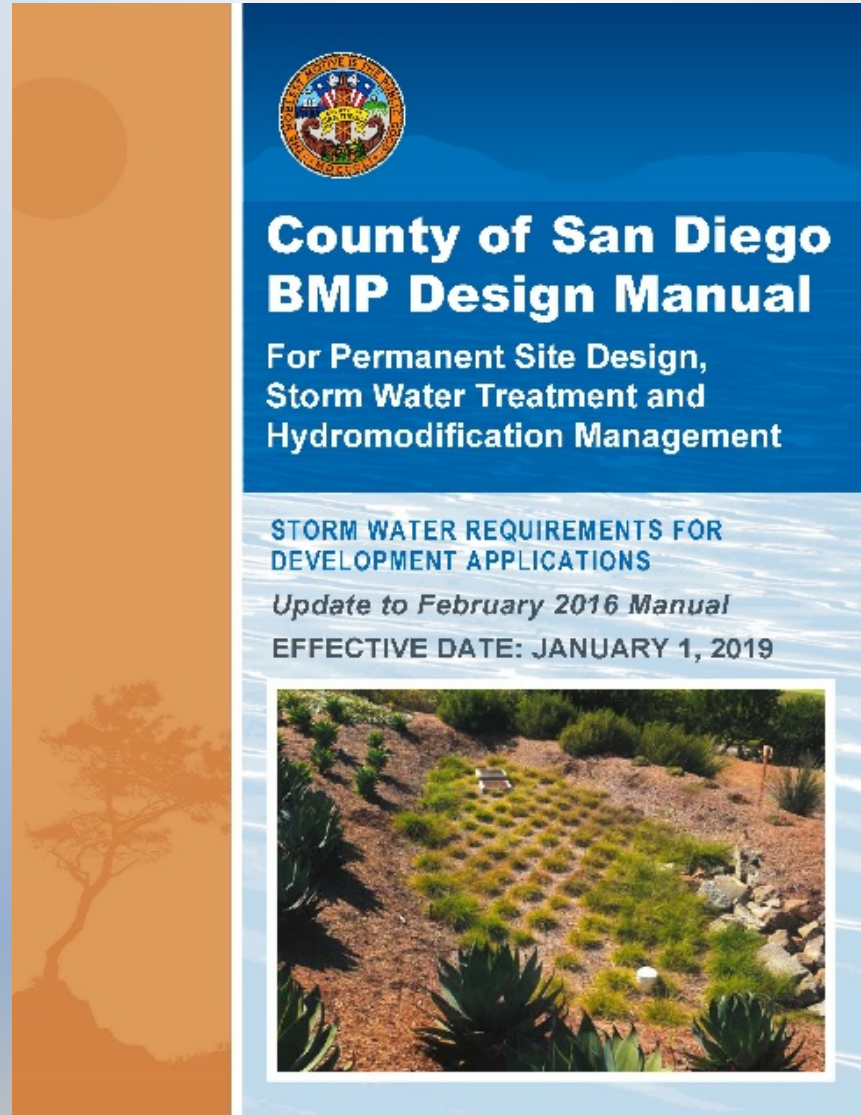


# COUNTY OF SAN DIEGO

## BMP DESIGN MANUAL 2018 UPDATE



**NOVEMBER 2018**

# PRESENTATION OUTLINE

BMP DM Section	Agenda Item	Presenter(s)
	Introduction	Jayne
1 & 2	Policies and Procedures; Performance Standards	Jon
3 & 4	Planning; Source Control and Site Design	René
5 & 6	Pollutant Control for PDPs; Hydromodification Management for PDPs	René
7 & 8	Maintenance; Submittal Requirements	Nancy
A	Appendices Overview, Submittal Templates	Jon
B, C & D	Pollutant Control Calculations; Geotechnical Guidance for Infiltration Infeasibility	Charles
E	Fact Sheets	René
F, G, H & I	General Guidance; Continuous Simulation Modeling; CCSYA Investigation; Checklists	Nancy
J, K, L,	Alt Compliance; Green Infrastructure; Grandfathering	Rey
Closing		Rey

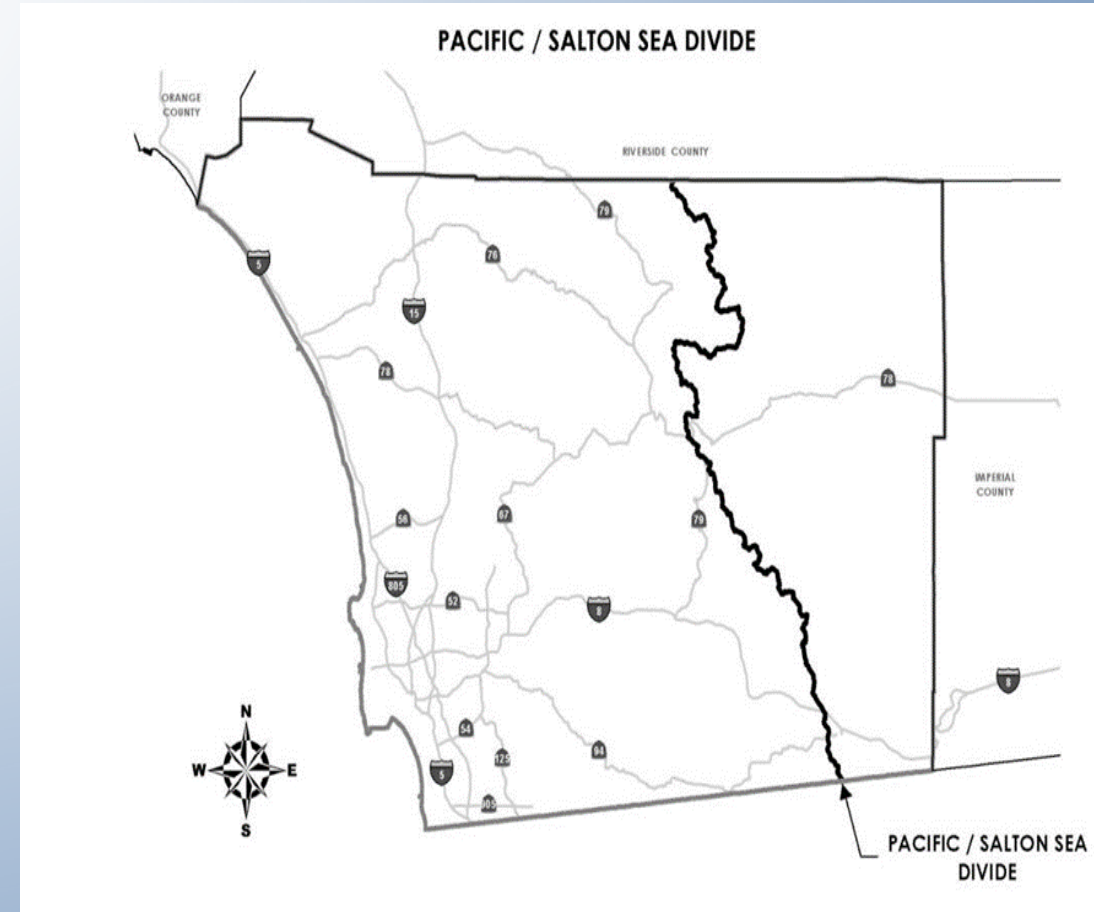
# TIMELINE

- ❖ November 5, 2018 Draft Manual posted with summary of changes  
[www.sandiegocounty.gov/stormwater](http://www.sandiegocounty.gov/stormwater)
- ❖ November 13, 2018 Public Workshop
- ❖ November 19, 2018 End of public review period
- ❖ January 1, 2018 Effective date and new manual posted!

# BACKGROUND

## General Permits

- 2013 MS4 Permit
- 2009 Construction General Permit (CGP)







# PERMIT REQUIREMENTS

- County is required to :
  - Ensure each permanent BMP is designed, installed and operating per specs, plans, permits, and MS4 permit
  - Maintain an inventory of all PDP sites and structural BMPs\*
  - Verify that structural BMPs are maintained and operating effectively, in perpetuity.
- REPORT FINDINGS TO REGIONAL BOARD IN ANNUAL REPORT

*\*County will also inventory significant site design BMPs*

SO HOW DO WE DO THIS....



# MANUAL DEVELOPMENT

- Incorporate Model updates
- County updates, incorporate White Pages, web page addresses
- Update all forms
- Integrate use of SSD-BMPs
- Overview of ubiquitous changes-organizational, streamlined, reduced redundancy....



# CHAPTER: SUBJECT (**MODEL**/COUNTY CHANGES)

**PURPOSE:** Purpose of chapter

*Model changes (Mauve italic letters)*

Underlined specific County textual additions

Used ~~strikeout~~ for specific County textual deletions

ADDITION/REMOVAL/MODIFICATION



# CHAPTER 1: POLICIES AND PROCEDURAL REQUIREMENTS

## PURPOSE:

- Introduces policies and procedural requirements for preparation, review, and approval of project submittals.
- Establishes parameters for determining BMP DM applicability.
- Describes criteria for project priority classification.
- Introduces stormwater management requirements by project type and classification.

# CHAPTER 1: POLICIES AND PROCEDURAL REQUIREMENTS (**MODEL**/COUNTY CHANGES)

## EXEMPTIONS FROM DEVELOPMENT PROJECT DEFINITION (1.3)

- ~~REMOVAL: Rebuilding a structure to original design after damage from earthquake, fire or similar disasters~~
- ~~REMOVAL: Routine replacement of damaged pavement, including full depth replacement, if the sole purpose is to repair the damaged pavement~~
- *ADDITION: Replacing Americans with Disabilities Act (ADA) non-compliant curb ramps with ADA compliant curb ramps*

# CHAPTER 1: POLICIES AND PROCEDURAL REQUIREMENTS (COUNTY CHANGES)

## EXEMPTIONS FROM DEVELOPMENT PROJECT DEFINITION (1.3)

- ADDITION: Installation of ground mounted solar arrays over existing impermeable surface
- MODIFICATION: Exterior alterations that do not increase existing impervious surface footprint and do not expose underlying soil during construction (e.g. roof replacement).  
~~Change the general dimensions and structural framing of the building (does not include building additions or projects where the existing building is demolished)~~
- MODIFICATION: Clarification that project definition based on ministerial or discretionary permit type is not absolute (“Neither of these lists is exhaustive. Other permit types may be development projects.”)



# CHAPTER 1: POLICIES AND PROCEDURAL REQUIREMENTS (COUNTY CHANGES)

## PDP CLASSIFICATION (1.4.1)

- MODIFICATION: New development projects, or redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface, ~~that support~~ and consisting of one or more of the following uses: [Streets, Parking Lots, Retail Gas Outlets, Restaurants, Hillside Development, etc.)

# CHAPTER 1: POLICIES AND PROCEDURAL REQUIREMENTS (COUNTY CHANGES)

## HYDROMODIFICATION MANAGEMENT EXEMPTIONS (1.6)

- ADDITION: The invert elevation of the direct discharge conveyance system (at the point of discharge to the enclosed embayment) should be equal to or below the mean high tide water surface elevation at the point of discharge, unless the outfall discharges to a quay or other non-erodible shore protection.

# CHAPTER 1: POLICIES AND PROCEDURAL REQUIREMENTS (COUNTY CHANGES)

## HYDROMODIFICATION MANAGEMENT EXEMPTIONS (1.6)

- For cases in which the direct discharge conveyance system outlet invert elevation is above the mean high tide water surface elevation but below the 100-year water surface elevation, additional analysis is required to determine if energy dissipation should be extended between the conveyance system outlet and the elevation associated with the mean high tide water surface level.
- No exemption may be granted for conveyance system outlet invert elevations located above the 100-year floodplain elevation.



# CHAPTER 1: POLICIES AND PROCEDURAL REQUIREMENTS (COUNTY CHANGES)

## MISCELLANEOUS CHANGES

- Consolidation and re-ordering of content for simplification (construction, etc.)
- Addition of eutrophication as Santa Margarita Highest Priority Water Quality Condition (HPWQC) (1.9)

# CHAPTER 2: PERFORMANCE STANDARDS AND CONCEPTS

## PURPOSE:

- Introduces the different types of performance standards applicable to Development Projects
- Describes the applicability of different performance standards by project priority (Standard versus PDP) and type

# CHAPTER 2: PERFORMANCE STANDARDS AND CONCEPTS (COUNTY CHANGES)

## UPDATED DESCRIPTION OF PROJECT PERFORMANCE STANDARDS

- ADDITION: Overview description and figure of multiple performance standards for Standard Projects and PDPs (2.1)
- ADDITION: Break out requirement for managing areas of critical coarse sediment yield as separate performance standard (2.3.3)
  - (1)Source Control BMPs
  - (2)Site Design BMPs
  - (3)Structural Pollutant Control Performance Standard
  - (4)Structural Hydromodification Management Performance Standard
  - (5)Management of Areas of Critical Coarse Sediment Yield



# CHAPTER 2: PERFORMANCE STANDARDS AND CONCEPTS (COUNTY CHANGES)

## UPDATED DESCRIPTION OF PROJECT PERFORMANCE STANDARDS

- ADDITION: Broader description of multiple pathways available for satisfying structural performance requirements (2.2.1 and 2.3.1):
  - (1) Self-retaining DMAs
  - (2) Self-retaining DMAs W/ Tree Wells
  - (3) Self-retaining DMAs W/ Impervious Dispersion
  - (4) Structural BMPs

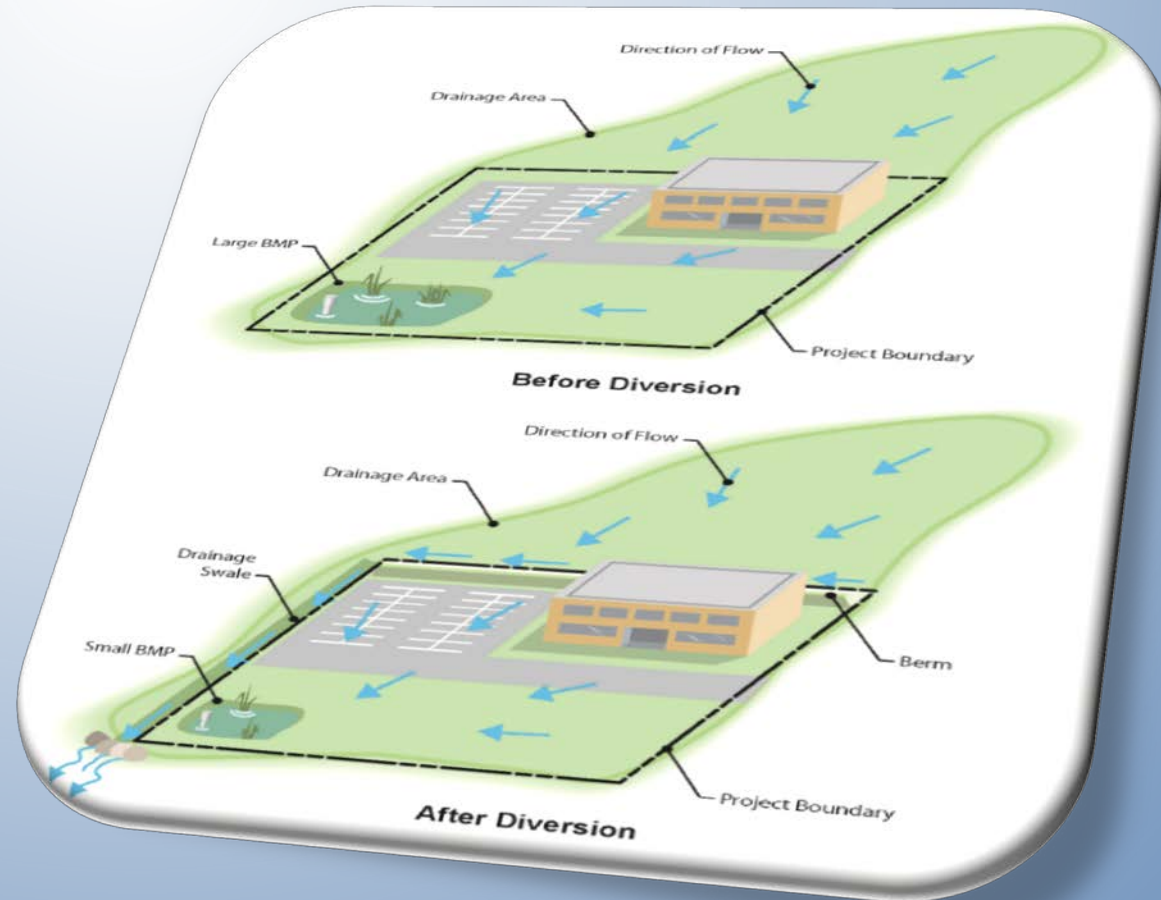
TABLE 2-1. Applicability of Performance Standards for Different Project Types

	1. Baseline BMP Implementation		2. DCV Reduction through Enhanced Site Design BMPs	3. Compliance with Structural Performance Standards		4. Avoidance & Bypass of Critical Coarse Sediment
	a. Source Control BMPs	b. Site Design BMPs		a. Pollutant Control	b. Hydromod. Management	
	Sections 2.1.1.2 & 4.2	Sections 2.1.1.3 & 4.3		Sections 2.2 & 5	Sections 2.3, 2.4 & 6	
Standard Projects	Required where applicable and feasible		NA	NA	NA	NA
<b>PDP-exempted Projects</b> <ul style="list-style-type: none"> <li>New or retrofit paved sidewalks, bicycle lanes, or trails (Section 1.4.3)</li> <li>Retrofitting or redevelopment of paved alleys, streets or roads (Section 1.4.3)</li> </ul>			NA	NA	NA	NA
<b>PDPs</b> <ul style="list-style-type: none"> <li>Without HMP Exemption (Section 1.4)</li> <li>With HMP Exemption (Section 6.1)</li> </ul>			Optional	Required	Required	Required
			Optional	Required	NA	NA

# CHAPTER 3: PLANNING AND DESIGN

## PURPOSE:

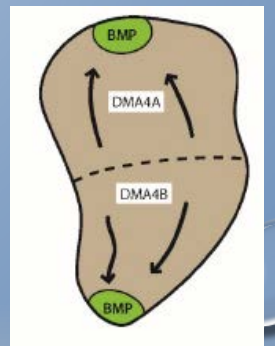
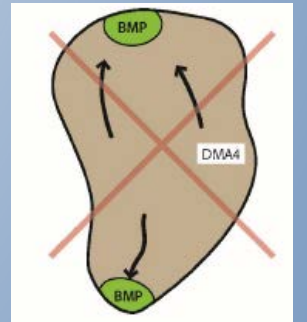
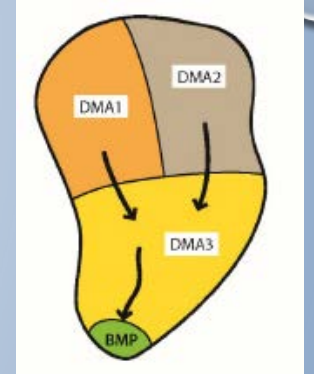
Design guidance for BMPs





# CHAPTER 3: PLANNING AND DESIGN (COUNTY CHANGES)

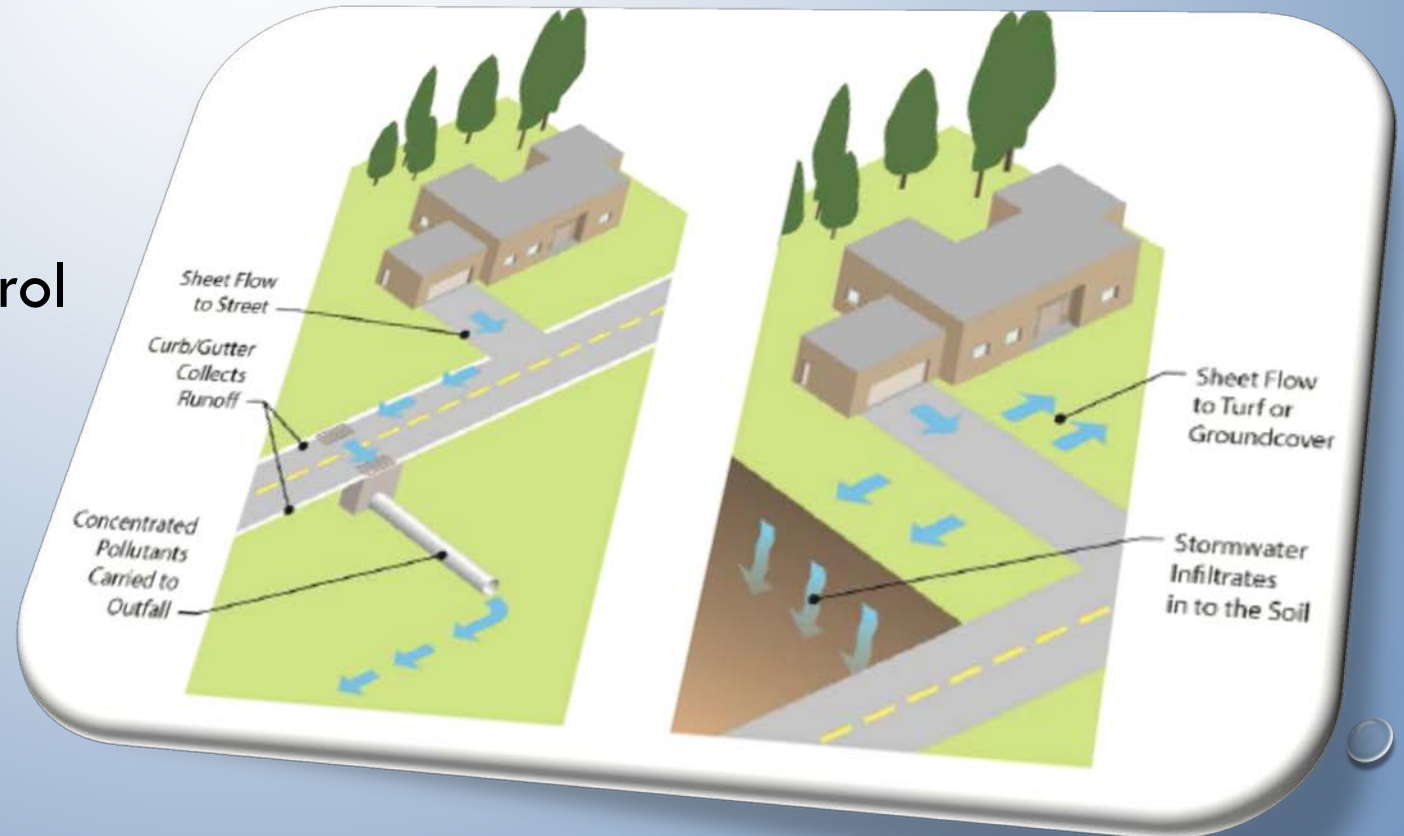
- **MODIFICATION:** Changed order of sections to show DMAs before critical coarse sediment yield areas in Chapter 3 (swapped Sections 3.3.2 & 3.3.3)
- **MODIFICATION:** Clarified which sections of the manual apply to PDPs, HMP exempt PDPs, and PDP exemption using guidance on Green Infrastructure (Sections 3.3.4 & 3.4.2)
- **ADDITION:** Language to clarify “offsite improvements” (Section 3.5)
- **ADDITION:** Language for “phased projects” (Section 3.6)
- **ADDITION:** Language to include “Site Design BMPs” in addition to “Structural BMPs” in the public right-of-way (Section 3.7)



# CHAPTER 4: SOURCE CONTROL AND SITE DESIGN

## PURPOSE:

Provide guidance for Source Control and Site Design



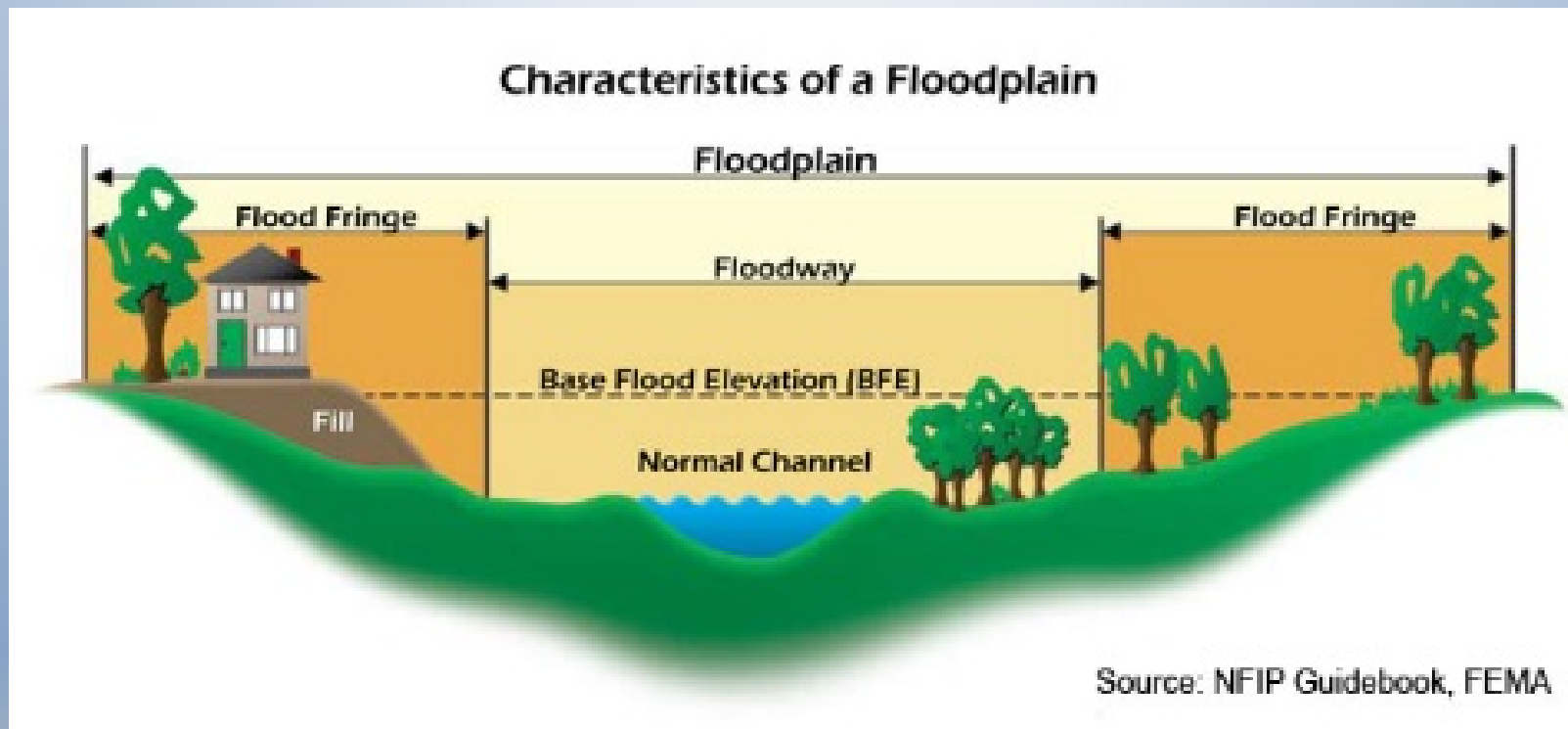
## CHAPTER 4: SOURCE CONTROL AND SITE DESIGN (MODEL CHANGES)

- *ADDITION: Section 4.3.2 (conserve natural areas, soils and vegetation) reference to Appendix E for additional guidance on implementing SD-A Tree Wells as a Site Design BMP*
- *ADDITION: Section 4.3.3 (minimize impervious area) reference to Appendix E for additional guidance on implementing SD-D Permeable Pavement as a Site Design BMP*
- *ADDITION: Section 4.3.4 (minimize soil compaction) reference to Appendix E for additional guidance on implementing Amended Soils*
- *ADDITION: Section 4.3.6 (collect runoff) reference to Appendix E for additional guidance on implementing Permeable Pavement (Site Design BMP) and Green Roofs*



# CHAPTER 4: SOURCE CONTROL AND SITE DESIGN (COUNTY CHANGES)

- ADDITION: Language regarding placing BMPs in FEMA or County floodplain or floodway (Section 4.1.4)



# CHAPTER 5: POLLUTANT CONTROL FOR PDPS

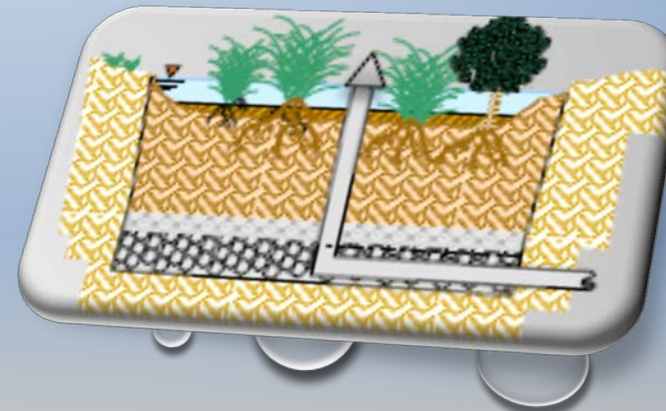
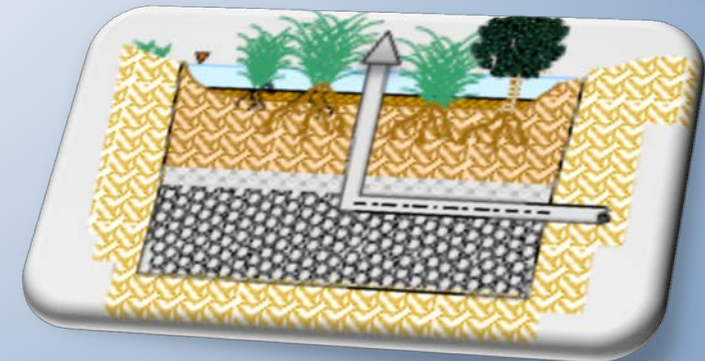
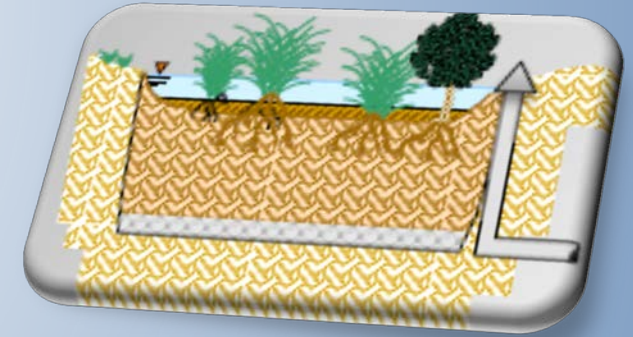
## **PURPOSE:**

Outline methodologies for pollutant control compliance



# CHAPTER 5: POLLUTANT CONTROL FOR PDPS (COUNTY CHANGES)

- REMOVAL: BMP feasibility analysis, BMP selection hierarchy, and BMP categories
- MODIFICATION: Clarify stepwise process and reference Appendix B for details (5.1)
- MODIFICATION: Clarify DMAs that can be excluded from DCV calculations (5.2)





# CHAPTER 6: HYDROMODIFICATION MANAGEMENT FOR PDPS

## PURPOSE:

Describe hydromodification management requirements:

- Stormwater flow control
- Protection of CCSYA
- How to implement them
- Outline exemptions.

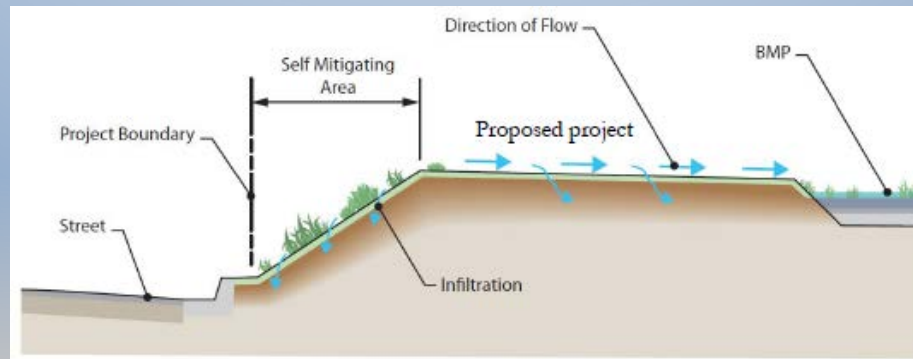




# CHAPTER 6: HYDROMODIFICATION MANAGEMENT FOR PDPS (MODEL CHANGES)

- *ADDITION: Clarify what DMAs can be excluded from HM flow requirements:*

1. *Self-Mitigating DMAs may only be excluded from flow control analyses if certain conditions are met. (6.1)*
  - a) *The self-mitigating area does not contribute runoff to a flow control POC.*
  - b) *The self-mitigating DMA does not concentrate runoff in a new location where runoff is not concentrated in the pre-development condition.*
  - c) *The self-mitigating DMA does not increase the total area draining to the same discharge point compared to the pre-development condition.*



# CHAPTER 6: HYDROMODIFICATION MANAGEMENT FOR PDPS (MODEL CHANGES)

- *ADDITION: Clarify what DMAs can be excluded from HM flow requirements:*
  2. ***De Minimus DMA** (subtract de minimus area from pre- and post- development)*
  3. ***Impervious Area Dispersion** that has a ratio of 1:1 or less. All other self-retaining DMAs via qualifying site design BMP DO NOT qualify. They only reduce the pollutant control requirements.*

# CHAPTER 6: HYDROMODIFICATION MANAGEMENT FOR PDPS (MODEL CHANGES)

- *ADDITION: Cautionary guidance: **avoid diversion of flow through grading and conveyance.** In addition to water balance issues, flow diversion increases the size of required flow control measures (post project drainage will be larger than pre project) (6.3.1)*
- *ADDITION: Clarified when calculating flow control for hydromodification management, **Cannot mix and match** continuous simulation hydrologic modeling and regression equation methodologies throughout the project POCs. (6.3.4)*

# CHAPTER 6: HYDROMODIFICATION MANAGEMENT FOR PDPS (COUNTY CHANGES)

- ADDITION: DMA's where the full DCV is captured within tree wells sized in accordance with fact sheet SD-A , can be excluded from HM calculations.
- ADDITION: Re-assessing channel susceptibility- County may require study be completed within a specific time frame prior to their review, and/or may apply a sunset date. (6.1)



# CHAPTER 7: LONG TERM OPERATION AND MAINTENANCE

## PURPOSE:

Outline requirements to ensure long term maintenance and proper proof of mechanism (guarantee) to ensure ongoing maintenance of BMPs as required by the permit.

# CHAPTER 7: LONG TERM OPERATION AND MAINTENANCE (COUNTY CHANGES)

- ADDITION: Information on Maintenance Notification letters.
  - Certificate of Approval requires letter. Templates provided online.
  - Other permit-types are encouraged to use them. (7.3)
- ADDITION: SSD-BMPs- No guarantees required, but recommend using notification letters. (7.3)

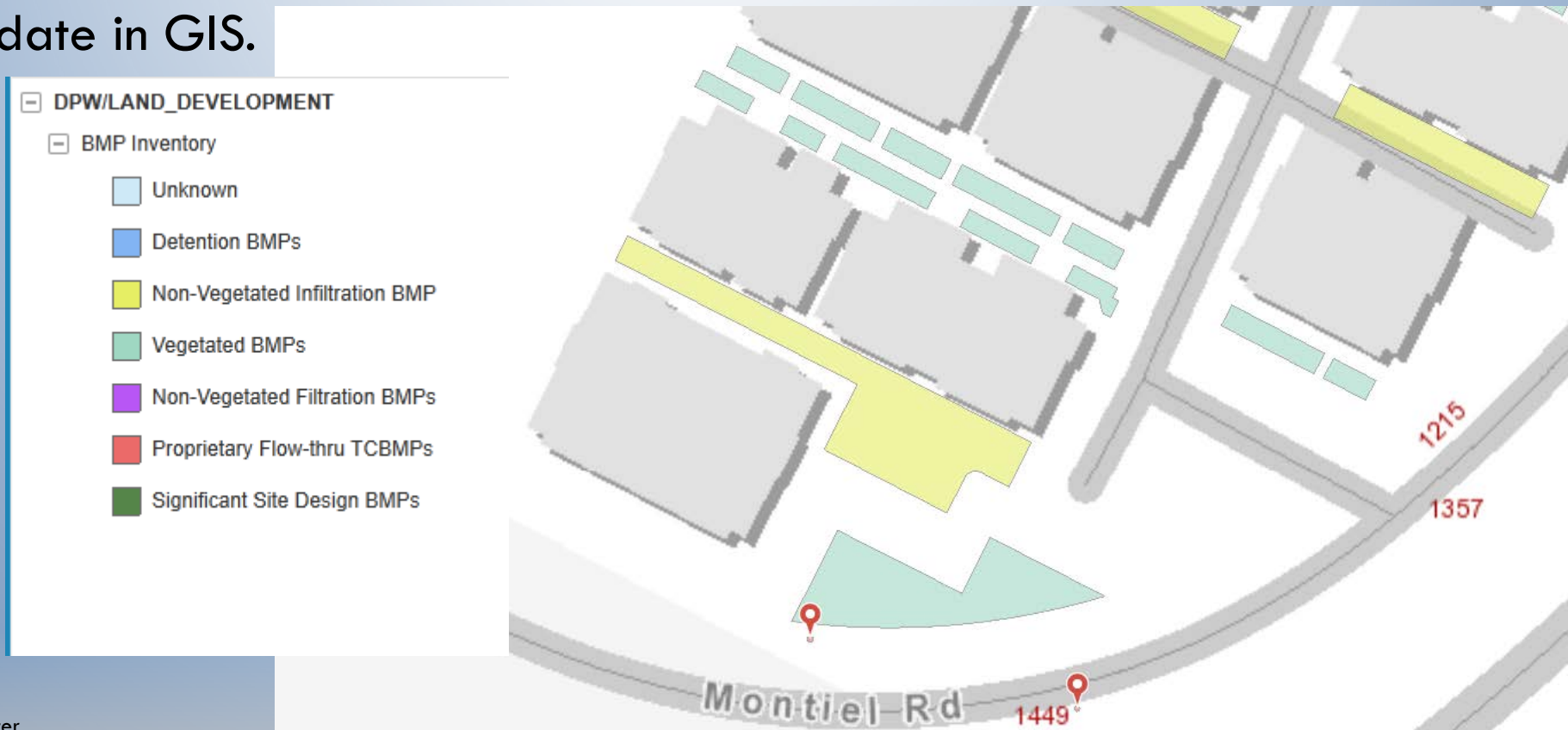


# CHAPTER 7: LONG TERM OPERATION AND MAINTENANCE (COUNTY CHANGES)

- REMOVAL: Cat 2 financial security and easement requirements.(7.3.2)
- ADDITION: Encroachment Maintenance & Removal Agreement (EMRAs) may be used at the discretion of Transportation Division.(7.3.4)
- ADDITION: Cat 3 & 4 BMPs, responsibility for maintenance remains with the developer until the County has officially accepted it and signed off the certificate of completion letter. (7.3)

# CHAPTER 7: LONG TERM OPERATION AND MAINTENANCE (COUNTY CHANGES)

- Ensure to copy WPP for sign off so a centralized inventory of BMPs is kept up-to date in GIS.



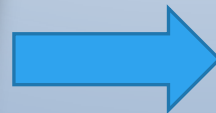
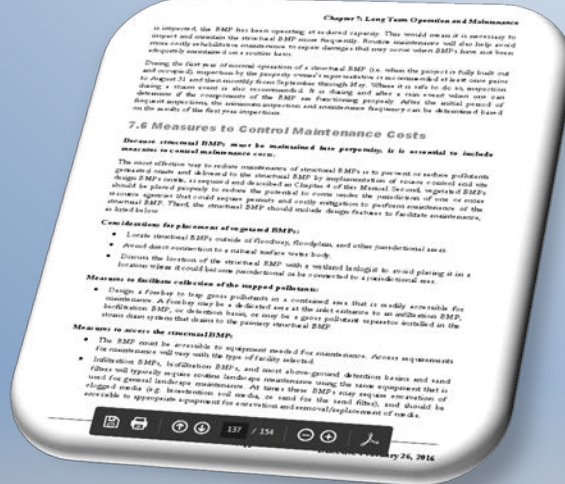


# CHAPTER 7: LONG TERM OPERATION AND MAINTENANCE (COUNTY CHANGES)

- REMOVAL: Maintenance plans. Referred to Appendix E, instead of rehashing and moved:

- Measures to control maintenance costs;
- Maintenance indicators and actions; to the corresponding BMP fact sheets.

(7.7)



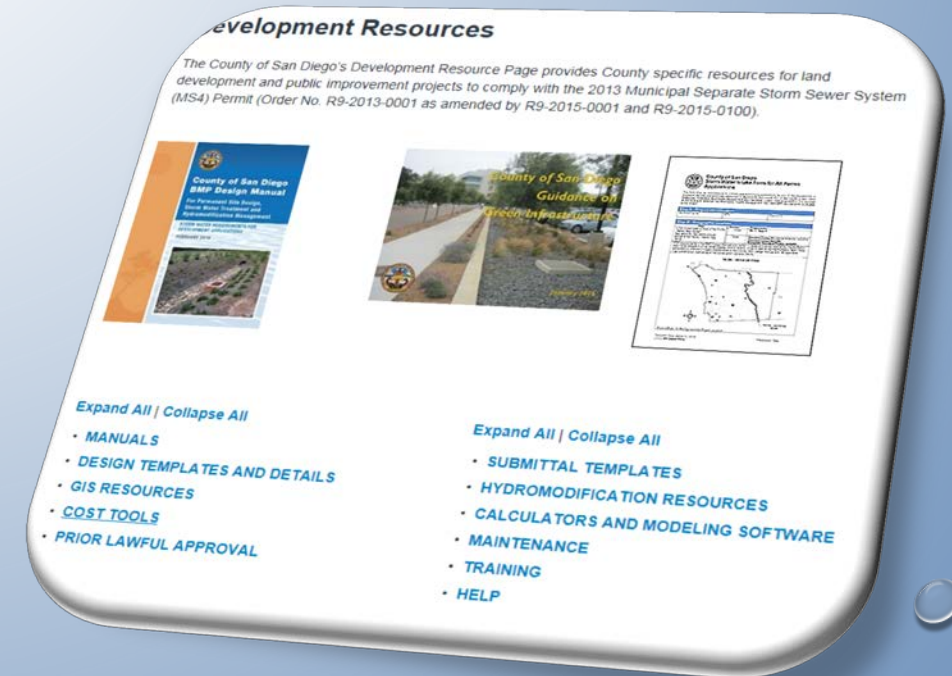
# CHAPTER 8: SUBMITTAL REQUIREMENTS THROUGH DEVELOPMENT

## PURPOSE:

Outline submittal requirements which will illustrate stormwater management design is compliant with the permit at each stage of the development process.

# CHAPTER 8: SUBMITTAL REQUIREMENTS THROUGH DEVELOPMENT (COUNTY CHANGES)

- **REMOVAL:** Submittal requirements already addressed in intake form, SWQMPS, plans and Installation Verification Form. Instead directed them to website for the forms (7.1, 7.2)
- **REMOVAL:** Maintenance Plan and Agreement requirements already outlined in Chapter 7. (8.2)



# CHAPTER 8: SUBMITTAL REQUIREMENTS THROUGH DEVELOPMENT (COUNTY CHANGES)

- Installation Verification Form replaces Certification Form
  - Coordination with Landscape Ordinance requirements
  - Easier tracking for partial permit closures
  - Better illustration of BMPs by DMA
  - Integration of Building Department into Process
  - Encourage Photographs illustrating proper construction of BMPs (Progressive)



# CHAPTER 8: SUBMITTAL REQUIREMENTS THROUGH DEVELOPMENT (COUNTY CHANGES)



# APPENDIX A: SUBMITTAL TEMPLATES

## **PURPOSE:**

Provide templates of SWQMP forms needed for project proposal, review, and approval



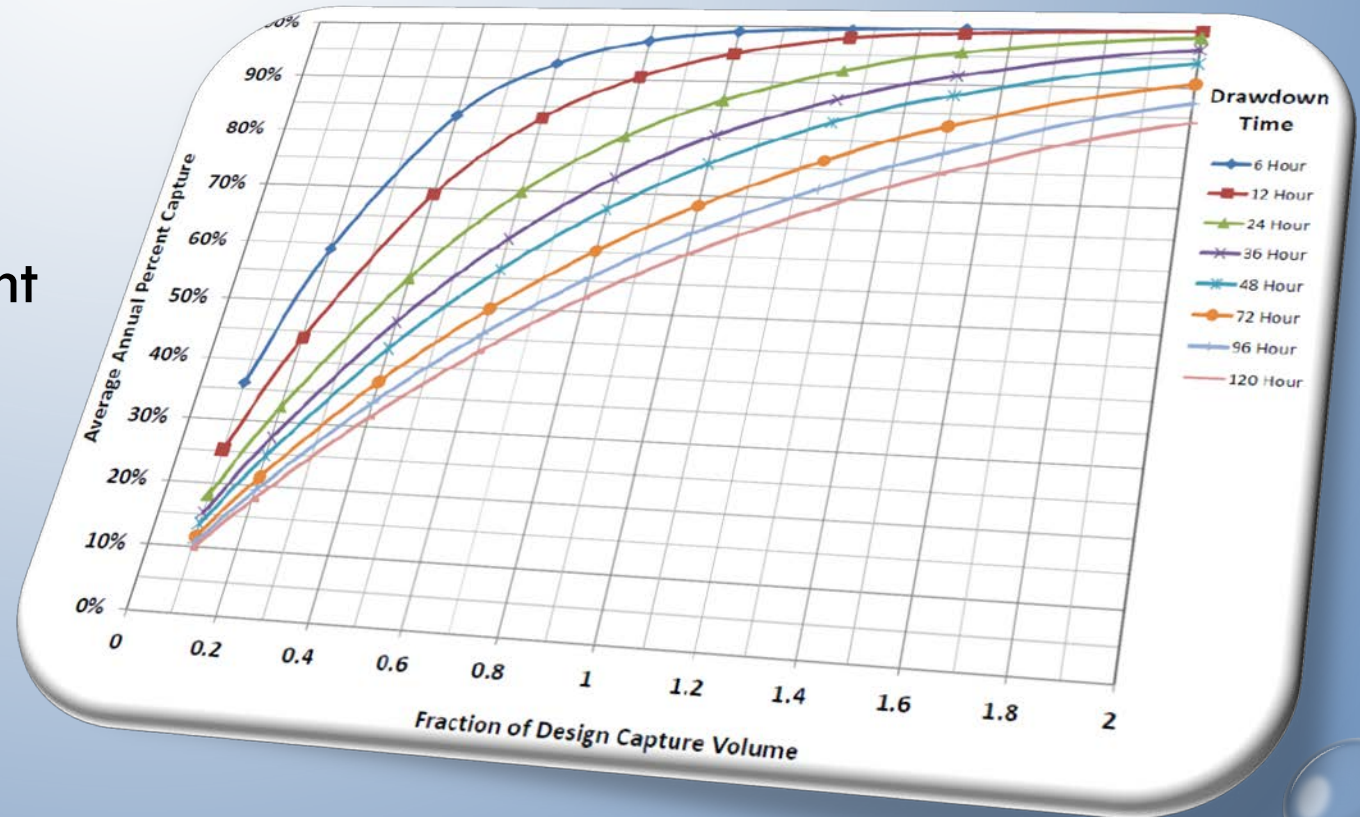
# APPENDIX A: SUBMITTAL TEMPLATES (COUNTY CHANGES)

- REMOVAL: All forms from Appendix. Now on our website.
- REMOVAL: ACP SWQMP. Integrated it into PDP SWQMP.
- MODIFIED: Intake Form, PDP & Standard SWQMP.
- MODIFIED: Green Streets PDP Exempt SWQMP.

# APPENDIX B: POLLUTANT CONTROL HYDROLOGIC CALCULATIONS AND SIZING METHODS

## PURPOSE:

Provide methodologies for pollutant control compliance





# APPENDIX B.1: DETERMINE DCV

- DCV formula updated to account for site design volume reductions.
- Determine DCV (B.1)
  - Rainfall Depth (B.1.1)
  - Tributary Areas (B.1.2)
  - Runoff Factors (B.1.3)
  - Site Design Volume Reductions (B.1.4)

Category	#	Description	<i>i</i>	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name		unitless
	2	85th Percentile 24-hr Storm Depth		inches
	3	Impervious Surfaces <u>Not Directed to Dispersion Area</u> (C=0.90)		sq-ft
	4	Semi-Pervious Surfaces <u>Not Serving as Dispersion Area</u> (C=0.30)		sq-ft
	5	Engineered Pervious Surfaces <u>Not Serving as Dispersion Area</u> (C=0.10)		sq-ft
	6	Natural Type A Soil <u>Not Serving as Dispersion Area</u> (C=0.10)		sq-ft
	7	Natural Type B Soil <u>Not Serving as Dispersion Area</u> (C=0.14)		sq-ft
	8	Natural Type C Soil <u>Not Serving as Dispersion Area</u> (C=0.23)		sq-ft
	9	Natural Type D Soil <u>Not Serving as Dispersion Area</u> (C=0.30)		sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?		yes/no
	11	Impervious Surfaces <b>Directed to Dispersion Area</b> per SD-B (Ci=0.90)		sq-ft
	12	Semi-Pervious Surfaces <b>Serving as Dispersion Area</b> per SD-B (Ci=0.30)		sq-ft
	13	Engineered Pervious Surfaces <b>Serving as Dispersion Area</b> per SD-B (Ci=0.10)		sq-ft
	14	Natural Type A Soil <b>Serving as Dispersion Area</b> per SD-B (Ci=0.10)		sq-ft
	15	Natural Type B Soil <b>Serving as Dispersion Area</b> per SD-B (Ci=0.14)		sq-ft
	16	Natural Type C Soil <b>Serving as Dispersion Area</b> per SD-B (Ci=0.23)		sq-ft
	17	Natural Type D Soil <b>Serving as Dispersion Area</b> per SD-B (Ci=0.30)		sq-ft
	18	Number of Tree Wells Proposed per SD-A		#
	19	Average Mature Tree Canopy Diameter		ft
	20	Number of Rain Barrels Proposed per SD-E		#
	21	Average Rain Barrel Size		gal
Results	35	Final Adjusted Runoff Factor		unitless
	36	Final Effective Tributary Area		sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements		cubic-feet
	38	Final Design Capture Volume Tributary to BMP		cubic-feet

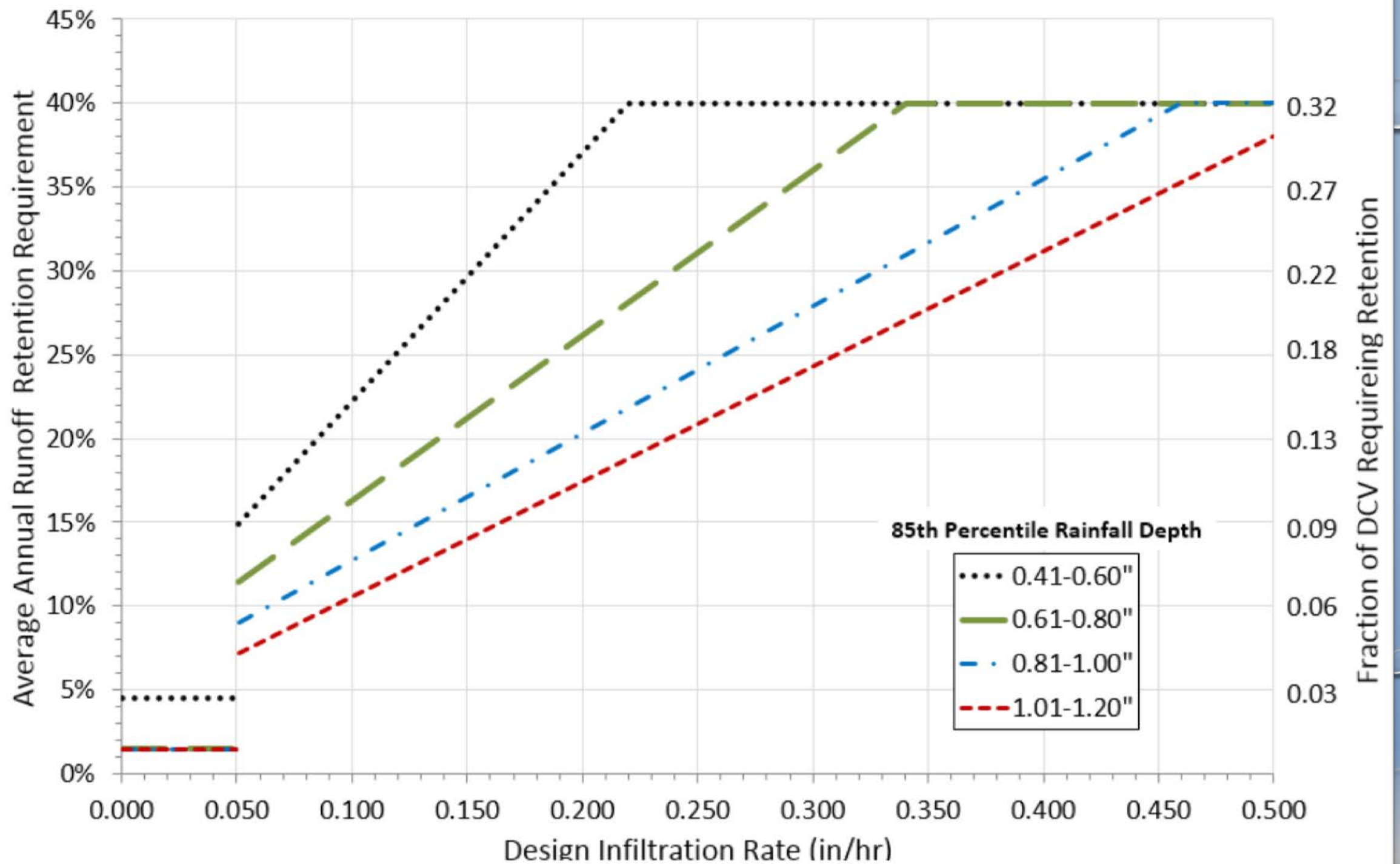
# APPENDIX B.2: DETERMINE RETENTION REQUIREMENTS

- Manual now includes numeric retention requirements
  - Eliminated BMP hierarchy, capture & use analysis, infiltration feasibility table
- Determine retention requirements (B.2)
  - Determine if capture and use analysis is required (B.2.1)
    - Only required if habitable structures >9 stories proposed
  - Evaluate infiltration restrictions (B.2.2)
    - Default restrictions: 100' from contaminated soils, 50' from septic tanks, hydric soils, etc.
  - Determine design infiltration rate (B.2.3)
    - Use default soil types rates or results of geotechnical analysis
  - Determine retention requirements (B.2.4)
    - Function of rainfall depth and design infiltration rate

Category	#	Description	<i>i</i>	Units
Basic Analysis	1	Drainage Basin ID or Name		unitless
	2	85th Percentile Rainfall Depth		inches
	3	Predominant NRCS Soil Type Within BMP Location		unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?		unitless
	5	Nature of Restriction		unitless
	6	Do Minimum Retention Requirements Apply to this Project?		yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?		yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?		yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer		in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements		in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA		percentage
	12	Fraction of DCV Requiring Retention		ratio
	13	Required Retention Volume		cubic-feet



Restriction Element		Is Element Applicable? (Yes/No)
Mandatory Considerations	BMP is within 100' of Contaminated Soils	
	BMP is within 100' of Industrial Activities Lacking Source Control	
	BMP is within 100' of Well/Groundwater Basin	
	BMP is within 50' of Septic Tanks/Leach Fields	
	BMP is within 10' of Structures/Tanks/Walls	
	BMP is within 10' of Sewer Utilities	
	BMP is within 10' of Groundwater Table	
	BMP is within Hydric Soils	
	BMP is within Highly Liquefiable Soils and has Connectivity to Structures	
	BMP is within 1.5 Times the Height of Adjacent Steep Slopes ( $\geq 25\%$ )	
	County Staff has Assigned "Restricted" Infiltration Category	
Optional Considerations	BMP is within Predominantly Type D Soil	
	BMP is within 10' of Property Line	
	BMP is within Fill Depths of $\geq 5'$ (Existing or Proposed)	
	BMP is within 10' of Underground Utilities	
	BMP is within 250' of Ephemeral Stream	
	Other (Provide detailed geotechnical support)	
Result	<b>Unrestricted.</b> None of the restriction elements above are applicable.	
	<b>Restricted.</b> One or more of the restriction elements above are applicable.	



# APPENDIX B.3: DETERMINE BMP PERFORMANCE

- Manual consolidates calculation process for all retention and biofiltration BMPs
- Determine BMP performance (B.3)
  - Identify BMP characteristics (B.3.1)
    - Lined/unlined, vegetated/unvegetated, underdrain/no-underdrain, proprietary/non-proprietary
  - Calculate retention processes (B.3.2)
  - Calculate biofiltration processes (B.3.3)
  - Satisfaction of pollutant control requirements (B.3.4)
  - Satisfaction of retention requirements (B.3.5)

Category	#	Description	<i>i</i>	Units
BMP Inputs	1	Drainage Basin ID or Name		sq-ft
	2	Design Infiltration Rate Recommended		in/hr
	3	Design Capture Volume Tributary to BMP		cubic-feet
	4	Is BMP Vegetated or Unvegetated?		unitless
	5	Is BMP Impermeably Lined or Unlined?		unitless
	6	Does BMP Have an Underdrain?		unitless
	7	Does BMP Utilize Standard or Specialized Media?		unitless
	8	Provided Surface Area		sq-ft
	9	Provided Surface Ponding Depth		inches
	10	Provided Soil Media Thickness		inches
	11	Provided Gravel Thickness (Total Thickness)		inches
	12	Underdrain Offset		inches
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)		inches
	14	Specialized Soil Media Filtration Rate		in/hr
	15	Specialized Soil Media Pore Space for Retention		unitless
	16	Specialized Soil Media Pore Space for Biofiltration		unitless
	17	Specialized Gravel Media Pore Space		unitless
Result	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?		yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)		ratio
	48	<b>Deficit of Effectively Treated Stormwater</b>		cubic-feet



# APPENDIX B: REDUCED SIZE BMPS

- Reduced size BMPs must demonstrate 10-year major maintenance interval (B.4)
- Calcs accommodate more pre-treatment options (B.4)

Category	#	Description	<i>i</i>	Units
Drainage Basin Info	1	Drainage Basin ID or Name		unitless
	2	Final Effective Tributary Area		sq-ft
	3	Provided BMP Surface Area		sq-ft
Biofiltration Clogging Inputs	4	Average Annual Precipitation		inches
	5	Load to Clog (default =2.0)		lb/sq-ft
	6	TSS Pretreatment Efficacy		yes/no
	7	Percentage "Commercial"		Percentage
	8	Percentage "Education"		Percentage
	9	Percentage "Industrial"		Percentage
	10	Percentage "Low Traffic Areas"		Percentage
	11	Percentage "Multi-Family Residential"		Percentage
	12	Percentage "Roof Areas"		Percentage
	13	Percentage "Single Family Residential"		Percentage
	14	Percentage "Transportation"		Percentage
	15	Percentage "Vacant/Open Space"		Percentage
Minimum Footprint Calculations	16	Percentage "Steep Hillslopes"		Percentage
	17	Total Percentage of Above Land Uses		Percentage
	18	Average TSS Concentration for Tributary After Pretreatment		mg/L
	19	Average Annual Runoff Volume		cubic-feet
	20	Average Annual TSS Load		lb/yr
Result	21	Available Sediment Storage within BMP		lb
	22	Anticipated Major Maintenance Frequency		Years

# APPENDIX C: GEOTECHNICAL AND GROUNDWATER INVESTIGATION REQUIREMENTS

## PURPOSE:

No longer used

# APPENDIX D: GEOTECHNICAL ENGINEER ANALYSIS

## PURPOSE:

Provide geotechnical engineer's guidance on evaluating infiltration feasibility/rates



# APPENDIX D: GEOTECHNICAL ENGINEER ANALYSIS

- REMOVAL: References to planning/design phases
- REMOVAL: Requirement for two infiltration tests at BMPs
- ADDITION: Table of infiltration restrictions (D.1)
- MODIFICATION: Geotech only required for BMPs without underdrain (D.2.1)
- MODIFICATION: Consolidation of factor of safety ratings (D.2.3)

Item	Value	Unit
<b>Initial Infiltration Rate</b> Identify per Section D.2.1		in/hr
<b>Corrected Infiltration Rate</b> Identify per Section D.2.2		in/hr
<b>Safety Factor</b> Identify per Section D.2.3		unitless
<b>Design Infiltration Rate</b> Corrected Infiltration Rate + Safety Factor		in/hr



# APPENDIX E: BMP DESIGN FACT SHEETS

## PURPOSE:

Provide guidance for  
specific BMP types






# APPENDIX E: BMP DESIGN FACT SHEETS (MODEL CHANGES)

- ADDITION: Quick guide
- ADDITION: Maintenance section to all Fact Sheets

**Fact Sheet Quick Guide**

9F-1 Biofiltration **1**



Location: 43rd Street and Logan Avenue, San Diego, California **3**

**MS4 Permit Category** **2**  
Biofiltration

**Manual Category**  
Biofiltration

**Applicable Performance Standard**  
Pollutant Control  
Flow Control

**Primary Benefits**  
Treatment

**Description** **4**  
Biofiltration (Bioretention with underdrain) facilities are vegetated surface water systems that filter water through vegetation, and soil or engineered media prior to discharge via underdrain or overflow to the downstream conveyance system.

**Fact Sheet Key**

1	Best Management Practice (BMP) Title
2	Categories, Standards, and Benefits
3	BMP Image
4	Main Content, Categories Include:

- Description
- Design Adaptations for Project Goals
- Recommended Siting Criteria
- Recommended BMP Component Dimensions
- Design Criteria and Considerations
- Conceptual Design and Sizing Approach for
  - Site Design
  - Storm Water Pollutant Control Only
  - Integrated Storm Water Pollutant Control and Flow Control
- Maintenance Overview
- Summary of Standard Inspection and Maintenance

**Summary of Standard Inspection and Maintenance**

The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district.

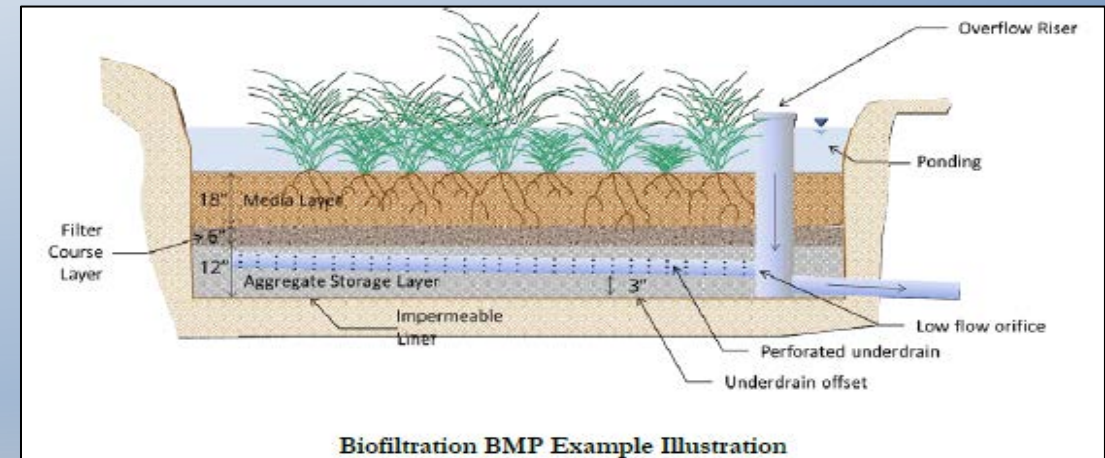
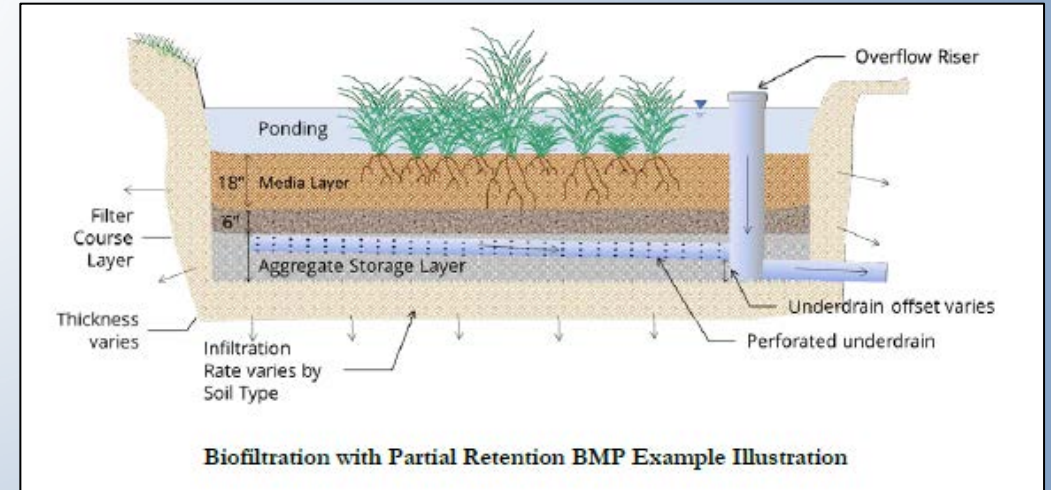
Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Tree health		
Dead or diseased tree		
Standing water in tree well for longer than 24 hours following a storm event		
Surface ponding longer than approximately 24 hours following a storm event detrimental to tree health		
Presence of mosquitoes/larvae		
For images of egg rafts, larva, pupa, mosquitoes, see <a href="http://www.mosquito.org/biology">http://www.mosquito.org/biology</a>		
Preventive vacuum/regular sweeping		
Accumulation of sediment, litter, or debris in forebay and/or basin	Remove and properly dispose of accumulated materials, (without damage to vegetation when applicable).	<ul style="list-style-type: none"> <li>• Inspect monthly. If the forebay is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event.</li> <li>• Remove any accumulated materials found within the infiltration area at each inspection.</li> <li>• When the BMP includes a forebay, materials must be removed from the forebay when the forebay is 25% full*, or if accumulation within the forebay blocks flow to the infiltration area.</li> </ul>

# APPENDIX E: BMP DESIGN FACT SHEETS

## (MODEL CHANGES)

- **ADDITION:** Clarification on biofiltration soil media options:
  - **INF-2 Bioretention**
  - **PR-1 Biofiltration with Partial Retention**
  - **BF-1 Biofiltration**





# APPENDIX E: BMP DESIGN FACT SHEETS (COUNTY CHANGES)

- ADDITION: SD-A Tree Well
  - Conceptual design and sizing approach for pollutant control



## MS4 Permit Category

Site Design  
Retention

## Manual Category

Site Design  
Infiltration

## Applicable Performance Standard

Site Design  
Pollutant Control  
Flow Control

#	Description	Drainage Basin ID or Name
1	Basin Drains to the Following BMP Type	
2	65th Percentile 24-hr Storm Depth	
3	Design Infiltration Rate Recommended by Geotechnical Engineer	
4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	
5	Semi-Permeable Surfaces Not Serving as Dispersion Area (C=0.30)	
6	Engineered Permeable Surfaces Not Serving as Dispersion Area (C=0.10)	
7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)	
8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)	
9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)	
10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)	
11	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No
12	Impervious Surfaces Directed to Dispersion Area per SD-B (C=0.90)	
13	Semi-Permeable Surfaces Serving as Dispersion Area per SD-B (C=0.30)	
14	Engineered Permeable Surfaces Serving as Dispersion Area per SD-B	
15	Natural Type A Soil Serving as Dispersion Area per SD-B (C=0.10)	
16	Natural Type B Soil Serving as Dispersion Area per SD-B (C=0.14)	
17	Natural Type C Soil Serving as Dispersion Area per SD-B (C=0.23)	
18	Natural Type D Soil Serving as Dispersion Area per SD-B (C=0.30)	
19	Number of Tree Wells Proposed per SD-A	
20	Average Mature Tree Canopy Diameter	
21	Number of Rain Barrels Proposed	
22	Average Rain Barrel Size	
23	Does BMP Overflow to Stormwater Features in Downstream Drainage?	No
24	Identify Downstream Drainage Basin Providing Treatment in Series	
25	Percent of Upstream Flows Directed to Downstream Dispersion Areas	
26	Upstream Impervious Surfaces Directed to Dispersion Area (C=0.90)	0
27	Upstream Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	0
28	Total Tributary Area	0
29	Initial Runoff Factor for Standard Drainage Areas	0.00
30	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00
31	Initial Weighted Runoff Factor	0.00
32	Initial Design Capture Volume	0
33	Total Impervious Area Dispersed to Permeable Surface	0
34	Total Permeable Dispersion Area	0
35	Ratio of Dispersed Impervious Area to Permeable Dispersion Area	n/a
36	Adjustment Factor for Dispersed & Dispersion Areas	1.00
37	Runoff Factor After Dispersion Techniques	n/a
38	Design Capture Volume After Dispersion Techniques	0
39	Total Tree Well Volume Reduction	0
40	Total Rain Barrel Volume Reduction	0
41	Final Adjusted Runoff Factor	0.00
42	Final Effective Tributary Area	0
43	Initial Design Capture Volume Retained by Site Design Elements	0
44	Final Design Capture Volume Tributary to BMP	0

# APPENDIX E: BMP DESIGN FACT SHEETS (COUNTY CHANGES)

- ADDITION: SD-A Tree Well
- Conceptual design and sizing approach for flow control

Tree Well Soil Depth (inches)	Hydrologic Soil Group				DCV Multiplier
	A	B	C	D (Default)	
30"	1.60	2.20	2.50	2.90	
36"	1.80	2.47	2.83	3.17	
42"	2.00	2.73	3.17	3.43	
48"	2.20	3.00	3.50	3.70	

DCV Multiplier Table

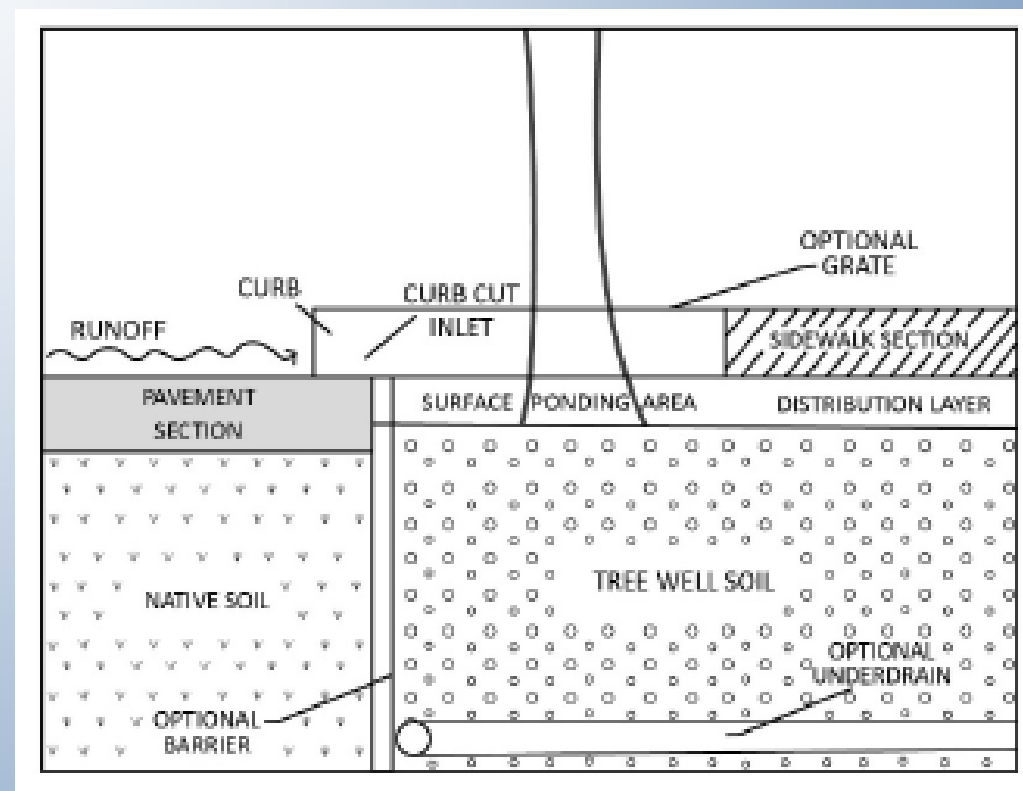
sandiegocounty.gov/stormwater

	Botanical Name	Common Name	Mature Height (ft)	Mature Canopy Diameter (ft)	Credit Volume per Tree (ft <sup>3</sup> )
1	<i>Ceanothus 'Ray Hartman'</i>	California Mountain Lillac	30	10	40
2	<i>Pittosporum Phillyraeoides</i>	Willow Pittosporum	25	15	100
3	<i>Salix Lasiolepis</i>	Arroyo Willow	25		
4	<i>Arbutus Unedo</i>	Strawberry Tree	30		
5	<i>Prunus Ilicifolia</i>	Hollyleaf Cherry	30	20	180
6	<i>Prunus Lyonii</i>	Catalina Cherry	40		
7	<i>Cercis Occidentalis</i>	Western Redbud	25	25	290
8	<i>Heteromeles Arbutifolia</i>	Toyon, Christmas Berry	25		
9	<i>Alnus Rhombifolia</i>	White Elder	75		
10	<i>Arbutus 'Marina'</i>	Hybrid Strawberry Tree	35		
11	<i>Chilopsis Linearis</i>	Desert Willow	30		
12	<i>Lyonothamnus Floribundus</i>	Catalina Ironwood	50		
13	<i>Magnolia Grandiflora</i>	Southern Magnolia	40		
14	<i>Pinus Torreyana</i>	Torrey Pine	80	30	420
15	<i>Platanus Racemosa</i>	California Sycamore	60		
16	<i>Quercus Agrifolia</i>	Coast Live Oak	70		
17	<i>Quercus Engelmannii</i>	Engelmann Oak	50		
18	<i>Quercus Suber</i>	Cork Oak	40		
19	<i>Sambucus Mexicana</i>	Blue Elderberry	30		

Tree Palette Table

# APPENDIX E: BMP DESIGN FACT SHEETS (COUNTY CHANGES)

- ADDITION: **SD-A Tree Well**
  - Tree planting design in new or reconstructed streetscapes
  - Structural requirements for confined tree well soil volume
  - Stormwater retention and treatment volume





# APPENDIX E: BMP DESIGN FACT SHEETS (COUNTY CHANGES)

- ADDITION: Section in **SD-B**  
**Impervious Area Dispersion** on  
conceptual design and sizing  
approach for
  - storm water pollutant control
  - flow control



MS4 Permit Category
Site Design
Manual Category
Site Design
Applicable Performance Criteria
Site Design
Primary Benefits
Volume Reduction
Peak Flow Attenuation

*Conceptual Design and Sizing Approach for Site Design*

1. Determine the areas where dispersion can be used in the site design to reduce the DCV for pollutant control sizing.
2. Calculate the DCV for storm water pollutant control per Appendix B.2, taking into account reduced runoff from dispersion.
3. Determine if a DMA is considered "Self-retaining" if the impervious to pervious ratio is:
  - a. 2:1 when the pervious area is composed of Hydrologic Soil Group A
  - b. 1:1 when the pervious area is composed of Hydrologic Soil Group B

*Conceptual Design and Sizing Approach for Storm Water Pollutant Treatment and Flow Control*

DMA's using impervious area dispersion are considered to meet both pollutant control and hydromodification flow control requirements if ALL of the following criteria are met:

1. All impervious area within the DMA discharges to the pervious area before the runoff discharges from the DMA.
2. As a minimum, the top 11 inches of the pervious area uses amended soils in accordance with the SD-F fact sheet and the pervious area also meets the requirements for dispersion (e.g. slope, inflow velocities, etc.) in the SD-B fact sheet.
3. The impervious to pervious area ratio is 1:1 or less.

Impervious Area Dispersion designed to meet both pollutant control and flow control requirements designated as SSD BMPs.



# APPENDIX E: BMP DESIGN FACT SHEETS (COUNTY CHANGES)

- ADDITION: Information in **SD-D**  
**Permeable Pavement (Site Design)**
  - In Section titled “Siting and Design” to synch it with “Permeable Pavement for Pollutant Control”
  - In section titled “Conceptual Design and Sizing Approach for Site Design”



Photo Credit: San Diego Low Impact Development Design Manual

<b>MS4 Permit Category</b>
Site Design
<b>Manual Category</b>
Site Design
<b>Applicable Performance Standard</b>
Site Design
<b>Primary Benefits</b>

# APPENDIX E: BMP DESIGN FACT SHEETS (COUNTY CHANGES)

- MODIFIED: Format of **SD-F Amended Soils** fact Sheet to synch with model manual fact sheet
- MODIFIED: **INF-3 Permeable Pavement (Pollutant Control)** to be consistent with SD-D (Permeable Pavement for site design) and Appendix K (Green Infrastructure)

[sandiegocounty.gov/stormwater](http://sandiegocounty.gov/stormwater)



Photo Credit: Orange County Technical Guidance Document

MS4 Permit Category
Site Design
Manual Category
Site Design
Applicable Performance Standard
Site Design
Primary Benefits
Volume Reduction Peak Flow Attenuation



Location: Kellogg Park, San Diego, California

MS4 Permit Category
Retention Flow-thru Treatment Control
Manual Category
Infiltration Flow-thru Treatment Control
Applicable Performance Standard
Pollutant Control Flow Control
Primary Benefits
Volume Reduction Peak Flow Attenuation



# APPENDIX F: GENERAL STANDARDS FOR VARIOUS BMPS

## PURPOSE:

- Provide standards and guidance for:
  - Biofiltration Soil Media (BSM) so that it will effectively filter stormwater and support plant growth. To be used in bioretention and biofiltration BMPs (BF-1, PR-1 & INF-2).
  - Plant list suggestions for BF-1, PR-1 & INF-2
  - Biofiltration. Useful for evaluating BMPs for qualification as a Biofiltration BMP that do not conform to PR-1 & BF-1 Fact Sheets (proprietary and non-proprietary)

Table 803-8

Component	Requirement
BSM Material Composition	Sand: 60-80% by volume Topsoil: 0-20% by volume Compost: 20% by volume
Alternative Blends Acceptable?	Yes, but they must meet performance-based specifications.
Sand Type	Washed sand conforming to particle size distribution
Topsoil Type	Sandy loam or loamy sand with clay < 15% and gravel < 25%
Compost Type	From a CalRecycle permitted facility. Biosolids derived materials are not acceptable
BSM Permeability	8-24 inches/hour for BMPs without outlet control; 15-80 inches/hour for BMPs with outlet control; testing is required to demonstrate.
Agronomic Suitability Requirements	Limits for salts and potential toxins. C:N ration between 12 and 40.
Water Quality Related Limits?	Requirements related to specific pollutants when water quality of receiving waters is impaired for those pollutants.

## APPENDIX F: GENERAL STANDARDS FOR BIORETENTION/ BIOFILTRATION BMPS (MODEL CHANGES)

- *ADDITION: BSM specs (F.3-New)*
  - *BSM testing requirements (upon request)*
  - *Delivery, storage and handling (F.3-New)*
- *REMOVAL: Checklist of Section F: Feasibility analysis. Addressed in numeric requirement (Appendix B).*



# APPENDIX F: GENERAL STANDARDS FOR BIORETENTION/ BIOFILTRATION BMPS (MODEL CHANGES)

- *ROLES OF BSM*
  - *Provides structure, nutrients and water for vegetation*
  - *Filters & removes pollutants from run off*
- *COMPOSITION IS A BALANCING ACT BETWEEN COMPETING ROLES*

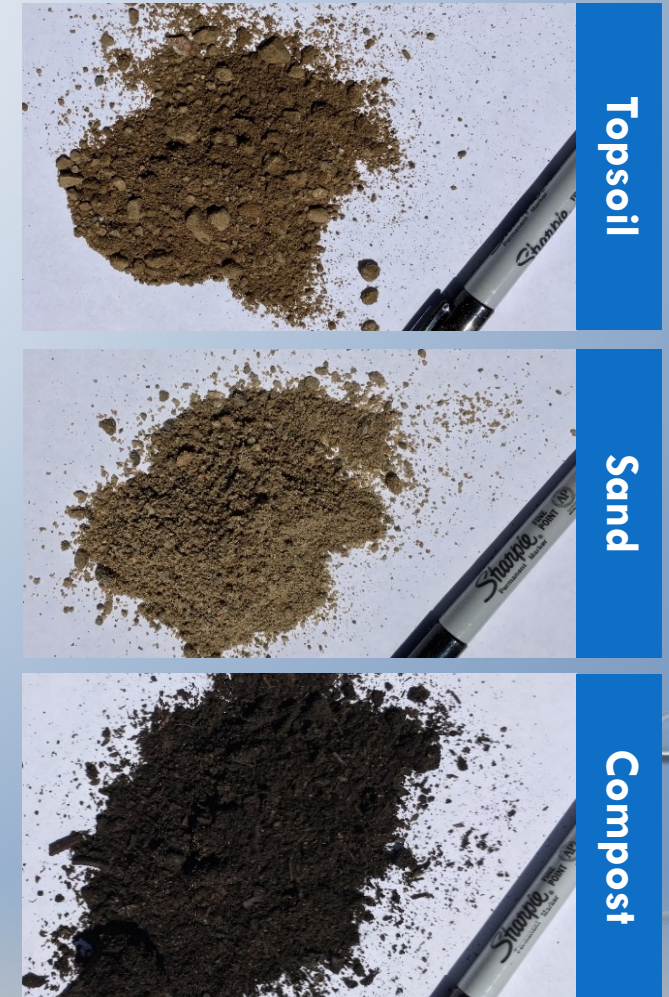
# APPENDIX F: GENERAL STANDARDS FOR BIORETENTION/ BIOFILTRATION BMPS (MODEL CHANGES)

- *DIFFICULT TO GET GOOD BSM WITH LIMITS ONLY  
AND NOT SPECS*
- *NUTRIENT EXPORT OBSERVED*
- *CLOGGING*
- *POOR PLANT HEALTH*

*SO.....*

*PREPARED A REGIONAL BSM SURVEY*

[sandiegocounty.gov/stormwater](http://sandiegocounty.gov/stormwater)



# APPENDIX F: GENERAL STANDARDS FOR BIORETENTION/ BIOFILTRATION BMPS (MODEL CHANGES)

- *UPDATED SPECIFICATION HIGHLIGHTS*

- *Single unified spec*
- *Updated content ranges*
  - *Locally available*
  - *Limit nutrient export*
  - *Maintain plant health*

BSM Blend (by Volume)	
60-80%	Sand
Up to 20%	Topsoil
Up to 20%	Compost

# APPENDIX F: GENERAL STANDARDS FOR BIORETENTION/ BIOFILTRATION BMPS (MODEL CHANGES)

- *TESTING PROTOCOL (UPON REQUEST PRIOR TO ORDERING)*
  - *Source, Address*
  - *Physical sample*
  - *Sample results (third party registered with State) < 120 days old*
    - *Test for components (S/T/C)*



Specification	Property
Sand	Washed and conforming to particle size distribution
Topsoil	Sandy loam or loamy sand with clay <15% and Gravel < 25%
Compost	From CalRecycle permitted facility Biosolids derived materials not acceptable
Delivery, Storage, payment	Thoroughly mixed, dry placement, dry storage, uncompacted. May require infiltrometer testing
Aggregate	Washed, gradation limits per table, specific installation requirements involving uniformity, spreading, and compacting

# APPENDIX F: GENERAL STANDARDS FOR BIORETENTION/ BIOFILTRATION BMPS (COUNTY CHANGES)

- ADDITION: Moved Bioretention facility plant list from Appendix E

	Botanical Name	Common Name	Mature Height (ft)	Mature Canopy Diameter (ft)	Volume per Tree (ft <sup>3</sup> )
1	<i>Ceanothus 'Ray Hartman'</i>	California Mountain Lillac	30	10	40
2	<i>Pittosporum Phillyraeoides</i>	Willow Pittosporum	25		
3	<i>Salix Lasiolepis</i>	Arroyo Willow	25	15	100
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17	<i>Quercus Engelmannii</i>	Engelmann Oak	50		
18	<i>Quercus Suber</i>	Cork Oak	40		
	<i>Sambucus Mexicana</i>	Blue Elderberry	30		

## PURPOSE:

[sandiegocounty.gov/stormwater](http://sandiegocounty.gov/stormwater)



- **MODIFICATION:**  
*Updated Sizing Factors used for simple DMAs & projects (G.2)*

- **MODIFICATION:** Updated Sizing Tool, now V3.0

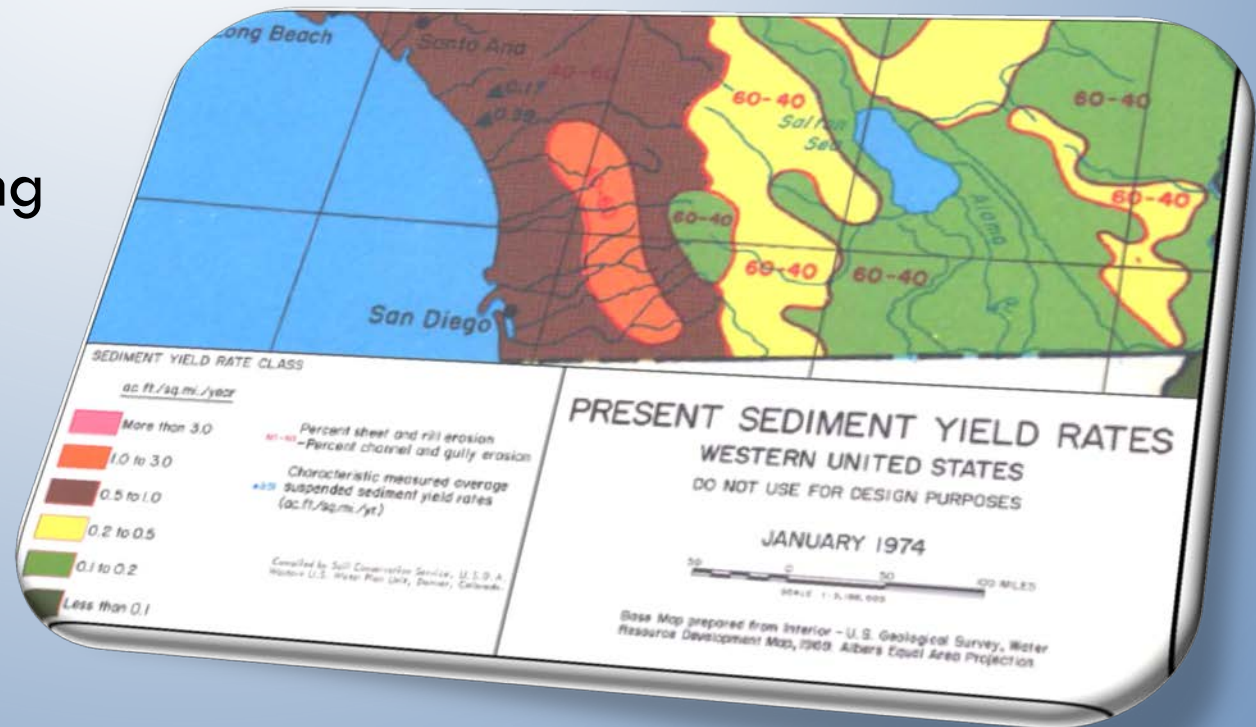
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# APPENDIX H: GUIDANCE FOR INVESTIGATING POTENTIAL CRITICAL COARSE SEDIMENT YIELD AREAS

## PURPOSE:

Provide guidance for investigating CCSYA

- NO CHANGES



# APPENDIX I: FORMS AND CHECKLISTS

## PURPOSE:

Provide additional forms to illustrate stormwater design.





# APPENDIX I: FORMS AND CHECKLISTS (COUNTY CHANGES)

- REMOVAL: Form I-8: Categorization of Infiltration Feasibility Condition. Integrated into Appendix B.2.
- REMOVAL: I.2 FORM I-9: Factor Of Safety And Design Infiltration Rate. Only used in geotechnical report, when required. Integrated into Appendix D.
- REMOVAL: I.3 Structural BMP Maintenance Guarantees. Already in PDP SWQMP as Attachment 3.
- REMOVAL: I.4 Structural BMP Label Template. Added to Plan Templates.

# APPENDIX J: OFFSITE ALTERNATIVE COMPLIANCE

## PURPOSE:

Summarize Alternative Compliance Program



# APPENDIX J: OFFSITE ALTERNATIVE COMPLIANCE (COUNTY CHANGES)

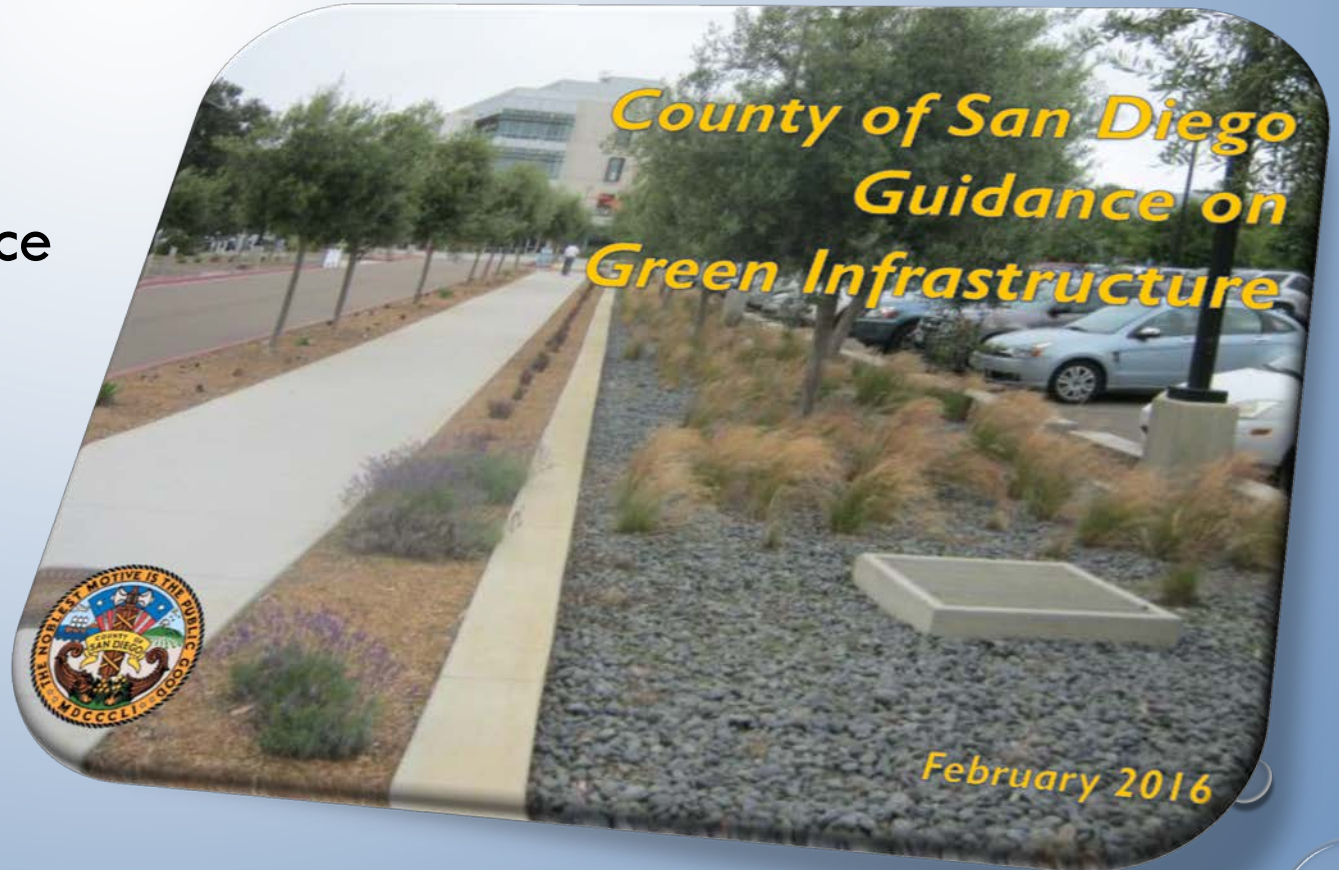
- ADDITION: Flow-Thru BMP calculation methodology now included here
- REMOVAL: ACP SWQMP references removed
- Pending Updates
  - Update WQE reference (pending RWQCB approval)



# APPENDIX K: GUIDANCE ON GREEN INFRASTRUCTURE

## PURPOSE:

Provide green infrastructure guidance for public and private projects.



# APPENDIX K: GUIDANCE ON GREEN INFRASTRUCTURE (COUNTY CHANGES)

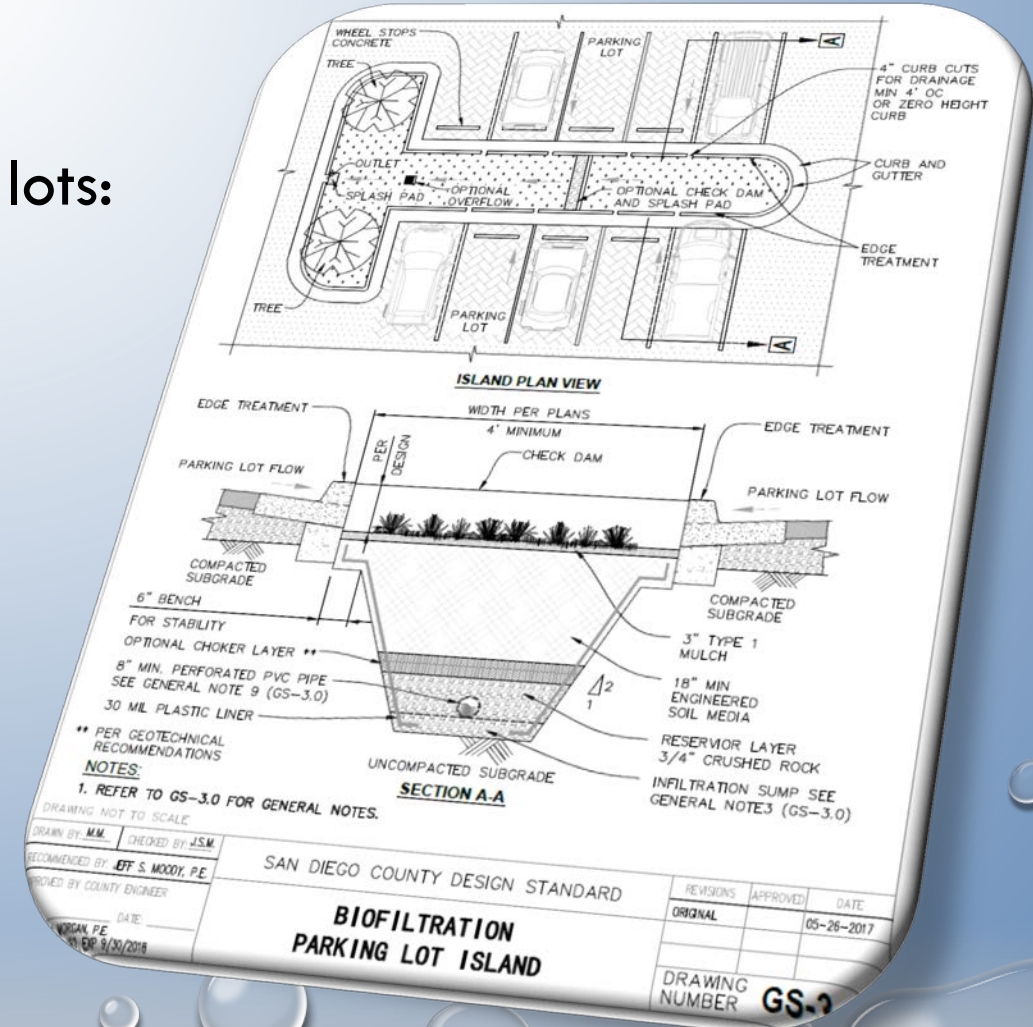
- MODIFICATION: Revised BMP types to match manual
- ADDITION: Green Streets performance standard
- MODIFICATION: Removed sections will be available online
  - Design criteria (K.3)
  - Green Streets Standard Drawings (K.4)
  - Maintenance schedule (K.5)
  - Green Streets Specifications (K.6)





# APPENDIX K: GUIDANCE ON GREEN INFRASTRUCTURE (COUNTY CHANGES)

- ADDITION: New section for green parking lots:
  - Guidelines
  - Design criteria (online)
  - Standard drawings (online)





# APPENDIX L: GRANDFATHERING REQUIREMENTS AND GUIDANCE

## PURPOSE:

Defines options and criteria for determining if prior lawful approval (PLA) applies to a project. Defines criteria for continued application of PLA determinations.

NO CHANGES

# **APPENDIX M: GLOSSARY OF KEY TERMS (COUNTY CHANGES)**

## **PURPOSE:**

Define acronyms, words and terms used throughout the manual

- **ADDITION:** Definitions for ACP, Baseline Site Design BMPs, BSM, MS4, MS4 Permit, Site Design BMPs and SSD-BMPs.



## County of San Diego BMP Design Manual

For Permanent Site Design,  
Storm Water Treatment and  
Hydromodification Management

STORM WATER REQUIREMENTS FOR  
DEVELOPMENT APPLICATIONS

*Update to February 2016 Manual*

EFFECTIVE DATE: JANUARY 1, 2019



- Streamlined
- Clarified
- Additional Guidance





## County of San Diego BMP Design Manual

For Permanent Site Design,  
Storm Water Treatment and  
Hydromodification Management

STORM WATER REQUIREMENTS FOR  
DEVELOPMENT APPLICATIONS

*Update to February 2016 Manual*

EFFECTIVE DATE: JANUARY 1, 2019



- BMP Sizing Method
- Self-Retaining DMAs
- Revised SWQMPs

# TIMELINE

- ❖ November 5, 2018 Draft Manual posted with summary of changes
- ❖ November 13, 2018 Public Workshop
- ❖ November 19, 2018 End of public review period
- ❖ January 1, 2019 Effective date and new manual posted!

# OPPORTUNITY TO COMMENT

- Send comments to: *Nancy.Richardson@sdcounty.ca.gov*
- Due by close of business November 19, 2018
- Sign up for our e-blasts:

<https://www.sandiegocounty.gov/stormwater>, click on “Development Resources”



Sign up to receive Watershed Development Support information via email

OR

