

C.3. Workshop: Track 1 – Basic C.3. Topics
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Stormwater BMP Inspection and Maintenance Programs

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**Santa Clara Valley Urban Runoff
Pollution Prevention Program**

Presentation Overview

- BMP Maintenance and Inspection Requirements
- BMP Maintenance Fact Sheets
- BMP Inspection Form
- Example Inspection/Maintenance Issues
 - Vegetated swales
 - Hydrodynamic Separators
 - Bioretention Areas

BMP Maintenance Responsibilities

- Property Owners
 - Have a maintenance agreement
 - Conduct regular maintenance (or contract out)
 - Conduct self-inspections
 - Submit reports, pay fees if applicable
- Local Municipality
 - Require maintenance agreement
 - Provide educational materials to property owner
 - Conduct verification inspections, enforce, report
 - Inspect/maintain BMPs on public property

BMP Inspection Requirements

- Permits require Local Agencies to develop and implement BMP Operation & Maintenance (O&M) verification programs
 - Compile a list of BMPs, responsible operators
 - Inspect a “subset of prioritized BMPs” annually
 - Report on inspections and results annually
 - Coordinate with vector control agencies

Challenges for Local Agencies

- Getting the maintenance agreements, construction and post-construction inspections into the “development process”
- Good communications among Planning, Engineering and Building Departments
- Finding the resources for inspections, tracking and reporting
- Inspector training
- Growing BMP inventory!

Key Elements of BMP Inspection Verification Program

- Include in development review process:
 - Conditions of approval for maintenance
 - Submittal and review of maintenance plan
- Conduct inspections during construction
- Require maintenance agreements before completion of project (include O&M info for owner)
- Track constructed BMP types, locations, and other information in database
- Prioritize, conduct, track, report BMP inspections

Pre-inspection Preparation

- Proper preparation in the office will facilitate complete inspections in the field
- Collect and review background information:
 - Site address/contact information
 - Site plans/as-built drawings with BMP location(s)
 - Previous inspection results
- For each BMP to be inspected, review:
 - Inspection and maintenance procedures (BMP fact sheets)
 - Field requirements (e.g., tools needed, confined space entry?)

BMP Maintenance Fact Sheets

Fact Sheets on 22
BMP Types

-Prepared by
CASQA (16) and
SCVURPPP (6)

-Include inspection
and maintenance
checklists

BMP Maintenance Fact Sheets



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O&M Verification Program

June 2006

BMP Maintenance Fact Sheets

Biofiltration

- Bioretention
- Vegetated Buffer Strip
- Vegetated Swale
- Roof Gardens
- Planter Boxes

Detention

- Extended Detention Basin
- Wet Pond
- Wetland

BMP Maintenance Fact Sheets

Infiltration

- Exfiltration Trench
- Infiltration Basin
- Infiltration Trench
- Retention/Irrigation


Structural

- Drain Insert
- Hydrodynamic Separator
- Media Filter
- Porous Pavement
- Underground Detention
- Vortex Separator
- Water Quality Inlet
- Wet Vault

Standard BMP Inspection Data Collection Form

- Developed by SCVURPPP to standardize reporting for Co-permittees
- Contains specific codes to describe typical inspection observations
- Links problems with specific actions
- Tracks maintenance activities over time
- Integrates well into a relational database (i.e. limited use of text fields)

SCVURPPP BMP Inspection Data Collection Form



**Santa Clara Valley
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Standard Stormwater Treatment BMP Inspection Data Collection Form

Date: _____ Time: _____ File Number: _____
Municipality: _____ Agency or Department: _____
Inspectors: _____

I. REASON FOR INSPECTION

Initial Follow-up Other _____
 Routine Response to Complaint Inspection Frequency: _____

II. PROJECT INFORMATION

1. ID # or Assessor Parcel Number: _____ 2. Year of Installation _____
3. Project Type: Residential Commercial Industrial Multi-use Road Institutional Other
4. Facility Name: _____
Site Address: _____
Contact Name: _____ Phone: _____
5. If the property owner is different than the contact name, fill out information below:
Owner Name: _____ Title: _____
Owner's Address: _____ Phone: _____
6. If the BMP operator is different than the contact name, fill out information below:
Name: _____ Title: _____
Address: _____ Phone: _____
7. Maintenance Documentation: Reviewed Not Reviewed Not Available Other: _____
8. Party responsible for O&M Documentation: Property owner BMP Operator Contractor
 Other: _____

III. BMP TYPE AND INSPECTION RESULTS (Use Codes from "Potential Inspection Results with Definitions" sheet)

<p>1. Biofiltration</p> <input type="checkbox"/> Vegetated Swale _____ <input type="checkbox"/> Vegetated Buffer Strip _____ <input type="checkbox"/> Bioretention _____ <input type="checkbox"/> Roof Gardens _____ <input type="checkbox"/> Planter Boxes _____ <p>Detention</p> <input type="checkbox"/> Extended Detention Basin _____ <input type="checkbox"/> Wet Pond _____ <input type="checkbox"/> Wetland _____	<p>Structural</p> <input type="checkbox"/> Drain Insert _____ <input type="checkbox"/> Porous Pavement _____ <input type="checkbox"/> Media Filter _____ <input type="checkbox"/> Hydrodynamic Separator _____ <input type="checkbox"/> Vortex Separator _____ <input type="checkbox"/> Water Quality Inlet _____ <input type="checkbox"/> Underground Detention Systems _____ <input type="checkbox"/> Wet Vault _____	<p>Infiltration</p> <input type="checkbox"/> Infiltration Basin _____ <input type="checkbox"/> Infiltration Trench _____ <input type="checkbox"/> Exfiltration Trench _____ <input type="checkbox"/> Retention/Irrigation _____ <p>Other (describe): _____ _____</p>
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2. Is maintenance needed at this time? Yes No 3. *Mosquitoes or Mosquito Larvae Present? Yes No
4. Comments/Notes: _____

IV. FOLLOW-UP AND ENFORCEMENT ACTIONS (Add additional information on back)

1. Describe corrective actions needed: _____

2. Describe materials distributed (brochures, BMPs, etc.): _____
3. Describe Enforcement Action:
 None Verbal Notice Warning Notice
 Administrative Action Administrative Action with Penalty/Fine Civil Action
 Criminal Action Referral for Enforcement _____
4. Follow-up required? Yes No Comments _____
5. Priority for reinspection: High Medium Low
6. Return inspection needed? Yes No Comments _____
7. Required Compliance Date: _____ Date Corrected: _____

Facility Representative: _____ **Inspector:** _____

Standard BMP Inspection Data Collection Form

I. REASON FOR INSPECTION		
<input type="checkbox"/> Initial	<input type="checkbox"/> Follow-up	<input type="checkbox"/> Other _____
<input type="checkbox"/> Routine	<input type="checkbox"/> Response to Complaint	Inspection Frequency: _____
II. PROJECT INFORMATION		
1. ID # or Assessor Parcel Number: _____		2. Year of Installation _____
3. Project Type: <input type="checkbox"/> Residential <input type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Multi-use <input type="checkbox"/> Road <input type="checkbox"/> Institutional <input type="checkbox"/> Other		
4. Facility Name: _____		
Site Address: _____		
Contact Name: _____ Phone: _____		
5. If the property owner is different than the contact name, fill out information below:		
Owner Name: _____		Title: _____
Owner's Address: _____		Phone: _____
6. If the BMP operator is different than the contact name, fill out information below:		
Name: _____		Title: _____
Address: _____		Phone: _____
7. Maintenance Documentation: <input type="checkbox"/> Reviewed <input type="checkbox"/> Not Reviewed <input type="checkbox"/> Not Available <input type="checkbox"/> Other: _____		
8. Party responsible for O&M Documentation: <input type="checkbox"/> Property owner <input type="checkbox"/> BMP Operator <input type="checkbox"/> Contractor		
<input type="checkbox"/> Other: _____		

- Reason for Inspection
 - Initial, Routine, Follow-up, Response to Complaint, Other, Inspection Frequency
- Project Information
 - ID, Type, Facility Name/Address, Property Owner, BMP Operator, Maintenance Documentation, Responsible Party

Standard BMP Inspection Data Collection Form

III. BMP TYPE AND INSPECTION RESULTS (Use Codes from "Potential Inspection Results with Definitions" sheet)		
1. Biofiltration <input type="checkbox"/> Vegetated Swale _____ <input type="checkbox"/> Vegetated Buffer Strip _____ <input type="checkbox"/> Bioretention _____ <input type="checkbox"/> Roof Gardens _____ <input type="checkbox"/> Planter Boxes _____	Structural <input type="checkbox"/> Drain Insert _____ <input type="checkbox"/> Porous Pavement _____ <input type="checkbox"/> Media Filter _____ <input type="checkbox"/> Hydrodynamic Separator _____ <input type="checkbox"/> Vortex Separator _____ <input type="checkbox"/> Water Quality Inlet _____ <input type="checkbox"/> Underground Detention Systems _____ <input type="checkbox"/> Wet Vault _____	Infiltration <input type="checkbox"/> Infiltration Basin _____ <input type="checkbox"/> Infiltration Trench _____ <input type="checkbox"/> Exfiltration Trench _____ <input type="checkbox"/> Retention/Irrigation _____ Other (describe): _____ <input type="checkbox"/> _____ _____ _____
Detention <input type="checkbox"/> Extended Detention Basin _____ <input type="checkbox"/> Wet Pond _____ <input type="checkbox"/> Wetland _____		
2. Is maintenance needed at this time? <input type="checkbox"/> Yes <input type="checkbox"/> No		
3. *Mosquitoes or Mosquito Larvae Present? <input type="checkbox"/> Yes <input type="checkbox"/> No		
4. Comments/Notes: _____ _____ _____ _____		

- BMP Type and Inspection Results
 - List of BMPs by category
 - Space by each BMP to enter code for inspection result
- Is maintenance needed at this time?
- Mosquitoes or mosquito larvae present?

Standard BMP Inspection Data Collection Form

IV. FOLLOW-UP AND ENFORCEMENT ACTIONS (Add additional information on back)		
1. Describe corrective actions needed:	_____	

2. Describe materials distributed (brochures, BMPs, etc.):	_____	
3. Describe Enforcement Action:		
<input type="checkbox"/> None	<input type="checkbox"/> Verbal Notice	<input type="checkbox"/> Warning Notice
<input type="checkbox"/> Administrative Action	<input type="checkbox"/> Administrative Action with Penalty/Fine	<input type="checkbox"/> Civil Action
<input type="checkbox"/> Criminal Action	<input type="checkbox"/> Referral for Enforcement	_____
4. Follow-up required? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Comments	_____	
5. Priority for reinspection: <input type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low	_____	
6. Return inspection needed? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Comments	_____	
7. Required Compliance Date: _____	Date Corrected: _____	

■ Follow-up

- Corrective actions needed
- Educational materials distributed
- Enforcement action type
- Indicate if follow-up is required
- Priority for re-inspection
- Date problems corrected

All BMP Types – Potential Inspection Results

ID	Inspection Results	Definitions
I. All BMP Types		
1	No Visible/Apparent Problems	No visible or apparent problems with BMP function. BMP appears to be well-maintained
2	Significant Engineering/Design Flaws	BMP observed to have significant engineering/design flaws which lessen its effectiveness as a stormwater treatment measure.
3	Unauthorized Modifications	Any modification that lessens the effectiveness of the BMP; any modification not authorized by the City, designated agency or other regulatory agency.
4	BMP Destroyed or Eliminated	BMP destroyed, removed or eliminated from property.
5	Trash/Debris Accumulation or Dumping	Trash & debris accumulates within and/or on BMP; trash & debris interferes with proper BMP function; visual evidence of trash/debris dumping.
6	Evidence of Contaminants & Pollution	Evidence or presence of oil, gasoline, contaminants or other pollutants.
7	BMP Access Obstructed	Access to BMP obstructed or limited.
8	Obnoxious Odors	Unpleasant odors within/from the BMP.
9	Fencing - Missing or Broken Bars	Any defect in or damage to the fence or gate that permits easy entry to a facility.
10	BMP Cannot Be Located	BMP cannot be located for inspection.

All BMP Types – Potential Inspection Results

Vegetated Swale



Result:

1 - No Visible/Apparent Problem

All BMP Types – Potential Inspection Results

Vegetated Swale



Over 2' drop from corner of sidewalk

Result:

2 - Significant
Engineering/Design Flaws

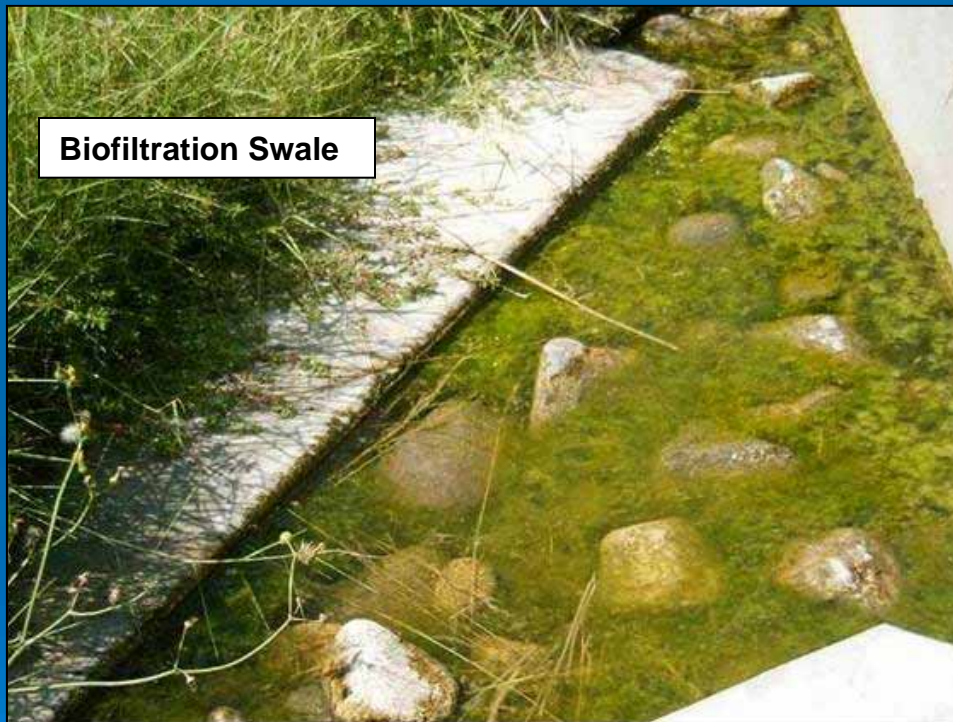
All BMP Types – Potential Inspection Results



Result:

**5 - Trash/Debris
Accumulation or Dumping**

All BMP Types – Potential Inspection Results



Result:

- 2 - Significant Engineering/Design Flaws
- 8 - Obnoxious Odors
- 18 - Standing Water/
Excessive Ponding/ Soggy
Soil
- 19 - Mosquito Habitat

Biofiltration - Potential Inspection Results

II. Biofiltration (Bioretention, Vegetated Buffer Strip, Vegetated Swale, Roof Gardens, Planter Boxes)		
A. General		
11	Uneven or Clogged Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed across the BMP.
12	Leaking or Malfunctioning Irrigation System	Irrigation system leaking or malfunctioning.
B. Sediment and Erosion Problems		
13	Sediment Accumulation	Sediment depth exceeds 2 inches on more than 10% of the vegetated treatment area; or sediment interferes with BMP performance.
14	Erosion/Scouring	Eroded or scoured areas due to flow channelization, higher flows, wind or water.
C. Vegetation Maintenance Issues		
15	Poor Vegetation Coverage	Planted vegetation is sparse or bare or eroded patches occur in more than 10 % of the BMP. Growth of planted vegetation is poor because sunlight does not reach swale.
16	Invasive/Nuisance Vegetation or Weeds	Planted vegetation is excessively tall; nuisance weeds, invasive or noxious vegetation are overgrown; vegetation reduces free movement of water through BMP.
17	Tree/Brush Growth	Growth does not allow maintenance access or interferes with maintenance activity.
D. Drainage Problems		
18	Standing Water/Excessive Ponding/Soggy Soil	Water is observed within the BMP (between storms) and appears not to drain freely or soil is excessively soggy. Excessive por
19	Mosquito Habitat	Suitable habitat exists for mosquito (areas accessible to mosquitoes).
20	Clogged or Obstructed Inlets/Outlets	Inlet/outlet clogged or obstructed
21	Constant Baseflow/Damage	Small quantities of water flow thro weeks, and an eroded, muddy ch from irrigation runoff..



Vegetated Swales – Properly Maintained



Result:

1 - No Visible/Apparent Problem

Vegetated Swales - Problematic



Result:

- 2** - Significant Engineering/Design Flaws
- 18** - Standing Water/ Excessive Ponding/Soggy Soil
- 19** - Mosquito Habitat

Vegetated Swales - Problematic



Result:

- 13 - Sediment Accumulation
- 14 - Erosion/Scouring
- 15 - Poor Vegetated Cover

Vegetated Swales - Problematic



Result:

2 - Significant Engineering/Design Flaws

18 - Standing Water/ Excessive Ponding/ Soggy Soil

Swale graded to “V-Ditch” limits effectiveness and channels flow.



Result:

2 - Significant Engineering/Design Flaws

Turf installed too high creates “lip” and restricts flow into swale.

Vegetated Swales - Problematic



Result:

- 18 - Standing Water/ Excessive Ponding/ Soggy Soil
- 19 - Mosquito Habitat



Result:

- 2 - Significant Design Flaws
- 14 - Erosion/Scouring
- 18 - Standing Water/ Excessive Ponding/ Soggy Soil
- 19 - Mosquito Habitat

Vegetated Swales - Problematic



Short-circuiting of swale; flows directly to catch basin.

Result:

2 - Significant
Engineering/Design Flaws

Vegetated Swales – Corrective Actions



Result:

15 - Poor Vegetated Cover



Result:

1 - No Visible/Apparent Problem

Structural BMPs



Hydrodynamic Separator – Problematic



Result:

37 - Mosquito Habitat



Result:

38 - Access Cover Not In Place

40 - Locking Mechanism Not Working

Questions?

