should be disinfected with bleach to prevent spreading the disease organism).
   - Small mammals and birds can be excluded using fences, netting, and tree trunk guards.
   - Promote beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seedhead weevils, and spiders that prey on detrimental pest species.

Training

1. **Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.**
2. **Educate and train employees on the use of pesticides and pesticide application techniques. Only employees properly trained to use pesticides can apply them.**
3. **Train and encourage employees to use integrated pest management techniques.**
4. **Train employees on proper spill containment and cleanup.**
   - Establish training that provides employees with the proper tools and knowledge to immediately begin cleaning up a spill.
   - Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
   - BMP IC17 discusses Spill Prevention and Control in detail.
5. **Establish a regular training schedule, train all new employees, and conduct annual refresher training.**
6. **Use a training log or similar method to document training.**

Stencil storm drains

Storm drain system signs act as highly visible source controls that are typically stenciled directly adjacent to storm drain inlets. Stencils should read "No Dumping Drains to Ocean".

References

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California Storm Water Best Management Practice Handbooks. Industrial/Commercial Best Management Practice Handbook. Prepared by Camp Dresser& McKee, Larry Walker Associates, Uribe and Associates, Resources Planning Associates for Stormwater Quality Task Force. March 1993.

King County Stormwater Pollution Control Manual. Best Management Practices for Businesses. King County Surface Water Management. July 1995. On-line: http://dnr.metrokc.gov/wlr/dss/spcm.htm

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Water Quality Handbook for Nurseries. Oklahoma Cooperative Extension Service. Division of Agricultural Sciences and Natural Resources. Oklahoma State University. E-951. September 1999.

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IC15. PARKING AND STORAGE AREA MAINTENANCE

Best Management Practices (BMPs)

A BMP is a technique, measure or structural control that is used for a given set of conditions to improve the quality of the stormwater runoff in a cost effective manner[1]. The minimum required BMPs for this activity are outlined in the box to the right. Implementation of pollution prevention/good housekeeping measures may reduce or eliminate the need to implement other more costly or complicated procedures. Proper employee training is key to the success of BMP implementation.

MINIMUM BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping

- Conduct regular cleaning.
- Properly collect and dispose of wash water.
- Keep the parking and storage areas clean and orderly.
- Use absorbent materials and properly dispose of them when cleaning heavy oily deposits.
- When conducting surface repair work cover materials and clean paintbrushes and tools appropriately.

Stencil storm drains

Training

- Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
- Provide on-going employee training in pollution prevention.

The BMPs outlined in this fact sheet target the following pollutants:

Targeted Constituents	
Sediment	x
Nutrients	x
Floatable Materials	x
Metals	x
Bacteria	x
Oil & Grease	x
Organics & Toxicants	x
Pesticides	x
Oxygen Demanding	x

Provided below are specific procedures associated with each of the minimum BMPs along with procedures for additional BMPs that should be considered if this activity takes place at a facility located near a sensitive waterbody. In order to meet the requirements for medium and high priority facilities, the owners/operators must select, install and maintain appropriate BMPs on site. Since the selection of the appropriate BMPs is a site-specific process, the types and numbers of additional BMPs will vary for each facility.

1. **Conduct regular cleaning.**
   - Sweeping or vacuuming the parking facility is encouraged over other methods.
   - Sweep all parking lots at least once before the onset of the wet season.
   - Establish frequency of sweeping based on usage and field observations of waste accumulation.
2. **Properly collect and dispose of wash water.**
   - Block the storm drain or contain runoff.
   - Wash water should be collected and pumped to the sanitary sewer or discharged to a pervious surface, do not allow wash water to enter storm drains. **DO NOT** discharge wash water to sanitary sewer until contacting the local sewer authority to find out if pretreatment is required.
   - Dispose of parking lot sweeping debris and dirt at a landfill.
3. **Consider use of source treatment BMPs to treat runoff.**
   - Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
   - Utilize sand filters or oleophilic collectors for oily waste in low quantities.
4. **Keep the parking and storage areas clean and orderly.**

[1] EPA " *Preliminary Data Summary of Urban Stormwater Best Management Practices*"

   - Clean out and cover litter receptacles frequently to prevent spillage.
   - Remove debris in a timely fashion.

   OPTIONAL:
   - Post "No Littering" signs.
5. **When cleaning heavy oily deposits:**
   - If possible, clean oily spots with absorbent materials.
   - Do not allow discharges to the storm drain.
   - Appropriately dispose of spilled materials and absorbents.
6. **When conducting surface repair work:**
   - Pre-heat, transfer or load hot bituminous material away from storm drain inlets.
   - Conduct surface repair work during dry weather to prevent contamination from contacting stormwater runoff.
   - Cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and clean any debris for proper disposal.
   - To avoid runoff, use only as much water as necessary for dust control.
   - Use drip pans or absorbent material to catch drips from paving equipment that is not in use. Dispose of collected material and absorbents properly.
7. **Conduct inspections on a regular basis.**
   - Designate personnel to conduct inspections of the parking facilities and stormwater conveyance systems associated with them.
   - Inspect cleaning equipment/sweepers for leaks on a regular basis.
8. **Keep accurate maintenance logs to evaluate materials removed/stored and improvements made.**
9. **Arrange rooftop drains to prevent drainage directly onto paved surfaces.**

Training

1. **Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.**
2. **Train employees on proper spill containment and cleanup.**
   - Establish training that provides employees with the proper tools and knowledge to immediately begin cleaning up a spill.
   - Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
   - BMP IC17 discusses Spill Prevention and Control in detail.
3. **Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.**
4. **Establish a regular training schedule, train all new employees, and conduct annual refresher training.**
5. **Use a training log or similar method to document training.**

Stencil storm drains

Storm drain system signs act as highly visible source controls that are typically stenciled directly adjacent to storm drain inlets. Stencils should read "No Dumping Drains to Ocean".

References

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Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July 1998 (Revised February 2002 by the California Coastal Commission).

Stormwater Management Manual for Western Washington. Volume IV Source Control BMPs. Prepared by Washington State Department of Ecology Water Quality Program. Publication No. 99-14. August 2001.

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IC16. POOL AND FOUNTAIN CLEANING

Best Management Practices (BMPs)

A BMP is a technique, measure or structural control that is used for a given set of conditions to improve the quality of the stormwater runoff in a cost effective manner[1]. The minimum required BMPs for this activity are outlined in the box to the right. Implementation of pollution prevention/good housekeeping measures may reduce or eliminate the need to implement other more costly or complicated procedures. Proper employee training is key to the success of BMP implementation.

MINIMUM BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping

- Prevent algae problems with regular cleaning, consistent adequate chlorine levels, and well-maintained water filtration and circulation systems.
- Discharge pool and fountain water properly.

Stencil storm drains

Training

- Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
- Provide on-going employee training in pollution prevention.

The BMPs outlined in this fact sheet target the following pollutants:

Targeted Constituents	
Sediment	x
Nutrients	x
Floatable Materials	x
Metals	
Bacteria	x
Oil & Grease	
Organics & Toxicants	x
Pesticides	x
Oxygen Demanding	x

Provided below are specific procedures associated with each of the minimum BMPs along with procedures for additional BMPs that should be considered if this activity takes place at a facility located near a sensitive waterbody. In order to meet the requirements for medium and high priority facilities, the owners/operators must select, install and maintain appropriate BMPs on site. Since the selection of the appropriate BMPs is a site-specific process, the types and numbers of additional BMPs will vary for each facility.

1. **Prevent algae problems with regular cleaning, consistent adequate chlorine levels, and well-maintained water filtration and circulation systems.**
   - Do not use copper-based algaecides.
   - Control algae with chlorine or other alternatives, such as sodium bromide.
2. **Manage pH and water hardness to minimize corrosion of copper pipes.**
3. **Discharge pool and fountain water properly.** Consider hiring a professional pool-draining service to collect all pool water for off-site disposal. If this is not feasible, adhere to the following:
   - When draining pools or fountains never discharge water to a street or storm drain, discharge to the sanitary sewer if permitted to do so.
   - If draining a pool to the sanitary sewer, prevent backflow by maintaining an "air gap" between the discharge line and the sewer line (do not seal the connection between the hose and sewer line). Be sure to call the local sewer authority for guidance on flow rate restrictions, backflow prevention, and handling special cleaning waste (such as acid wash). Keep discharge flows to the low levels. Higher flow rates may be prohibited by local ordinance.

[1] EPA " *Preliminary Data Summary of Urban Stormwater Best Management Practices*"

- If water is dechlroinated with a neutralizing chemical or by allowing chlorine to dissipate for a few days (do not use the facility during this time), the water may be recycled/reused by draining it gradually onto a landscaped area. Water must be tested prior to discharge to ensure that chlorine is not present.
- Provide drip pans or buckets beneath drain pipe connections to catch leaks. This will be especially pertinent if pool or spa water that has not been dechlorinated is pumped through piping to a discharge location.

4. **Properly clean and/or dispose of filters.**
    - Never clean a filter in the street or near a storm drain.
    - Rinse cartridge filters onto a dirt area, and work filter residue into soil.
    - Backwash diatomaceous earth filters onto dirt. Dispose of spent diatomaceous earth in the garbage. Diatomaceous earth cannot be discharged to surface waters, storm drainage systems, septic systems, or on the ground.
    - If there is not a suitable dirt area, discharge filter backwash or rinsewater to the sanitary sewer if permitted to do so by the local sewering agency.

Training

1. **Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.**
2. **Train employees on proper spill containment and cleanup.**
    - Establish training that provides employees with the proper tools and knowledge to immediately begin cleaning up a spill.
    - Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
    - BMP IC17 discusses Spill Prevention and Control in detail.
3. **Train maintenance personnel on the proper techniques for testing chlorine levels and applying neutralizing chemicals.**
4. **Establish a regular training schedule, train all new employees, and conduct annual refresher training.**
5. **Use a training log or similar method to document training.**

Stencil storm drains

Storm drain system signs act as highly visible source controls that are typically stenciled directly adjacent to storm drain inlets. Stencils should read "No Dumping Drains to Ocean".

References

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King County Stormwater Pollution Control Manual. Best Management Practices for Businesses. 1995. King County Surface Water Management. July. On-line: http://dnr.metrokc.gov/wlr/dss/spcm.htm

Los Angeles County Stormwater Quality. Public Agency Activities Model Program. On-line: http://ladpw.org/wmd/npdes/public_TC.cfm

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July 1998 (Revised February 2002 by the California Coastal Commission).

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IC17. SPILL PREVENTION AND CLEANUP

Best Management Practices (BMPs)

A BMP is a technique, measure or structural control that is used for a given set of conditions to improve the quality of the stormwater runoff in a cost effective manner[1]. The minimum required BMPs for this activity are outlined in the box to the right. Implementation of pollution prevention/good housekeeping measures may reduce or eliminate the need to implement other more costly or complicated procedures. Proper employee training is key to the success of BMP implementation.

MINIMUM BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping

- Develop procedures to prevent/mitigate spills to storm drain systems.
- Post "No Dumping" signs with a phone number for reporting illegal dumping and disposal.
- Conduct routine cleaning, inspections, and maintenance.
- Properly store and handle chemical materials.
- Protect materials stored outside from stormwater runon.
- Secure drums stored in an area where unauthorized persons may gain access to prevent accidental spillage, pilferage, or any unauthorized use.
- Identify key spill response personnel.
- Clean up leaks and spills immediately.
- Report and track spills.

Stencil storm drains

Training

- Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
- Provide on-going employee training in pollution prevention.

The BMPs outlined in this fact sheet target the following pollutants:

Targeted Constituents	
Sediment	x
Nutrients	x
Floatable Materials	x
Metals	x
Bacteria	x
Oil & Grease	x
Organics & Toxicants	x
Pesticides	x
Oxygen Demanding	x

Provided below are specific procedures associated with each of the minimum BMPs along with procedures for additional BMPs that should be considered if this activity takes place at a facility located near a sensitive waterbody. In order to meet the requirements for medium and high priority facilities, the owners/operators must select, install and maintain appropriate BMPs on site. Since the selection of the appropriate BMPs is a site-specific process, the types and numbers of additional BMPs will vary for each facility.

Spill Prevention

1. **Develop procedures to prevent/mitigate spills to storm drain systems.**
   Standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.
2. **Post "No Dumping" signs with a phone number for reporting illegal dumping and disposal.**
3. **Conduct routine cleaning, inspections, and maintenance**
   - Sweep and clean storage areas consistently at a designated frequency (e.g. weekly, monthly). **DO NOT** hose down areas to storm drains.
   - Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Reuse, recycle, or properly dispose of any collected liquids or soiled absorbent materials.
   - Check tanks (and any containment sumps) frequently for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating with tanks in good condition. Collect all spilled liquids and properly dispose of them.

[1] EPA " *Preliminary Data Summary of Urban Stormwater Best Management Practices*"

   - Check for external corrosion of material containers, structural failures, spills and overfills due to operator error, failure of piping system, etc.
   - Inspect tank foundations, connections, coatings, and tank walls and piping system.
4. **Properly store and handle chemical materials.**
   - Designate a secure material storage area that is paved with Portland cement concrete, free of cracks and gaps, and impervious in order to contain leaks and spills.
   - Do not store chemicals, drums, or bagged materials directly on the ground. Place these items in secondary containers.
   - Keep chemicals in their original containers, if feasible.
   - Keep containers well labeled according to their contents (e.g., solvent, gasoline).
   - Label hazardous substances regarding the potential hazard (corrosive, radioactive, flammable, explosive, poisonous).
   - Prominently display required labels on transported hazardous and toxic materials (per US DOT regulations).
5. **Utilize secondary containment systems for liquid materials.**
   - Surround storage tanks with a berm or other secondary containment system.
   - Slope the area inside the berm to a drain.
   - Drain liquids to the sanitary sewer if available. **DO NOT** discharge wash water to sanitary sewer until contacting the local sewer authority to find out if pretreatment is required
   - Pass accumulated stormwater in petroleum storage areas through an oil/water separator.
   - Use catch basin filtration inserts.
6. **Protect materials stored outside from stormwater runon.** Construct a berm around the perimeter of the material storage area to prevent the runon of uncontaminated stormwater from adjacent areas as well as runoff of stormwater from the material.
7. **Secure drums stored in an area where unauthorized persons may gain access to prevent accidental spillage, pilferage, or any unauthorized use.**

Spill Control and Cleanup Activities

8. **Identify key spill response personnel.**
9. **Adopt the Orange County Hazardous Materials Area Plan or an equivalent plan, which includes a set of planned responses to hazardous materials emergencies. The plan should include:**
   - Description of the facility, owner and address, activities and chemicals present
   - Facility map
   - Notification and evacuation procedures
   - Cleanup instructions
   - Identification of responsible departments
10. **Clean up leaks and spills immediately.**
    - Place a stockpile of spill cleanup materials where they will be readily accessible (e.g. near storage and maintenance areas).
    - Utilize dry cleaning methods to clean up spills to minimize the use of water. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste. Physical methods for the cleanup of dry chemicals include the use brooms, shovels, sweepers, or plows.
    - Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
    - Clean up chemical materials with absorbents, gels, and foams. Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
    - For larger spills, a private spill cleanup company or Hazmat team may be necessary.

11. **Reporting**
    1. **Report spills that pose an immediate threat to human health or the environment to local agencies, such as the fire department, and the Regional Water Quality Control Board.**
    2. **Establish a system for tracking incidents. The system should be designed to identify the following:**
        - Types and quantities (in some cases) of wastes
        - Patterns in time of occurrence (time of day/night, month, or year)
        - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
        - Responsible parties
    3. **Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).**

Training

1. **Educate employees about spill prevention and cleanup.**
    - Establish training that provides employees with the proper tools and knowledge to immediately begin cleaning up a spill.
    - Educate employees on aboveground storage tank requirements.
    - Train all employees upon hiring and conduct annual refresher training.
2. **Train employees responsible for aboveground storage tanks and liquid transfers on the Spill Prevention Control and Countermeasure Plan.**

Stencil storm drains

Storm drain system signs act as highly visible source controls that are typically stenciled directly adjacent to storm drain inlets. Stencils should read "No Dumping Drains to Ocean".

References

California Storm Water Best Management Practice Handbook. Industrial and Commercial. 2003. www.cabmphandbooks.com

California Storm Water Best Management Practice Handbooks. Industrial/Commercial Best Management Practice Handbook. Prepared by Camp Dresser& McKee, Larry Walker Associates, Uribe and Associates, Resources Planning Associates for Stormwater Quality Task Force. March 1993.

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July 1998 (Revised February 2002 by the California Coastal Commission).

Stormwater Management Manual for Western Washington. Volume IV Source Control BMPs. Prepared by Washington State Department of Ecology Water Quality Program. Publication No. 99-14. August 2001.

For additional information contact:

County of Orange
Watershed & Coastal Resources
Stormwater Program
(714)567-6363
or visit our website at:
www.ocwatersheds.com

IC22. EATING AND DRINKING ESTABLISHMENTS

Best Management Practices (BMPs)

A BMP is a technique, measure or structural control that is used for a given set of conditions to improve the quality of the stormwater runoff in a cost effective manner[1]. The minimum required BMPs for this activity are outlined in the box to the right. Implementation of pollution prevention/good housekeeping measures may reduce or eliminate the need to implement other more costly or complicated procedures. Proper employee training is key to the success of BMP implementation.

MINIMUM BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping

- Use dry cleaning methods instead of water
- Clean equipment (floor mats, grease filters, grills, garbage cans, etc.) indoors or in a covered outdoor wash area that is plumbed to the sanitary sewer or in an area that will contain the wash water.
- Recycle and/or properly dispose of grease and oil.
- Block the storm drain when hosing or steam/pressure washing outside dumpster areas, sidewalks, and common areas.

Stencil storm drains

Training

- Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
- Provide on-going employee training in pollution prevention.

The BMPs outlined in this fact sheet target the following pollutants:

Targeted Constituents	
Sediment	
Nutrients	x
Floatable Materials	x
Metals	
Bacteria	x
Oil & Grease	x
Organics & Toxicants	x
Pesticides	x
Oxygen Demanding	x

Provided below are specific procedures associated with each of the minimum BMPs along with procedures for additional BMPs that should be considered if this activity takes place at a facility located near a sensitive waterbody. In order to meet the requirements for medium and high priority facilities, the owners/operators must select, install and maintain appropriate BMPs on site. Since the selection of the appropriate BMPs is a site-specific process, the types and numbers of additional BMPs will vary for each facility.

1. **Practice good housekeeping.**
    - Conduct regular sweeping or vacuuming of outdoor areas: Dry sweep pavement areas including "drive-thru" areas, parking lots, sidewalks, outdoor eating areas and dumpster storage areas frequently.
    - Keep outside areas free of trash & debris.
    - Do not hose out dumpsters or fill them with liquid waste.
    - Regularly inspect, repair, and/or replace dumpsters.
2. **Clean equipment (floor mats, grease filters, grills, garbage cans, etc.) indoors or in a covered outdoor wash area that is plumbed to the sanitary sewer.**
    - Clean equipment in a mop sink if possible (never in a food preparation sink). If there is no mop sink, dedicate an indoor cleaning area where a drain is plumbed to the sanitary sewer.
    - Dispose mop water from cleaning floors in a mop sink, toilet or other drain that is plumbed to the sanitary sewer.
    - Do not pour wash water outside or into a street, gutter, or storm drain.
    - Dispose of all wastewater containing oil and grease in a grease trap or interceptor.

[1] EPA " *Preliminary Data Summary of Urban Stormwater Best Management Practices*"

3. **Recycle and/or properly dispose of grease and oil.** Collect and dispose of concentrated waste oil and grease and disposed of by a certified waste grease hauler. NEVER pour grease or oil into a sink, floor drain, storm drain or dumpster.
4. **Block storm drain(s) when cleaning (hosing or steam/pressure washing) outside dumpster areas, sidewalks, and common areas with hot water, soap, or other cleaning agent.** Collect water/waste and discharge to the sanitary sewer (with approval of the local sanitation district).

Training

1. **Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.**
2. **Train employees on proper spill containment and cleanup.**
   - Establish training that provides employees with the proper tools and knowledge to immediately begin cleaning up a spill.
   - Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
   - BMP IC17 discusses Spill Prevention and Control in detail.
3. **Establish a regular training schedule, train all new employees, and conduct annual refresher training.**
4. **Use a training log or similar method to document training.**

Stencil storm drains

Storm drain system signs act as highly visible source controls that are typically stenciled directly adjacent to storm drain inlets. Stencils should read "No Dumping Drains to Ocean".

References

California Storm Water Best Management Practice Handbook. Industrial and Commercial. 2003. www.cabmphandbooks.com

Carlsbad Jurisdictional Urban Runoff Management Plan. Best Management Practices for Restaurants. City of Carlsbad. February 2002. On-line: http://www.ci.carlsbad.ca.us/cserv/jurmp.html

Orange County Stormwater Program. 2001. Water Quality Guidelines for Exterior Restaurant Cleaning Operations. Brochure. June.

Orange County Stormwater Program. Good Cleaning Practices Food & Restaurant Industry. Poster. Courtesy of the City and County of LA.

For additional information contact:

County of Orange
Watershed & Coastal Resources
Stormwater Program
(714)567-6363
or visit our website at:
www.ocwatersheds.com

IC23. FIRE SPRINKLER TESTING/MAINTENANCE

Best Management Practices (BMPs)

A BMP is a technique, measure or structural control that is used for a given set of conditions to improve the quality of the stormwater runoff in a cost effective manner[1]. The minimum required BMPs for this activity are outlined in the box to the right. Implementation of pollution prevention/good housekeeping measures may reduce or eliminate the need to implement other more costly or complicated procedures. Proper employee training is key to the success of BMP implementation.

Provided below are specific procedures associated with this activity. In order to meet the requirements for medium and high priority facilities, the owners/operators must select, install and maintain appropriate BMPs on site. Since the selection of the appropriate BMPs is a site-specific process, the types and numbers of additional BMPs will vary for each facility.

MINIMUM BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping

- Conduct activity on non-rainy days and for the shortest duration possible to minimize discharge volume.
- Inspect flow path and remove all debris and materials prior to testing or maintenance.

Training

- Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
- Provide on-going employee training in pollution prevention.

The BMPs outlined in this fact sheet target the following pollutants:

Targeted Constituents	
Sediment	
Nutrients	
Floatable Materials	
Metals	x
Bacteria	
Oil & Grease	x
Organics & Toxicants	
Pesticides	
Oxygen Demanding	

Best Management Practices

1. **Contain flows onsite** and/or direct the water flows to landscaped or green areas whenever possible and safe to do so without causing damage or erosion.
2. **Divert sprinkler system flows to the sewer**, when practicable and with the permission of the local sewer agency.
3. **Training**
   a. Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
   b. Establish a regular training schedule, train all new employees, and conduct annual refresher training.
   c. Use a training log or similar method to document training.

References

California Storm Water Best Management Practice Handbooks. Industrial/Commercial Best Management Practice Handbook. Prepared by Camp Dresser& McKee, Larry Walker Associates for California Stormwater Quality Association. January 2003.

For additional information contact:

County of Orange
Watershed & Coastal Resources
Stormwater Program
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or visit our website at:
www.ocwatersheds.com

[1] EPA " *Preliminary Data Summary of Urban Stormwater Best Management Practices*"

R-5
DISPOSAL OF PET WASTES

Pet wastes left in the environment may introduce solids, bacteria, and nutrients to the storm drain. The type and quantity of waste will dictate the proper disposal method. Small quantities of waste are best disposed with regular trash or flushed down a toilet. Large quantities of wastes from herbivore animals may be composted for subsequent use or disposal to landfill.

The activities outlined in this fact sheet target the following pollutants:	
Sediment	x
Nutrients	x
Bacteria	x
Foaming Agents	
Metals	
Hydrocarbons	
Hazardous Materials	
Pesticides and Herbicides	
Other	

Pick up after your pet! It's as easy as 1-2-3. 1) Bring a bag. 2) Clean it up. 3) Dispose of it properly (toilet or trash). The pollution prevention activities outlined in this fact sheets are used to prevent the discharge of pollutants to the storm drain system.

Think before you dispose of any pet wastes. Remember - The ocean starts at your front door.

Required Activities

- All pet wastes must be picked up and properly disposed of. Pet waste should be disposed of in the regular trash, flushed down a toilet, or composted as type and quantities dictate.
- Properly dispose of unused flea control products (shampoo, sprays, or collars).
- Manure produced by livestock in uncovered areas should be removed at least daily for composting, or storage in water-tight container prior to disposal. Never hose down to stream or storm drain. Composting or storage areas should be configured and maintained so as not to allow contact with runoff. Compost may be donated to greenhouses, nurseries, and botanical parks. Topsoil companies and composting centers may also accept composted manure.
- Line waste pits or trenches with an impermeable layer, such as thick plastic sheeting.
- When possible, allow wash water to infiltrate into the ground, or collect in an area that is routed to the sanitary sewer.
- Confine livestock in fenced in areas except during exercise and grazing times. Restrict animal access to creeks and streams, preferably by fencing.

For additional information contact:
County of Orange, Watershed & Coastal Resources - Stormwater Program
(714)567-6363 or visit our website at: www.ocwatersheds.com

- Install gutters that will divert roof runoff away from livestock areas.

Recommended Activities

- In order to properly dispose of pet waste, carry bags, pooper-scooper, or equivalent to safely pick up pet wastes while walking with pets.
- Bathe pets indoors and use less toxic shampoos. When possible, have pets professionally groomed.
- Properly inoculate your pet in order to maintain their health and reduce the possibility of pathogens in pet wastes.
- Maintain healthy and vigorous pastures with at least three inches of leafy material.
- Consider indoor feeding of livestock during heavy rainfall, to minimize manure exposed to potential runoff.
- Locate barns, corrals, and other high use areas on portions of property that either drain away from or are located distant form nearby creeks or storm drains.

For additional information contact:
County of Orange, Watershed & Coastal Resources - Stormwater Program
(714)567-6363 or visit our website at: www.ocwatersheds.com

Site Design & Landscape Planning SD-10

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

SD-10 Site Design & Landscape Planning

Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.
- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.
- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

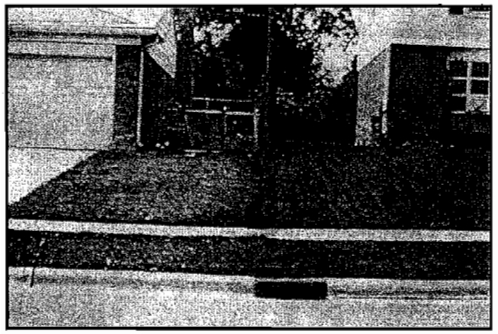
Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Efficient Irrigation SD-12



Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

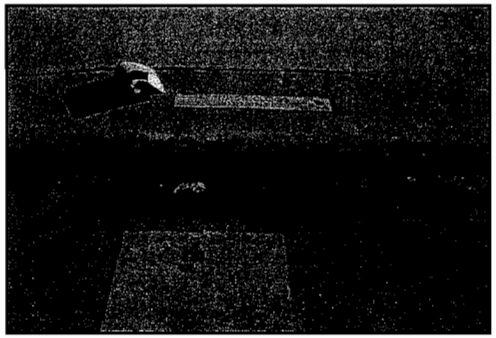
A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13



Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include "NO DUMPING

– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.
- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

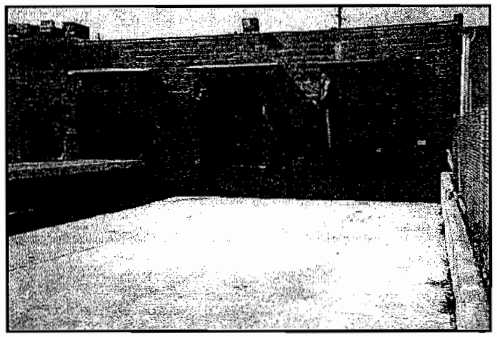
A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Maintenance Bays & Docks SD-31



Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Several measures can be taken to prevent operations at maintenance bays and loading docks from contributing a variety of toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to the stormwater conveyance system.

Approach

In designs for maintenance bays and loading docks, containment is encouraged. Preventative measures include overflow containment structures and dead-end sumps. However, in the case of loading docks from grocery stores and warehouse/distribution centers, engineered infiltration systems may be considered.

Suitable Applications

Appropriate applications include commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for vehicle maintenance and repair are governed by Building and Fire Codes, and by current local agency ordinances, and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code requirements.

Designing New Installations

Designs of maintenance bays should consider the following:

- Repair/maintenance bays and vehicle parts with fluids should be indoors; or designed to preclude urban run-on and runoff.
- Repair/maintenance floor areas should be paved with Portland cement concrete (or equivalent smooth impervious surface).

- Repair/maintenance bays should be designed to capture all wash water leaks and spills. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around repair bays to prevent spilled materials and wash-down waters form entering the storm drain system. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.
- Other features may be comparable and equally effective.

The following designs of loading/unloading dock areas should be considered:

- Loading dock areas should be covered, or drainage should be designed to preclude urban run-on and runoff.
- Direct connections into storm drains from depressed loading docks (truck wells) are prohibited.
- Below-grade loading docks from grocery stores and warehouse/distribution centers of fresh food items should drain through water quality inlets, or to an engineered infiltration system, or an equally effective alternative. Pre-treatment may also be required.
- Other features may be comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Trash Storage Areas SD-32

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Maintenance Considerations

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Vehicle Washing Areas SD-33

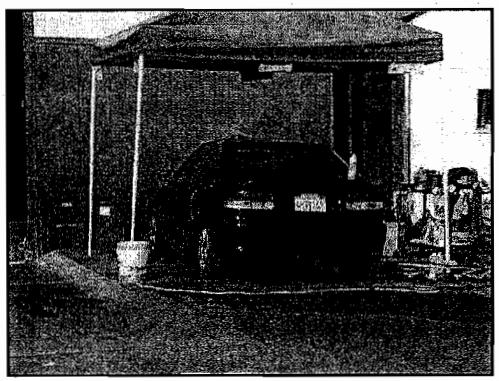


Photo Credit: Geoff Brosseau

Design Objectives

- ☑ Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- ☑ Collect and Convey

Description

Vehicle washing, equipment washing, and steam cleaning may contribute high concentrations of metals, oil and grease, solvents, phosphates, and suspended solids to wash waters that drain to stormwater conveyance systems.

Approach

Project plans should include appropriately designed area(s) for washing-steam cleaning of vehicles and equipment. Depending on the size and other parameters of the wastewater facility, wash water may be conveyed to a sewer, an infiltration system, recycling system or other alternative. Pretreatment may be required for conveyance to a sanitary sewer.

Suitable Applications

Appropriate applications include commercial developments, restaurants, retail gasoline outlets, automotive repair shops and others.

Design Considerations

Design requirements for vehicle maintenance are governed by Building and Fire Codes, and by current local agency ordinances, and zoning requirements. Design criteria described in this fact sheet are meant to enhance and be consistent with these code requirements.

Designing New Installations

Areas for washing/steam cleaning should incorporate one of the following features:

- Be self-contained and/or covered with a roof or overhang
- Be equipped with a clarifier or other pretreatment facility
- Have a proper connection to a sanitary sewer

- Include other features which are comparable and equally effective

CAR WASH AREAS - Some jurisdictions' stormwater management plans include vehicle-cleaning area source control design requirements for community car wash racks in complexes with a large number of dwelling units. In these cases, wash water from the areas may be directed to the sanitary sewer, to an engineered infiltration system, or to an equally effective alternative. Pre-treatment may also be required.

Depending on the jurisdiction, developers may be directed to divert surface water runoff away from the exposed area around the wash pad (parking lot, storage areas), and wash pad itself to alternatives other than the sanitary sewer. Roofing may be required for exposed wash pads.

It is generally advisable to cover areas used for regular washing of vehicles, trucks, or equipment, surround them with a perimeter berm, and clearly mark them as a designated washing area. Sumps or drain lines can be installed to collect wash water, which may be treated for reuse or recycling, or for discharge to the sanitary sewer. Jurisdictions may require some form of pretreatment, such as a trap, for these areas.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment.

Additional Information

Maintenance Considerations

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Media Filter MP-40

Description

Stormwater media filters are usually two-chambered including a pretreatment settling basin and a filter bed filled with sand or other absorptive filtering media. As stormwater flows into the first chamber, large particles settle out, and then finer particles and other pollutants are removed as stormwater flows through the filtering media in the second chamber.

There are currently three manufacturers of stormwater filter systems. Two are similar in that they use cartridges of a standard size. The cartridges are placed in vaults; the number of cartridges a function of the design flow rate. The water flows laterally (horizontally) into the cartridge to a centerwell, then downward to an underdrain system. The third product is a flatbed filter, similar in appearance to sand filters.

California Experience

There are currently about 75 facilities in California that use manufactured filters.

Advantages

- Requires a smaller area than standard flatbed sand filters, wet ponds, and constructed wetlands.
- There is no standing water in the units between storms, minimizing but does not entirely eliminate the opportunity for mosquito breeding.
- Media capable of removing dissolved pollutants can be selected.
- One system utilizes media in layers, allowing for selective removal of pollutants.
- The modular concept allows the design engineer to more closely match the size of the facility to the design storm.

Limitations

- As some of the manufactured filter systems function at higher flow rates and/or have larger media than found in flatbed filters, the former may not provide the same level of performance as standard sand filters. However, the level of treatment may still be satisfactory.
- As with all filtration systems, use in catchments that have significant areas of non-stabilized soils can lead to premature clogging.

Design Considerations

- Design Storm
- Media Type
- Maintenance Requirement

Targeted Constituents

- ✓ Sediment
- ✓ Nutrients
- ✓ Trash
- ✓ Metals
- Bacteria
- ✓ Oil and Grease
- ✓ Organics

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

CASQA California Stormwater Quality Association

Design and Sizing Guidelines

There are currently three manufacturers of stormwater filter systems.

Filter System A: This system is similar in appearance to a slow-rate sand filter. However, the media is cellulose material treated to enhance its ability to remove hydrocarbons and other organic compounds. The media depth is 12 inches (30 cm). It operates at a very high rate, 20 gpm/ft2 at peak flows. Normal operating rates are much lower assuming that the stormwater covers the entire bed at flows less than the peak rate. The system uses vortex separation for pretreatment. As the media is intended to remove sediments (with attached pollutants) and organic compounds, it would not be expected to remove dissolved pollutants such as nutrients and metals unless they are complexed with the organic compounds that are removed.

Filter System B: It uses a simple vertical filter consisting of 3 inch diameter, 30 inch high slotted plastic pipe wrapped with fabric. The standard fabric has nominal openings of 10 microns. The stormwater flows into the vertical filter pipes and out through an underdrain system. Several units are placed vertically at 1 foot intervals to give the desired capacity. Pretreatment is typically a dry extended detention basin, with a detention time of about 30 hours. Stormwater is retained in the basin by a bladder that is automatically inflated when rainfall begins. This action starts a timer which opens the bladder 30 hours later. The filter bay has an emptying time of 12 to 24 hours, or about 1 to 2 gpm/ft2 of filter area. This provides a total elapsed time of 42 to 54 hours. Given that the media is fabric, the system does not remove dissolved pollutants. It does remove pollutants attached to the sediment that is removed.

Filter System C: The system use vertical cartridges in which stormwater enters radially to a center well within the filter unit, flowing downward to an underdrain system. Flow is controlled by a passive float valve system, which prevents water from passing through the cartridge until the water level in the vault rises to the top of the cartridge. Full use of the entire filter surface area and the volume of the cartridge is assured by a passive siphon mechanism as the water surface recedes below the top of the cartridge. A balance between hydrostatic forces assures a more or less equal flow potential across the vertical face of the filter surface. Hence, the filter surface receives suspended solids evenly. Absent the float valve and siphon systems, the amount of water treated over time per unit area in a vertical filter is not constant, decreasing with the filter height; furthermore, a filter would clog unevenly. Restriction of the flow using orifices ensures consistent hydraulic conductivity of the cartridge as a whole by allowing the orifice, rather than the media, whose hydraulic conductivity decreases over time, to control flow.

The manufacturer offers several media used singly or in combination (dual- or multi-media). Total media thickness is about 7 inches. Some media, such as fabric and perlite, remove only suspended solids (with attached pollutants). Media that also remove dissolved include compost, zeolite, and iron-infused polymer. Pretreatment occurs in an upstream unit and/or the vault within which the cartridges are located.

Water quality volume or flow rate (depending on the particular product) is determined by local governments or sized so that 85% of the annual runoff volume is treated.

Construction/Inspection Considerations

- Inspect one or more times as necessary during the first wet season of operation to be certain that it is draining properly.

Performance

The mechanisms of pollutant removal are essentially the same as with public domain filters (TC -40) if of a similar design. Whether removal of dissolved pollutants occurs depends on the media. Perlite and fabric do not remove dissolved pollutants, whereas for examples, zeolites, compost, activated carbon, and peat have this capability.

As most manufactured filter systems function at higher flow rates and have larger media than found in flatbed filters, they may not provide the same level of performance as standard sand filters. However, the level of treatment may still be satisfactory.

Siting Criteria

There are no unique siting criteria.

Additional Design Guidelines

Follow guidelines provided by the manufacturer.

Maintenance

- Maintenance activities and frequencies are specific to each product. Annual maintenance is typical.
- Manufactured filters, like standard filters (TC-40), require more frequent maintenance than most standard treatment systems like wet ponds and constructed wetlands, typically annually for most sites.
- Pretreatment systems that may precede the filter unit should be maintained at a frequency specified for the particular process.

Cost

Manufacturers provide costs for the units including delivery. Installation costs are generally on the order of 50 to 100 % of the manufacturer's costs.

Cost Considerations

- Filters are generally more expensive to maintain than swales, ponds, and basins.
- The modularity of the manufactured systems allows the design engineer to closely match the capacity of the facility to the design storm, more so than with most other manufactured products.

References and Sources of Additional Information

Minton, G.R., 2002, Stormwater Treatment: Biological, Chemical, and Engineering Principles, RPA Press, 416 pages.

SECTION 7

Section VII Educational Materials

The following is a list of educational materials to be included in the Final WQMP:

1. The Ocean begins at your front door.
2. Ten Ways that you Will Save the Most
3. Your Home. Your Community. Your Environment
4. Household Tips to Help Ocean Pollution
5. After the Storm
6. Blueprint for a Clean Ocean
7. Information on What You and Your Community Can Do to Use Water More Efficiently
8. Sewage Spill Reference Guide
9. Proper Maintenance Practices for Your Business
10. Water Quality Guidelines for Pool Maintenance
11. Water Quality Guidelines for Permitted Lot and Pool Drains
12. A Guide for Food Service Facilities
13. Water Quality Guidelines for Exterior Restaurant Cleaning Operations
14. Water Quality Guidelines for Landscaping and Gardening
15. Healthy Lawn Healthy Environment
16. EPA Citizen's Guide to Pest Control and Pesticide Safety
17. Integrated Waste Management Collection Centers
18. Waste Oil Collection Centers – Central Orange County
19. Using Pest Control Products
20. County of Orange Public Facilities & Resources Department "Management Guidelines for the Use of Fertilizers and Pesticides"
21. State of California Model Landscape Ordinance
22. County of Orange Water Quality Ordinance
23. City of Huntington Beach "Stormwater and Urban Runoff Management", Water Quality Ordinance 3364, Municipal Code §14.25
24. City of Huntington Beach "Water Efficient Landscape Requirements", Water Quality Ordinance 3183, Municipal Code §14.52

Section VII

Educational Materials

To Be Provided in Final WQMP
(Not a Preliminary WQMP Requirement)

SECTION A

Appendix A

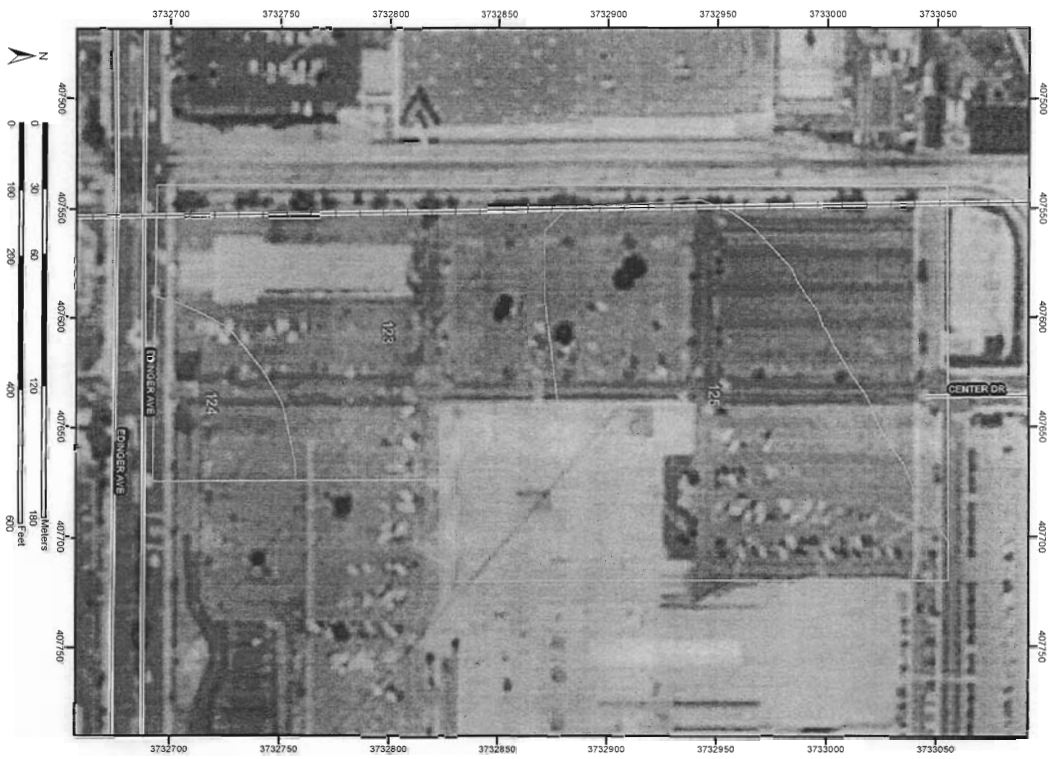
Conditions of Approval
(To Be Provided When Available)

SECTION B

Appendix B

Soil Map and Hydrology Soil Group

Based on the Natural Resources Conservation Service's Web Soil Survey, onsite soils consist primarily of Bolsa Silt Loam and Bolsa Silt Clay, which are considered in Hydrologic Soil Group C, characterized as having slow infiltration rate when thoroughly wet.



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features

Municipalities
- Cities
- Urban Areas

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

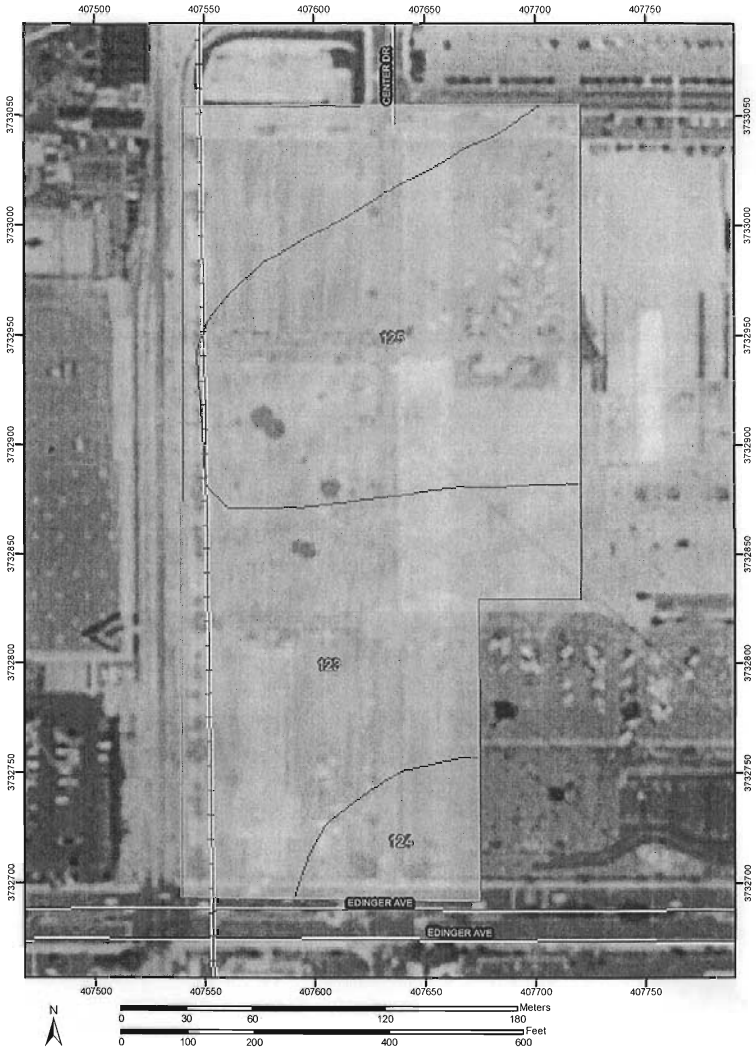
Soil Survey Area: Orange County and Part of Riverside County, California
Survey Area Data: Version 4, Jan 3, 2008

Date(s) aerial images were photographed: 5/31/1994; 6/1/1994; 10/3/1995

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Orange County and Part of Riverside County, California (CA678)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
123	BOLSA SILT LOAM, DRAINED	7.8	53.2%
124	BOLSA SILTY CLAY LOAM	1.0	6.9%
125	BOLSA SILTY CLAY LOAM, DRAINED	5.8	39.9%
Totals for Area of Interest (AOI)		14.6	100.0%



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Soil Ratings
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Political Features

Municipalities
- Cities
- Urban Areas

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

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Hydrologic Soil Group

Hydrologic Soil Group—Summary by Map Unit — Orange County and Part of Riverside County, California				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
123	BOLSA SILT LOAM, DRAINED	C	7.8	53.2%
124	BOLSA SILTY CLAY LOAM	C	1.0	6.9%
125	BOLSA SILTY CLAY LOAM, DRAINED	C	5.8	39.9%
Totals for Area of Interest (AOI)			14.6	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower