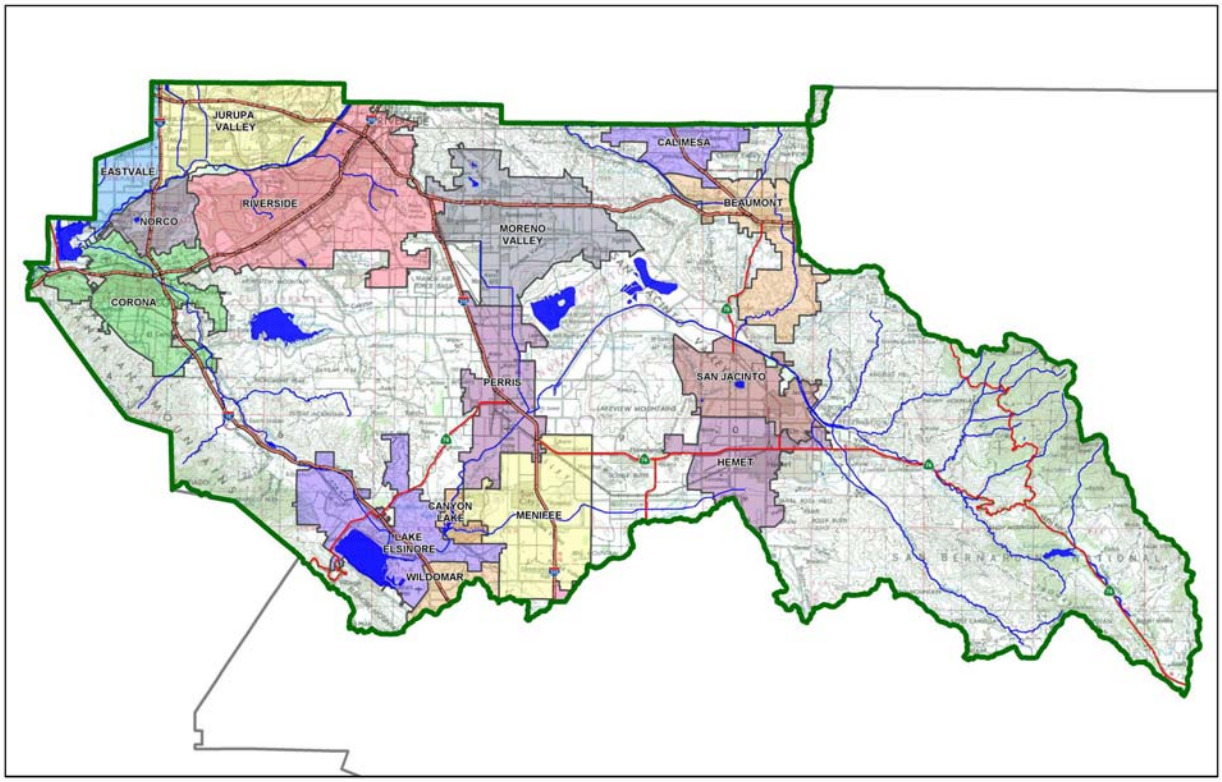
Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

Project Title: Serrano Oaks

Development No: TBD

Design Review/Case No: MA21245



☒ **Preliminary**
☐ **Final**

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Regional Board Order No. **R8-2010-0033**

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OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Rexco Development by Land Development Design Company, LLC.

This WQMP is intended to comply with the requirements of the City of Jurupa Valley Municipal Code which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under City of Jurupa Valley Water Quality Ordinance (Ordinance 2012-07 and Resolution 2012-32).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature	Date
Kevin J. Richer	Project Engineer
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

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Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Multi-Family Residential
Planning Area:	n/a
Community Name:	n/a
Development Name:	Serrano Oaks

PROJECT DESCRIPTION

The proposed project is located on a 4.13-acre site located on the east side of Clay St., approximately 270-lf northerly of the intersection with Linares Ave., in the City of Jurupa Valley. It is bounded to the west by Clay St., to the north and east by residential developments, and to the south by a commercial development.

The project site is currently undeveloped with poor natural grass coverage and no impervious surfaces. In its existing condition, the site sheets storm flows in a southwesterly direction, discharging from the site by sheeting across the westerly boundary into the right-of-way of Clay St. The project site does not accept run-on from the adjacent properties.

The project proposes to develop the site for residential use, and proposes to construct thirteen multi-family buildings, AC pavement, concrete hardscape, concrete curbs, concrete gutters, fencing, a catch basin inlet with filter, rip-rap pads, and an underground infiltration system. It will disturb the entire property. The proposed drainage pattern will mimic the existing patterns, directing runoff to the southerly boundary of the site. There is one drainage area. Storm water runoff sheets across proposed landscape and AC pavement to be intercepted by a proposed concrete gutters throughout the drainage area. The gutters coveys flows southerly and westerly to a proposed inlet located at the southwesterly corner of the project site. The inlet intercepts flows and discharges into a proposed underground infiltration system beneath the adjacent parking area. A filter is proposed in the inlet to provide pretreatment of flows. Overflows of the underground system pond up in said inlet and are intercepted by a proposed underwalk drain that discharges overflows into the right-of-way of Clay St. as in the existing condition.

The entire V_{BMP} is retained on-site and infiltrated into native soils by the proposed underground infiltration system. Inlet filters in the proposed catch basin inlets provide pretreatment of storm water runoff before discharge into the proposed underground systems.

PROJECT LOCATION

Latitude & Longitude (DMS): 33°58'21"N/117°27'42"W

Project Watershed and Sub-Watershed: Santa Ana Watershed

APN(s): 163-400-026, -028, -029

Map Book and Page No.: PM 133/99

PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	
Proposed or Potential SIC Code(s)	6513
Area of Impervious Project Footprint (SF)	143,828 SF
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	143,828 SF
Does the project consist of offsite road improvements?	☐ Y ☒ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the project limits (SF)	0 SF
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	
What is the Water Quality Design Storm Depth for the project?	0.68”

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Santa Ana River – Reach 3	Copper, Lead and Pathogens	None	N/A
Santa Ana River – Reach 2	Indicator Bacteria	None	N/A
Santa Ana River – Reach 1	None	None	N/A

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☐ N
Other *(please list in the space below as required)*	☐ Y	☒ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, constraints might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. Opportunities might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

The proposed drainage pattern will mimic the existing patterns. Storm water will sheet across proposed AC pavement and landscaping in a southwesterly direction.

Did you identify and protect existing vegetation? If so, how? If not, why?

There are no trees or shrubs onsite; however, the proposed landscape will significantly increase the canopy interception for the site. The landscape will include the use of native and drought tolerant trees and shrubs.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

The project proposes underground storage infiltration systems to utilize the site's natural infiltration capacity to mitigate the entire VBMP generated by the proposed development. Additionally, proposed landscape areas will be marked off and construction equipment prohibited from these areas. This is to avoid compaction of native soils that would inhibit site infiltration of runoff.

Did you identify and minimize impervious area? If so, how? If not, why?

The project site is proposing an 80-percent impervious ratio for the overall property which is typical of this type of development.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Roof runoff is directed into landscape areas .

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
1A	Ornamental Landscape	36,172	Type D
1B	Concrete/Asphalt	81,048	Type D
1C	Roofs	62,780	Type D

[1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
N/A			

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]
N/A						

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet)	Post-project surface type	Runoff factor	Product	DMA name /ID	Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]		[D]	[C]/[D]
N/A							

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
DMA 1A	INF-1
DMA 1B	INF-1
DMA 1C	INF-1

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site. If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?		X
If Yes, list affected DMAs:		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		X
Describe here:		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

☐ Reclaimed water will be used for the non-potable water demands for the project.

☐Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☒ The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If neither of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: N/A

Type of Landscaping (Conservation Design or Active Turf): N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: N/A

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
N/A	N/A

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: N/A

Project Type: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-1 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: N/A

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	**Projected number of toilet users (Step 1)**
N/A	N/A

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

N/A

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-3 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-3: N/A

Step 4: Multiply the unit value obtained from Step 4 by the total of impervious areas from Step 3 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: N/A

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
N/A	N/A

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment, unless a site-specific analysis has been completed that demonstrates technical infeasibility as noted in D.3 below.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☐LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

N/A

The DCV will be mitigated through infiltration.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
DMA 1A	☒	☐	☐	☐	☐
DMA 1B	☒	☐	☐	☐	☐
DMA 1C	☒	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Underground Storage Pipe and Dry well*		
	[A]		[B]	[C]	[A] x [C]			
1A	36,172	Ornamental Landscaping	0.1	0.11	3,995.5			
1B	81,048	Concrete or Asphalt	1	0.892	72,294.8			
1C	62,780	Roofs	1	0.892	55,999.8			
						Design Storm Depth (in)	*Design Capture Volume,* $\mathbf{V_{BMP}}$ *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	180,000				132,290.1	0.68”	7,496	7,508

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☐ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft^2)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft^2)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☐	☐	☐	☐	☐	☐	☐	☐

P = Potential

N = Not Potential

(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

(3) A potential Pollutant is land use involving animal waste

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
N/A	N/A
Total Credit Percentage[1]	

[1]*Cannot Exceed 50%*
[2]*Obtain corresponding data from Table 3-8 in the WQMP Guidance Document*

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	**DMA Area (square feet)**	**Post-Project Surface Type**	**Effective Impervious Fraction, I_f**	**DMA Runoff Factor**	**DMA Area x Runoff Factor**		***Enter BMP Name / Identifier Here***		
	[A]		[B]	[C]	[A] x [C]				
N/A						*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	A_T = Σ[A]				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$	[F] X (1-[H])	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12
[H] is from the Total Credit Percentage as Calculated from Table E.2 above
[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
N/A		

[1] *Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.*
[2] *Cross Reference Table E.1 above to populate this column.*
[3] *As documented in a Co-Permittee Approved Study and provided in Appendix 6.*

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	N/A	N/A	N/A
Volume (Cubic Feet)	N/A	N/A	N/A

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier: Project flows conveyed to Prado Dam, an adequate sump. However, RWQCB has not allowed RCFCD to use this as an adequate sump.

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

Site is exempt from HCOC due to mitigation of 2-year post-development storm flows below 2-Year pre-development storm flows. See project Hydrology Study in Appendix 7. The Hydrology Study was prepared for the development of the entire project site.

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site Storm Drain Inlets	All on-site drain inlets shall be stenciled per Riverside County's standards. At a minimum the drain inlets shall be stenciled "NO DUMPING DRAINS TO OCEAN".	The Storm Drain System Stenciling and Signage shall be inspected annually at a minimum by the owner and shall be replaced as necessary. The Owner shall provide stormwater pollution prevention information to new site owners, lessees, and operators.

		All drain inlets and curb opening catch basins shall be inspected to ensure they are clean, free of standing water, working properly, and unobstructed from debris/sediment, etc. Additionally, see SC-44, "Drainage System Maintenance," of the CASQA Handbooks. The owner/tenants shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains.
Indoor/ Structural Pest Control	Construction is concrete tilt-up design which reduces structural pests. Entrances designed to reduce entry of pests.	The owner shall review SC-41 "Building and Grounds Maintenance" for use of pesticides. The entrance design features shall be maintained to minimize entrance of pests. Owner shall contract with a licensed pest control contractor as necessary.
Landscape/Outdoor Pesticide Use	The landscape will be depressed to minimize irrigation and runoff, to promote infiltration, and shall minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. The landscape architect shall propose the site to be landscaped and planted with grouped species, which have similar irrigation requirements on his landscape plans. Additionally, the plants shall be appropriate to the site's soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	The landscape shall be designed maintained using minimum or no pesticides. The discharge of fertilizer and pesticides into streets is prohibited.
Refuse Areas	Trash enclosures are designed to divert all flows around the	The owner shall ensure an adequate number of receptacles

	enclosure. All dumpsters will have lids installed. The owner shall contract with a refuse company to have the dumpsters emptied on a weekly basis at a minimum. A sign shall be posted on or near the dumpsters with the words "Do not dump hazardous materials here" or similar.	are provided as required by the city. A program shall be implemented by the owner to inspect trash enclosures and receptacles regularly, to pick up litter, and sweep/clean the trash enclosure at a regularly scheduled frequency. In the event a receptacle is identified to be leaking, it must be repaired or replaced. Spill control materials shall be available on-site to clean up spills immediately. Additionally, see SC-34, "Waste Handling and Disposal," of the CASQA Stormwater Quality Handbooks.
Condensate Drain Lines	Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system.	
Rooftop Equipment	Rooftop equipment shall be roofed or have secondary containment.	
Roofing, gutters, and trim.	The use of roofing, gutters, and trim made of copper or unprotected metals that may leach into runoff shall be avoided.	
Plazas, Sidewalks, and Parking Lots.		Parking lots shall be swept weekly to prevent sediment, garden waste, and trash, or other pollutants from entering public storm channels. The parking lot shall be swept by a qualified maintenance/landscape contractor on a weekly basis at a minimum.

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
INF-1	Underground Storage Infiltration System	WQMP Exhibit

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: --

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

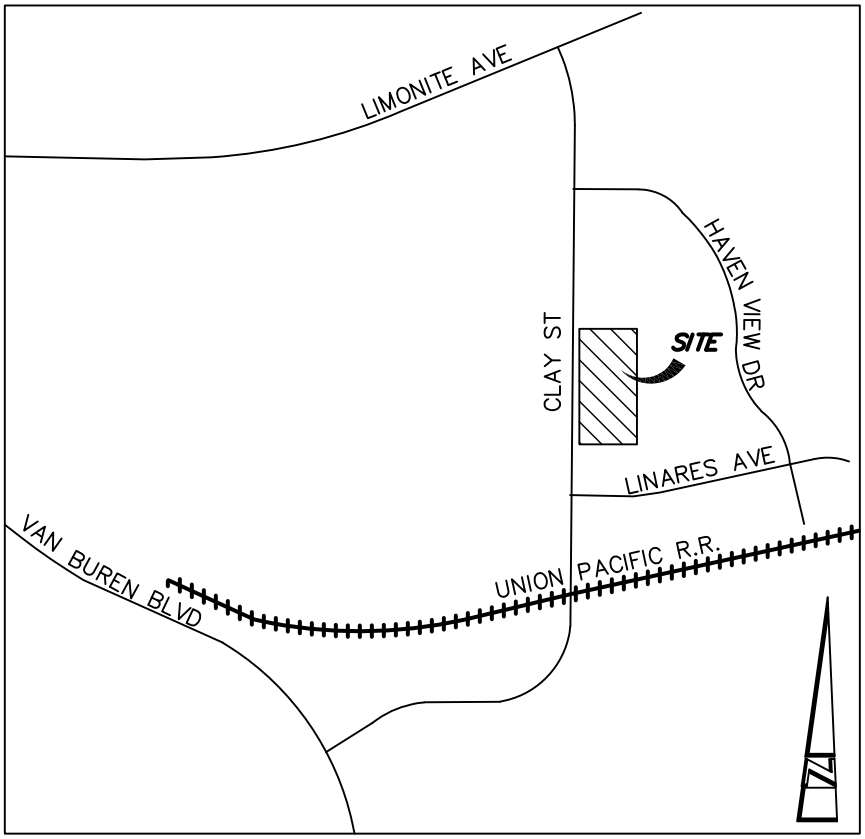
☐ Y ☒ N

Rexco Development
1285 Corona Point Court, Ste. 102
Corona, CA 92879
951-898-1502

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

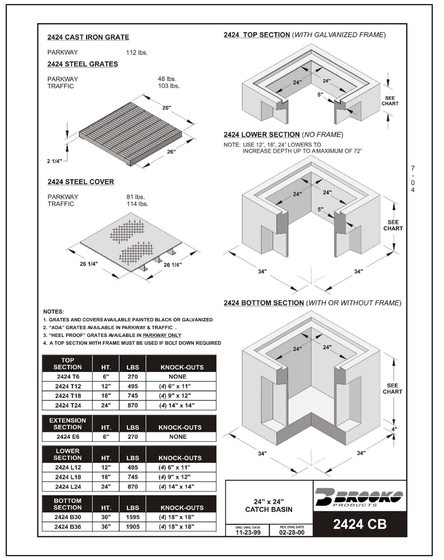
Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map



VICINITY MAP

NTS



CATCH BASIN INLET
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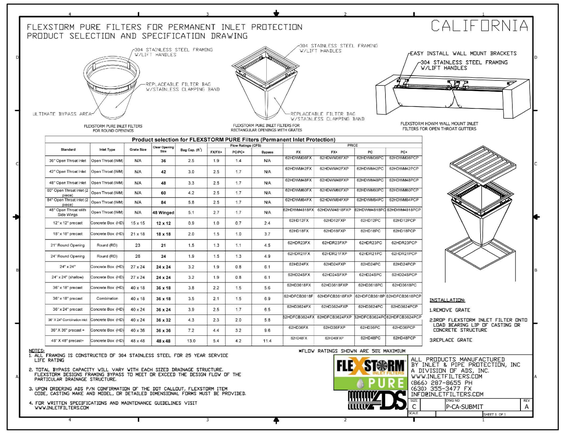


FLEXSTORM FILTER
NTS

STENCIL
NTS

LEGEND

- PROP. LANDSCAPE
- PROP. AC PAVEMENT
- PROP. CONCRETE
- PROP. DECORATIVE CONCRETE
- PROP. BUILDING
- PROP. TRASH ENCLOSURE
- PROP. INFILTRATION SYSTEM
- PROP. STORM DRAIN PIPE
- PROP. RIP-RAP PAD
- PROP. CATCH BASIN INLET W/FLEXSTORM FILTER
- PROP. ROOF DRAIN
- PROP. STORM DRAIN PIPE
- DRAINAGE AREA BOUNDARY
- DRAINAGE FLOW

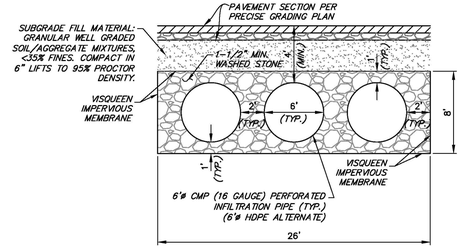
BMP LEGEND

1	SC-42	BUILDING REPAIR AND CONSTRUCTION
2	SC-43	PARKING/STORAGE AREA MAINTENANCE
3	SC-44	DRAINAGE MAINTENANCE
4	SC-73	LANDSCAPE MAINTENANCE
5	SD-11	ROOF RUNOFF CONTROLS
6	SD-12	EFFICIENT IRRIGATION
7	SD-13	STORM DRAIN SIGNAGE
8	SD-32	TRASH ENCLOSURES
9	MP-52	DRAIN INSERTS

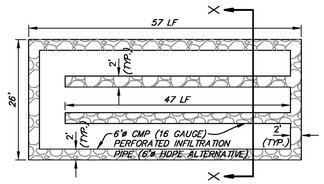
SC-10	NON-STORMWATER DISCHARGES
SC-11	SPILL PROTECTION, CONTROL AND CLEANUP
SC-41	BUILDING & GROUND MAINTENANCE
SC-60	HOUSEKEEPING PRACTICES
SD-10	SITE DESIGN & LANDSCAPE PLANNING

DA 1		
DMA ID	SURFACE TYPE	DMA AREA
1A	ORNAMENTAL LANDSCAPING	36,172 SF
1B	CONCRETE OR ASPHALT	81,048 SF
1C	ROOFS	62,780 SF
TOTAL		180,000 SF

STORAGE VOLUME		
AREA	$V_{REQ'D}$	$V_{PROVIDED}$
DA 1	7,496 CF	7,508 CF



X-X



UNDEGROUND STORAGE SYSTEM
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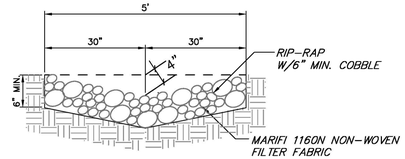

RIP-RAP PAD
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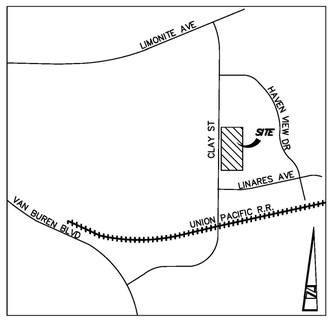

VICINITY MAP
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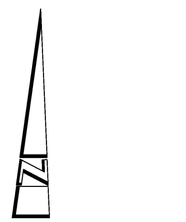


LAND DEVELOPMENT DESIGN COMPANY, LLC
2313 E. Philadelphia St., Ste. F
Ontario, CA 91761
(909) 930-1466 - FAX (909) 930-1468
PLANNING • CIVIL • SURVEYING

BENCHMARK

REVISIONS:

PREPARED UNDER THE SUPERVISION OF:
KEVIN J. RICHER
R.C.E. 43714 LIC. EXP. 3/31/23 DATE

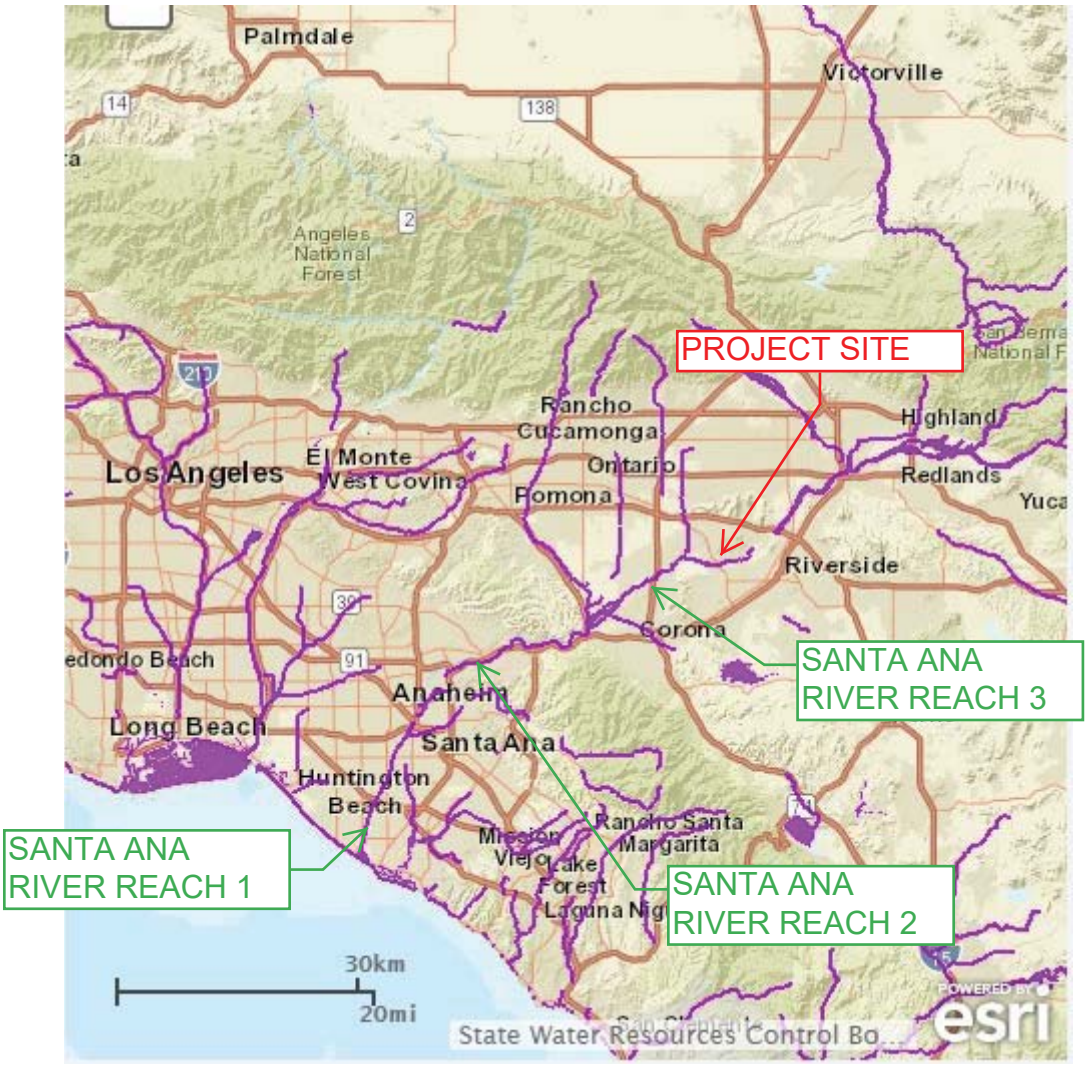
APPROVED BY:
DATE

WQMP EXHIBIT

SITE
CLAY ST.
JURUPA VALLEY, CA 92509

PREPARED FOR
REXCO DEVELOPMENT
1285 CORONA POINTE COURT, SUITE 102
CORONA, CA 92879
951.898.1502

DATE: 09/20/22	JOB NO. 6440
DRAWN BY: JCQ	SCALE 1'=40'
DESIGNED BY:	SHEET 1 OF 1 SHEETS
CHECKED BY: KJR	


PROJECT SITE
SANTA ANA RIVER REACH 3
SANTA ANA RIVER REACH 2
SANTA ANA RIVER REACH 1
Palmdale
Victorville
Angeles National Forest
Los Angeles
El Monte
West Covina
Rancho Cucamonga
Ontario
Pomona
Highland
Redlands
Riverside
Corona
Anaheim
Santa Ana
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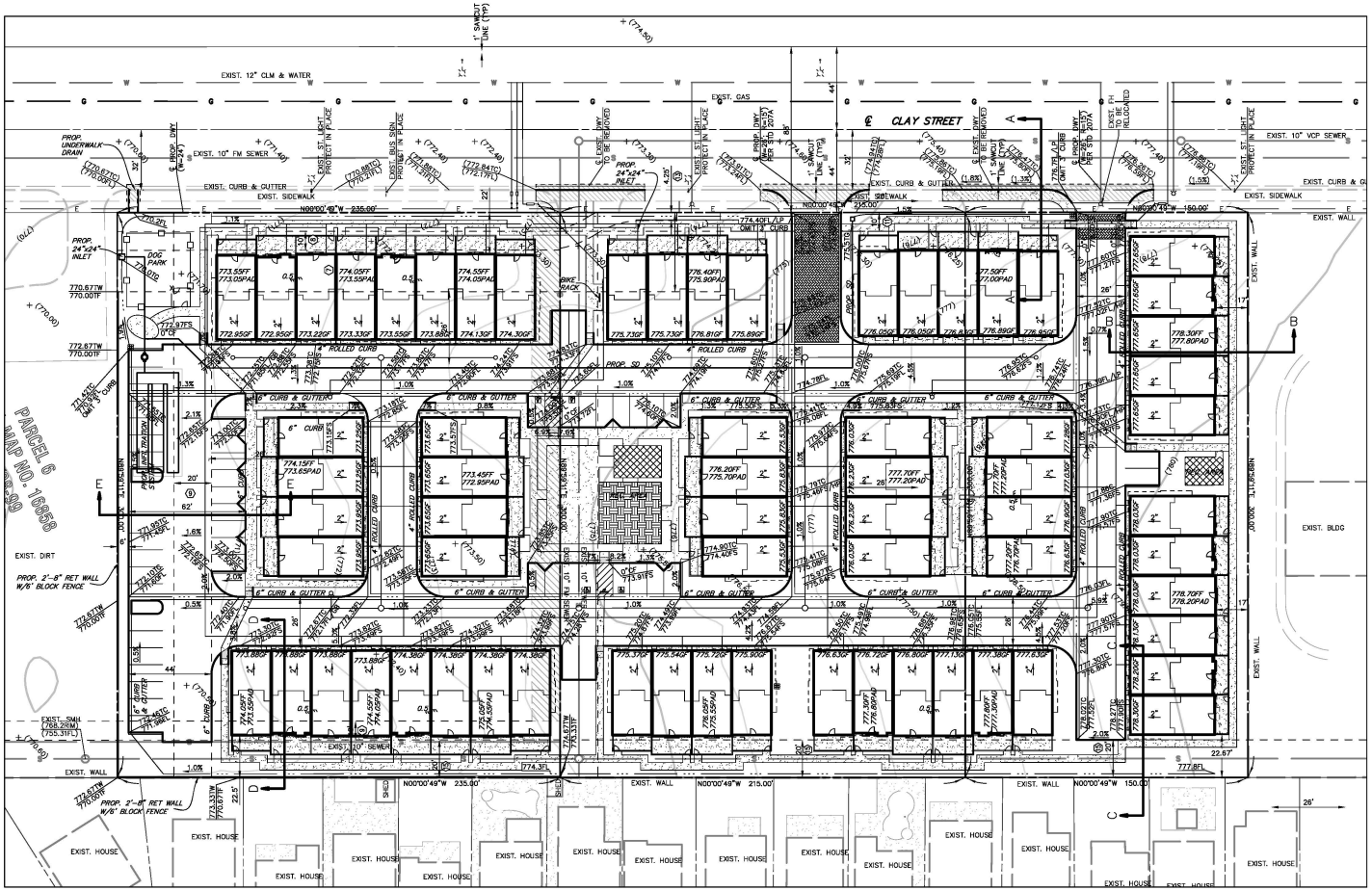
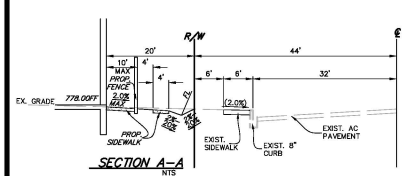
State Water Resources Control Bo...
esri

Appendix 2: Construction Plans

Grading and Drainage Plans





SECTION A-A
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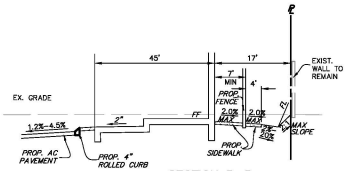

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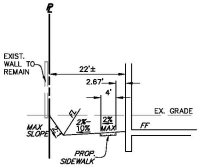

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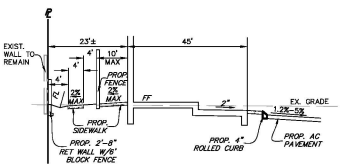

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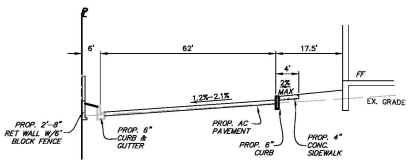


SECTION E-E
NTS

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF JURUPA VALLEY IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCEL 1: APN(163-400-026)

PARCEL 5 OF PARCEL MAP NO. 16858, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP ON FILE IN BOOK 133 PAGE(S) 98 AND 99 OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

EXCEPT ALL URANIUM, THORIUM AND OTHER FISSIONABLE MATERIALS, OIL, GAS, PETROLEUM, ASPHALTUM, AND OTHER HYDROCARBON SUBSTANCES AND OTHER MINERALS AND MINERAL ORES OF EVERY KIND AND CHARACTER, WHETHER SIMILAR TO THESE PRODUCED FROM THE HEREINBEFORE DESCRIBED LAND, TOGETHER WITH THE RIGHT TO USE THAT PORTION ONLY OF SAID LAND WHICH UNDERLIES A PLANE PARALLEL TO AND 500.00 FEET BELOW THE PRESENT SURFACE OF SAID LAND, FOR THE PURPOSES OF PROSPECTING FOR, DEVELOPING AND/OR EXTRACTING SAID URANIUM, THORIUM, AND OTHER FISSIONABLE MATERIALS FROM SAID LAND, AS RESERVED BY SOUTHERN CALIFORNIA EDISON COMPANY IN DEED RECORDED FEBRUARY 14, 1986 AS INSTRUMENT NO. 35170 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

PARCEL 2: APN(163-400-028)

PARCEL 4 OF PARCEL MAP NO. 16858, IN THE CITY OF JURUPA VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP ON FILE IN BOOK 133, PAGE(S) 98 AND 99 OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

EXCEPT ALL URANIUM, THORIUM AND OTHER FISSIONABLE MATERIALS, OIL, GAS, PETROLEUM, ASPHALTUM, AND OTHER HYDROCARBON SUBSTANCES AND OTHER MINERALS AND MINERAL ORES OF EVERY KIND AND CHARACTER, WHETHER SIMILAR TO THESE PRODUCED FROM THE HEREINBEFORE DESCRIBED LAND, TOGETHER WITH THE RIGHT TO USE THAT PORTION ONLY OF SAID LAND WHICH UNDERLIES A PLANE PARALLEL TO AND 500.00 FEET BELOW THE PRESENT SURFACE OF SAID LAND, FOR THE PURPOSE OF PROSPECTING FOR, DEVELOPING AND/OR EXTRACTING SAID URANIUM, THORIUM, AND OTHER FISSIONABLE MATERIALS, OIL, GAS, PETROLEUM, ASPHALTUM AND OTHER MINERAL OF HYDROCARBON SUBSTANCES FROM SAID LAND, AS RESERVED BY SOUTHERN CALIFORNIA EDISON COMPANY IN DEED RECORDED FEBRUARY 14, 1986 AS INSTRUMENT NO. 35170 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

PARCEL 3: APN(163-400-029)

PARCEL 3 OF PARCEL MAP 16858, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 133, PAGES 98 AND 99 OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

EXCEPT ALL URANIUM, THORIUM AND OTHER FISSIONABLE MATERIALS, ALL OIL, GAS, PETROLEUM, ASPHALTUM, AND OTHER HYDROCARBON SUBSTANCES AND OTHER MINERALS AND MINERAL ORES OF EVERY KIND AND CHARACTER, WHETHER SIMILAR TO THESE HEREIN SPECIFIED OR NOT, WITHIN OR UNDERLYING, OR WHICH MAY BE PRODUCED FROM THE HEREINBEFORE DESCRIBED LAND, AS RESERVED BY SOUTHERN CALIFORNIA EDISON COMPANY IN DEED RECORDED FEBRUARY 11, 1986 AS INSTRUMENT NO. 33074, OFFICIAL RECORDS.

EASEMENTS:

PARCELS 1 & 2:

(THE FOLLOWING EASEMENTS AND AGREEMENTS REFERENCE THE ITEM NUMBERS SHOWN IN THE TITLE REPORT DATED 08/29/2021, ORDER NUMBER NHSC-6635898 PREPARED BY FIRST AMERICAN TITLE COMPANY.)

1-5 NOT A SURVEY MATTER.

6 AN EASEMENT IN FAVOR OF JURUPA COMMUNITY SERVICES DISTRICT OF RIVERSIDE COUNTY, A PUBLIC AGENCY, ITS SUCCESSORS AND ASSIGNS FOR COMMUNICATION PURPOSES, AND FOR THE INGRESS AND EGRESS THROUGHOUT THE ENTIRE EASEMENT AREA AND RIGHT OF WAY AND INCIDENTAL PURPOSES, RECORDED JULY 17, 2013 AS INSTRUMENT NO. 2013-0344867 OF OFFICIAL RECORDS.

7 AN TEMPORARY NON-EXCLUSIVE EASEMENT IN FAVOR OF COUNTY OF RIVERSIDE, A POLITICAL SUBDIVISION OF THE STATE OF CALIFORNIA, ITS SUCCESSORS AND ASSIGNS TO CONSTRUCT SLOPE AND FOR ALL PURPOSES NECESSARY TO FACILITATE AND ACCOMPLISH THE CONSTRUCTION OF THE CLAY STREET GRADE SEPARATION PROJECT, INCLUDING TEMPORARY AERIAL EASEMENT FOR UTILITY RELOCATION PURPOSES AND INCIDENTAL PURPOSES, RECORDED JULY 17, 2013 AS INSTRUMENT NO. 2013-0344868 OF OFFICIAL RECORDS.

8 AN EASEMENT IN FAVOR OF PACIFIC BELL TELEPHONE COMPANY, A CALIFORNIA CORPORATION DBA AT&T CALIFORNIA, ITS ASSOCIATED AND AFFILIATED COMPANIES, ITS AND THEIR SUCCESSORS, ASSIGNS, LESSEES AND AGENTS FOR UNDERGROUND COMMUNICATION FACILITIES AND INCIDENTAL PURPOSES, RECORDED JULY 22, 2014 AS INSTRUMENT NO. 2014-0270967 OF OFFICIAL RECORDS.

9 AN EASEMENT IN FAVOR OF JURUPA COMMUNITY SERVICES DISTRICT OF RIVERSIDE COUNTY, A PUBLIC AGENCY FOR COMMUNICATION PURPOSES, AND FOR THE INGRESS AND EGRESS THROUGHOUT THE ENTIRE EASEMENT AREA AND RIGHT OF WAY AND INCIDENTAL PURPOSES, RECORDED JULY 05, 2017 AS INSTRUMENT NO. 2017-0274662 OF OFFICIAL RECORDS.

10 NOT A SURVEY MATTER.

11 AN EASEMENT IN FAVOR OF PACIFIC BELL TELEPHONE COMPANY, A CALIFORNIA CORPORATION DBA AT&T CALIFORNIA, ITS ASSOCIATED AND AFFILIATED COMPANIES, ITS AND THEIR SUCCESSORS, ASSIGNS, LESSEES AND AGENTS FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES, RECORDED MAY 14, 2013 AS INSTRUMENT NO. 13-0228453 OF OFFICIAL RECORDS.

12 AN EASEMENT IN FAVOR OF COUNTY OF RIVERSIDE, A POLITICAL SUBDIVISION OF THE STATE OF CALIFORNIA, ITS SUCCESSORS AND ASSIGNS FOR TEMPORARY CONSTRUCTION AND INCIDENTAL PURPOSES, RECORDED JUNE 27, 2013 AS INSTRUMENT NO. 13-308201 OF OFFICIAL RECORDS.

13 AN EASEMENT IN FAVOR OF PACIFIC BELL TELEPHONE COMPANY, A CALIFORNIA CORPORATION DBA AT&T CALIFORNIA, ITS ASSOCIATED AND AFFILIATED COMPANIES, ITS AND THEIR SUCCESSORS, ASSIGNS, LESSEES AND AGENTS FOR UNDERGROUND COMMUNICATION FACILITIES AND INCIDENTAL PURPOSES, RECORDED JULY 22, 2014 AS INSTRUMENT NO. 14-270964 OF OFFICIAL RECORDS.

14 NOT A SURVEY MATTER.

15 AN EASEMENT IN FAVOR JURUPA COMMUNITY SERVICES DISTRICT FOR ERECT, CONSTRUCT, RECONSTRUCT, REPLACE, REPAIR, MAINTAIN AND USE A PIPELINE OR PIPELINE FOR SEWER AND INCIDENTAL PURPOSES, RECORDED SEPTEMBER 18, 1981 AS INSTRUMENT NO. 176423 OF OFFICIAL RECORDS.

16-25 NOT A SURVEY MATTER.

PARCEL 3:

1-3 (THE FOLLOWING EASEMENTS AND AGREEMENTS REFERENCE THE ITEM NUMBERS SHOWN IN THE TITLE REPORT DATED 08/29/2021, ORDER NUMBER NHSC-6635876 PREPARED BY FIRST AMERICAN TITLE COMPANY.) NOT A SURVEY MATTER.

4 AN EASEMENT IN FAVOR OF JURUPA COMMUNITY SERVICES DISTRICT FOR ERECT, CONSTRUCT, RECONSTRUCT, REPLACE, REPAIR, MAINTAIN AND USE A PIPELINE OR PIPELINE FOR SEWER AND INCIDENTAL PURPOSES, RECORDED SEPTEMBER 18, 1981 AS INSTRUMENT NO. 176423 OF OFFICIAL RECORDS.

5-11 NOT A SURVEY MATTER.

LEGEND

BW	BACK OF WALK
EG	EXISTING GRADE
FG	FINISH GRADE
FS	FINISH SURFACE
TC	TOP OF CURB
FL	FLOW LINE
EP	EDGE OF PAVEMENT
FF	FINISH FLOOR
PAD	PAD GRADE
TW	TOP OF WALL
TF	TOP OF FOOTING
HP	HIGH POINT
LP	LOW POINT
CF	CURB FACE
TG	TOP OF GRATE
TRW	TOP OF RETAINING WALL
EDF	EXTRA DEPTH FOOTING
INV	INVERT OF PIPE
2%	TOP OF SLOPE
2%	RATE OF SLOPE
	TOE OF SLOPE
--S--	EXISTING SEWER
--W--	EXISTING WATER
	EXISTING FIRE HYDRANT
	EXISTING FDC
	EXISTING WATER VALVE
	EXISTING GAS METER
	EXISTING WATER METER
	EXISTING PULL BOX
	EXISTING ICV
	EXISTING STREET LIGHT
(G)	EXISTING CONTOUR
	FINISH CONTOURS
	DAYLIGHT LINE
	REMOVAL
	EXIST. CONCRETE
	CONCRETE

NOTE:

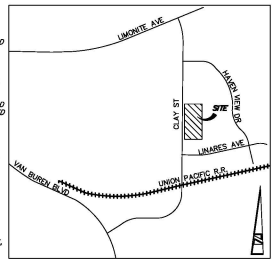
GRADING PERMIT REQUIRED PRIOR TO GRADING OPERATIONS

AREAS:

TOTAL AREA: 180,000 S.F.
IMPERVIOUS: 143,828 S.F.
PERVIOUS: 36,172 S.F.

NOTE INDEX:

30 0 30 60 90
SCALE: 1"=30'



VICINITY MAP
NTS

LAND DEVELOPMENT DESIGN COMPANY, LLC
2313 E. Philadelphia St., Ste. F
Ontario, CA 91761
(909) 930-1466 • FAX (909) 930-1468
PLANNING • CIVIL • SURVEYING

DIGALERT
DIAL TOLL FREE 811
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
KEVIN J. RICHER
No. 43714
Exp. 3/31/2023
CIVIL
STATE OF CALIFORNIA

BENCHMARK

REVISIONS:

PREPARED UNDER THE SUPERVISION OF:
KEVIN J. RICHER
R.C.E. 43714 LIC. EXP. 03/31/23 DATE

APPROVED BY:
DATE

PRELIMINARY GRADING PLAN

SITE:
CLAY ST.
JURUPA VALLEY, CA

PREPARED FOR:
REXCO
1295 CORONA POINT COURT STE. 102
CORONA, CA 92879

DATE: 7/20/22	JOB NO. 6440
DRAWN BY: RAS	SCALE 1"=30'
DESIGNED BY:	SHEET 1 OF 2 SHEETS
CHECKED BY: KJR	

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

South Shore Testing & Environmental

23811 Washington Ave, Suite C110, #112, Murrieta, CA 92562 E-mail: ss.testing@aol.com
Phone: (951) 239-3008 FAX: (951) 239-3122

January 14, 2022

Mr. Griffin Haupert
Rexco Development
1285 Corona Point Court
Corona, California 92879

SUBJECT: **ONSITE STORMWATER INFILTRATION SYSTEM INVESTIGATION**
Proposed Serrano Oaks Apartment Homes
APN Nos. 163-400-026, -028, & -029, 4.12-Acres (Gross)
Clay Street, North of Linares Avenue
Jurupa Valley, Riverside County, California
Work Order No. 0292102.01I

Dear Mr. Haupert:

In accordance with your authorization, we have conducted percolation testing for the infiltration system for the proposed multi-family residential development. The purpose of our investigation was to provide infiltration rates for proposed infiltration systems. The infiltration test areas were performed in the southerly portion of the site on the lower elevations. For our investigation, we were provided with a 20-scale "Conceptual Site Plan, prepared by Summa Architecture of Bonsall, CA.

Site Description

The subject site is a 4.12-acre parcel of land located on the east side of Clay Street, north of Linares Avenue in the Jurupa Valley area, Riverside County, California. The geographical relationships of the site and surrounding area are depicted on our Site Location Map, **Figure 1**.

The subject site is currently vacant and undeveloped. Man-made development at the subject site include and existing sewer line along the easterly and southerly boundaries with associated man-hole, street improvements along Clay Street. Topographically, the subject site consists of relatively flat terrain that slopes to south-southwest at a less than 2 percent gradient. Drainage is generally accomplished by sheet flow to the south-southwest. At the time of our investigation, vegetation onsite generally consisted of a low, dried recently mowed annual weeds and grasses. Overall relief on the subject site is approximately 4-ft, from above mean sea elevations 776 to 780.

Proposed Development

The proposed development consists of construction of the Serrano Oaks Apartment Homes with 6 two-story apartment buildings, leasing office, a pool, rec building, common open-space, and driveway and parking areas. Owing to the relatively flat nature of the subject site, grading will consist of overexcavation and recompaction of the upper 4 to 5-ft of proposed building pads such that all footings will be founded into like materials.

Percolation Investigation

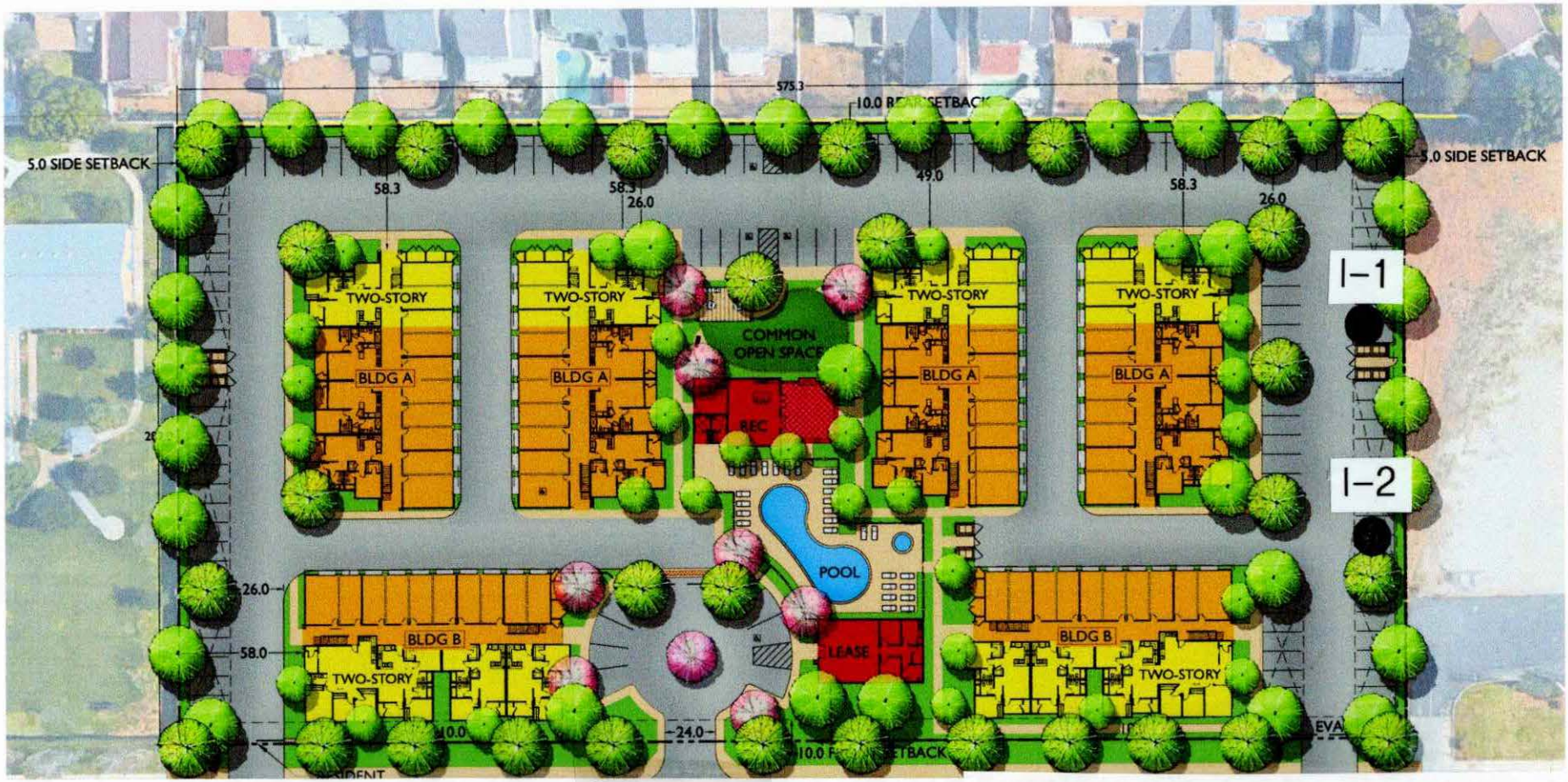
Percolation testing was conducted on December 10, 2021, on the southerly or lower elevations of the subject site. Two (2) tests were performed within the onsite late to middle Pleistocene-age Old alluvial fan deposits (Morton & Cox, 2001). Two (2) exploratory borings were advanced to a depth of 3-ft below the ground surface (bgs) with an infiltration test performed at the bottom of each boring. The Old alluvial fan deposits, for the most part, consisted of silty Sand (Unified Soil Classification – SM) that can generally be described as red to orange-brown, fine to coarse grained, abundant fines, slightly moist, loose (top 1 to 2-ft) to dense, and grading in part to a sandy silt (ML) Infiltration test holes were advanced to a depth of 36-ft bgs utilizing a truck mounted drill rig equipped with 6-inch augers. Our field personnel logged the exploratory borings and copies of our Exploratory Boring Logs are presented in **Appendix B**.

GROUNDWATER

Groundwater was encountered within our exploratory boring B-1 (SS, 2021) at a depth of 27-ft bgs. Historic high groundwater is anticipated to be between 25 and 30-ft bgs (Carson & Matti, 1985). The observed groundwater appears to be in a perched confined condition within thin sandy layers below a depth of 27-ft bgs. The upper Old alluvial fan deposits generally consisted of sandy Silts ML) and Clayey Silts (ML - CL). Minor fluctuations can and will likely occur in moisture or free water content of the soil owing to rainfall and irrigation over time.

SUMMARY OF TEST PROCEDURES

The testing procedure was performed in accordance with Riverside County Department of Environmental Health's "Local Management Program for Onsite Wastewater Treatment Systems", which became effective October 5, 2016 and the resulting perc rates were converted to infiltration rates utilizing the Porchet Method as outlined in the Riverside County Flood Control and Water Conservation District, "Design Handbook for Low Impact Development Best Management Practices" dated September 2011. The percolation tests were performed at a depth of 3-ft bgs. Owing to the mostly moderately fast rates the procedures for **Normal** soils were followed (see percolation test sheets).



SOUTH SHORE TESTING & ENVIRONMENTAL

INFILTRATION TEST LOCATION MAP
PROPOSED SERRANO OAKS APPARTMENT HOMES
APN NOS. 163-400-026, -028 & -029
CLAY STREET, NORT OF LINARES AVENUE
JURUPA VALLEY, RIVERSIDE COUNTY, CALIFORNIA

WORK ORDER: 0292102.011 **DATE:** JAN. 2022 **PLATE:** 1 OF 1

I-2 - **APPROXIMATE LOCATION OF INFILTRATION TESTS**

JURUPA VALLEY, CA

REXCO DEVELOPMENT
1285 CORONA POINTE COURT, SUITE 102
CORONA, CA 92879
951.898.1502

CLAY STREET

OCTOBER 5, 2021

SCALE: 0 20 40 60 N

CONCEPTUAL SITE PLAN

SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198

Conclusion

Testing indicated infiltration rates at 3-ft below existing grade within the native soils obtained moderately fast rates of 6.0 to 13.3-min/inch percolation rate. The percolation rates were converted to infiltration rate utilizing the Porchet Method. The converted infiltration rates varied from 1.1 to 3.5-inches/hr. The rate provided does not include a safety factor. The test locations are presented on our Infiltration Test Location Map, **Plate 1**.

PERCOLATION TEST NO.	DEPTH OF TEST BELOW GRADE (In Feet)	PERCOLATION RATE (Min/Inch	INFILTRATION RATE (In/Hr)
1	3	7.5	5.3
2	3	6.0	7.0

CLOSURE

It should be noted that infiltration rates determined by testing are ultimate rates based on short-duration field test results utilizing clear water. Infiltration rates can be affected by silt build-up, debris, degree of soil saturation, and other factors. An appropriate safety factor should be applied prior to use in design to account for subsoil inconsistencies, possible compaction related to site grading, and potential silting of the percolating soils. The safety factor should also be determined with consideration to other factors in the system design, particularly storm water volume estimates and the safety factors associated with those design components.

LIMITATIONS

The tested rates are representative for the areas and soil types tested. Should the systems be moved, or the exposed soil types are found to different within the proposed systems, the approved infiltration rates may not apply. Our investigation was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable Geotechnical Engineers and Geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

The report is issued with the understanding that it is used only by the owner and it is the sole responsibility of the owner or their representative to ensure that the information and recommendations contained herein are brought to the attention of the architect, engineer, and appropriate jurisdictional agency for the project and incorporated into the plans; and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations contained herein during construction and in the field.

The samples taken and used for testing and the observations made are believed representative; however, soil and geologic conditions can vary significantly between test locations. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by **South Shore Testing & Environmental**, or its assigns.

The findings of this report are valid as of the present date. However, changes in the condition of a property can occur with the passage of time, whether due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and revision as changed conditions are identified. The firm that performed the geotechnical investigation for this project should be retained to provide testing observation services during construction to maintain continuity of geotechnical interpretation and to check that the recommendations presented herein are implemented during construction of improvements.

If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project geotechnical engineer of record. Selection of another firm to perform any of the recommended activities or failure to retain the undersigned to perform the recommended activities wholly absolves **South Shore Testing & Environmental**, the undersigned, and its assigns from any and all liability arising directly or indirectly from any aspects of this project.

We appreciate the opportunity to be of service. Limitations and conditions contained in reference documents are considered in full force and applicable. If you have any questions, please do not hesitate to call our office.

Respectfully Submitted,

South Shore Testing & Environmental

John P. Frey
Project Manager

William C. Hobbs, RCE 42265
Civil Engineer

ATTACHMENTS

Plate 1 – Infiltration Test Location Map
Appendix A –References
Appendix B – Exploratory Boring Logs
Appendix C - Percolation Test Data

APPENDIX A

References

REFERENCES

CDM Smith, Inc. 2013, "Technical Guidance Document for Water Quality Management Plans" dated June 7, 2013.

Carson, Scott E. and Matti, Jonathan C., 1985, "Contour Map Showing Minimum Depth to Ground Water, Upper Santa Ana River Valley, California, 1973-1979", U.S. Geological Survey Miscellaneous Field Studies Map-Map MF-1802, Scale: 1:48,000.

County of Riverside GIS Website, 2022.

Morton, D.M., 2004, "Preliminary Digital Geologic Map of the Santa Ana 30' x 60' Quadrangle, Southern California (Version 2.0)", U.S. Geological Survey in Cooperation with the California Geologic Survey, Open-File Report 99-172, Scale: 1" = 100,000'.

Riverside County Flood Control and Water Conservation District, 2011, "Design Handbook for Low Impact Development Best Management Practices" dated 9, 2011.

South Shore Testing & Environmental, 2020, "Preliminary Geotechnical Investigation, Proposed Serrano Oaks Apartment Homes, APN Nos. 163-400-026, -028, & -029, 4.12-Acres (Gross), Clay Street, North of Linares Avenue, Jurupa Valley, Riverside County, California", Work Order No. 0292102.00.

SUMMA Architecture, October 5, 2021, "Conceptual Site Plan, Serrano Oaks Apartment Homes, Clay Street, Jurupa Valley, CA", Sheet 1 of 1, Scale: 1" =20'.

U.S. Geological Survey in Cooperation with the California Division of Mines and Geology, 2001, "Geologic Map of the Riverside West 7.5' Quadrangle, Riverside County, California", Open-File Report 01-451, Scale 1" = 2,000'.

APPENDIX B

Exploratory Boring Logs

LOGGED BY: JPF	METHOD OF EXCAVATION: MOBILE DRILL RIG EQUIPPED W/6" HOLLOW STEM AUGERS ELEVATION: ± 776	DATE OBSERVED:12/10/2021 LOCATION: SEE PLATE 1

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT(%)	INPLACE DRY DENSITY (PCF)	BORING LOG NO._1____ DESCRIPTION	SOIL TEST
							OLD ALLUVIAL FAN DEPOSITS	
							SANDY SILT (ML): ORANGE BROWN, DENSE, MINOR COARSE SAND GRAINS, SLIGHTLY MOIST, MINOR CALICHE VEINLETS	
							TOTAL DEPTH = 3.0FT	
5							**NO GROUNDWATER**	
10								
15								
20								
25								
30								
35								
40								

JOB NO:0292102.01I	LOG OF BORING	FIGURE: B-1

LOGGED BY: JPF	METHOD OF EXCAVATION: MOBILE DRILL RIG EQUIPPED W/6" HOLLOW STEM AUGERS ELEVATION: ± 776	DATE OBSERVED:12/10/2021 LOCATION: SEE PLATE 1

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT(%)	INPLACE DRY DENSITY (PCF)	BORING LOG NO._2____ DESCRIPTION	SOIL TEST
							OLD ALLUVIAL FAN DEPOSITS	
							SILTY SAND (SM): ORANGE BROWN, DENSE, FINE TO COARSE GRAINED, SLIGHTLY MOIST, MODERATELY GRADED	
							TOTAL DEPTH = 3.0FT	
5							**NO GROUNDWATER**	
10								
15								
20								
25								
30								
35								
40								

JOB NO:0292102.01I	LOG OF BORING	FIGURE: B-2

APPENDIX C

Percolation Test Results

Appendix 4

Leach Line Percolation Data Sheet

Project Rocco		Job No. 0292102.01I	
Test Hole No. I-1		Date Excavated: Dec 10, 2021	
Depth of Test Hole: 36" (8"=diameter)		Soil Classification SM	
Check for Sandy Soil Criteria Tested by: JPF		Date:	Presoak: Dec 10, 2021
Actual Percolation Tested by: JPF		Date:	Dec 11, 2021

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (Min)	Initial Water Level (Inches)	Final Water Level (Inches)	▲in Water Level (Inches)
1	8:42 / 9:07	25	6 1/2"	1/2	4 1/2
2					

Use: (Normal) Sandy (Circle One) Soil Criteria

Time	Time Interval (Min)	Total Elapsed Time (Min)	Initial Water Level (Inches)	Final Water Level (Inches)	▲in Water Level (Inches)	Percolation Rate (Min/Inch)
11:05 / 11:35	30	30	6"	1 3/4	4 1/4	7.1
11:35 / 12:05	30	60	6"	1 3/4	4 1/4	7.1
12:05 / 12:35	30	90	6"	2"	4"	7.5
12:35 / 1:05	30	120	6"	2"	4"	7.5
1:05 / 1:35	30	150	6"	2"	4"	7.5
1:35 / 2:05	30	180	6"	2"	4"	7.5
2:05 / 2:35	30	240	6"	2"	4"	7.5

Appendix 4

Leach Line Percolation Data Sheet

Project Rexco		Job No. 029.2102.011	
Test Hole No. I-2		Date Excavated: Dec 10, 2021	
Depth of Test Hole: 36" (8" diameter)		Soil Classification SM	
Check for Sandy Soil Criteria Tested by: JPF		Date:	Presoak: Dec 10, 2021
Actual Percolation Tested by: JPF		Date:	Dec 11, 2021

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (Min)	Initial Water Level (Inches)	Final Water Level (Inches)	▲in Water Level (Inches)
1	8:39 / 9:04	25	6 5/16	1/4	5 3/4
2					

Use: Normal Sandy (Circle One) Soil Criteria

Time	Time Interval (Min)	Total Elapsed Time (Min)	Initial Water Level (Inches)	Final Water Level (Inches)	▲in Water Level (Inches)	Percolation Rate (Min/Inch)
11:00 / 11:30	30	30	6"	1/2	5 1/2	5.5
11:30 / 12:00	30	60	6"	1/2	5 1/2	5.5
12:00 / 12:30	30	90	6"	3/4	5 1/4	5.7
12:30 / 1:00	30	120	6"	1"	5"	6"
1:00 / 1:30	30	150	6"	1"	5"	6"
1:30 / 2:00	30	180	6"	1"	5"	6"
2:00 / 2:30	30	240	6"	1"	5"	6"

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

N/A

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

N/A

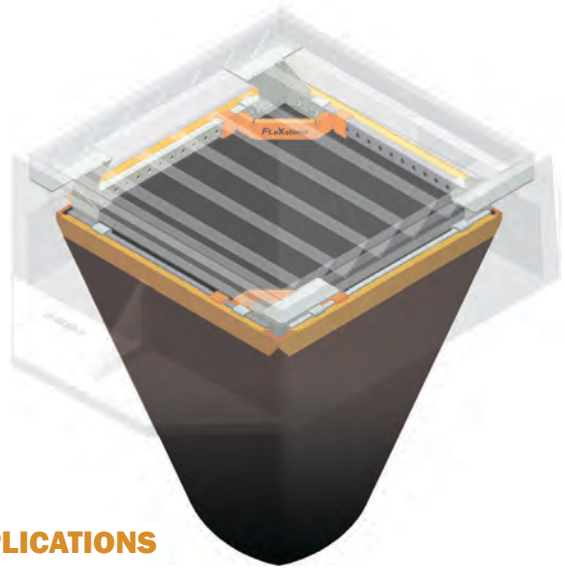
Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

FLEXSTORM INLET FILTERS™

The Universal Solution for Storm Water Runoff Control

State DOTs and Municipalities across the country now have a universal structural BMP to address the issue of storm sewer inlet protection.The FLEXSTORM system is inexpensive, configurable and adjustable and offers more versatility to fit the wide array of drainage structures throughout the United States while offering various levels of filtration. FLEXSTORM Inlet Filters are the preferred choice for inlet protection and storm water runoff control.



APPLICATIONS

DOT/Road Construction
Commercial/Parking Lots
Residential Developments
Industrial/Maintenance

FEATURES

- **Configurable**: Steel frames configured to fit ANY storm drainage structure
- **Adjustable**: Rectangular frames are adjustable in 1/2" increments up to 5" per side
- **Reusable**: Replaceable geotextile sediment bags de signed for construction or post construction applications
- **Affordable**: Low per-unit cost; installs in seconds; easily maintained with Universal Removal Tool (no machinery required)
- **Effective**: Works below grade; overflow feature allows streets to drain with full bag; prevents ponding

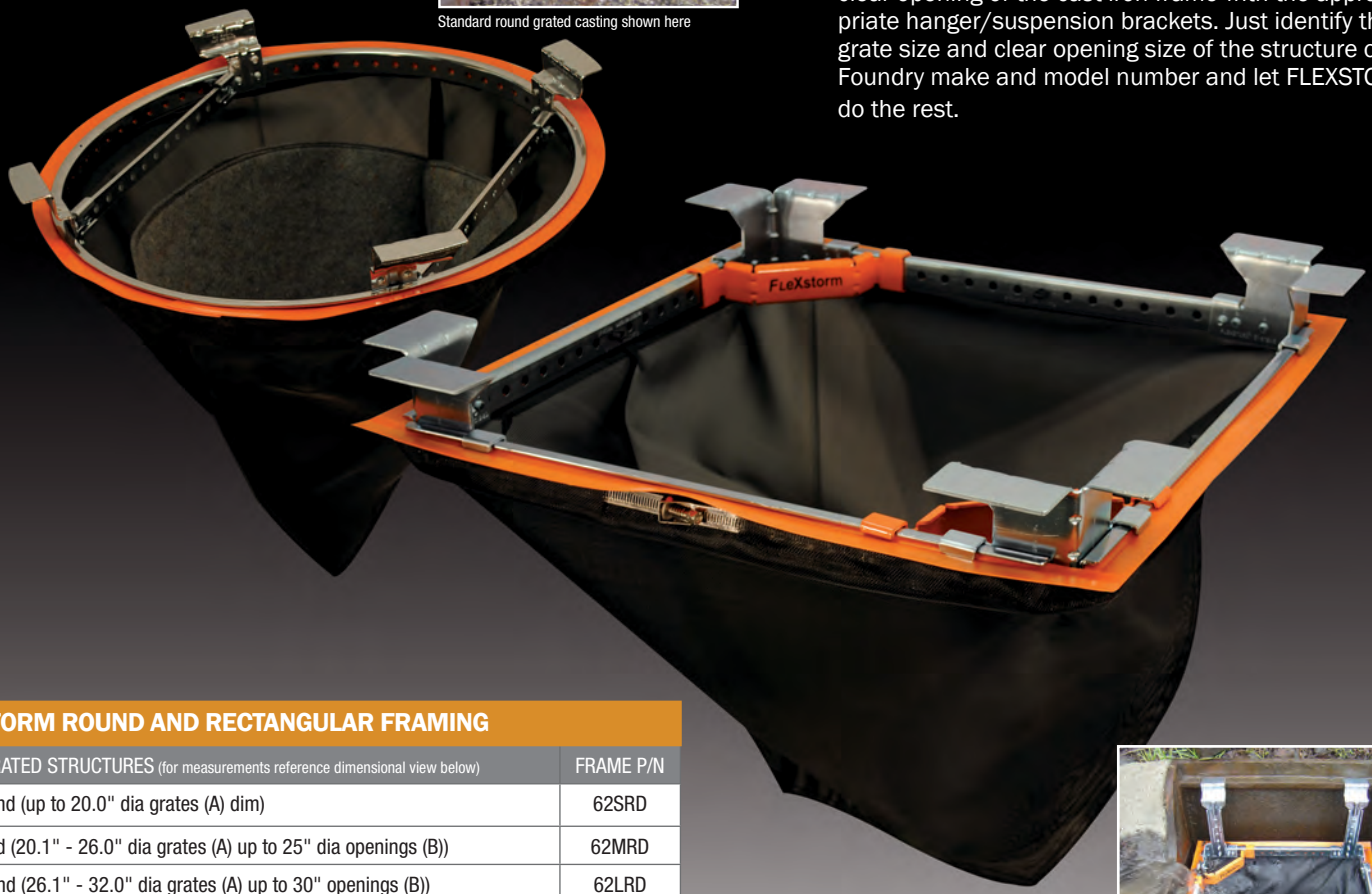
CREATE YOUR OWN FLEXSTORM SOLUTION IN THREE EASY STEPS

1. IDENTIFY YOUR FRAME
2. CHOOSE YOUR FILTER BAG
3. CREATE YOUR PART NUMBER

Standard round grated casting shown here

Grated Structures

FLEXSTORM Inlet Filters are well suited for Frame and Grate applications where there is a continuous framing lip upon which the grate rests. The FLEXSTORM assembly is shipped to the field to fit precisely into the clear opening of the cast iron frame with the appropriate hanger/suspension brackets. Just identify the grate size and clear opening size of the structure or the Foundry make and model number and let FLEXSTORM do the rest.



FLEXSTORM ROUND AND RECTANGULAR FRAMING

ROUND GRATED STRUCTURES (for measurements reference dimensional view below)	FRAME P/N
Small Round (up to 20.0" dia grates (A) dim)	62SRD
Med Round (20.1" - 26.0" dia grates (A) up to 25" dia openings (B))	62MRD
Large Round (26.1" - 32.0" dia grates (A) up to 30" openings (B))	62LRD
XL Round (32.1" dia - 39" dia grates (A) up to 37" dia openings (B))	62XLRD

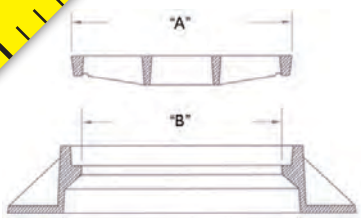
RECTANGULAR GRATED STRUCTURES (for measurements reference dimensional view below)	FRAME P/N	COMBO INLET P/N*
Small Rect / Square (up to 16" (B) x 16" (D) openings or 64" perimeter)	62SSQ	62SCB
Med Rect / Square (up to 24" (B) x 24" (D) openings or 96" perimeter)	62MSQ	62MCB
Large Rect / Square (up to 36" (B) x 24" (D) openings or 120" perimeter)	62LSQ	62LCB
XL Rect / Square (side by side 2 pc set to fit up to 48" (B) x 36" (D) openings)	62XLSQ	62XLCB

*Rigid backsplash option is available for combination inlets with open curb hoods. Ref P/N 62RIGCBFL

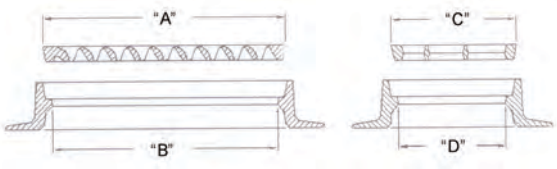
Adjustable hanger brackets make it possible to fit all rolled curb castings

Combination inlet with magnetic rear guard attachment

MEASURING



Round Grated Structures



Rectangular Grated Structures

FLEXSTORM is the universal solution to fit any storm sewer

Round Inlet (metal or concrete frame)

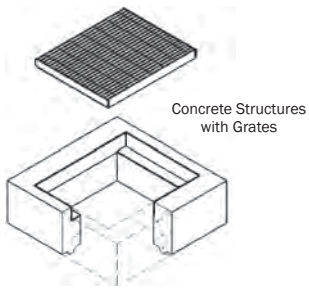
Rectangular Inlet (metal or concrete)

Rectangular Rolled Curb

Combination Inlets with Curb Hoods

FITTING CONCRETE STRUCTURES

FLEXSTORM has developed special extended hanger brackets for Concrete Structures since there is considerable variance in the clear opening dimensions when compared to cast iron frames. It is important to identify the grate size along with concrete opening and location of the grate supports. NOTE: Sizing follows the same guidelines as the frame and grate designs based on the concrete clear opening dimensions.



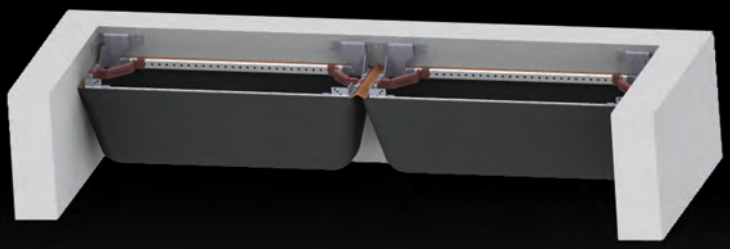
Concrete Structures with Grates

Wall Mounted Structures

FLEXSTORM wall mount units are designed to mount easily inside open throat concrete structures beneath the curb opening. Maintenance is also simplified with the easy off hanger system. All stainless steel mounting hardware is provided.

FLEXSTORM WALL MOUNT FOR OPEN THROAT CURB INLETS

CURB OPENING SIZE	FRAME P/N
Up to 4' curb openings (1 Filter and Mounting Hardware)	62WM1
Between 4' and 8' (2 Filters and Mounting Hardware)	62WM2
Between 8' and 12' (3 Filters and Mounting Hardware)	62WM3
Between 12' and 16' (4 Filters and Mounting Hardware)	62WM4



Nyloplast Castings

FLEXSTORM Filters for Nyloplast castings are comprised of stainless steel framing designed to fit all castings ranging from 12" to 30" diameter. FLEXSTORM Catch-ITs are now available specified with the FX or FX-S (short) filter bags.

FLEXSTORM NYLOPLAST STAINLESS STEEL FRAMING

Nyloplast Casting Size	FRAME P/N
12" diameter	6212NY
15" diameter	6215NY
18" diameter	6218NY
24" diameter	6224NY
30" diameter	6230NY

FRAMING MATERIAL OPTIONS

Choosing the best framing material for your application is a matter of identifying the type of environment and the length of usage.

Zinc Plated

FLEXSTORM STANDARD FRAMING

Medium to long term applications with low to moderate levels of salt exposure

Chrome Plated

Medium to Long term applications with moderate to high levels of salt exposure

FRAMING MATERIAL	P/N SUFFIX
Chrome Plated	CHR

Stainless Steel

Permanant applications in harsh environments and/or high levels of salt or chemical exposure

Compliant in regions with stringent environmental regulations

FRAMING MATERIAL	P/N SUFFIX
Stainless Steel	SS

2. CHOOSE YOUR FILTER BAG

Silt, sand, gravel and Large partical filtration

The standard woven polypropylene bag has the highest flow rate in the industry. This durable geotextile resists clogging and cleans up easily. It is well suited for construction sites and heavy flow drainage areas. Provisions for hydrocarbon removal are offered as add-ons (see FX+ and FXO).

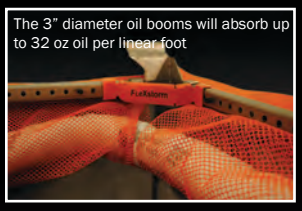
FILTRATION EFFICIENCY = 82% †

† Large scale, 3rd party testing per ASTM D 7351, Standard Test Method for Determination of Sediment Retention Device Effectiveness in Sheet Flow Application using 7% USDA Sandy Loam

FX
Flexstorm standard woven bag for temporary or permanent applications

FX+
Standard woven bag with MyCelx skimmer for low to moderate hydrocarbon removal

FXO
Standard woven bag with oil boom for low to moderate hydrocarbon removal



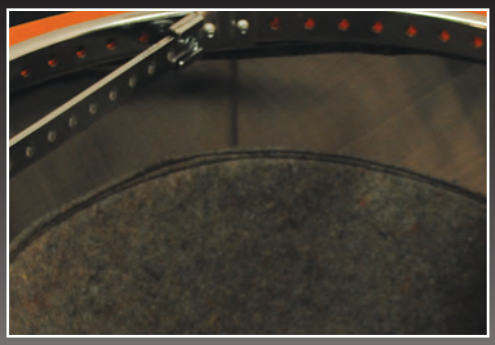
Oil, grease, metals and Fine partical filtration

The FLEXSTORM PC 'Post Construction' line of inlet filters is designed to specifically target small particle and hydrocarbon removal from parking lots, industrial buildings, and other drainage hot spots.

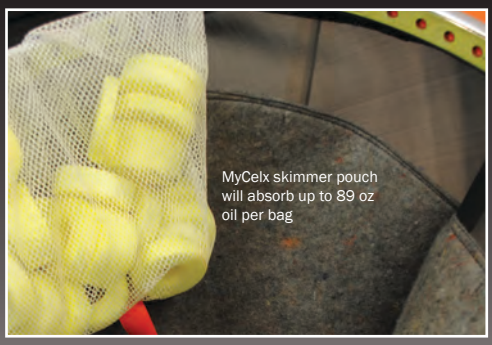
TSS = 99% TPH = 97% ‡

‡ Large scale testing at 90 GPM. 3rd party results using US Silica OK-110 sand at 1750 mg/L measuring TSS per SM 2540D. TPH tested at 243 mg/L used motor oil using EPA Method 1664A.

PC
For very fine particals with moderate levels of hydrocarbon runoff



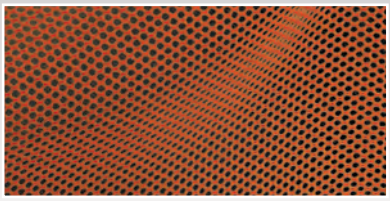
PC+
For very fine particals with high levels of hydrocarbon runoff



FLEXSTORM FILTER BAGS	STANDARD BAG P/N (22" depth)	SHORT BAG P/N (12" depth)
FX: Standard Woven Bag	FX	FX-S
FX+: Woven w/ MyCelx	FXP	FXP-S
FXO: Woven w/ Oil Boom	FXO	FXO-S
PC: Post Construction Bag	PC	PC-S
PC+: PC Bag w/ MyCelx	PCP	PCP-S
LL: Litter and Leaf Bag	LL	LL-S
IL: IDOT NonWoven Bag	IL	IL-S

SPECIALITY BAGS

LL - LITTER AND LEAF BAG
Polyester mesh bag designed to capture litter, leaves and large debris



IL - IDOT NONWOVEN
IDOT specified non-woven with polyester reinforcement mesh for temporary use

FILTER BAG SPECIFICATIONS & CAPABILITES

Bag Type (P/N)	Clean Water Flow Rate (GPM/SqFt)	Min A.O.S. (US Sieve)
Woven (FX)	200	40
Post Construction (PC)	137	140
NonWoven (IL)	145	70
Litter & Leaf Bag (LL)	High	3.5

Standard Bag Size§	Solids Storage Capacity (CuFt)	Filtered Flow Rate at 50% Max (CFS)			Oil Retention (Oz)	
		FX	PC	IL	PC*	PCP**
Small	1.6	1.2	0.8	0.9	66	155
Medium	2.1	1.8	1.2	1.3	96	185
Large	3.8	2.2	1.5	1.6	120	209
XL	4.2	3.6	2.4	2.6	192	370

* PC filter bag at 50% max adsorption capacity
** PC filter bag at 50% capacity and MyCelx skimmer at 100% capacity
§ Standard bags are 22" in depth. Short bags are 12" in depth, reducing solids storage capacity by approximately 50%.

3. CREATE YOUR PART NUMBER

		–	

FRAME P/N
Enter your frame part number from step one.

FILTER BAG P/N
Enter your filter bag part number from step two.

FRAMING MATERIAL
Enter your framing material suffix from step one.*

*Zinc is standard framing and requires no suffix. Use "CHR" for chrome and "SS" for stainless steel.

Create your FLEXSTORM Inlet Filter part number combining your frame and bag part numbers. Framing upgrades are identified with a suffix. Please note that the specific casting foundry make and model number, DOT callout, or detailed dimensional form must be provided with any order so FLEXSTORM can configure your customized solution. All units are shipped to the field fully assembled to fit precisely into your identified drainage structure.

Need help with your Part Number?

Use this part number guide to identify your frame and fiter bag part number, then add your framing material suffix.

PART NUMBER GUIDE | **FILTER BAG SELECTION** (Part Numbers are for Standard 22" depth bags. Short 12" depth bags are available for all types using -S Suffix)

FRAMING TYPE AND SIZE SELECTION

Choose your frame type and size below, then select your filter bag in the columns to the right to identify your part number. If upgrading from standard zinc framing, append your part number with either "CHR" for chrome or "SS" for stainless steel.

		Frame P/N:	FX: Woven Standard Bag Bag P/N: FX	FX+: Woven w/ Mycelx Skimmer Bag P/N: FXP	FXO: Woven w/ Oil Boom Bag P/N: FXO	PC: Post Construction (Adsorb-it Lined) Bag P/N: PC	PC+: PC bag w/ MyCelx Skimmer Bag P/N: PCP	LL: Litter Leaf Bag Bag P/N: LL	IL: IDOT Specified NonWoven Bag Bag P/N: IL
ROUND	**Small Round** (up to 20.0" dia grates (A) dim)	**62SRD**	62SRDFX	62SRDFXP	62SRDFXO	62SRDPC	62SRDPCP	62SRDLL	62SRDIL
ROUND	**Med Round** (20.1" - 26.0" dia grates (A) up to 25" dia openings (B))	**62MRD**	62MRDFX	62MRDFXP	62MRDFXO	62MRDPC	62MRDPCP	62MRDLL	62MRDIL
ROUND	**Large Round** (26.1" - 32.0" dia grates (A) up to 30" openings (B))	**62LRD**	62LRDFX	62LRDFXP	62LRDFXO	62LRDPC	62LRDPCP	62LRDLL	62LRDIL
ROUND	**XL Round** (32.1" dia - 39" dia grates (A) up to 37" dia openings (B))	**62XLRD**	62XLRDFX	62XLRDFXP	62XLRDFXO	62XLRDPC	62XLRDPCP	62XLRDLL	62XLRDIL
RECTANGULAR	**Small Rect** / Square (up to 16" (B) x 16" (D) openings or 64" perimeter)	**62SSQ**	62SSQFX	62SSQFXP	62SSQFXO	62SSQPC	62SSQPCP	62SSQLL	62SSQIL
RECTANGULAR	**Med Rect** / Square (up to 24" (B) x 24" (D) openings or 96" perimeter)	**62MSQ**	62MSQFX	62MSQFXP	62MSQFXO	62MSQPC	62MSQPCP	62MSQLL	62MSQIL
RECTANGULAR	**Large Rect** / Square (up to 36" (B) x 24" (D) openings or 120" perimeter)	**62LSQ**	62LSQFX	62LSQFXP	62LSQFXO	62LSQPC	62LSQPCP	62LSQLL	62LSQIL
RECTANGULAR	**XL Rect** / Square (side by side 2 pc set to fit up to 48" (B) x 36" (D) openings)	**62XLSQ**	62XLSQFX	62XLSQFXP	62XLSQFXO	62XLSQPC	62XLSQPCP	62XLSQLL	62XLSQIL
COMBO INLETS	**Small Rect** / Square (ref Rect sizing; shipped with Magnetic Curb Flaps)	**62SCB**	62SCBFX	62SCBFXP	62SCBFXO	62SCBPC	62SCBPCP	62SCBLL	62SCBIL
COMBO INLETS	**Med Rect** / Square (ref Rect sizing; shipped with Magnetic Curb Flaps)	**62MCB**	62MCBFX	62MCBFXP	62MCBFXO	62MCBPC	62MCBPCP	62MCBLL	62MCBIL
COMBO INLETS	**Large Rect** / Square (ref Rect sizing; shipped with Magnetic Curb Flaps)	**62LCB**	62LCBFX	62LCBFXP	62LCBFXO	62LCBPC	62LCBPCP	62LCBLL	62LCBIL
COMBO INLETS	**XL Rect** / Square (ref Rect sizing; shipped with Magnetic Curb Flaps)	**62XLCB**	62XLCBFX	62XLCBFXP	62XLCBFXO	62XLCBPC	62XLCBPCP	62XLCBLL	62XLCBIL
NYLOPLAST	**12"** diameter Nyloplast castings (Stainless Steel Framing standard)	**6212NY**	6212NYFX	6212NYFXP	6212NYFXO	6212NYPC	6212NYPCP	6212NYLL	6212NYIL
NYLOPLAST	**15"** diameter Nyloplast castings (Stainless Steel Framing standard)	**6215NY**	6215NYFX	6215NYFXP	6215NYFXO	6215NYPC	6215NYPCP	6215NYLL	6215NYIL
NYLOPLAST	**18"** diameter Nyloplast castings (Stainless Steel Framing standard)	**6218NY**	6218NYFX	6218NYFXP	6218NYFXO	6218NYPC	6218NYPCP	6218NYLL	6218NYIL
NYLOPLAST	**24"** diameter Nyloplast castings (Stainless Steel Framing standard)	**6224NY**	6224NYFX	6224NYFXP	6224NYFXO	6224NYPC	6224NYPCP	6224NYLL	6224NYIL
NYLOPLAST	**30"** diameter Nyloplast castings (Stainless Steel Framing standard)	**6230NY**	6230NYFX	6230NYFXP	6230NYFXO	6230NYPC	6230NYPCP	6230NYLL	6230NYIL
WALL MOUNT	**Open Throat Gutters** - Curb Opening Size (Units shipped with Short 12" Depth Bags unless otherwise specified)								
WALL MOUNT	**Up to 4' curb openings** (1 Filter and Mounting Hardware)	**62WM1**	62WM1FX	62WM1FXP	62WM1FXO	62WM1PC	62WM1PCP	62WM1LL	62WM1IL
WALL MOUNT	**Between 4' and 8'** (2 Filters and Mounting Hardware)	**62WM2**	62WM2FX	62WM2FXP	62WM2FXO	62WM2PC	62WM2PCP	62WM2LL	62WM2IL
WALL MOUNT	**Between 8' and 12'** (3 Filters and Mounting Hardware)	**62WM3**	62WM3FX	62WM3FXP	62WM3FXO	62WM3PC	62WM3PCP	62WM3LL	62WM3IL
WALL MOUNT	**Between 12' and 16'** (4 Filters and Mounting Hardware)	**62WM4**	62WM4FX	62WM4FXP	62WM4FXO	62WM4PC	62WM4PCP	62WM4LL	62WM4IL

Replacement Bags Available

Replacement bags are available for all units shipped complete with stainless steel clamping band. Size categories are for either round or rectangular framing. The original framing detail is required with each order.

BAG SIZE	FX	FXP	FXO	PC	PCP	LL	IL
Small	62SRBFX	62SRBFXP	62SRBFXO	62SRBPC	62SRBPCP	62SRBLL	62SRBIL
Medium	62MRBFX	62MRBFXP	62MRBFXO	62MRBPC	62MRBPCP	62MRBLL	62MRBIL
Large	62LRBFX	62LRBFXP	62LRBFXO	62LRBPC	62LRBPCP	62LRBLL	62LRBIL
XL	62XLRBFX	62XLRBFXP	62XLRBFXO	62XLRBPC	62XLRBPCP	62XLRBLL	62XLRBIL

Accessories

UNIVERSAL MAINTENANCE TOOL
Dual purpose tool makes both grate and filter removal safe and fast

ALL PRODUCTS MANUFACTURED BY:

IPP
INLET & PIPE PROTECTION, INC

www.inletfilters.com

ADS FLEXSTORM INLET FILTER SPECIFICATIONS

IDENTIFICATION
The installer shall inspect the plans and/or worksite to determine the quantity of each drainage structure casting type. The foundry casting number, exact grate size and clear opening size, or other information will be necessary to finalize the FLEXSTORM part number and dimensions. The units are shipped to the field configured precisely to fit the identified drainage structure.

MATERIAL AND PERFORMANCE
The FLEXSTORM Inlet Filter system is comprised of a corrosion resistant steel frame and a replaceable geotextile filter bag attached to the frame with a stainless steel locking band. The filter bag hangs suspended at a distance below the grate that shall allow full water flow into the drainage structure if the bag is completely filled with sediment. The standard Woven Polypropylene FX filter bags are rated for 200 gpm/sqft with a removal efficiency of 82% when filtering a USDA Sandy Loam sediment load. The Post Construction PC filter bags are rated for 137 gpm/sqft and have been 3rd party tested at 99% TSS removal to 110 micron and 97% TPH removal of used motor oil hydrocarbon mix.

INSTALLATION
Remove the grate from the casting or concrete drainage structure. Clean the ledge (lip) of the casting frame or drainage structure to ensure it is free of stone and dirt. Drop in the FLEXSTORM Inlet Filter through the clear opening and be sure the suspension hangers rest firmly on the inside ledge (lip) of the casting. Replace the grate and confirm it is elevated no more than 1/8", which is the thickness of the steel hangers. For wall mount units, follow instructions for attaching the stainless steel mounting brackets using the provided concrete fasteners.

INSPECTION FREQUENCY
Construction site inspection should occur following each ½" or more rain event. Post Construction inspections should occur three times per year (every four months) in areas with mild year round rainfall and four times per year (every three months Feb-Nov) in areas with summer rains before and after the winter snowfall season. Industrial application site inspections (loading ramps, wash racks, maintenance facilities) should occur on a regularly scheduled basis no less than three times per year.

MAINTENANCE GUIDELINES
Empty the filter bag if more than half filled with sediment and debris, or as directed by the Engineer. Remove the grate, engage the lifting bars or handles with the FLEXSTORM Removal Tool, and lift from the drainage structure. Dispose of the sediment or debris as directed by the Engineer or Maintenance Contract in accordance with EPA guidelines. As an alternative, an industrial vacuum may be used to collect the accumulated sediment. Remove any caked on silt from the sediment bag and reverse flush the bag with medium spray for optimal filtration. Replace the bag if torn or punctured to ½" diameter or greater on the lower half of the bag. Post Construction PC/PC+ Bags should be maintained prior to 50% oil saturation. The average 2' x 2' PC filter bag will retain approx 96 oz (5.4 lbs) of oil at which time it should be serviced or replaced. It can be centrifuged or passed through a wringer to recover the oils, and the fabric reused with 85% to 90% efficacy. It may also be recycled for its fuel value through waste to energy incineration. When utilizing the MyCelx Skimmer Pouches in the + bags, note that the skimmers start yellow in color and will gradually turn brown as they become saturated, indicating time for replacement. Each MyCelx skimmer pouch will absorb approximately 89 oz (5 lbs) of oil before requiring replacement. It may also be recycled for its fuel value through waste to energy incineration. Dispose of all oil contaminated products in accordance with EPA guidelines.

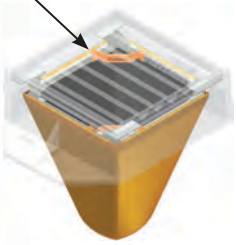
FILTER BAG REPLACEMENT
Remove the bag by loosening or cutting off the clamping band. Take the new filter bag, which is equipped with a stainless steel worm drive clamping band, and use a screw driver to tighten the bag around the frame channel. Ensure the bag is secure and that there is no slack around the perimeter of the band.

Lift Handles ease installation and maintenance

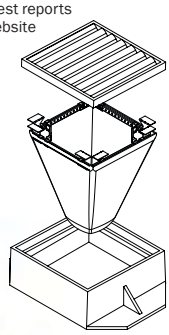
Replaceable Sediment Bag

1/8" thick steel hangers & channels; precision stampings **configured to fit each individual casting**

Rectangular frames are **adjustable** in 1/2" increments up to 5" per side



CAD drawings, work instructions and test reports on website



US Patent No. 7,670,483

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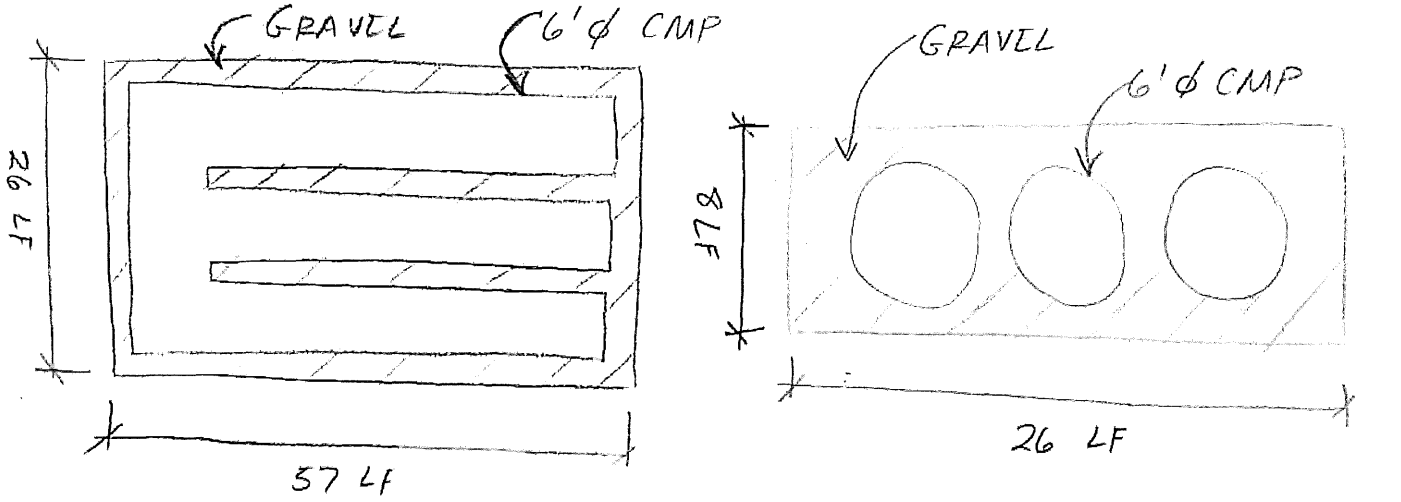


PLAN

SECTION

$V_{TRENCH} = (8LF)(26LF)(57LF) = 11,856\ CF$

$V_{PIPES} = \frac{\pi(6LF)^2}{4}(163\ LF) = 4,608.7\ CF$

$V_{GRAVEL} = (40\%)(11856 - 4608.7) = 2898.9\ CF$

$STORAGE = 4608.7 + 2898.9 = 7,508\ CF$

$P = \frac{5.3 + 7.0}{2} = 6.15\ IN/HR \quad FS = 3 \quad P_{DESIGN} = \frac{6.15}{3} = 2.05\ IN/HR$

$T_{MAX} = 72\ HRS$

$MAX.\ PONDING = (2.05/12)(72) = 12.3\ LF$

LAND DEVELOPMENT DESIGN COMPANY
2313 E. Philadelphia St., Ste. F
ONTARIO, CA 91761
(909) 930-1466
FAX (909) 930-1468
PLANNING • CIVIL • SURVEYING

DATE:	SCALE:	SHEET:	JOB NO.	BMP DESIGN
			6440	

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	Land Development Design Company, LLC	Date	7/1/2022
Designed by	Kevin J. Richer	Case No	TBD
Company Project Number/Name	JN6440-Serrano Oaks		

BMP Identification

BMP NAME / ID: INF-1

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

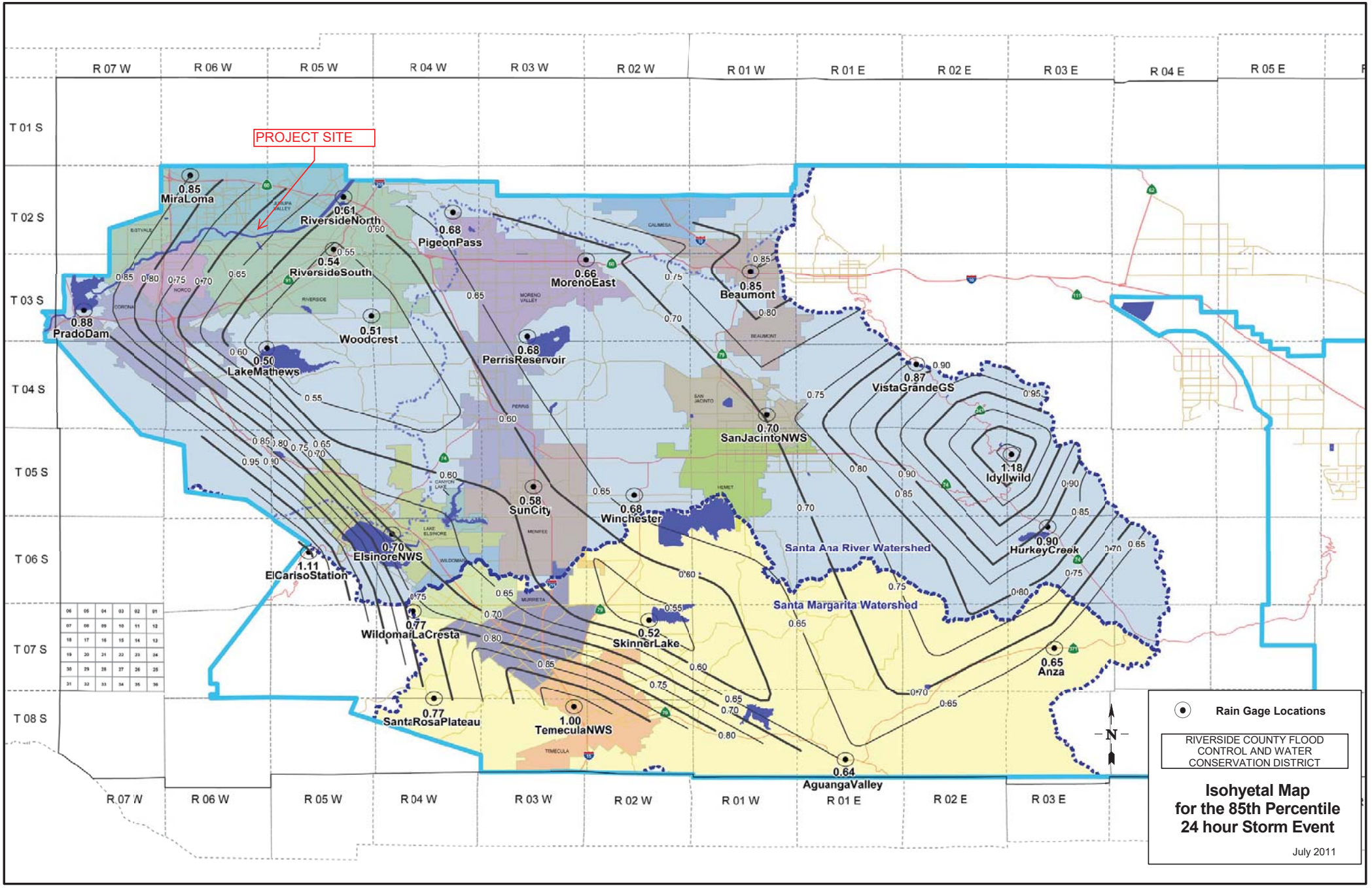
D_{85}= 0.68 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1A	*36,172*	*Ornamental Landscaping*	*0.1*	*0.11*	*3995.5*			
1B	*81,048*	*Concrete or Asphalt*	*1*	*0.892*	*72294.8*			
1C	*62,780*	*Roofs*	*1*	*0.892*	*55999.8*			
	180000		***Total***		**132290.1**	**0.68**	***7496.4***	***7,508***

Notes: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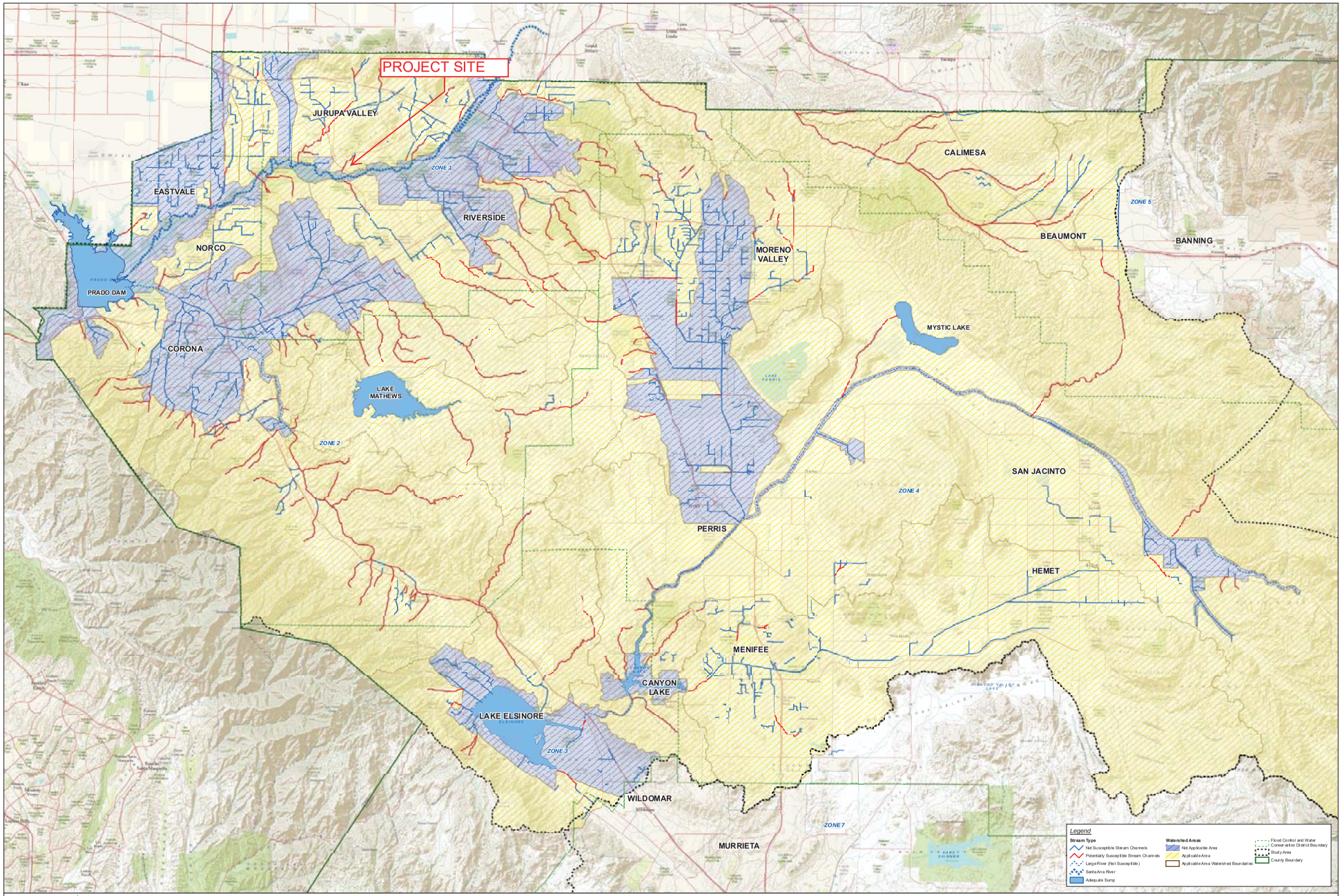
R 06 W
R 05 W
R 04 W
R 03 W
R 02 W
R 01 W
R 01 E
R 02 E
R 03 E
R 04 E
R 05 E
T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S
PROJECT SITE
0.85 MiraLoma
0.61 RiversideNorth
0.68 PigeonPass
0.54 RiversideSouth
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.68 PerrisReservoir
0.50 LakeMathews
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.90 HurkeyCreek
1.11 ElCariso Station
0.70 ElsinoreNWS
Santa Ana River Watershed
Santa Margarita Watershed
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley
N
Rain Gage Locations
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Isohyetal Map for the 85th Percentile 24 hour Storm Event
July 2011

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

See Project Hydrology Study



HCOC Applicability Map

Hydromodification Susceptibility Documentation Report and Mapping
Riverside County Flood Control and Water Conservation District

Map 2

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ A. **On-site storm drain inlets**	☑ **Locations of inlets.**	☑ **Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.**	☐ **Maintain and periodically repaint or replace inlet markings.** ☑ **Provide stormwater pollution prevention information to new site owners, lessees, or operators.** ☑ **See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** ☑ **Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."**
☐ B. **Interior floor drains and elevator shaft sump pumps**		☐ **State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.**	☐ **Inspect and maintain drains to prevent blockages and overflow.**
☐ C. **Interior parking garages**		☐ **State that parking garage floor drains will be plumbed to the sanitary sewer.**	☐ **Inspect and maintain drains to prevent blockages and overflow.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ D1. **Need for future indoor & structural pest control**		☑ **Note building design features that discourage entry of pests.**	☑ **Provide Integrated Pest Management information to owners, lessees, and operators.**
☑ D2. **Landscape/ Outdoor Pesticide Use**	☑ **Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained.** ☑ **Show self-retaining landscape areas, if any.** ☑ **Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)**	**State that final landscape plans will accomplish all of the following.** ☑ **Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.** ☑ **Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.** **Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.** ☑ **Consider using pest-resistant plants, especially adjacent to hardscape.** **To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.**	☑ **Maintain landscaping using minimum or no pesticides.** ☑ **See applicable operational BMPs in "What you should know for…..Landscape and Gardening"** at http://rcflood.org/stormwater/**Error! Hyperlink reference not valid.** ☑ **Provide IPM information to new owners, lessees and operators.**

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ E. **Pools, spas, ponds, decorative fountains, and other water features.**	☑ **Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)**	☑ **If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.**	☑ **See applicable operational BMPs in** "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
☐ F. **Food service**	☐ **For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment.** ☐ **On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.**	☐ **Describe the location and features of the designated cleaning area.** ☐ **Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.**	☐ **See the brochure, "**The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ **Provide this brochure to new site owners, lessees, and operators.**
☑ G. **Refuse areas**	☑ **Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas.** ☑ **If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area.** ☑ **Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.**	☑ **State how site refuse will be handled and provide supporting detail to what is shown on plans.** ☑ **State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.**	☑ **State how the following will be implemented:** **Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at** www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ H. **Industrial processes.**	❑ **Show process area.**	❑ **If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."**	❑ **See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ I. **Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)**	❑ **Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area.** ❑ **Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults.** ❑ **Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.**	**Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains.** **Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for:** ▪ **Hazardous Waste Generation** ▪ **Hazardous Materials Release Response and Inventory** ▪ **California Accidental Release (CalARP)** ▪ **Aboveground Storage Tank** ▪ **Uniform Fire Code Article 80 Section 103(b) & (c) 1991** ▪ **Underground Storage Tank** www.cchealth.org/groups/hazmat/	❑ **See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ J. **Vehicle and Equipment Cleaning**	❑ **Show on drawings as appropriate:** **(1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses.** **(2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use).** **(3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer.** **(4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.**	❑ **If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.**	**Describe operational measures to implement the following (if applicable):** ❑ **Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system.** Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ❑**Car dealerships and similar may rinse cars with water only.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ K. **Vehicle/Equipment Repair and Maintenance**	❑ **Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater.** ❑ **Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas.** ❑ **Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.**	❑ **State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area.** ❑ **State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.** ❑ **State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.**	**In the Stormwater Control Plan, note that all of the following restrictions apply to use the site:** ❑ **No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains.** ❑ **No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately.** ❑ **No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.** Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ L. **Fuel Dispensing Areas**	❑ **Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable.** ❑ **Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.**		❑ **The property owner shall dry sweep the fueling area routinely.** ❑ **See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

[6] The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ M. **Loading Docks**	❑ **Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer.** ❑ **Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation.** ❑ **Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.**		❑ **Move loaded and unloaded items indoors as soon as possible.** ❑ **See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ N. **Fire Sprinkler Test Water**		☑ **Provide a means to drain fire sprinkler test water to the sanitary sewer.**	☑ **See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**
O. **Miscellaneous Drain or Wash Water or Other Sources** ☐ **Boiler drain lines** ☐ **Condensate drain lines** ☑ **Rooftop equipment** ☑ **Drainage sumps** ☑ **Roofing, gutters, and trim.** ☐ **Other sources**		☐ **Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system.** ☐ **Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system.** ☑ **Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment.** ☑ **Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.** ☑ **Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.** **Include controls for other sources as specified by local reviewer.**	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ P. **Plazas, sidewalks, and parking lots.**			☑ **Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.**

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

OPERATIONS and MAINTENANCE (O&M) PLAN

For:

Serrano Oaks

Clay St.

Jurupa Valley, CA 92509

APN: 163-400-026, -028, -029

Prepared for:

Rexco Development

1285 Corona Point Court, Ste. 102

Corona, CA 92879

951-898-1502

Prepared by:

Land Development Design Company, LLC

2313 E. Philadelphia Street, Suite F

Ontario, CA 91761

909-930-1466

Date of Preparation:

January 17, 2022

Table of Contents

Attachment

Responsible Party Information:

Name: Serrano Oaks
Clay St.
Jurupa Valley, CA 92509

Table 1. BMP Implementation, Maintenance, and Inspection Table

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Non-Structural Source Control BMPs			
Yes	N1. Education for Property Owners, Tenants and Occupants Educational materials will be provided to the owner. The Owner will provide educational materials related to the protection of water quality to their staff, sub-contractors, etc. The education materials will be provided by the Owner upon occupancy and annually thereafter. A list of the BMPs selected for this project can be found in Attachment "A".	Upon occupancy & annually thereafter.	*Owner*

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	N2. Activity Restriction There are no CC&Rs for the project. The Owner will include in the documents given to employees, tenants, owners, etc. the prohibited activities listed below. The maintenance contractor will be instructed to prohibit these activities. The owner is responsible to enforce these restrictions until such time as the building is sold. The dumping of any waste into drainage areas is prohibited. Waste disposal shall be limited to approved receptacles. Blowing or sweeping of debris such as grass clippings, plant trimmings, dead leaves, etc. into the drainage areas or streets is prohibited. All vehicle/equipment maintenance prohibited. Outdoor storage is prohibited. Vehicle washing is prohibited.	Upon occupancy & annually thereafter.	Owner

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	N3. Common Area Landscape Management The Owner will hire a qualified landscape contractor to maintain the landscaping onsite. The landscaping is designed to minimize erosion and to promote water conservation. The maintenance visits shall be conducted biweekly at a minimum. The duties will include maintenance of the landscape, removal of debris, and removal of dead vegetation. The inspections of the irrigation system will be checked for broken pipes, overspray, broken or clogged heads, and proper spray pattern of each head. The timers shall be checked seasonally, at a minimum, to adjust for seasonal needs of watering to prevent overwatering. The rain sensors also need to be inspected to verify proper function.	Weekly at minimum.	Owner
Yes	N4. BMP Maintenance BMP implementation, operation, and maintenance are the owner's responsibility. This section provides the maintenance and frequency required for each BMP. In addition, implementation, operations, and maintenance will be implemented as specified in this Table. The owner shall use the "Record of BMP Implementation, Maintenance, and Inspection" Form in Attachment B. The Owner shall be responsible for completing and maintaining inspection reports that include the date of the inspection, the name of the person who performed the inspection, the signature of the person who performed the inspection, the name of the bmp inspected/maintained, a description of the Implementation, Maintenance, and Inspection Activity Performed. The Owner will be responsible for completing and maintaining inspection forms of their activities in Attachment C. Records shall be maintained continuously. The records shall be available for at least 5 years for inspection upon request from the City Engineer, Regional Water Quality Control Board, or the designated City Representative.	As specified in this table.	Owner

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
No	N5. Title 22 CCR Compliance Hazardous waste are not anticipated	N/A	N/A
No	N7. Spill Contingency Plan Fluids and hazardous wastes are not anticipated.	N/A	N/A
No	N8. Underground Storage Tank Compliance There will be no underground storage tanks.	N/A	N/A
No	N9. Hazardous Materials Disclosure Compliance Hazardous materials are not anticipated.	N/A	N/A
Yes	N10. Uniform Fire Code Implementation The Owner will meet compliance with Article 80 of the Uniform Fire Code enforced by a fire protection agency.	Annually at a minimum.	Owner
Yes	N11. Common Area Litter Control The Owner shall develop a plan to clean-up site for litter on a daily basis.	Site litter clean-up shall be done daily.	Owner
Yes	N12. Employee Training The owner will develop a training program for staff that includes the use of the educational materials; training on litter patrol, contingency plans for spill clean-up, housekeeping of the site, etc. The owner is responsible to supply education materials at the initial time of employment and on an annual basis.	Upon initial employment and annually thereafter.	Owner
No	N13. Housekeeping of Loading Docks Loading docks are not proposed.	N/A	N/A
Yes	N14. Common Area Catch Basin Inspection The Owner will hire a qualified maintenance contractor to inspect the drain inlets and inlet filter's (see manufacturer recommendations) prior to, during, and after the rainy season to assure that they are clean, working properly, free of standing water, and unobstructed from debris, sediment, etc.. The Owner will be responsible to contract with a qualified maintenance contractor to perform these inspections and maintenance services.	The drain inlets and inlet filter's (see manufacturer recommendations) shall be inspected/maintained prior to, during, and after the rainy season at a minimum.	Owner

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	N15. Street Sweeping Private Streets and Parking Lots The site's parking lot will be swept bi-weekly, at a minimum frequency, to remove sediment and other debris. The owner will contract with a qualified contractor to perform this BMP.	Bi-weekly at a minimum.	Owner
No	N17. Comply with all other applicable NPDES permits NPDES General Industrial Activities Permit to be complied with by filing a SWPPP with the state and obtaining a WDID Discharge Permit # as needed.	SWPPP needs to be kept onsite, as needed.	Owner
	Structural Source Control BMPs		
Yes	Provide Storm Drain System Stenciling and Signage Inspect Storm Drain System Stenciling and Signage. Replace as necessary. The drain inlet shall be stenciled "NO DUMPING-DRAINS TO OCEAN"	Annually at a minimum	Owner
No	Design and Construct Outdoor Material Storage Areas to Reduce Pollutant Introduction The will be no outdoor storage areas	N/A	N/A
Yes	Design and Construct Trash and Waste Storage Areas to Reduce Pollutant Introduction The trash enclosure was selected and designed to reduce pollution and dispose of the waste in a correct manner. The trash bins shall have solid lids. Furthermore, the trash enclosure was designed to prevent storm water runoff from entering or flowing through.	The Trash Enclosure shall be inspected and cleaned weekly at a minimum. The Dumpster pick-up shall be scheduled weekly at minimum.	Owner
Yes	Use Efficient Irrigation Systems & Landscape Design Will employ rain-triggered shutoff devices to prevent irrigation after precipitation. Implement landscape plans consistent with county or city water conservation resolutions, which may include provision of water sensors, programmable irrigation times.	The irrigation system and landscape shall be maintained at a weekly interval at a minimum.	Owner
No	Protect Slopes and Channels and Provide Energy Dissipation Not a project feature.	N/A	N/A
No	Maintenance Bays There will be no maintenance bays.	N/A	N/A

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
No	Vehicle Wash Areas There will be no vehicle washing areas	N/A	N/A
No	Outdoor Processing Areas There are no outdoor processing areas.	N/A	N/A
No	Equipment Wash Areas There are no equipment wash areas.	N/A	N/A
No	Fueling Areas There are no fueling areas.	N/A	N/A
No	Hillside Landscaping Not a feature of the project site.	N/A	N/A
No	Wash Water Controls for Food Preparation Areas There are no food preparation area.	N/A	N/A
No	Community Car Wash Racks There is no community car wash racks.	N/A	N/A
	Treatment Control BMPs		
Yes	Inlet Filters The inlet filters shall be inspected, cleaned, and replaced as necessary. The debris shall be removed and disposed of in proper receptacles. See manufactures maintenance recommendations in Appendix 10 of the WQMP.	The FlexStorm Inlet Filters shall be inspected/maintained prior to, during, and following the rainy season at a minimum.	Owner

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
	Infiltration BMPs		
Yes	Underground Storage Infiltration System The Underground Storage Pipe shall be inspected and maintained by a qualified maintenance contractor to ensure they are clean, free of standing water, working properly, and unobstructed from debris, sediment, etc. Operation, Inspections, and Maintenance shall be performed as specified in the Underground Infiltration System Inspection/Maintenance section. See Appendix 10 of the WQMP for additional inspection and maintenance recommendations.	The Underground Storage Infiltration System shall be inspected/maintained prior to, during, and after the rainy season at a minimum. During the first year of operation, the system shall be inspected every 6 months at a minimum. After the first 6 months, the system shall be inspected yearly at a minimum. The Underground Storage Infiltration System shall have sediment removed when 3 inches of sediment accumulate throughout the length of a row of pipe.	Owner

Regulatory Permits

This O&M Plan has been prepared in conjunction with the Water Quality Management Plan (WQMP) for Low Impact Development (LID) prepared for this project. Furthermore, this O&M Plan is in accordance with the Water Quality Management Plan (WQMP) for the Santa Ana Region for Riverside County (Order No. R8-2010-0033, NPDES Permit No. CAS618033).

Forms to Record BMP Implementation, Maintenance, and Inspection

The Owner, Serrano Oaks, shall be responsible for BMP Implementation, Maintenance, and Inspection. See Table 1 for BMP implementation, maintenance, and inspection requirements. The form "Record of BMP Implementation, Maintenance, and Inspection" in Attachment B will be used to record implementation, maintenance, and inspection of BMPs. The inspection form shall include the date of the inspection, the name of the person who performed the inspection, the signature of the person who performed the inspection, the name of the bmp inspected/ maintained, a description of the implementation, maintenance, and inspection activity performed. Completed forms shall be kept in Attachment C. Records shall be maintained continuously.

Recordkeeping

All records must be maintained for at least five (5) years and must be made available for review upon request.

Employee Training Program

The Owner, Serrano Oaks, will develop a training program for staff that includes the use of the educational materials; training on litter patrol, contingency plans for spill clean-up, housekeeping of the site, etc. The owner is responsible to supply education materials at the time of initial employment and on an annual basis.

Revisions to O&M Plan

Revisions to the O&M Plan in the event of a substantial change to the project due to construction modifications or uses at the site will be the responsibility of the Property Owner. Modifications to the O&M Plan may be necessary if project changes result in a potential increase in pollutant discharge to storm water or if inspection and monitoring indicates that existing BMPs are ineffective. The Property Owner shall secure the services of the firm that prepared the original O&M Plan or other qualified person(s) to make any appropriate changes, additions, or deletions. Any revisions shall require approval by the local government that has jurisdiction over the subject property.

Funding

The Owner, as listed below, will be responsible for funding the installation and on-going maintenance for the BMPs. An appropriate mechanism for the long-term operation and maintenance will be developed by the Owner.

Owner/Responsible Party Information:

Rexco Development
1285 Corona Pointe Court, Ste. 102
Corona, CA 92879
951-898-1502

Attachment A:

Educational Material

Educational Materials

Practical information will be provided to the owner/operators of the facility on general good housekeeping practices that contribute to protection of storm water quality. Environmental awareness education materials are made available by the municipalities. See list attached for titles of reference materials provided to the operators prior to transfer.

Following are the educational materials included in this WQMP:

- SC-10 Non-Storm Water Discharges
- SC-11 Spill-Prevention, Control & Cleanup
- SC-30 Outdoor Loading/Unloading
- SC-41 Building & Grounds Maintenance
- SC-43 Parking Area Maintenance
- SC-44 Drainage System Maintenance
- SC-60 Housekeeping Practices
- SC-73 Landscape Maintenance
- SD-10 Site Design & Landscape Planning
- SD-11 Roof Runoff Controls
- SD-12 Efficient Irrigation
- SD-13 Storm Drain System Signs
- SD-32 Trash Enclosures
- MP-52 Drain Inserts

Public Education- Educational materials shall be provided to the owner or tenant concerning good housekeeping practices, and illegal dumping. These materials can be obtained from the city, other local agencies, and via the internet at http://www.cabmphandbooks.com/. A copy has been included in Section 6.4 of the WQMP.

Attachment B:

Inspection Form

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

Attachment C:

Completed Inspection Forms

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

FLEXSTORM OPERATION AND MAINTENANCE PLAN

OPERATION & MAINTENANCE PLAN

Installation Instructions:

1. Remove grate from the drainage structure
2. Clean stone and dirt from ledge (lip) of drainage structure
3. Drop the FLEXSTORM inlet filter through the clear opening such that the hangers rest firmly on the lip of the structure.
4. Replace the grate and confirm it is not elevated more than 1/8", the thickness of the steel hangers.

Frequency of Inspections:

1. Inspection should occur following any rain event >½".
2. Post construction inspections should occur 4 times per year. In snowfall affected regions additional inspections should take place before and after snowfall season.
3. Industrial application site inspections (loading ramps, wash racks, maintenance facilities) should occur on a regularly scheduled basis no less than 3 times/year.

Maintenance Guidelines:

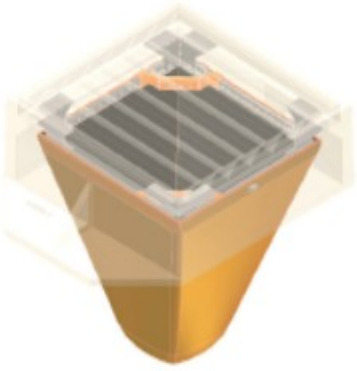
1. Empty the sediment bag if more than half filled with sediment and debris, or as directed.
2. Remove the grate, engage the lifting bars with the FLEXSTORM Removal Tool, and lift from drainage structure.
3. Dispose of sediment or debris as directed by the Engineer or Maintenance contract.
4. An industrial vacuum can be used to collect sediment.
5. Remove caked on silt from sediment bag and flush with Medium spray with optimal filtration.
6. Replace bag if torn or punctured to >½" diameter on lower half of bag.

Post Construction PC Bag Maintenance:

1. At 50% saturation the average 2'x2' Adsorb-it lined PC filter will retain approximately 75 oz (4.2 lbs) of oil and should be serviced. To recover the oils the filter can be centrifuged or passed through a wringer.
2. Oil skimmer pouches start to turn black when saturated, indicating time for replacement. Each ClearTec Rubberizer pouch will absorb ~62oz (4 lbs) of oil before needing replacement.
3. Dispose of all oil contaminated products in accordance with EPA guidelines. ClearTec Rubberizer, since a solidifier, will not leach under pressure and can be disposed of in most landfills, recycled for industrial applications, or burned as fuel.

Sediment Bag Replacement:

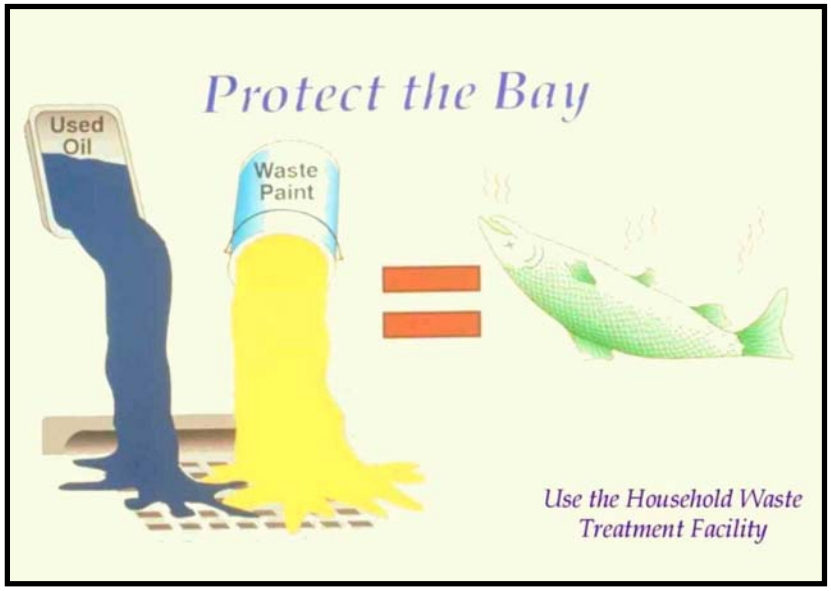
1. Remove the bag by loosening or cutting off clamping bag.
2. Take new sediment bag and secure worm drive clamping band to the frame channel.
3. Ensure Bag is secure and there is no slack around perimeter.



STRUCTURE ID#/LOCATION:

DATE	TASK PERFORMED	INSPECTOR

Non-Stormwater Discharges SC-10



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Non-stormwater discharges are those flows that do not consist entirely of stormwater. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include car washing, air conditioner condensate, etc. However there are certain non-stormwater discharges that pose environmental concern. These discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges (which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants into storm drains. They can generally be detected through a combination of detection and elimination. The ultimate goal is to effectively eliminate non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of pollutants on streets and into the storm drain system and creeks.

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Approach

Initially the industry must make an assessment of non-stormwater discharges to determine which types must be eliminated or addressed through BMPs. The focus of the following approach is in the elimination of non-stormwater discharges.

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Pollution Prevention

- Ensure that used oil, used antifreeze, and hazardous chemical recycling programs are being implemented. Encourage litter control.

Suggested Protocols

Recommended Complaint Investigation Equipment

- Field Screening Analysis
  - pH paper or meter
  - Commercial stormwater pollutant screening kit that can detect for reactive phosphorus, nitrate nitrogen, ammonium nitrogen, specific conductance, and turbidity
  - Sample jars
  - Sample collection pole
  - A tool to remove access hole covers
- Laboratory Analysis
  - Sample cooler
  - Ice
  - Sample jars and labels
  - Chain of custody forms
- Documentation
  - Camera
  - Notebook
  - Pens
  - Notice of Violation forms
  - Educational materials

General

- Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially those that are not classified as hazardous. These are often not responded to as effectively as they need to be.
- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream” stenciled or demarcated next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

- See SC44 Stormwater Drainage System Maintenance for additional information.

Illicit Connections

- Locate discharges from the industrial storm drainage system to the municipal storm drain system through review of "as-built" piping schematics.
- Isolate problem areas and plug illicit discharge points.
- Locate and evaluate all discharges to the industrial storm drain system.

Visual Inspection and Inventory

- Inventory and inspect each discharge point during dry weather.
- Keep in mind that drainage from a storm event can continue for a day or two following the end of a storm and groundwater may infiltrate the underground stormwater collection system. Also, non-stormwater discharges are often intermittent and may require periodic inspections.

Review Infield Piping

- A review of the "as-built" piping schematic is a way to determine if there are any connections to the stormwater collection system.
- Inspect the path of floor drains in older buildings.

Smoke Testing

- Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two systems.
- During dry weather the stormwater collection system is filled with smoke and then traced to sources. The appearance of smoke at the base of a toilet indicates that there may be a connection between the sanitary and the stormwater system.

Dye Testing

- A dye test can be performed by simply releasing a dye into either your sanitary or process wastewater system and examining the discharge points from the stormwater collection system for discoloration.

TV Inspection of Drainage System

- TV Cameras can be employed to visually identify illicit connections to the industrial storm drainage system.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- On paved surfaces, clean up spills with as little water as possible. 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 the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- 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.

Once a site has been cleaned:

- Post "No Dumping" signs with a phone number for reporting dumping and disposal.
- Landscaping and beautification efforts of hot spots may also discourage future dumping, as well as provide open space and increase property values.
- Lighting or barriers may also be needed to discourage future dumping.
- See fact sheet SC11 Spill Prevention, Control, and Cleanup.

Inspection

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Conduct field investigations of the industrial storm drain system for potential sources of non-stormwater discharges.
- Pro-actively conduct investigations of high priority areas. Based on historical data, prioritize specific geographic areas and/or incident type for pro-active investigations.

Reporting

- A database is useful for defining and tracking the magnitude and location of the problem.
- Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained, and cleaned up or eliminated.
- Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any on-site drainage points observed.
- Document and report annually the results of the program.
- Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.

Training

- Training of technical staff in identifying and documenting illegal dumping incidents is required.
- Consider posting the quick reference table near storm drains to reinforce training.
- Train employees to identify non-stormwater discharges and report discharges to the appropriate departments.

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Determine and implement appropriate outreach efforts to reduce non-permissible non-stormwater discharges.
- Conduct spill response drills annually (if no events occurred to evaluate your plan) in cooperation with other industries.
- When a responsible party is identified, educate the party on the impacts of his or her actions.

Spill Response and Prevention

- See SC11 Spill Prevention Control and Cleanup.

Other Considerations

- Many facilities do not have accurate, up-to-date schematic drawings.

Requirements

Costs (including capital and operation & maintenance)

- The primary cost is for staff time and depends on how aggressively a program is implemented.
- Cost for containment and disposal is borne by the discharger.
- Illicit connections can be difficult to locate especially if there is groundwater infiltration.
- Indoor floor drains may require re-plumbing if cross-connections to storm drains are detected.

Maintenance (including administrative and staffing)

- Illegal dumping and illicit connection violations requires technical staff to detect and investigate them.

Supplemental Information

Further Detail of the BMP

Illegal Dumping

- Substances illegally dumped on streets and into the storm drain systems and creeks include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. All of these wastes cause stormwater and receiving water quality problems as well as clog the storm drain system itself.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots

- 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

One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people at the facility who are aware of the problem and who have the tools to at least identify the incident, if not correct it. Therefore, train field staff to recognize and report the incidents.

What constitutes a "non-stormwater" discharge?

- Non-stormwater discharges to the stormwater collection system may include any water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

Permit Requirements

- Facilities subject to stormwater permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence of non-stormwater discharges. The State's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's SWPPP.

Performance Evaluation

- Review annually internal investigation results; assess whether goals were met and what changes or improvements are necessary.
- Obtain feedback from personnel assigned to respond to, or inspect for, illicit connections and illegal dumping incidents.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Spill Prevention, Control & Cleanup SC-11

Photo Credit: Geoff Brosseau

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Many activities that occur at an industrial or commercial site have the potential to cause accidental or illegal spills. Preparation for accidental or illegal spills, with proper training and reporting systems implemented, can minimize the discharge of pollutants to the environment.

Spills and leaks are one of the largest contributors of stormwater pollutants. Spill prevention and control plans are applicable to any site at which hazardous materials are stored or used. An effective plan should have spill prevention and response procedures that identify potential spill areas, specify material handling procedures, describe spill response procedures, and provide spill clean-up equipment. The plan should take steps to identify and characterize potential spills, eliminate and reduce spill potential, respond to spills when they occur in an effort to prevent pollutants from entering the stormwater drainage system, and train personnel to prevent and control future spills.

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Approach

Pollution Prevention

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

- Develop a Spill Prevention Control and Countermeasure (SPCC) Plan. The plan should include:

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- Description of the facility, owner and address, activities and chemicals present
- Facility map
- Notification and evacuation procedures
- Cleanup instructions
- Identification of responsible departments
- Identify key spill response personnel

- Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of process materials that are brought into the facility.

Suggested Protocols (including equipment needs)

Spill Prevention

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

- If consistent illegal dumping is observed at the facility:
  - Post "No Dumping" signs with a phone number for reporting illegal dumping and disposal. Signs should also indicate fines and penalties applicable for illegal dumping.
  - Landscaping and beautification efforts may also discourage illegal dumping.
  - Bright lighting and/or entrance barriers may also be needed to discourage illegal dumping.

- Store and contain liquid materials in such a manner that if the tank is ruptured, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.

- If the liquid is oil, gas, or other material that separates from and floats on water, install a spill control device (such as a tee section) in the catch basins that collects runoff from the storage tank area.

- Routine maintenance:
  - Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Any collected liquids or soiled absorbent materials must be reused/recycled or properly disposed.
  - Store and maintain appropriate spill cleanup materials in a location known to all near the tank storage area; and ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
  - Sweep and clean the storage area monthly if it is paved, *do not hose down the area to a storm drain.*

  - Check tanks (and any containment sumps) daily 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.

- Label all containers 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).
- Identify key spill response personnel.

Spill Control and Cleanup Activities

- Follow the Spill Prevention Control and Countermeasure Plan.
- Clean up leaks and spills immediately.
- Place a stockpile of spill cleanup materials where it will be readily accessible (e.g., near storage and maintenance areas).
- On paved surfaces, clean up spills with as little water as possible. 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 the 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 of brooms, shovels, sweepers, or plows.
- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Chemical cleanups of material can be achieved with the use of adsorbents, 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.

Reporting

- Report spills that pose an immediate threat to human health or the environment to the Regional Water Quality Control Board.
- 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).
- Report spills to local agencies, such as the fire department; they can assist in cleanup.
- 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

Training

- Educate employees about spill prevention and cleanup.

- Well-trained employees can reduce human errors that lead to accidental releases or spills:

  - The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.

  - Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.

- Employees should be educated about aboveground storage tank requirements. Employees responsible for aboveground storage tanks and liquid transfers should be thoroughly familiar with the Spill Prevention Control and Countermeasure Plan and the plan should be readily available.

- Train employees to recognize and report illegal dumping incidents.

Other Considerations (Limitations and Regulations)

- A Spill Prevention Control and Countermeasure Plan (SPCC) is required for facilities that are subject to the oil pollution regulations specified in Part 112 of Title 40 of the Code of Federal Regulations or if they have a storage capacity of 10,000 gallons or more of petroleum. (Health and Safety Code 6.67)

- State regulations also exist for storage of hazardous materials (Health & Safety Code Chapter 6.95), including the preparation of area and business plans for emergency response to the releases or threatened releases.

- Consider requiring smaller secondary containment areas (less than 200 sq. ft.) to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

Requirements

Costs (including capital and operation & maintenance)

- Will vary depending on the size of the facility and the necessary controls.

- Prevention of leaks and spills is inexpensive. Treatment and/or disposal of contaminated soil or water can be quite expensive.

Maintenance (including administrative and staffing)

- This BMP has no major administrative or staffing requirements. However, extra time is needed to properly handle and dispose of spills, which results in increased labor costs.

Supplemental Information

Further Detail of the BMP

Reporting

Record keeping and internal reporting represent good operating practices because they can increase the efficiency of the facility and the effectiveness of BMPs. A good record keeping system helps the facility minimize incident recurrence, correctly respond with appropriate cleanup activities, and comply with legal requirements. A record keeping and reporting system should be set up for documenting spills, leaks, and other discharges, including discharges of hazardous substances in reportable quantities. Incident records describe the quality and quantity of non-stormwater discharges to the storm sewer. These records should contain the following information:

- Date and time of the incident
- Weather conditions
- Duration of the spill/leak/discharge
- Cause of the spill/leak/discharge
- Response procedures implemented
- Persons notified
- Environmental problems associated with the spill/leak/discharge

Separate record keeping systems should be established to document housekeeping and preventive maintenance inspections, and training activities. All housekeeping and preventive maintenance inspections should be documented. Inspection documentation should contain the following information:

- The date and time the inspection was performed
- Name of the inspector
- Items inspected
- Problems noted
- Corrective action required
- Date corrective action was taken

Other means to document and record inspection results are field notes, timed and dated photographs, videotapes, and drawings and maps.

Aboveground Tank Leak and Spill Control

Accidental releases of materials from aboveground liquid storage tanks present the potential for contaminating stormwater with many different pollutants. Materials spilled, leaked, or lost from

tanks may accumulate in soils or on impervious surfaces and be carried away by stormwater runoff.

The most common causes of unintentional releases are:

- Installation problems
- Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves)
- External corrosion and structural failure
- Spills and overfills due to operator error
- Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa

Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Practices listed below should be employed to enhance the code requirements:

- Tanks should be placed in a designated area.
- Tanks located in areas where firearms are discharged should be encapsulated in concrete or the equivalent.
- Designated areas should be impervious and paved with Portland cement concrete, free of cracks and gaps, in order to contain leaks and spills.
- Liquid materials should be stored in UL approved double walled tanks or surrounded by a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain.
- For used oil or dangerous waste, a dead-end sump should be installed in the drain.
- All other liquids should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
- Accumulated stormwater in petroleum storage areas should be passed through an oil/water separator.

Maintenance is critical to preventing leaks and spills. Conduct routine inspections and:

- Check for external corrosion and structural failure.
- Check for spills and overfills due to operator error.
- Check for failure of piping system (pipes, pumps, flanger, coupling, hoses, and valves).
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.

- Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Frequently relocate accumulated stormwater during the wet season.
- Periodically conduct integrity testing by a qualified professional.

Vehicle Leak and Spill Control

Major spills on roadways and other public areas are generally handled by highly trained Hazmat teams from local fire departments or environmental health departments. The measures listed below pertain to leaks and smaller spills at vehicle maintenance shops.

In addition to implementing the spill prevention, control, and clean up practices above, use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- Perform all vehicle fluid removal or changing inside or under cover to prevent the run-on of stormwater and the runoff of spills.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Immediately drain all fluids from wrecked vehicles.
- Store wrecked vehicles or damaged equipment under cover.
- Place drip pans or absorbent materials under heavy equipment when not in use.
- Use adsorbent materials on small spills rather than hosing down the spill.
- Remove the adsorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- Oil filters disposed of in trashcans or dumpsters can leak oil and contaminate stormwater. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.

- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- Design the fueling area to prevent the run-on of stormwater and the runoff of spills:
  - Cover fueling area if possible.
  - Use a perimeter drain or slope pavement inward with drainage to a sump.
  - Pave fueling area with concrete rather than asphalt.
- If dead-end sump is not used to collect spills, install an oil/water separator.
- Install vapor recovery nozzles to help control drips as well as air pollution.
- Discourage "topping-off' of fuel tanks.
- Use secondary containment when transferring fuel from the tank truck to the fuel tank.
- Use adsorbent materials on small spills and general cleaning rather than hosing down the area. Remove the adsorbent materials promptly.
- Carry out all Federal and State requirements regarding underground storage tanks, or install above ground tanks.
- Do not use mobile fueling of mobile industrial equipment around the facility; rather, transport the equipment to designated fueling areas.
- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Train employees in proper fueling and cleanup procedures.

Industrial Spill Prevention Response

For the purposes of developing a spill prevention and response program to meet the stormwater regulations, facility managers should use information provided in this fact sheet and the spill prevention/response portions of the fact sheets in this handbook, for specific activities. The program should:

- Integrate with existing emergency response/hazardous materials programs (e.g., Fire Department)
- Develop procedures to prevent/mitigate spills to storm drain systems
- Identify responsible departments
- Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures
- Address spills at municipal facilities, as well as public areas

- Provide training concerning spill prevention, response and cleanup to all appropriate personnel

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Stormwater Managers Resource Center http://www.stormwatercenter.net/

Building & Grounds Maintenance SC-41

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	
Organics	

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, abnormal pH, and oils and greases. Utilizing the protocols in this fact sheet will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Encourage proper lawn management and landscaping, including use of native vegetation.

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- Encourage use of Integrated Pest Management techniques for pest control.
- Encourage proper onsite recycling of yard trimmings.
- Recycle residual paints, solvents, lumber, and other material as much as possible.

Suggested Protocols

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used, and the surrounding area is paved, wash runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.
- If you are pressure washing on a grassed 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 grass and not drain to pavement.

Landscaping Activities

- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures on exposed soils.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.
- 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.
- Clean paintbrushes 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.
- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. This is particularly necessary on rainy days. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. If directed off-site, you should direct the water through hay bales and filter fabric or use other sediment filters or traps.
- Store toxic material under cover during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures when soils are exposed.
- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Consider an alternative approach when bailing out muddy water: do not put it in the storm drain; pour over landscaped areas.
- Use hand weeding where practical.

Fertilizer and Pesticide Management

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.
- Use less toxic pesticides that will do the job when applicable. Avoid use of copper-based pesticides if possible.
- Do not use pesticides if rain is expected.
- Do not mix or prepare pesticides for application near storm drains.
- Use the minimum amount needed for the job.
- Calibrate fertilizer distributors to avoid excessive application.
- Employ techniques to minimize off-target application (e.g., spray drift) of pesticides, including consideration of alternative application techniques.
- Apply pesticides only when wind speeds are low.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Irrigate slowly to prevent runoff and then only as much as is needed.
- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Dispose of empty pesticide containers according to the instructions on the container label.

- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering and repair leaks in the irrigation system as soon as they are observed.

Training

- Educate and train employees on pesticide use and in pesticide application techniques to prevent pollution.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Be sure the frequency of training takes into account the complexity of the operations and the nature of the staff.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where it will be readily accessible.
- Have employees trained in spill containment and cleanup present during the loading/unloading of dangerous wastes, liquid chemicals, or other materials.
- Familiarize employees with the Spill Prevention Control and Countermeasure Plan.
- Clean up spills immediately.

Other Considerations

Alternative pest/weed controls may not be available, suitable, or effective in many cases.

Requirements

Costs

- Cost will vary depending on the type and size of facility.
- Overall costs should be low in comparison to other BMPs.

Maintenance

Sweep paved areas regularly to collect loose particles. Wipe up spills with rags and other absorbent material immediately, do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Fire Sprinkler Line Flushing

Building fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water, though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping, but it is subject to rusting and results in lower quality water. Initially, the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time (typically a year) and between flushes may accumulate iron, manganese, lead, copper, nickel, and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Mobile Cleaners Pilot Program: Final Report. 1997. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Parking/Storage Area Maintenance SC-43

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Description

Parking lots and storage areas can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants from parking/storage areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

Approach

The goal of this program is to ensure stormwater pollution prevention practices are considered when conducting activities on or around parking areas and storage areas to reduce potential for pollutant discharge to receiving waters. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Encourage alternative designs and maintenance strategies for impervious parking lots. (See New Development and Redevelopment BMP Handbook)
- Keep accurate maintenance logs to evaluate BMP implementation.

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SC-43 Parking/Storage Area Maintenance

Suggested Protocols

General

- Keep the parking and storage areas clean and orderly. Remove debris in a timely fashion.
- 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.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.
- Discharge soapy water remaining in mop or wash buckets to the sanitary sewer through a sink, toilet, clean-out, or wash area with drain.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide an adequate number of litter receptacles.
- Clean out and cover litter receptacles frequently to prevent spillage.
- Provide trash receptacles in parking lots to discourage litter.
- Routinely sweep, shovel, and dispose of litter in the trash.

Surface Cleaning

- Use dry cleaning methods (e.g., sweeping, vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system if possible.
- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- Sweep all parking lots at least once before the onset of the wet season.
- Follow the procedures below if water is used to clean surfaces:
  - Block the storm drain or contain runoff.
  - Collect and pump wash water to the sanitary sewer or discharge to a pervious surface. Do not allow wash water to enter storm drains.
  - Dispose of parking lot sweeping debris and dirt at a landfill.
- Follow the procedures below when cleaning heavy oily deposits:
  - Clean oily spots with absorbent materials.
  - Use a screen or filter fabric over inlet, then wash surfaces.

- Do not allow discharges to the storm drain.
- Vacuum/pump discharges to a tank or discharge to sanitary sewer.
- Appropriately dispose of spilled materials and absorbents.

Surface Repair

- Preheat, transfer or load hot bituminous material away from storm drain inlets.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff.
- Cover and seal nearby storm drain inlets where applicable (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.
- Use only as much water as necessary for dust control, to avoid runoff.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Inspection

- Have designated personnel conduct inspections of parking facilities and stormwater conveyance systems associated with parking facilities on a regular basis.
- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Training

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.
- Train employees and contractors in proper techniques for spill containment and cleanup.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- Clean up fluid spills immediately with absorbent rags or material.
- Dispose of spilled material and absorbents properly.

Other Considerations

Limitations related to sweeping activities at large parking facilities may include high equipment costs, the need for sweeper operator training, and the inability of current sweeper technology to remove oil and grease.

SC-43 Parking/Storage Area Maintenance

Requirements

Costs

Cleaning/sweeping costs can be quite large. Construction and maintenance of stormwater structural controls can be quite expensive as well.

Maintenance

- Sweep parking lot regularly to minimize cleaning with water.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Clean parking facilities regularly to prevent accumulated wastes and pollutants from being discharged into conveyance systems during rainy conditions.

Supplemental Information

Further Detail of the BMP

Surface Repair

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff. Where applicable, 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 all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal. Only use only as much water as is necessary for dust control to avoid runoff.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Drainage System Maintenance SC-44

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and stormwater that may contain certain pollutants. The protocols in this fact sheet are intended to reduce pollutants reaching receiving waters through proper conveyance system operation and maintenance.

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	
Bacteria	✓
Oil and Grease	
Organics	

Approach

Pollution Prevention

Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Suggested Protocols

Catch Basins/Inlet Structures

- Staff should regularly inspect facilities to ensure compliance with the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC34 Waste Handling and Disposal).

- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- Conduct routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS.

Illicit Connections and Discharges

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:
  - Is there evidence of spills such as paints, discoloring, etc?

- Are there any odors associated with the drainage system?
- Record locations of apparent illegal discharges/illicit connections?
- Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- Eliminate the discharge once the origin of flow is established.

- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - 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
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Allow only properly trained individuals to handle hazardous materials/wastes.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).

- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).

- Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Spill Response and Prevention

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.
- Refer to fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Other Considerations (Limitations and Regulations)

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and prohibition against disposal of flushed effluent to sanitary sewer in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget.
- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The primary cost is for staff time. Cost depends on how aggressively a program is implemented. Other cost considerations for an illegal dumping program include:

  - Purchase and installation of signs.

  - Rental of vehicle(s) to haul illegally-disposed items and material to landfills.

  - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.

  - Purchase of landfill space to dispose of illegally-dumped items and material.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.

Supplemental Information

Further Detail of the BMP

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm sewer flushing.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

Ferguson, B.K. 1991. Urban Stream Reclamation, p. 324-322, Journal of Soil and Water Conservation.

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line:
http://www.epa.gov/npdes/menuofbmps/poll_16.htm

Housekeeping Practices SC-60

Description

Promote efficient and safe housekeeping practices (storage, use, and cleanup) when handling potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, automotive products, and swimming pool chemicals. Related information is provided in BMP fact sheets SC-11 Spill Prevention, Control & Cleanup and SC-34 Waste Handling & Disposal.

Approach

Pollution Prevention

- Purchase only the amount of material that will be needed for foreseeable use. In most cases this will result in cost savings in both purchasing and disposal. See SC-61 Safer Alternative Products for additional information.
- Be aware of new products that may do the same job with less environmental risk and for less or the equivalent cost. Total cost must be used here; this includes purchase price, transportation costs, storage costs, use related costs, clean up costs and disposal costs.

Suggested Protocols

General

- Keep work sites clean and orderly. Remove debris in a timely fashion. Sweep the area.
- Dispose of wash water, sweepings, and sediments, properly.
- Recycle or dispose of fluids properly.
- Establish a daily checklist of office, yard and plant areas to confirm cleanliness and adherence to proper storage and security. Specific employees should be assigned specific inspection responsibilities and given the authority to remedy any problems found.
- Post waste disposal charts in appropriate locations detailing for each waste its hazardous nature (poison, corrosive, flammable), prohibitions on its disposal (dumpster, drain, sewer) and the recommended disposal method (recycle, sewer, burn, storage, landfill).
- Summarize the chosen BMPs applicable to your operation and post them in appropriate conspicuous places.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

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- Require a signed checklist from every user of any hazardous material detailing amount taken, amount used, amount returned and disposal of spent material.
- Do a before audit of your site to establish baseline conditions and regular subsequent audits to note any changes and whether conditions are improving or deteriorating.
- Keep records of water, air and solid waste quantities and quality tests and their disposition.
- Maintain a mass balance of incoming, outgoing and on hand materials so you know when there are unknown losses that need to be tracked down and accounted for.
- Use and reward employee suggestions related to BMPs, hazards, pollution reduction, work place safety, cost reduction, alternative materials and procedures, recycling and disposal.
- Have, and review regularly, a contingency plan for spills, leaks, weather extremes etc. Make sure all employees know about it and what their role is so that it comes into force automatically.

Training

- Train all employees, management, office, yard, manufacturing, field and clerical in BMPs and pollution prevention and make them accountable.
- Train municipal employees who handle potentially harmful materials in good housekeeping practices.
- Train personnel who use pesticides in the proper use of the pesticides. The California Department of Pesticide Regulation license pesticide dealers, certify pesticide applicators and conduct onsite inspections.
- Train employees and contractors in proper techniques for spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and Countermeasure (SPCC) plant up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- There are no major limitations to this best management practice.
- There are no regulatory requirements to this BMP. Existing regulations already require municipalities to properly store, use, and dispose of hazardous materials

Requirements

Costs

- Minimal cost associated with this BMP. Implementation of good housekeeping practices may result in cost savings as these procedures may reduce the need for more costly BMPs.

Maintenance

- Ongoing maintenance required to keep a clean site. Level of effort is a function of site size and type of activities.

Supplemental Information

Further Detail of the BMP

- The California Integrated Waste Management Board's Recycling Hotline, 1-800-553-2962, provides information on household hazardous waste collection programs and facilities.

Examples

There are a number of communities with effective programs. The most pro-active include Santa Clara County and the City of Palo Alto, the City and County of San Francisco, and the Municipality of Metropolitan Seattle (Metro).

References and Resources

British Columbia Lake Stewardship Society. Best Management Practices to Protect Water Quality from Non-Point Source Pollution. March 2000.
http://www.nalms.org/bclss/bmphome.html#bmp

King County Stormwater Pollution Control Manual - 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 by California Coastal Commission, February 2002.

Orange County Stormwater Program
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

San Mateo STOPPP - (http://stoppp.tripod.com/bmp.html)

Landscape Maintenance SC-73

Objectives

- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	
Oxygen Demanding	☑

Description

Landscape maintenance activities include vegetation removal; herbicide and insecticide application; fertilizer application; watering; and other gardening and lawn care practices. Vegetation control typically involves a combination of chemical (herbicide) application and mechanical methods. All of these maintenance practices have the potential to contribute pollutants to the storm drain system. The major objectives of this BMP are to minimize the discharge of pesticides, herbicides and fertilizers to the storm drain system and receiving waters; prevent the disposal of landscape waste into the storm drain system by collecting and properly disposing of clippings and cuttings, and educating employees and the public.

Approach

Pollution Prevention

- Implement an integrated pest management (IPM) program. IPM is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools.
- Choose low water using flowers, trees, shrubs, and groundcover.
- Consider alternative landscaping techniques such as naturescaping and xeriscaping.
- Conduct appropriate maintenance (i.e. properly timed fertilizing, weeding, pest control, and pruning) to help preserve the landscapes water efficiency.

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- Consider grass cycling (grass cycling is the natural recycling of grass by leaving the clippings on the lawn when mowing. Grass clippings decompose quickly and release valuable nutrients back into the lawn).

Suggested Protocols

Mowing, Trimming, and Weeding

- Whenever possible use mechanical methods of vegetation removal (e.g mowing with tractor-type or push mowers, hand cutting with gas or electric powered weed trimmers) rather than applying herbicides. Use hand weeding where practical.
- Avoid loosening the soil when conducting mechanical or manual weed control, this could lead to erosion. Use mulch or other erosion control measures when soils are exposed.
- Performing mowing at optimal times. Mowing should not be performed if significant rain events are predicted.
- Mulching mowers may be recommended for certain flat areas. Other techniques may be employed to minimize mowing such as selective vegetative planting using low maintenance grasses and shrubs.
- Collect lawn and garden clippings, pruning waste, tree trimmings, and weeds. Chip if necessary, and compost or dispose of at a landfill (see waste management section of this fact sheet).
- Place temporarily stockpiled material away from watercourses, and berm or cover stockpiles to prevent material releases to storm drains.

Planting

- Determine existing native vegetation features (location, species, size, function, importance) and consider the feasibility of protecting them. Consider elements such as their effect on drainage and erosion, hardiness, maintenance requirements, and possible conflicts between preserving vegetation and the resulting maintenance needs.
- Retain and/or plant selected native vegetation whose features are determined to be beneficial, where feasible. Native vegetation usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation.
- Consider using low water use groundcovers when planting or replanting.

Waste Management

- Compost leaves, sticks, or other collected vegetation or dispose of at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Place temporarily stockpiled material away from watercourses and storm drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Reduce the use of high nitrogen fertilizers that produce excess growth requiring more frequent mowing or trimming.

- Avoid landscape wastes in and around storm drain inlets by either using bagging equipment or by manually picking up the material.

Irrigation

- Where practical, use automatic timers to minimize runoff.
- Use popup sprinkler heads in areas with a lot of activity or where there is a chance the pipes may be broken. Consider the use of mechanisms that reduce water flow to sprinkler heads if broken.
- Ensure that there is no runoff from the landscaped area(s) if re-claimed water is used for irrigation.
- 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.
- Irrigate slowly or pulse irrigate to prevent runoff and then only irrigate as much as is needed.
- Apply water at rates that do not exceed the infiltration rate of the soil.

Fertilizer and Pesticide Management

- Utilize a comprehensive management system that incorporates integrated pest management (IPM) techniques. There are many methods and types of IPM, including the following:
  - Mulching can be used to prevent weeds where turf is absent, fencing installed to keep rodents out, and netting used to keep birds and insects away from leaves and fruit.
  - Visible insects can be removed by hand (with gloves or tweezers) and placed in soapy water or vegetable oil. Alternatively, insects can be sprayed off the plant with water or in some cases vacuumed off of larger plants.
  - Store-bought traps, such as species-specific, pheromone-based traps or colored sticky cards, can be used.
  - Slugs 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, tree trunk guards.
  - Beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seed head weevils, and spiders that prey on detrimental pest species can be promoted.
- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.

- Use pesticides only if there is an actual pest problem (not on a regular preventative schedule).
- Do not use pesticides if rain is expected. Apply pesticides only when wind speeds are low (less than 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 pest.
- Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Calibrate fertilizer and pesticide application equipment to avoid excessive application.
- Periodically test soils for determining proper fertilizer use.
- Sweep pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Purchase only the amount of pesticide that you can reasonably use in a given time period (month or year depending on the product).
- Triple rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Dispose of empty pesticide containers according to the instructions on the container label.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.
- Inspect pesticide/fertilizer equipment and transportation vehicles daily.

Training

- Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution. Pesticide application must be under the supervision of a California qualified pesticide applicator.
- Train/encourage municipal maintenance crews to use IPM techniques for managing public green areas.
- Annually train employees within departments responsible for pesticide application on the appropriate portions of the agency's IPM Policy, SOPs, and BMPs, and the latest IPM techniques.

- Employees who are not authorized and trained to apply pesticides should be periodically (at least annually) informed that they cannot use over-the-counter pesticides in or around the workplace.
- Use a training log or similar method to document training.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup
- Have spill cleanup materials readily available and in a know in location
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- The Federal Pesticide, Fungicide, and Rodenticide Act and California Title 3, Division 6, Pesticides and Pest Control Operations place strict controls over pesticide application and handling and specify training, annual refresher, and testing requirements. The regulations generally cover: a list of approved pesticides and selected uses, updated regularly; general application information; equipment use and maintenance procedures; and record keeping. The California Department of Pesticide Regulations and the County Agricultural Commission coordinate and maintain the licensing and certification programs. All public agency employees who apply pesticides and herbicides in "agricultural use" areas such as parks, golf courses, rights-of-way and recreation areas should be properly certified in accordance with state regulations. Contracts for landscape maintenance should include similar requirements.
- All employees who handle pesticides should be familiar with the most recent material safety data sheet (MSDS) files.
- Municipalities do not have the authority to regulate the use of pesticides by school districts, however the California Healthy Schools Act of 2000 (AB 2260) has imposed requirements on California school districts regarding pesticide use in schools. Posting of notification prior to the application of pesticides is now required, and IPM is stated as the preferred approach to pest management in schools.

Requirements

Costs

Additional training of municipal employees will be required to address IPM techniques and BMPs. IPM methods will likely increase labor cost for pest control which may be offset by lower chemical costs.

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

Waste Management

Composting is one of the better disposal alternatives if locally available. Most municipalities either have or are planning yard waste composting facilities as a means of reducing the amount of waste going to the landfill. Lawn clippings from municipal maintenance programs as well as private sources would probably be compatible with most composting facilities

Contractors and Other Pesticide Users

Municipal agencies should develop and implement a process to ensure that any contractor employed to conduct pest control and pesticide application on municipal property engages in pest control methods consistent with the IPM Policy adopted by the agency. Specifically, municipalities should require contractors to follow the agency's IPM policy, SOPs, and BMPs; provide evidence to the agency of having received training on current IPM techniques when feasible; provide documentation of pesticide use on agency property to the agency in a timely manner.

References and Resources

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 Model Programs. Public Agency Activities http://ladpw.org/wmd/npdes/model_links.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.

Orange County Stormwater Program http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Landscaping and Lawn Care. Office of Water. Office of Wastewater Management. On-line: http://www.epa.gov/npdes/menuofbmps/poll_8.htm

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.

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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.

Roof Runoff Controls SD-11

Rain Garden

Design Objectives

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

Description

Various roof runoff controls are available to address stormwater that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches: cisterns or rain barrels; dry wells or infiltration trenches; pop-up emitters, and foundation planting. The first three approaches require the roof runoff to be contained in a gutter and downspout system. Foundation planting provides a vegetated strip under the drip line of the roof.

Approach

Design of individual lots for single-family homes as well as lots for higher density residential and commercial structures should consider site design provisions for containing and infiltrating roof runoff or directing roof runoff to vegetative swales or buffer areas. Retained water can be reused for watering gardens, lawns, and trees. Benefits to the environment include reduced demand for potable water used for irrigation, improved stormwater quality, increased groundwater recharge, decreased runoff volume and peak flows, and decreased flooding potential.

Suitable Applications

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

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain

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barrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least 2 rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load. Several types of rain barrels are commercially available. Consideration must be given to selecting rain barrels that are vector proof and childproof. In addition, some barrels are designed with a bypass valve that filters out grit and other contaminants and routes overflow to a soak-away pit or rain garden.

If the cistern has an operable valve, the valve can be closed to store stormwater for irrigation or infiltration between storms. This system requires continual monitoring by the resident or grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering stormwater runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say ¼ to ½ inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent, small storms.

Dry wells and Infiltration Trenches

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance.

In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Infiltration trenches function in a similar manner and would be particularly effective for larger roof areas. An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. These are described under Treatment Controls.

Pop-up Drainage Emitter

Roof downspouts can be directed to an underground pipe that daylights some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

Foundation Planting

Landscape planting can be provided around the base to allow increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

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.

Supplemental Information

Examples

- City of Ottawa's Water Links Surface –Water Quality Protection Program
- City of Toronto Downspout Disconnection Program
- City of Boston, MA, Rain Barrel Demonstration Program

Other Resources

Hager, Marty Catherine, Stormwater, "Low-Impact Development", January/February 2003. www.stormh2o.com

Low Impact Urban Design Tools, Low Impact Development Design Center, Beltsville, MD. www.lid-stormwater.net

Start at the Source, Bay Area Stormwater Management Agencies Association, 1999 Edition

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.

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- 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

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– 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.

Trash Storage Areas SD-32

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.

Design Objectives

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

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.

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- 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.

Drain Insert MP-52

General Description

Drain inserts are manufactured filters or fabric placed in a drop inlet to remove sediment and debris. There are a multitude of inserts of various shapes and configurations, typically falling into one of three different groups: socks, boxes, and trays. The sock consists of a fabric, usually constructed of polypropylene. The fabric may be attached to a frame or the grate of the inlet holds the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene "bag" is placed in the wire mesh box. The bag takes the form of the box. Most box products are one box; that is, the setting area and filtration through media occur in the same box. Some products consist of one or more trays or mesh grates. The trays may hold different types of media. Filtration media vary by manufacturer. Types include polypropylene, porous polymer, treated cellulose, and activated carbon.

Inspection/Maintenance Considerations

Washout problems increase with rain intensity. Susceptibility of accumulated sediments to be re-suspended at low flow rates, can be corrected with an energy dissipater between gate and treatment areas.

Inspection Activities	Suggested Frequency
■ Inspect for sediment buildup and proper functioning.	At the beginning of the wet season and after significant storms
■ Verify that stormwater enters the unit and does not leak around the perimeter.	After construction.
Maintenance Activities	**Suggested Frequency**
■ Remove sediment as needed.	At the beginning of the wet season and as necessary

Maintenance Concerns, Objectives, and Goals

■ Sediment Removal

Targeted Constituents

- ✓ Sediment
- ✓ Nutrients
- ✓ Trash
- ✓ Metals
- Bacteria
- ✓ Oil and Grease
- ✓ Organics

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.