Ventura Countywide Stormwater Quality Program Land Development Technical Guidance Manual Revisions

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Outline

- Revised Permit Requirement
- Revised Draft TGM

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Revised Permit Requirements Order R4-2010-0108

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Integrated Water Quality / Flow Reduction / Resources Management Criteria

- Applicable projects must reduce Effective Impervious Area (EIA) to less than 5% of the total project area, unless infeasible
- 5% EIA BMP Hierarchy:
  1. Retention BMPs
     - Infiltration,
     - Rainwater Harvesting, and/or
     - Evapotranspiration
  2. Biofiltration BMPs
     - May only be used if Retention BMPs are shown to be infeasible

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Integrated Water Quality / Flow Reduction / Resources Management Criteria

- Provide treatment for 5% EIA and developed pervious areas
- Treatment can include:
  - Retention BMPs
  - Biofiltration BMPs
  - Treatment Control Measures
  - Pretreatment/Gross Solids Removal BMPs (in treatment train)

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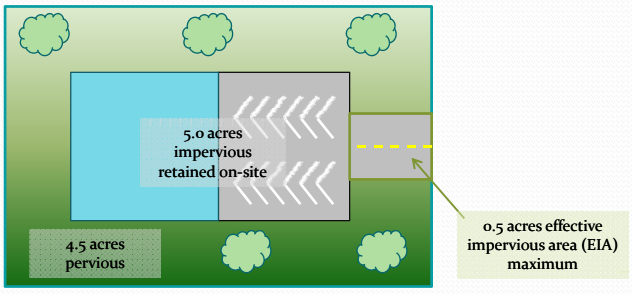
Simple Example

Total Project Area: A_{total} = 10 acres
Maximum allowed EIA = A_{total} * 0.05 = 0.5 acres
$A_{impervious}$ = 5.5 acres (building, parking lot, driveway)
$A_{pervious}$ = 4.5 acres (surrounding landscaping)
$A_{retained}$ = 5.5 – 0.5 = 5 acres retained onsite (minimum)
$A_{treated}$ = 0.5 + 4.5 = 5 acres treated



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Integrated Water Quality / Flow Reduction / Resources Management Criteria

- Impervious surface are rendered "ineffective" if water quality design storm runoff volume is fully retained onsite
  - 85th percentile, 24-hour event
  - 80 percent capture volume
  - 0.75 inch storm event
- If it is technically infeasible to fully retain design storm volume from impervious area, then biofilter 1.5 times the remaining volume

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Alternative Compliance

- If Retention BMPs and Biofiltration BMPs have been used to the maximum extent practicable and the 5% EIA standard still cannot be met, then the following projects types are eligible for alternative compliance:
  - Redevelopment/Infill/Smart Growth within existing urban areas
  - Pedestrian/bike trail projects
  - Agencies' flood control, drainage, and wet utilities projects
  - Historical preservation projects
  - Transit oriented development (within ½ mile of transit center)
  - Low income housing projects
- If the site does not meet one of the above criteria, then the applicant must redesign site to meet 5% EIA

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Alternative Compliance

- Alternative compliance may be met through two options:
  - An offsite mitigation project; or
  - An offsite mitigation fee
- Alternative compliance is based on the mitigation volume:
  - The mitigation volume is the difference between the volume of runoff produced from the *allowed* 5% EIA and the volume of runoff produced from the *actual* EIA achieved onsite ≤30%
  - The offsite mitigation for EIA in excess of 30% is *1.5 times* the amount of stormwater not managed onsite

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Revised Draft TGM

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Section 1 – Background and Goals

- 1.1 Goals
- 1.2 Regulatory Background
- 1.3 Impacts of Land Development
- 1.4 Stormwater Management Principals
- 1.5 Applicability
- 1.6 Use and Organization of the Manual

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Effective Date

- 90 calendar days after the Regional Board Executive Officer's approval of the revised TGM, except:
  - Projects or phases of projects where applications for such projects have been "deemed complete for processing", or words of similar import, by the applicable Permittee in accordance with the Permittee's applicable rules, prior to the Effective Date; or
  - Projects that are the subject of a Development Agreement and/or a Specific Plan, or an application for a Development Agreement and/or Specific Plan where the application for the Development Agreement and/or Specific Plan has been "deemed complete for processing", or words of similar import, by the applicable Permittee in accordance with the Permittee's applicable rules, and thereafter during the term of such Agreement and/or Specific Plan unless earlier cancelled or terminated; or

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Effective Date (cont.)

- 90 calendar days after the Regional Board Executive Officer's approval of the revised TGM, except:
  - All private projects in which, prior to the Effective Date, the private party has completed public improvements; commenced design, obtained financing, and/or participated in the financing of the public improvements; or which requires the private party to reimburse Permittee for public improvements upon the development of such private project; or
  - Permittee's projects for which the governing body or their designee has approved initiation of the project design prior to the Effective Date.

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Effective Date (cont.)

- Intent:
  - Applicants that have filed complete applications with a final, or substantially final, drainage concept and site layout that includes water quality treatment based upon the performance criteria set forth in the 2002 TGM are not required to redesign the proposed project for purposes of complying with the new permit.

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Effective Date (cont.)

- In addition, if a Tentative Map or Vesting Tentative Map was deemed complete or approved by the Permittee prior to the Effective Date, and subsequently a Revised Map is submitted, the project would be exempt from the revised TGM provisions if the change requested under the Revised Map was solely initiated by the Permittee or other public agency, and the Permittee has determined that the revisions substantially conform to original map design, consistent with Subdivision Map Act requirements.

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Section 2 – Stormwater Management Standards

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Single Family Hillside Homes

- Conserve Natural Areas
- Protect Slopes and Channels
- Channel Protection
- Provide Storm Drain System Stenciling and Signage
- Divert Roof Runoff and Surface Flows to Vegetated Area(s) or Collection System(s), Unless the Diversion Would Result in Slope Instability

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Roadway Projects

- Minimum requirements for the impervious area within the right-of-way associated with streets, roads, highways, and freeways are as follows:
  - Provide Retention BMPs or Biofiltration BMPs sized to capture and treat the Stormwater Quality Design Volume (SQDV) or the Stormwater Quality design Flow (SQDF)
  - Additional Treatment Control Measures may be integrated into roadway projects if they are used in a treatment train approach with Retention BMPs or Biofiltration BMPs to address the pollutants of concern

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Roadway Projects

- In addition, roadway projects should apply the following measures to the maximum extent practicable and as specified in the permitting agency's codes:
  - Minimize street width to the appropriate minimum width for maintaining traffic flow and public safety;
  - Use porous pavement or pavers for low traffic roadways, on-street parking, shoulders or sidewalks; and
  - Add tree canopy by planting or preserving trees and shrubs.

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Section 3 – Site Assessment and BMP Selection

- 3.1 Assessing Site Conditions and Other Constraints
- 3.2 Technical Feasibility Screening
  - Determining Maximum Volume Feasibly Retained and Biofiltered
- 3.3 Identification of Pollutants of Concern
- 3.4 Treatment Control Measure Selection Guidance

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3.1 Assessing Site Conditions and Other Constraints

- Topography
- Soil Type and Geology
- Groundwater Considerations
- Geotechnical Considerations
- Managing Off-site Drainage
- Existing Utilities
- Environmentally Sensitive Areas

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3.2 Technical Feasibility Screening

- Technical infeasibility may result from conditions including:
  - Seasonal High Groundwater Table
  - Ventura Soil Numbers 1-3 or measured low infiltration rate
  - Locations within 100 feet of a groundwater well
  - Brownfield development sites
  - Locations with potential geotechnical hazards
  - Projects with untreated high-risk areas
  - Locations where reduction of runoff may impair beneficial uses
  - Location where increase in infiltration could impair beneficial uses
  - Insufficient demand for harvested stormwater
  - Project where density and/or nature of the project would create significant difficulty for compliance

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Determining Maximum Volume Feasibly Retained and Biofiltered

- Criteria for Maximizing Infiltration Volume
- Criteria for Maximizing RWH Volume
- Criteria for Maximizing Biofiltration Volume
- Table 3-1: Recommended Criteria for Percent of Site Feasible to Dedicate to BMPs

Project Type		Percent of Site
New Development	SF/MF Residential < 7 du/ac	10
	SF/MF Residential 7 – 18 du/ac	7
	SF/MF Residential > 18 du/ac	5
	Mixed Use, Commercial, Institutional/Industrial w/ FAR < 1.0	10
	Mixed Use, Commercial, Institutional/Industrial w/ FAR 1.0 – 2.0	7
	Mixed Use, Commercial, Institutional/Industrial w/ FAR > 2.0	5
	Podium (parking under > 75% of project)	3
	Projects with zoning allowing development to lot lines	2
	Transit Oriented Development	5
	Parking	5
Redevelopment	SF/MF Residential < 7 du/ac	5
	SF/MF Residential 7 – 18 du/ac	4
	SF/MF Residential > 18 du/ac	3
	Mixed Use, Commercial, Institutional/Industrial w/ FAR < 1.0	5
	Mixed Use, Commercial, Institutional/Industrial w/ FAR 1.0 – 2.0	4
	Mixed Use, Commercial, Institutional/Industrial w/ FAR > 2.0	3
	Podium (parking under > 75% of project)	2
	Projects with zoning allowing development to lot lines	1
	Transit Oriented Development	3
	Projects in Historic Districts	3

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3.3 Identification of Pollutants of Concern

- Land Use Types/Sources
- **Table 3-2: Common Post-Development Sources of Stormwater Pollutants** →
- Receiving Water Impairments and TMDLs
- Uncertainty Associated with Identification of Pollutants of Concern

Pollutant	Potential Land Use and Activities Sources
Sediment (TSS and Turbidity), Trash and Debris (Gross Solids and Floatables)	Streets, landscaped areas, driveways, roads, construction activities, atmospheric deposition, soil erosion (channels and slopes)
Pesticides and Herbicides	Residential lawns and gardens, roadsides, utility right-of-ways, commercial and industrial landscaped areas, soil wash-off
Organic Materials/ Oxygen Demanding Substances	Residential lawns and gardens, commercial landscaping, animal wastes
Metals	Automobiles, bridges, atmospheric deposition, industrial areas, soil erosion, metal surfaces, combustion processes
Oil and Grease/ Organics Associated with Petroleum	Roads, driveways, parking lots, vehicle maintenance areas, gas stations, illicit dumping to storm drains, automobile emissions, and fats, oils and grease from restaurants
Bacteria and Viruses	Lawns, roads, leaky sanitary sewer lines, sanitary sewer cross-connections, animal waste (domestic and wild), septic systems, homeless encampments, sediments/biofilms in stormwater conveyance system
Nitrogen and Phosphorus	Landscape fertilizers, atmospheric deposition, automobile exhaust, soil erosion, animal waste, detergents

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3.4 Treatment Control Measure Selection Guidance

- Treatment Control Measure Selection Criteria
- Consideration of Site-Specific Conditions
  - Table 3 3: BMP Site Suitability Considerations
  - Table 3 4: BMP Cost Considerations

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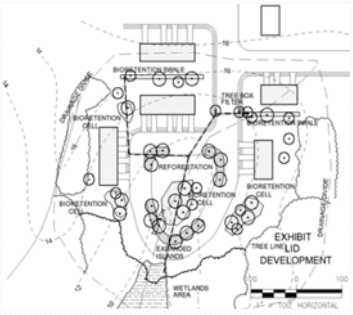
Section 4 – Site Design Principles and Techniques

- 4.2 Site Planning and Layout
  - Techniques to minimize impervious cover

Table 4-1 Rule of Thumb Space Requirements for BMPs

BMP Type	% of Contributing Drainage Area
Infiltration	3 to 10
Rainwater Harvesting (Cistern)	0 to 10
Evapotranspiration (Green Roof)	1 to 1 ratio of impervious cover treated
Biofiltration	3 to 5
Dry Extended Detention Basin	1 to 3
Wet Detention Basin	1 to 3
Sand Filters	0 to 5
Cartridge Media Filter	0 to 5



LID BMPs Integrated within Site Planning Process

Low Impact Development Center, Inc

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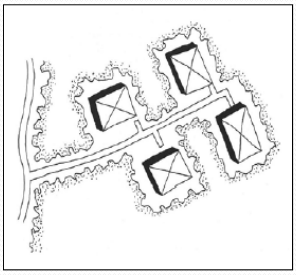
Section 4 – Site Design Principles and Techniques

- 4.3 Protect and Restore Natural Areas

Stream Buffer
Larry Walker Associates



Minimized Clearing and Grading
Greenfield et al., 1991

- 4.4 Minimize Land Disturbance

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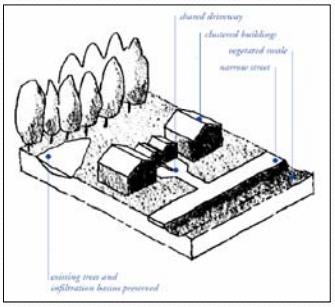
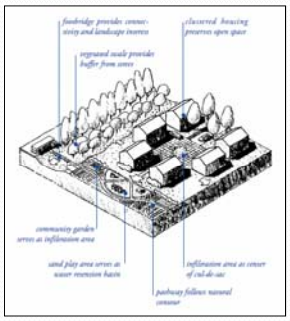
Section 4 – Site Design Principles and Techniques

- 4.5 Minimize Impervious Cover



Impervious Cover Minimization
BASMAA, Start at the Source



LID BMPs Considered at Various Scales
BASMAA, Start at the Source

- 4.6 Apply LID at Various Scales

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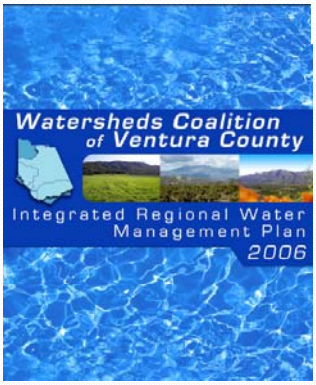
Section 4 – Site Design Principles and Techniques

- 4.7 Integrated Water Resource Management Practices (including coordination with flood control measures)



Integrated Regional Water Management Plan

Ventura County

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Section 5 – Source Control Measures

- S-1: Storm Drain Message and Signage
- S-2: Outdoor Material Storage Area Design
- S-3: Outdoor Trash Storage Area Design
- S-4: Outdoor Loading/Unloading Dock Area Design

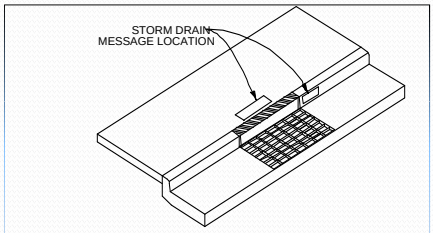

FIGURE 5-1. STORM DRAIN MESSAGE LOCATION

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Section 5 – Source Control Measures

- S-5: Outdoor Repair/Maintenance Bay Design
- S-6: Outdoor Vehicle/Equipment/Accessory Washing Area Design
- S-7: Fueling Area Design
- S-8: Proof of Control Measure Maintenance

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Section 6 – Stormwater BMP Design

- 6.2 General Considerations
  - Maintenance Responsibility
  - Pretreatment
  - Infiltration
  - Biofiltration BMPs
  - Treatment Control Measures
    - Filtration
    - Wetpool Facilities
  - "On-line" and "Off-line" Facilities

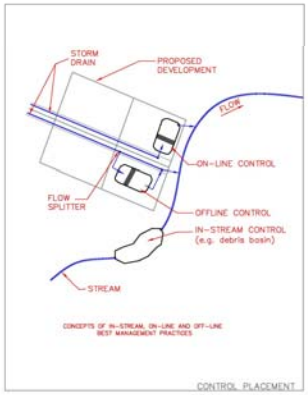

Figure 6-1: Differences between On-line, Off-line, and In-stream Control Measures

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Section 6 – Stormwater BMP Design

- Retention BMP Factsheets
  - Infiltration BMPs
    - INF-1: Infiltration Basin
    - INF-2: Infiltration Trench
    - INF-3: Bioretention
    - INF-4: Drywell
    - INF-5: Permeable Pavement
    - INF-6: Proprietary Infiltration

Bioretention in Parkway and parking lots
Photo Credit: Geosyntec Consultants

Permeable pavement application
Photo Credit: Geosyntec Consultants

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Section 6 – Stormwater BMP Design

- Rainwater Harvesting BMPs
  - RWH-1: Cistern
- Evapotranspiration BMPs
  - ET-1: Green Roof
  - ET-2: Hydrologic Source Control BMPs

Green Roof Example
Photo Credit: Geosyntec Consultants

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Section 6 – Stormwater BMP Design

- Biofiltration BMP Factsheets:
  - BIO-1: Bioretention with Underdrain
  - BIO-2: Planter Box
  - BIO-3: Vegetated Swale
  - BIO-4: Vegetated Filter Strip
  - BIO-5 : Proprietary Biotreatment

Proprietary Biotreatment Example

Photo Credit: Filterra®

Vegetated swale captures flow from a residential street

Photo Credit: Geosyntec Consultants

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Section 6 – Stormwater BMP Design

- Treatment Control Measure Factsheets:
  - TCM-1: Dry Extended Detention Basin
  - TCM-2: Wet Detention Basin
  - TCM-3: Constructed Wetland
  - TCM-4 : Sand Filter
  - TCM-5 : Cartridge Media Filter

Wet Detention Basin

Photo Credit: Geosyntec Consultants

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Section 6 – Stormwater BMP Design

- Pretreatment/Gross Solids Removal BMP Factsheets:
  - PT-1: Hydrodynamic Device
  - PT-2: Catch Basin Insert

Hydrodynamic Separation

Photo Credits: Contech Stormwater Solutions, Inc.

Catch Basin Inserts

Photo Credits: 1. KriStar

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Section 7 Maintenance Plan

- **Section 7 –Maintenance Plan**
  - 7.1 Site Map
  - 7.2 Baseline Descriptions
  - 7.2 Spill Plan
  - 7.4 Facility Changes
  - 7.5 Training
  - 7.6 Basic Inspection and Maintenance Activities
  - 7.7 Revisions of Pollution Mitigation Measures
  - 7.8 Monitoring and Reporting Program

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Appendices

- A: Glossary of Terms
- B: Maps
  - Hydrologic Areas
  - Environmentally Sensitive Areas
  - 85th Percentile Rainfall Depth
  - Existing Urban Areas
  - Soil Classification
  - Liquifaction Potential/ Expansive Soils

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Appendices

- C: Site Soil Type and Infiltration Testing
  - Soil investigations
  - Infiltration testing analyses
  - Assessment of test results
- D: BMP Selection and Combined LID/Treatment BMP Sizing Guidance
  - BMP Selection Guidance
    - Using performance stats to guide selection
  - Combined LID/Treatment BMP Sizing Guidance

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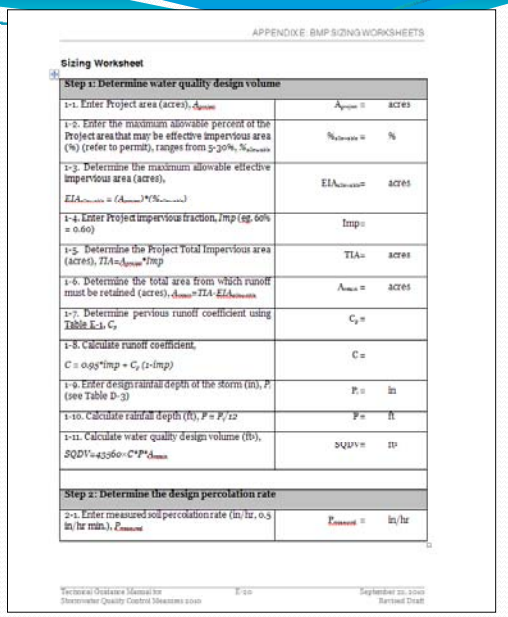
Appendices

- E: BMP Sizing Worksheets
  - Sizing Criteria
  - Step by Step sizing instructions for BMPs
  - Worksheet Form
  - Worksheet Form Example



APPENDIX E: BMP SIZING WORKSHEETS

Sizing Worksheet

Step 1: Determine water quality design volume		
1-1. Enter Project area (acres), $A_{project}$	$A_{project}$ =	acres
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (%) (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable}$ =	%
1-3. Determine the maximum allowable effective impervious area (acres), $EIA_{allowable} = (A_{project})*(\%_{allowable})$	$EIA_{allowable}$=	acres
1-4. Enter Project impervious fraction, *Imp* (eg. 60% = 0.60)	Imp=	
1-5. Determine the Project Total Impervious area (acres), $TIA=A_{project}*Imp$	TIA=	acres
1-6. Determine the total area from which runoff must be retained (acres), $A_{bmp}=TIA-EIA_{allowable}$	A_{bmp} =	acres
1-7. Determine pervious runoff coefficient using Table E-1, C_p	C_p =	
1-8. Calculate runoff coefficient, $C = 0.95*Imp + C_p(1-Imp)$	C =	
1-9. Enter design rainfall depth of the storm (in), P (see Table D-3)	P =	in
1-10. Calculate rainfall depth (ft), $P = P/12$	P =	ft
1-11. Calculate water quality design volume (ft³), $SQDV=43560*C*P*A_{bmp}$	SQDV=	ft³
Step 2: Determine the design percolation rate		
2-1. Enter measured soil percolation rate (in/hr, 0.5 in/hr min.), $P_{measured}$	$P_{measured}$ =	in/hr

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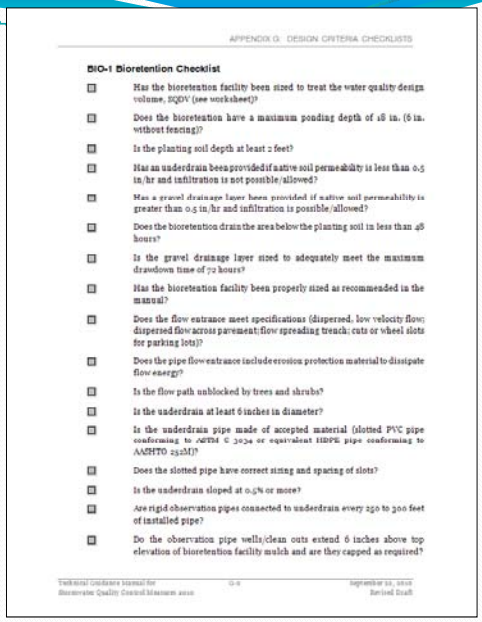
Appendices

- F: Flow Splitter Design Specifications
- G: Design Criteria Checklists for Stormwater Runoff BMPs



APPENDIX G: DESIGN CRITERIA CHECKLISTS

BIO-1 Bioretention Checklist

- ☐ Has the bioretention facility been sized to treat the water quality design volume, SQDV (see worksheet)?
- ☐ Does the bioretention have a maximum ponding depth of 18 in. (6 in. without fencing)?
- ☐ Is the planting soil depth at least 2 feet?
- ☐ Has an underdrain been provided if native soil permeability is less than 0.5 in/hr and infiltration is not possible/allowed?
- ☐ Has a gravel drainage layer been provided if native soil permeability is greater than 0.5 in/hr and infiltration is possible/allowed?
- ☐ Does the bioretention drain the area below the planting soil in less than 48 hours?
- ☐ Is the gravel drainage layer sized to adequately meet the maximum drawdown time of 72 hours?
- ☐ Has the bioretention facility been properly sized as recommended in the manual?
- ☐ Does the flow entrance meet specifications (dispersed, low velocity flow; dispersed flow across pavement; flow spreading trench; cuts or wheel slots for parking lots)?
- ☐ Does the pipe flow entrance include erosion protection material to dissipate flow energy?
- ☐ Is the flow path unblocked by trees and shrubs?
- ☐ Is the underdrain at least 6 inches in diameter?
- ☐ Is the underdrain pipe made of accepted material (slotted PVC pipe conforming to ASTM C 3034 or equivalent HDPE pipe conforming to AASHTO 252M)?
- ☐ Does the slotted pipe have correct sizing and spacing of slots?
- ☐ Is the underdrain sloped at 0.5% or more?
- ☐ Are rigid observation pipes connected to underdrain every 250 to 300 feet of installed pipe?
- ☐ Do the observation pipe wells/clean outs extend 6 inches above top elevation of bioretention facility mulch and are they capped as required?

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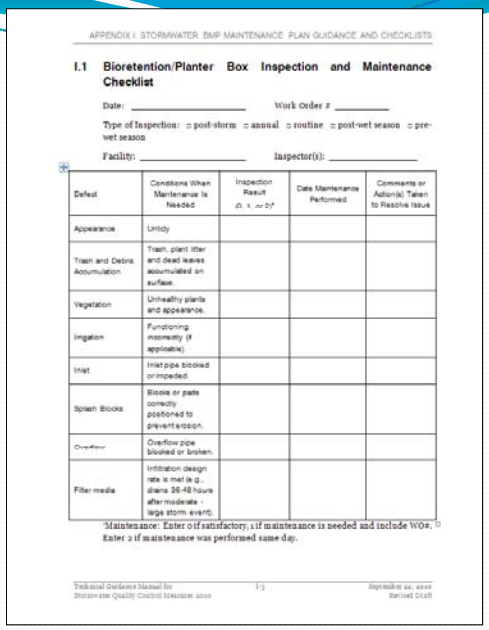
Appendices

- H: Stormwater Control Measure Access and Maintenance Agreements
- I: Stormwater Control Measure Maintenance Plan Guidelines and Checklists



APPENDIX I: STORMWATER BMP MAINTENANCE PLAN GUIDANCE AND CHECKLISTS

I.1 Bioretention/Planter Box Inspection and Maintenance Checklist

Date: _____ Work Order # _____

Type of Inspection: □ post-storm □ annual □ routine □ post-wet season □ pre-wet season

Facility: _____ Inspector(s): _____

Defect	Conditions When Maintenance Is Needed	Inspection Result (S, S, or U)*	Date Maintenance Performed	Comments or Action(s) Taken to Resolve Issue
Appearance	Untidy			
Trash and Debris Accumulation	Trash, plant litter and dead leaves accumulated on surface.			
Vegetation	Unhealthy plants and appearance.			
Irrigation	Functioning incorrectly (if applicable)			
Inlet	Inlet pipe blocked or impeded.			
Splash Blocks	Blocks or pads correctly positioned to prevent erosion.			
Overflow	Overflow pipe blocked or broken.			
Filter media	Infiltration design rate is met (e.g., drains 36-48 hours after moderate - large storm event).			

*Maintenance: Enter 0 if satisfactory, 1 if maintenance is needed and include WO#. Enter 2 if maintenance was performed same day.

Technical Guidance Manual for Stormwater Quality Control Measures 2010 I-3 September 22, 2010 Revised Draft

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