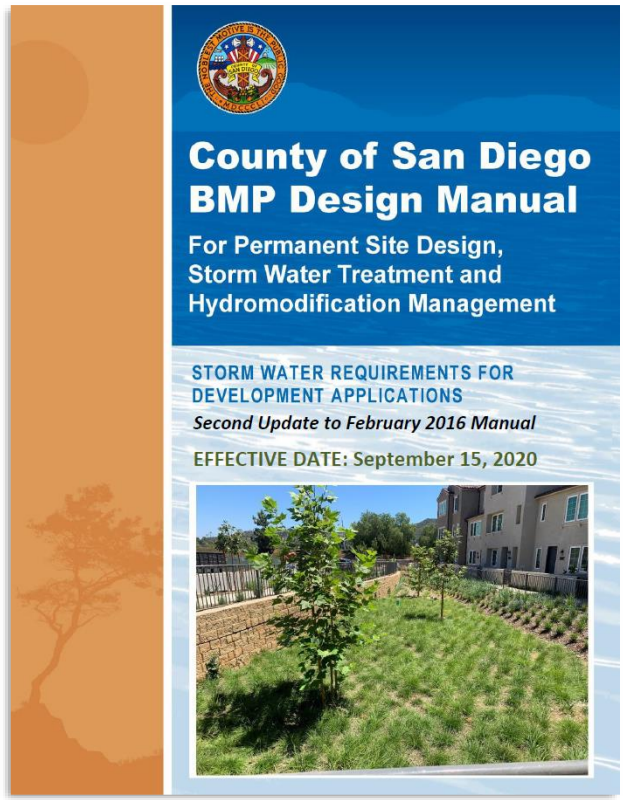
Welcome



2020 Update to the County of San Diego BMP Design Manual

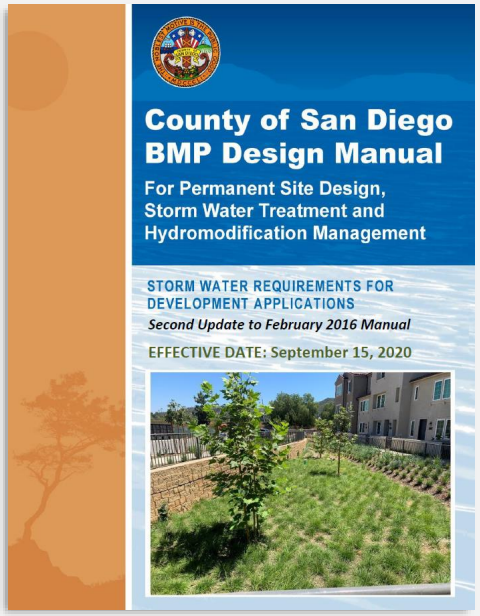
Watershed Protection Program
Department of Public Works

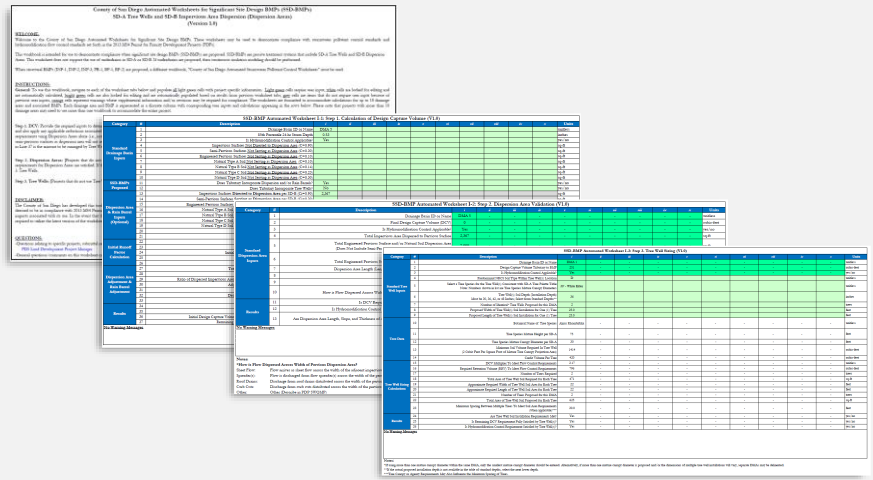
OCTOBER 27, 2020

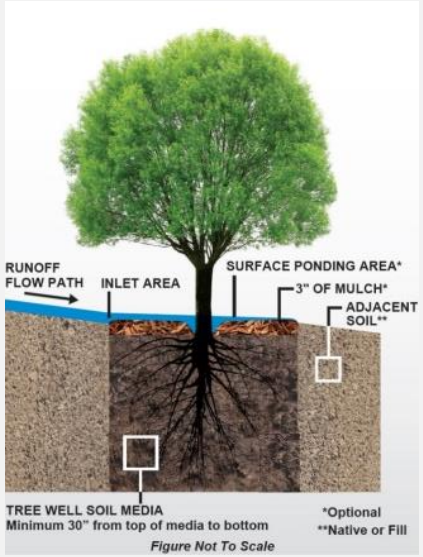
PUBLIC INFORMATION SESSION

2020 Update to the County of San Diego BMP Design Manual

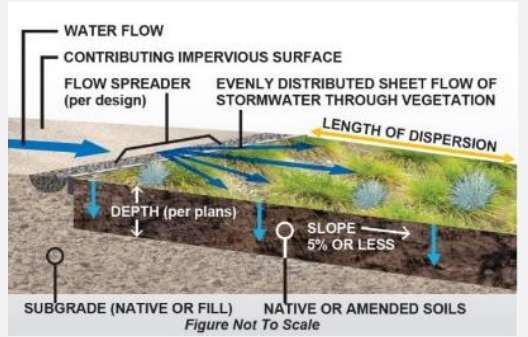
Watershed Protection Program
Department of Public Works





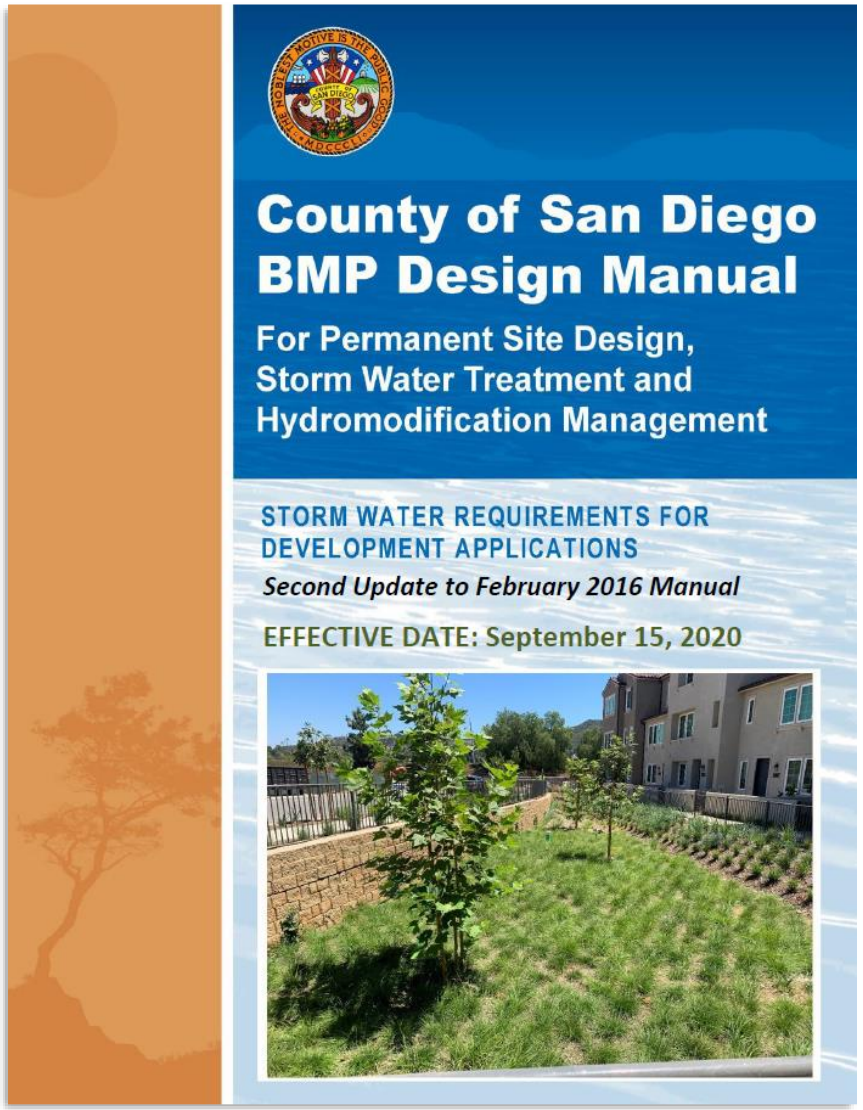


RICK
ENGINEERING COMPANY



Welcome

Presentation Logistics & Agenda



RICK ENGINEERING COMPANY

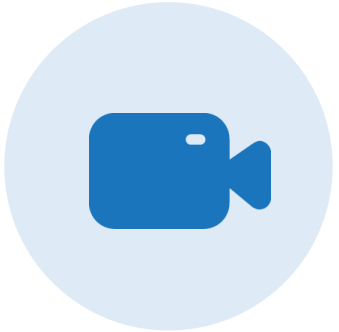
Jayne Janda-Timba, PE, QSD, QSP, ToR

Session Notes

Microphones Muted

Question & Answer Procedure

Scheduled Breaks



Recording

Poll / Survey

Speaker Profiles

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lhenry@rickengineering.com

Agenda

01 **Introduction**
PRESENTER Jayne Janda-Timba, Rick Engineering Company

02 **Summary of Changes & Miscellaneous Edits**
PRESENTER René Vidales, County of San Diego

03 **Site Design & Source Control Fact Sheets** (New Appendix C)
PRESENTER Jeremy Fantaroni, County of San Diego

04 **Tables 1 & 2 of Standard & PDP SWQMP Forms**
PRESENTER Jeremy Fantaroni, County of San Diego

05 **BMP Implementation, Source Control & Site Design BMP Requirements** (Text Updates in Chapters 2 & 4)
PRESENTER René Vidales, County of San Diego

Q&A on Topics Above
MODERATOR Jayne Janda-Timba, Rick Engineering Company
PRESENTER René Vidales, County of San Diego

5 Minute Break

Agenda

06 **Significant Site Design BMP (SSD-BMP) Sizing Methods & Calculations** (New Appendix I)
PRESENTER Laura Henry, Rick Engineering Company

07 **DCV Reduction, Self-Retaining DMAs, & Flow Control**
(Text Updates in Chapters 5, & 6, Appendices B & G)
PRESENTER Laura Henry, Rick Engineering Company

Q&A on Topics Above
MODERATOR Jayne Janda-Timba, Rick Engineering Company
PRESENTER René Vidales, County of San Diego & Laura Henry, Rick Engineering Company

5 Minute Break

Agenda

08 **SSD-BMP Tool**
PRESENTER René Vidales, County of San Diego

09 **Example Project**
PRESENTER Laura Henry, Rick Engineering Company

Q&A on Topics Above
MODERATOR Jayne Janda-Timba, Rick Engineering Company
PRESENTER René Vidales, County of San Diego & Laura Henry, Rick Engineering Company

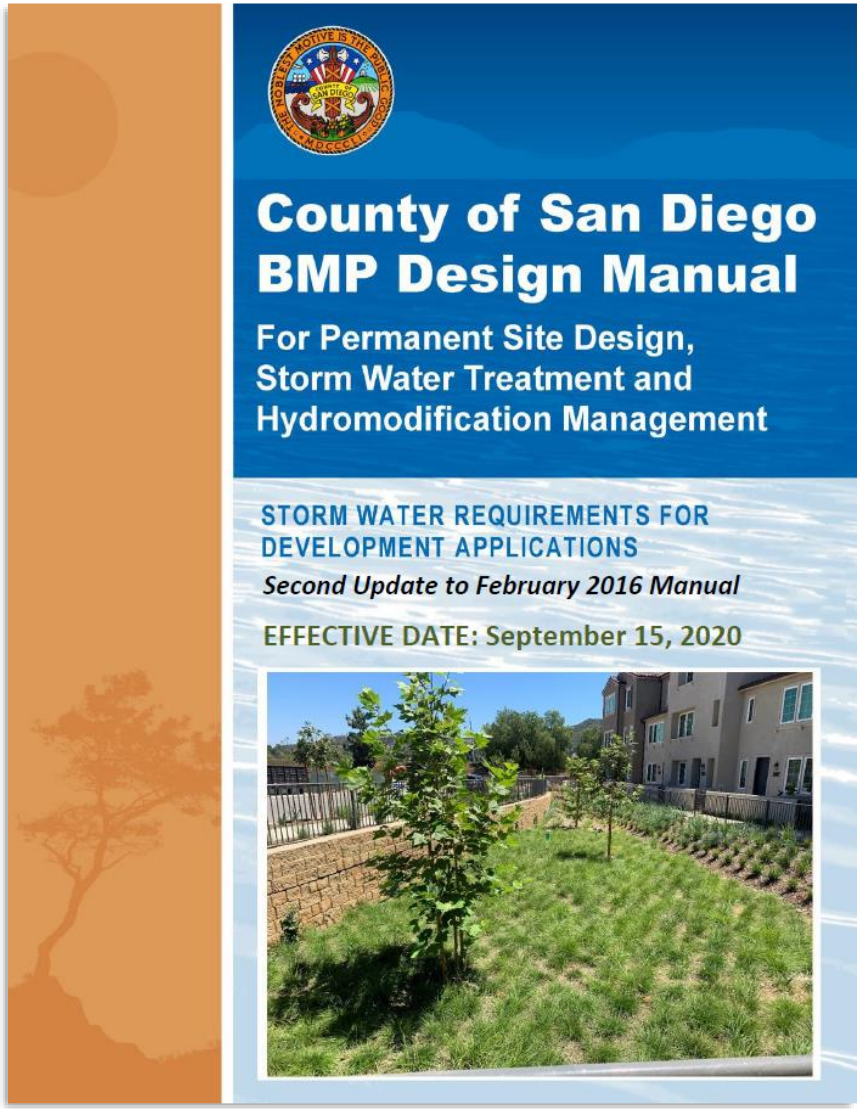
10 **Verification & Maintenance Requirements for SSD-BMPs**
(PDP SWQMP Form Attachment 10)
PRESENTER Juli Hughes, County of San Diego

11 **Recommended Best Practices**
PRESENTER René Vidales, County of San Diego

Closing & Final Q&A
MODERATOR Jayne Janda-Timba, Rick Engineering Company

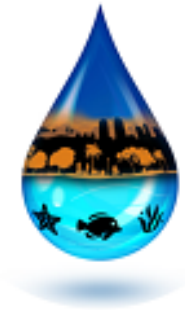
Poll / Survey

Summary of Changes & Miscellaneous Edits



René Vidales, PE, LEED GA, ENV SP, ISSP-SA, QSD

sandiegocounty.gov/stormwater



Development Resources

Summary of Changes to County BMP Design Manual

Updates from Jan 2019 to September 2020 Edition

UPDATES FROM JANUARY 2019 TO SEPTEMBER 2020 EDITION		
DATE	**CH./SEC.**	**REVISION**
9-15-2020	Beginning of Manual	Miscellaneous updates for Cover Sheet, footer on all pages, List of Updates, Chronology Table, Approval Memo, Summary, and Glossary
9-15-2020	Ch. 1	Replaced "Grandfathering" with "Exception"
9-15-2020	Ch. 1, Sec. 1.4.1	Removed "Swimming pools and decorative ponds with adequate freeboard or an overflow structure that does not release overflow to the MS4"
9-15-2020	Ch. 2	Integrated Site Design and Source Control Fact Sheets from Appendix C
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9-15-2020	App. A, Standard SWQMP Form	Revised Tables 1 and 2 to be consistent with Appendix C Fact Sheets; added Project Information on cover sheet

Summary of changes available at:

sandiegocounty.gov/stormwater

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Development Resources

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Manuals

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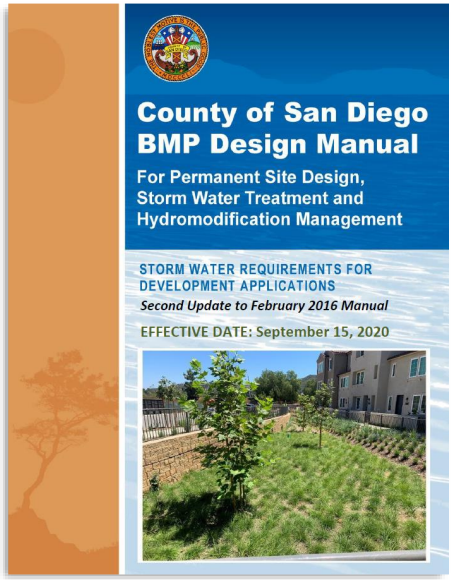
BMP Design Manual



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Summary of changes available at:

sandiegocounty.gov/stormwater

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Development Resources

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Manuals

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BMP Design Manual

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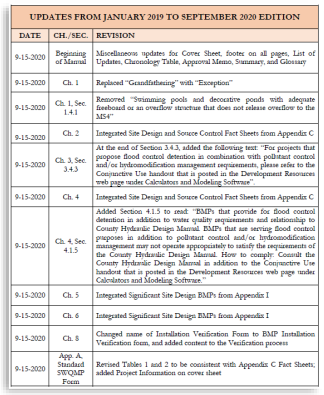

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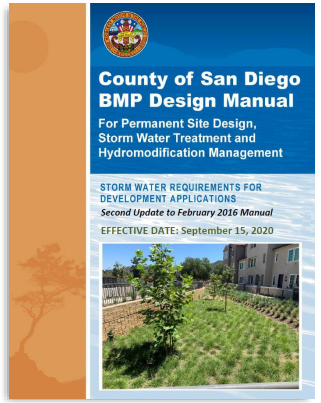
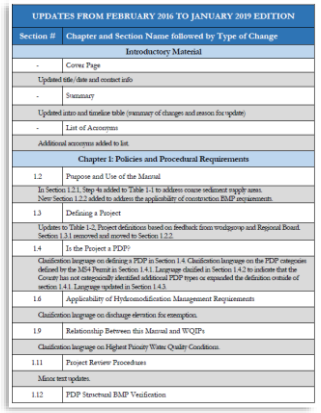


Feb 2016 to Jan 2019



UPDATES FROM FEBRUARY 2016 TO JANUARY 2019 EDITION	
Section #	Chapter and Section Name followed by Type of Change
Introductory Material	
-	Cover Page
Updated title/date and contact info	
-	Summary
Updated intro and timeline table (summary of changes and reason for update)	
-	List of Acronyms
Additional acronyms added to list.	
Chapter 1: Policies and Procedural Requirements	
1.2	Purpose and Use of the Manual
In Section 1.2.1, Step 4c added to Table 1-1 to address coarse sediment supply rates. New Section 1.2.2 added to address the applicability of construction BMP requirements.	
1.3	Defining a Project
Updates to Table 1-2, Project definitions based on feedback from workgroup and Regional Board. Section 1.3.1 removed and moved to Section 1.2.2.	
1.4	Is the Project a PDP?
Clarification language on defining a PDP in Section 1.4. Clarification language on the PDP categories defined by the MS4 Permit in Section 1.4.1. Language clarified in Section 1.4.2 to indicate that the County has not categorically identified additional PDP types or expanded the definition outside of section 1.4.1. Language updated in Section 1.4.3.	
1.6	Applicability of Hydromodification Management Requirements
Clarification language on discharge elevation for exemption.	
1.9	Relationship Between this Manual and WQIPs
Clarification language on Highest Pursuity Water Quality Conditions.	
1.11	Project Review Procedures
Minor text updates.	
1.12	PDP Structural BMP Verification

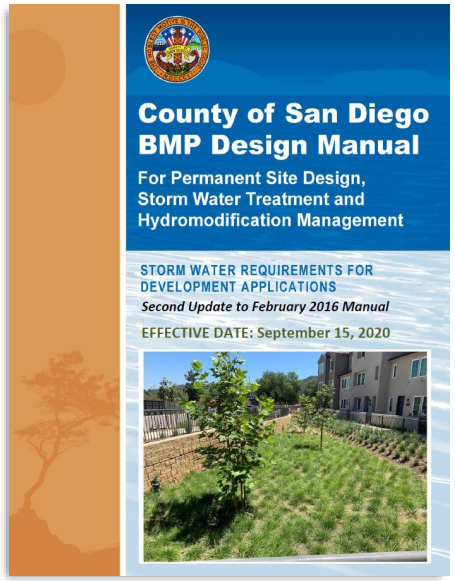
February 2016

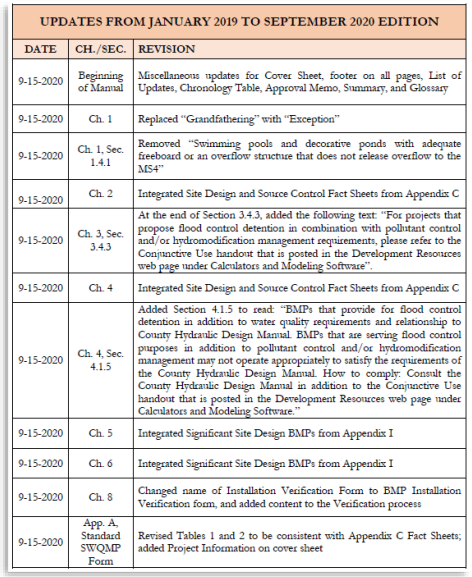
Miscellaneous Edits to the BMP Design Manual

- Beginning of Manual & Glossary
- Chapter 1 and Appendix L
- Swimming Pools/Water Features towards PDP Threshold
- Conjunctive Use Handout
- INF-3 Added to Engineered Pervious Surfaces
- Removed Source Control Fact Sheets from Appendix E
- Filter Course Layer
- Impermeable Liner
- Green Streets Standard Drawings & Specifications - link to Appendix K

Beginning of Manual

Miscellaneous updates for Cover Sheet, footer on all pages, List of Updates, Chronology Table, Approval Memo, Summary, and Glossary





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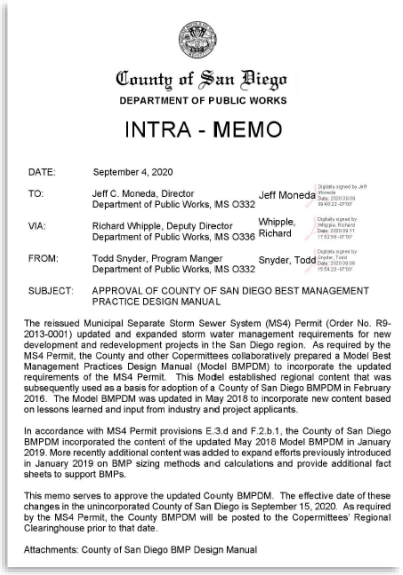


County of San Diego
DEPARTMENT OF PUBLIC WORKS

INTRA - MEMO

DATE: September 4, 2020

TO: Jeff C. Moneda, Director
Department of Public Works, MS O332

VIA: Richard Whipple, Deputy Director
Department of Public Works, MS O336

FROM: Todd Snyder, Program Manger
Department of Public Works, MS O332

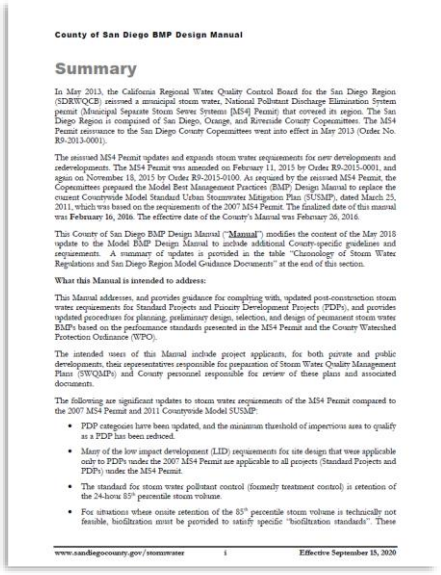
SUBJECT: APPROVAL OF COUNTY OF SAN DIEGO BEST MANAGEMENT PRACTICE DESIGN MANUAL

The reissued Municipal Separate Storm Sewer System (MS4) Permit (Order No. R9-2013-0001) updated and expanded storm water management requirements for new development and redevelopment projects in the San Diego region. As required by the MS4 Permit, the County and other Copermittees collaboratively prepared a Model Best Management Practices Design Manual (Model BMPDM) to incorporate the updated requirements of the MS4 Permit. This Model established regional content that was subsequently used as a basis for adoption of a County of San Diego BMPDM in February 2016. The Model BMPDM was updated in May 2018 to incorporate new content based on lessons learned and input from industry and project applicants.

In accordance with MS4 Permit provisions E.3.d and F.2.b.1, the County of San Diego BMPDM incorporated the content of the updated May 2018 Model BMPDM in January 2019. More recently additional content was added to expand efforts previously introduced in January 2019 on BMP sizing methods and calculations and provide additional fact sheets to support BMPs.

This memo serves to approve the updated County BMPDM. The effective date of these changes in the unincorporated County of San Diego is September 15, 2020. As required by the MS4 Permit, the County BMPDM will be posted to the Copermittees' Regional Clearinghouse prior to that date.

Attachments: County of San Diego BMP Design Manual



County of San Diego BMP Design Manual

Summary

In May 2013, the California Regional Water Quality Control Board for the San Diego Region (SDRWQCB) reissued a municipal storm water, National Pollutant Discharge Elimination System permit (Municipal Separate Storm Sewer Systems [MS4] Permit) that covered its region. The San Diego Region is comprised of San Diego, Orange, and Riverside County Copermittees. The MS4 Permit reissuance to the San Diego County Copermittees went into effect in May 2013 (Order No. R9-2013-0001).

The reissued MS4 Permit updates and expands storm water requirements for new developments and redevelopments. The MS4 Permit was amended on February 11, 2015 by Order R9-2015-0001, and again on November 18, 2015 by Order R9-2015-0100. As required by the reissued MS4 Permit, the Copermittees prepared the Model Best Management Practices (BMP) Design Manual to replace the current Countywide Model Standard Urban Stormwater Mitigation Plan (SUSMP), dated March 25, 2011, which was based on the requirements of the 2007 MS4 Permit. The finalized date of this manual was **February 16, 2016**. The effective date of the County's Manual was February 26, 2016.

This County of San Diego BMP Design Manual ("Manual") modifies the content of the May 2018 update to the Model BMP Design Manual to include additional County-specific guidelines and requirements. A summary of updates is provided in the table "Chronology of Storm Water Regulations and San Diego Region Model Guidance Documents" at the end of this section.

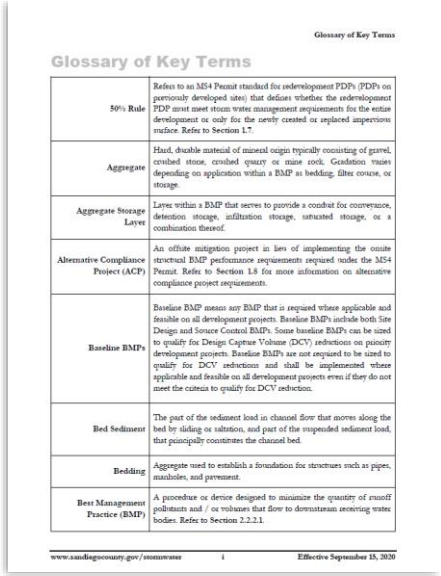
What this Manual is intended to address:

This Manual addresses, and provides guidance for complying with, updated post-construction storm water requirements for Standard Projects and Priority Development Projects (PDPs), and provides updated procedures for planning, preliminary design, selection, and design of permanent storm water BMPs based on the performance standards presented in the MS4 Permit and the County Watershed Protection Ordinance (WPO).

The intended users of this Manual include project applicants, for both private and public developments, their representatives responsible for preparation of Storm Water Quality Management Plans (SWQMPs) and County personnel responsible for review of these plans and associated documents.

The following are significant updates to storm water requirements of the MS4 Permit compared to the 2007 MS4 Permit and 2011 Countywide Model SUSMP:

- PDP categories have been updated, and the minimum threshold of impervious area to qualify as a PDP has been reduced.
- Many of the low impact development (LID) requirements for site design that were applicable only to PDPs under the 2007 MS4 Permit are applicable to all projects (Standard Projects and PDPs) under the MS4 Permit.
- The standard for storm water pollutant control (formerly treatment control) is retention of the 24-hour 85th percentile storm volume.
- For situations where onsite retention of the 85th percentile storm volume is technically not feasible, biofiltration must be provided to satisfy specific "biofiltration standards". These



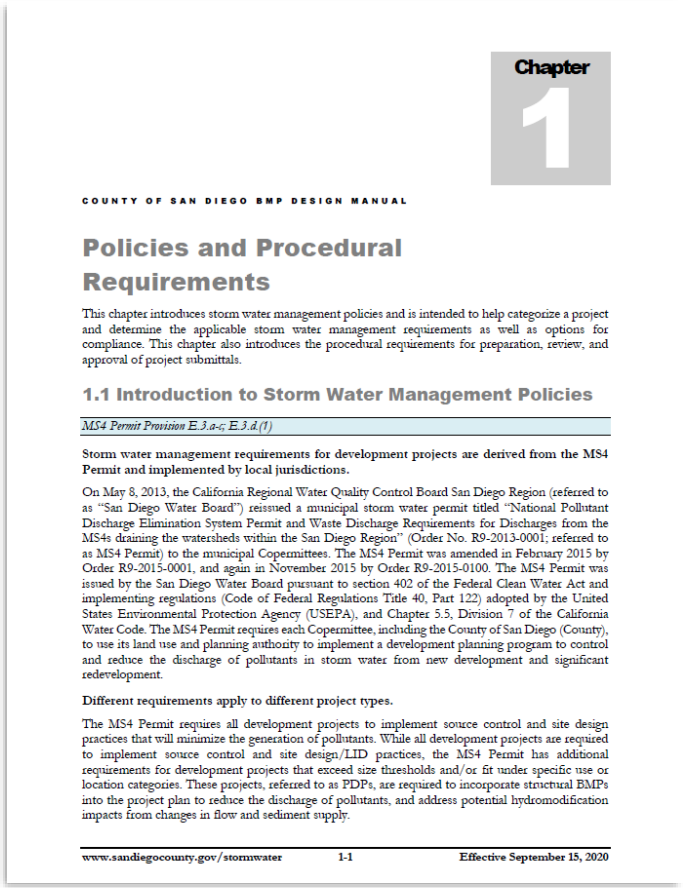
Glossary of Key Terms

Glossary of Key Terms

50% Rule	Refers to an MS4 Permit standard for redevelopment PDPs (PDPs on previously developed sites) that defines whether the redevelopment PDP must meet storm water management requirements for the entire development or only for the newly created or replaced impervious surface. Refer to Section 1.7.
Aggregate	Hard, durable material of mineral origin typically consisting of gravel, crushed stone, crushed quarry or mine rock. Gradation varies depending on application within a BMP as bedding, filter course, or storage.
Aggregate Storage Layer	Layer within a BMP that serves to provide a conduit for conveyance, detention storage, infiltration storage, saturated storage, or a combination thereof.
Alternative Compliance Project (ACP)	An offsite mitigation project in lieu of implementing the onsite structural BMP performance requirements required under the MS4 Permit. Refer to Section 1.8 for more information on alternative compliance project requirements.
Baseline BMPs	Baseline BMP means any BMP that is required where applicable and feasible on all development projects. Baseline BMPs include both Site Design and Source Control BMPs. Some baseline BMPs can be sized to qualify for Design Capture Volume (DCV) reductions on priority development projects. Baseline BMPs are not required to be sized to qualify for DCV reductions and shall be implemented where applicable and feasible on all development projects even if they do not meet the criteria to qualify for DCV reduction.
Bed Sediment	The part of the sediment load in channel flow that moves along the bed by sliding or saltation, and part of the suspended sediment load, that principally constitutes the channel bed.
Bedding	Aggregate used to establish a foundation for structures such as pipes, manholes, and pavement.
Best Management Practice (BMP)	A procedure or device designed to minimize the quantity of runoff pollutants and / or volumes that flow to downstream receiving water bodies. Refer to Section 2.2.2.1.

Chapter 1 and Appendix L

Replaced "Grandfathering" with "Exception"



Chapter
1

COUNTY OF SAN DIEGO BMP DESIGN MANUAL

Policies and Procedural Requirements

This chapter introduces storm water management policies and is intended to help categorize a project and determine the applicable storm water management requirements as well as options for compliance. This chapter also introduces the procedural requirements for preparation, review, and approval of project submittals.

1.1 Introduction to Storm Water Management Policies

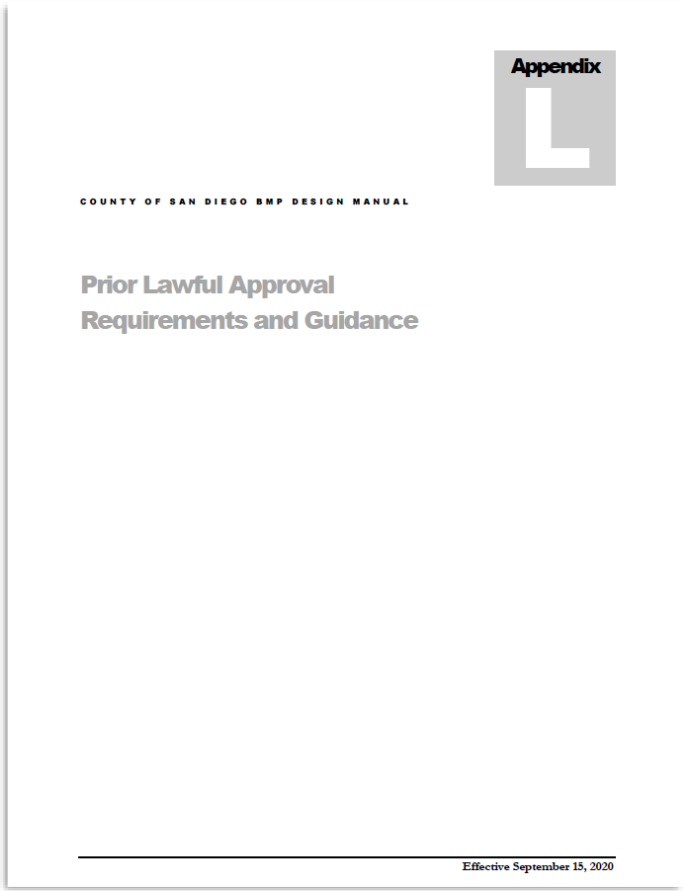
MS4 Permit Provision E.3.a-c; E.3.d.(1)

Storm water management requirements for development projects are derived from the MS4 Permit and implemented by local jurisdictions.

On May 8, 2013, the California Regional Water Quality Control Board San Diego Region (referred to as "San Diego Water Board") reissued a municipal storm water permit titled "National Pollutant Discharge Elimination System Permit and Waste Discharge Requirements for Discharges from the MS4s draining the watersheds within the San Diego Region" (Order No. R9-2013-0001; referred to as MS4 Permit) to the municipal Copermittees. The MS4 Permit was amended in February 2015 by Order R9-2015-0001, and again in November 2015 by Order R9-2015-0100. The MS4 Permit was issued by the San Diego Water Board pursuant to section 402 of the Federal Clean Water Act and implementing regulations (Code of Federal Regulations Title 40, Part 122) adopted by the United States Environmental Protection Agency (USEPA), and Chapter 5.5, Division 7 of the California Water Code. The MS4 Permit requires each Copermittee, including the County of San Diego (County), to use its land use and planning authority to implement a development planning program to control and reduce the discharge of pollutants in storm water from new development and significant redevelopment.

Different requirements apply to different project types.

The MS4 Permit requires all development projects to implement source control and site design practices that will minimize the generation of pollutants. While all development projects are required to implement source control and site design/LID practices, the MS4 Permit has additional requirements for development projects that exceed size thresholds and/or fit under specific use or location categories. These projects, referred to as PDPs, are required to incorporate structural BMPs into the project plan to reduce the discharge of pollutants, and address potential hydromodification impacts from changes in flow and sediment supply.



Appendix
L

COUNTY OF SAN DIEGO BMP DESIGN MANUAL

Prior Lawful Approval Requirements and Guidance

Chapter 1, Section 1.4.1

Removed "Swimming pools and decorative ponds with adequate freeboard or an overflow structure that does not release overflow to the MS4"

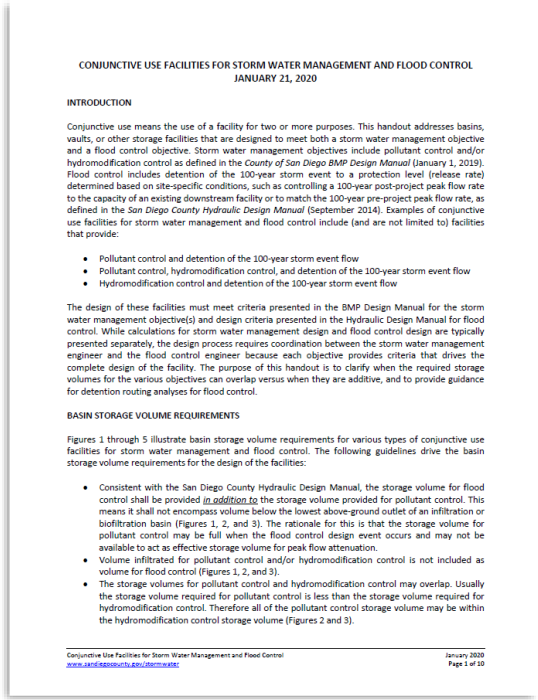
Area that may be excluded from impervious area calculations for determining if the project is a PDP:

(a) Consistent with Table 1-2, areas of a project that are considered exempt from storm water requirements (e.g. routine maintenance activities, resurfacing, etc.) should not be included as part of "added or replaced" impervious surface in determining project classification.

~~(b) Swimming pools and decorative ponds with adequate freeboard or an overflow structure that does not release overflow to the MS4.~~

Chapter 3, Section 3.4.3

At the end of Section 3.4.3, added the following text: "For projects that propose flood control detention in combination with pollutant control and/or hydromodification management requirements, please refer to the Conjunctive Use handout that is posted in the Development Resources web page under Calculators and Modeling Software".



CONJUNCTIVE USE FACILITIES FOR STORM WATER MANAGEMENT AND FLOOD CONTROL
JANUARY 21, 2020

INTRODUCTION

Conjunctive use means the use of a facility for two or more purposes. This handout addresses basins, vaults, or other storage facilities that are designed to meet both a storm water management objective and a flood control objective. Storm water management objectives include pollutant control and/or hydromodification control as defined in the *County of San Diego BMP Design Manual* (January 1, 2019). Flood control includes detention of the 100-year storm event to a protection level (release rate) determined based on site-specific conditions, such as controlling a 100-year post-project peak flow rate to the capacity of an existing downstream facility or to match the 100-year pre-project peak flow rate, as defined in the *San Diego County Hydraulic Design Manual* (September 2014). Examples of conjunctive use facilities for storm water management and flood control include (and are not limited to) facilities that provide:

- Pollutant control and detention of the 100-year storm event flow
- Pollutant control, hydromodification control, and detention of the 100-year storm event flow
- Hydromodification control and detention of the 100-year storm event flow

The design of these facilities must meet criteria presented in the BMP Design Manual for the storm water management objective(s) and design criteria presented in the Hydraulic Design Manual for flood control. While calculations for storm water management design and flood control design are typically presented separately, the design process requires coordination between the storm water management engineer and the flood control engineer because each objective provides criteria that drives the complete design of the facility. The purpose of this handout is to clarify when the required storage volumes for the various objectives can overlap versus when they are additive, and to provide guidance for detention routing analyses for flood control.

BASIN STORAGE VOLUME REQUIREMENTS

Figures 1 through 5 illustrate basin storage volume requirements for various types of conjunctive use facilities for storm water management and flood control. The following guidelines drive the basin storage volume requirements for the design of the facilities:

- Consistent with the San Diego County Hydraulic Design Manual, the storage volume for flood control shall be provided *in addition to* the storage volume provided for pollutant control. This means it shall not encompass volume below the lowest above-ground outlet of an infiltration or biofiltration basin (Figures 1, 2, and 3). The rationale for this is that the storage volume for pollutant control may be full when the flood control design event occurs and may not be available to act as effective storage volume for peak flow attenuation.
- Volume infiltrated for pollutant control and/or hydromodification control is not included as volume for flood control (Figures 1, 2, and 3).
- The storage volumes for pollutant control and hydromodification control may overlap. Usually the storage volume required for pollutant control is less than the storage volume required for hydromodification control. Therefore all of the pollutant control storage volume may be within the hydromodification control storage volume (Figures 2 and 3).

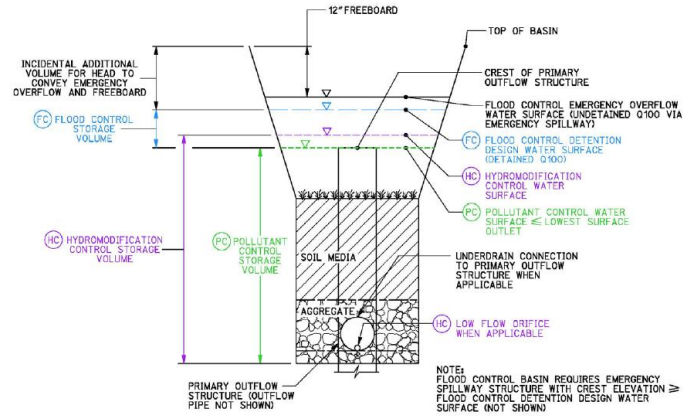
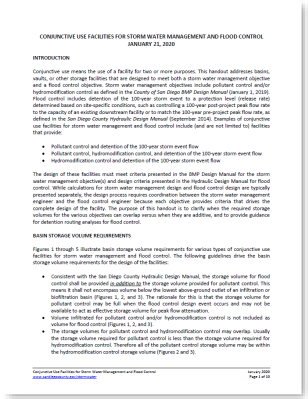


Figure 2
Conjunctive Use Facility for Storm Water Management and Flood Control:
Pollutant Control, Hydromodification Control, and Flood Control Detention; No Mid-flow Outlet

Chapter 4, Section 4.1.5

Added Section 4.1.5 to read: "BMPs that provide for flood control detention in addition to water quality requirements and relationship to County Hydraulic Design Manual. BMPs that are serving flood control purposes in addition to pollutant control and/or hydromodification management may not operate appropriately to satisfy the requirements of the County Hydraulic Design Manual. How to comply: Consult the County Hydraulic Design Manual in addition to the Conjunctive Use handout that is posted in the Development Resources web page under Calculators and Modeling Software."



CONJUNCTIVE USE FACILITIES FOR STORM WATER MANAGEMENT AND FLOOD CONTROL
JANUARY 23, 2020

INTRODUCTION

Conjunctive use means the use of a facility for two or more purposes. This handout addresses basins, vaults, or other storage facilities that are designed to meet both a storm water management objective and a flood control objective. Storm water management objectives include pollutant control and/or hydromodification control as defined in the *County of San Diego BMP Design Manual* (January 1, 2019). Flood control includes detention of the 100-year storm event to a protection level (release rate) determined based on site-specific conditions, such as controlling a 100-year post-project peak flow rate to the capacity of an existing downstream facility or to match the 100-year pre-project peak flow rate, as defined in the *San Diego County Hydraulic Design Manual* (September 2014). Examples of conjunctive use facilities for storm water management and flood control include (and are not limited to) facilities that provide:

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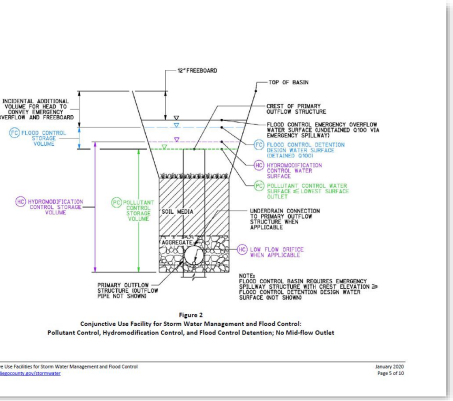


Figure 2
Conjunctive Use Facility for Storm Water Management and Flood Control:
Pollutant Control, Hydromodification Control, and Flood Control Detention; No Mid-flow Outlet

Appendix B, Table B.1-1

Added INF-3 to Engineered Pervious Surfaces

Table B.1-1: Runoff factors for surfaces draining to BMPs – Pollutant Control BMPs

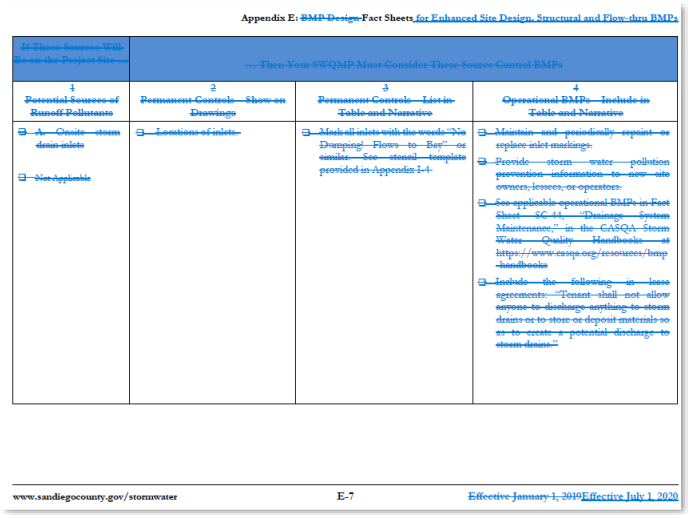
Category	Surface Type	Runoff Factor (C)
Impervious Surfaces	Roofs, Concrete, Asphalt, Unit Pavers (grouted)	0.90
Semi-Pervious Surfaces	Decomposed Granite, Cobbles, Crushed Aggregate, Compacted soil (unpaved parking)	0.30
Engineered Pervious Surfaces	Green Roofs per SD-C Permeable Pavement per SD-D, Amended Soils per SD-F, Landscaped/Mulched Soils, Permeable Pavement per INF-3	0.10
Natural Pervious Surfaces	Type A Soil	0.10
	Type B Soil	0.14
	Type C Soil	0.23
	Type D Soil	0.30
Impoundments	Swimming pools, fountains, ponds, etc.	0.00
Dispersion Areas	Areas routed to or serving as a dispersion area per SD-B	See Dispersion Area Text Below

Appendix E Removed all Source Control Fact Sheets

Fact Sheets for Enhanced Site Design, Structural and Flow-thru BMPs

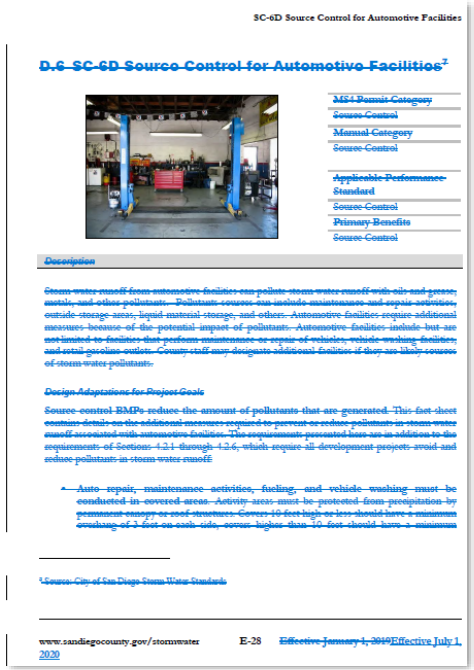
The following fact sheets were developed to assist the project applicants with designing BMPs to meet the storm water obligations. The Fact Sheet Quick Guide on the next page summarizes the layout and type of information contained in each fact sheet.

	MS4 Category	Manual Category	Design Fact Sheet	Page
	Source Control	Source Control	SC: Source Control BMP Requirements	E-4
			SC-6A: Source Control for Large Trash-Generating Facilities	E-18
			SC-6B: Source Control for Animal Facilities	E-22
			SC-6C: Source Control for Plant Nurseries and Garden Centers	E-24
			SC-6D: Source Control for Automotive-related Uses	E-26
Enhanced Site Design BMPs	Site Design	Site Design	SD-A Tree Wells*	E-28
			SD-B: Impervious Area Dispersion*	E-42
			SD-C: Green Roofs	E-50
			SD-D: Permeable Pavement (Site Design BMP)	E-58
			SD-E: Rain Barrels	E-68
			SD-F: Amended Soil	E-74
Structural BMPs	Retention	Harvest and Use	HU-1: Cistern	E-78
		Infiltration	INF-1: Infiltration Basins	E-88
			INF-2: Bioretention	E-100
			INF-3: Permeable Pavement (Pollutant Control)	E-114
			INF-4: Dry Wells	E-132
		Partial Retention	PR-1: Biofiltration with Partial Retention	E-136
	Biofiltration	Biofiltration	BF-1: Biofiltration	E-150
			BF-2: Nutrient Sensitive Media Design	E-164
			BF-3: Proprietary Biofiltration	E-168
	Flow-thru Treatment Control	Flow-thru Treatment Control with	FT-1: Vegetated Swales	E-170
			FT-2: Media Filters	E-182
			FT-3: Sand Filters	E-190



Appendix E: ~~BMP Design~~ Fact Sheets for Enhanced Site Design, Structural and Flow-thru BMPs

~~If These Sources Will Be on the Project Site…~~	… Then Your SWQMP Must Consider These Source Control BMPs		
~~1 Potential Sources of Runoff Pollutants~~	~~2 Permanent Controls – Show on Drawings~~	~~3 Permanent Controls – List in Table and Narrative~~	~~4 Operational BMPs – Include in Table and Narrative~~
~~☐ A. Onsite storm drain inlets~~	~~☐ Locations of inlets.~~	~~☐ Mark all inlets with the words "No Dumping! Flows to Bay" or similar. See stencil template provided in Appendix I.4.~~	~~☐ Maintain and periodically repaint or replace inlet markings.~~
~~☐ Not Applicable~~			~~☐ Provide storm water 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 Storm Water Quality Handbooks at https://www.casqa.org/resources/bmp-handbooks~~
			~~☐ 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."~~



~~SC-6D Source Control for Automotive Facilities~~

~~D.6 SC-6D Source Control for Automotive Facilities[7]~~

~~MS4 Permit Category~~
~~Source Control~~

~~Manual Category~~
~~Source Control~~

~~Applicable Performance Standard~~
~~Source Control~~

~~Primary Benefits~~
~~Source Control~~

~~Description~~

~~Storm water runoff from automotive facilities can pollute storm water runoff with oils and grease, metals, and other pollutants. Pollutants sources can include maintenance and repair activities, outside storage areas, liquid material storage, and others. Automotive facilities require additional measures because of the potential impact of pollutants. Automotive facilities include but are not limited to facilities that perform maintenance or repair of vehicles, vehicle washing facilities, and retail gasoline outlets. County staff may designate additional facilities if they are likely sources of storm water pollutants.~~

~~Design Adaptations for Project Goals~~

~~Source control BMPs reduce the amount of pollutants that are generated. This fact sheet contains details on the additional measures required to prevent or reduce pollutants in storm water runoff associated with automotive facilities. The requirements presented here are in addition to the requirements of Sections 4.2.1 through 4.2.6, which require all development projects avoid and reduce pollutants in storm water runoff.~~

- ~~Auto repair, maintenance activities, fueling, and vehicle washing must be conducted in covered areas. Activity areas must be protected from precipitation by permanent canopy or roof structures. Covers 10 feet high or less should have a minimum overhang of 3 feet on each side; covers higher than 10 feet should have a minimum~~

~~[7]Source: City of San Diego Storm Water Standards~~

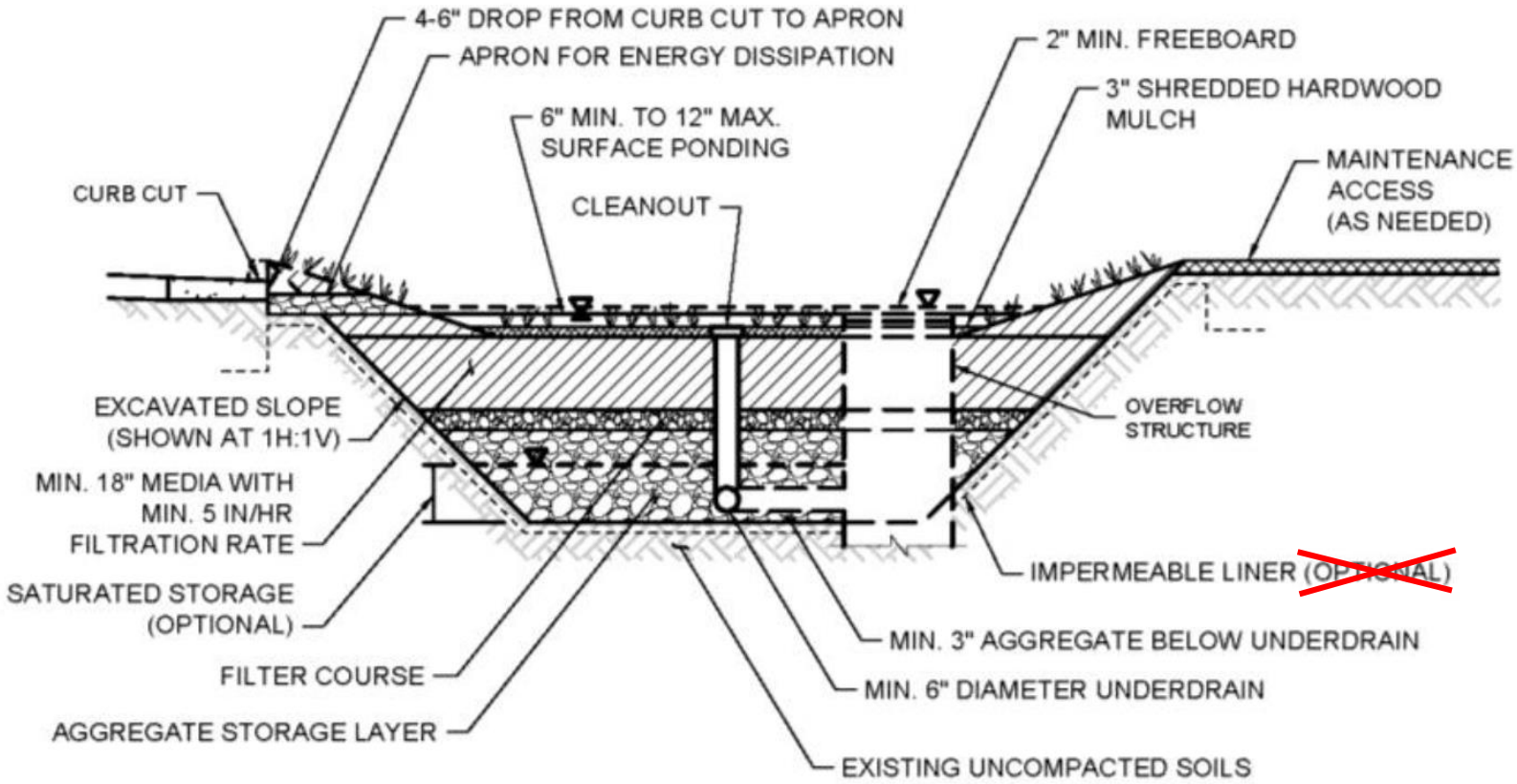
Appendix E, BF-1, PR-1 and INF-2

Text Added to Fact Sheets in the Filter Course Layer section

Filter Course Layer		
☐	A filter course is used to prevent migration of fines through layers of the facility. Filter fabric is not used.	Migration of media can cause clogging of the aggregate storage layer void spaces or subgrade. Filter fabric is more likely to clog.
☐	Filter course is a minimum of 6 inches thick provided in two separate 3 inch layers. The top layer shall be made of ASTM C33 choker sand and the bottom layer shall be of ASTM No. 8 aggregate. Marker stakes shall be used to ensure uniform lift thickness.	To prevent reduction of the available storage volume that would lead to clogging of the underdrain and native soil beneath the BMP.

Appendix E, BF-1

Removed the word "Optional" in Impermeable Liner Figure; added text for Impermeable Liner Thickness under Recommended Siting Criteria



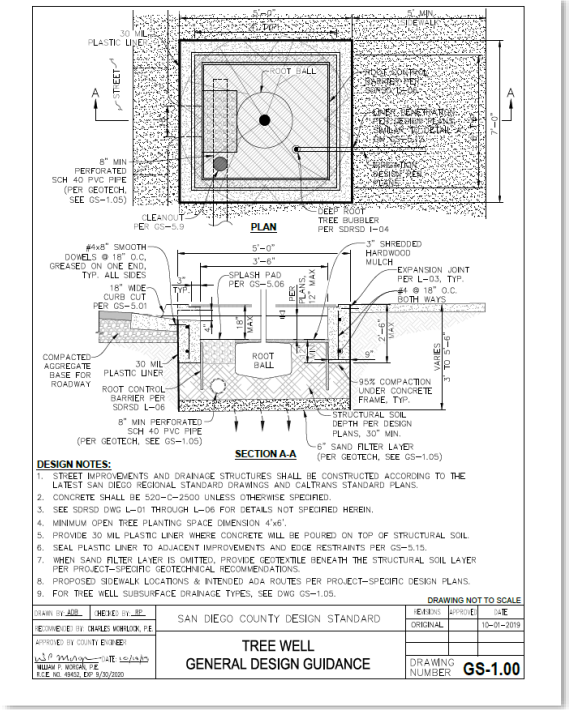
Appendix E, BF-1

Recommended Siting Criteria		
	Siting Criteria	***Intent/Rationale***
☐	Placement observes geotechnical recommendations regarding potential hazards (e.g., slope stability, landslides, liquefaction zones) and setbacks (e.g., slopes, foundations, utilities).	Must not negatively impact existing site geotechnical concerns.
☐	An impermeable liner or other hydraulic restriction layer is included if site constraints indicate that infiltration or lateral flows should not be allowed.	Lining prevents storm water from impacting groundwater and/or sensitive environmental or geotechnical features. Incidental infiltration, when allowable, can aid in pollutant removal and groundwater recharge.
☐	The thickness of the Impermeable Liner shall be 30 MIL per County Green Streets Design Standard Drawing GS-3.00 and County Green Streets Supplement to Caltrans Specifications 20-11.08B.	Considerations when choosing an Impermeable Liner may include placement methods, media and underlying soil characteristics, and intended design life among others.

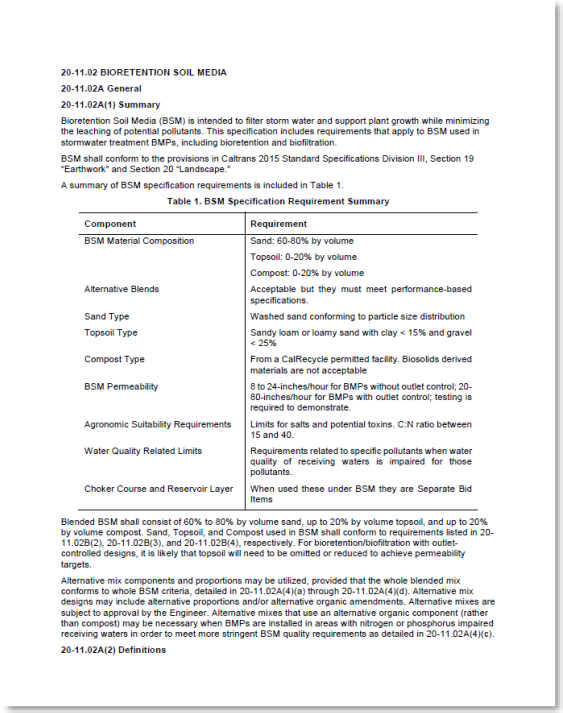
Appendix K, Page K-1

Design Criteria, Design Standard Drawings, and Specifications~~, and Maintenance Schedules~~ for Green Streets and Green Parking Lots can be found on the County's Watershed Protection Program website under ~~the~~ Green Infrastructure Resources within the Development Resources tab:

https://www.sandiegocounty.gov/stormwater



Green Streets Standard Drawings



20-11.02 BIORETENTION SOIL MEDIA

20-11.02A General

20-11.02A(1) Summary

Bioretention Soil Media (BSM) is intended to filter storm water and support plant growth while minimizing the leaching of potential pollutants. This specification includes requirements that apply to BSM used in stormwater treatment BMPs, including bioretention and biofiltration.

BSM shall conform to the provisions in Caltrans 2015 Standard Specifications Division III, Section 19 "Earthwork" and Section 20 "Landscape."

A summary of BSM specification requirements is included in Table 1.

Table 1. BSM Specification Requirement Summary

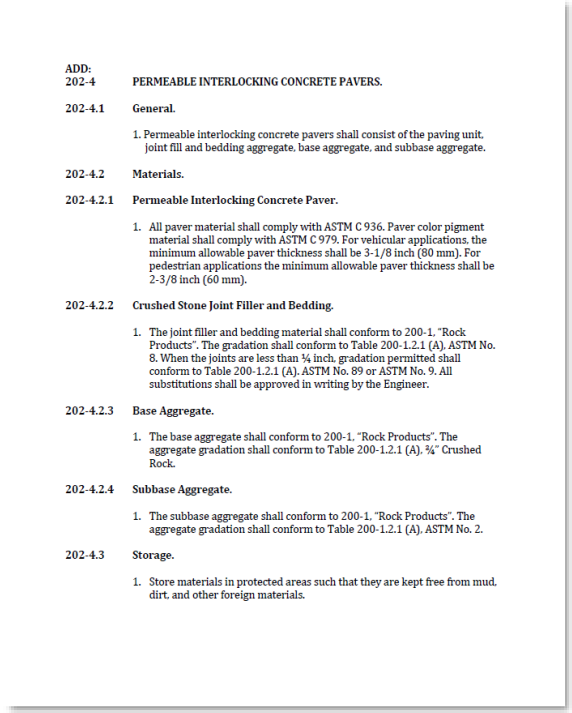
Component	Requirement
BSM Material Composition	Sand: 60-80% by volume
	Topsoil: 0-20% by volume
	Compost: 0-20% by volume
Alternative Blends	Acceptable but they must meet performance-based specifications.
Sand Type	Washed sand conforming to particle size distribution
Topsoil Type	Sandy loam or loamy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

Blended BSM shall consist of 60% to 80% by volume sand, up to 20% by volume topsoil, and up to 20% by volume compost. Sand, Topsoil, and Compost used in BSM shall conform to requirements listed in 20-11.02B(2), 20-11.02B(3), and 20-11.02B(4), respectively. For bioretention/biofiltration with outlet-controlled designs, it is likely that topsoil will need to be omitted or reduced to achieve permeability targets.

Alternative mix components and proportions may be utilized, provided that the whole blended mix conforms to whole BSM criteria, detailed in 20-11.02A(4)(a) through 20-11.02A(4)(d). Alternative mix designs may include alternative proportions and/or alternative organic amendments. Alternative mixes are subject to approval by the Engineer. Alternative mixes that use an alternative organic component (rather than compost) may be necessary when BMPs are installed in areas with nitrogen or phosphorus impaired receiving waters in order to meet more stringent BSM quality requirements as detailed in 20-11.02A(4)(c).

20-11.02A(2) Definitions

Supplement to Caltrans Specifications



ADD:

202-4 PERMEABLE INTERLOCKING CONCRETE PAVERS.

202-4.1 General.

1. Permeable interlocking concrete pavers shall consist of the paving unit, joint fill and bedding aggregate, base aggregate, and subbase aggregate.

202-4.2 Materials.

202-4.2.1 Permeable Interlocking Concrete Paver.

1. All paver material shall comply with ASTM C 936. Paver color pigment material shall comply with ASTM C 979. For vehicular applications, the minimum allowable paver thickness shall be 3-1/8 inch (80 mm). For pedestrian applications the minimum allowable paver thickness shall be 2-3/8 inch (60 mm).

202-4.2.2 Crushed Stone Joint Filler and Bedding.

1. The joint filler and bedding material shall conform to 200-1, "Rock Products". The gradation shall conform to Table 200-1.2.1 (A). ASTM No. 8. When the joints are less than ¼ inch, gradation permitted shall conform to Table 200-1.2.1 (A). ASTM No. 89 or ASTM No. 9. All substitutions shall be approved in writing by the Engineer.

202-4.2.3 Base Aggregate.

1. The base aggregate shall conform to 200-1, "Rock Products". The aggregate gradation shall conform to Table 200-1.2.1 (A), ¾" Crushed Rock.

202-4.2.4 Subbase Aggregate.

1. The subbase aggregate shall conform to 200-1, "Rock Products". The aggregate gradation shall conform to Table 200-1.2.1 (A), ASTM No. 2.

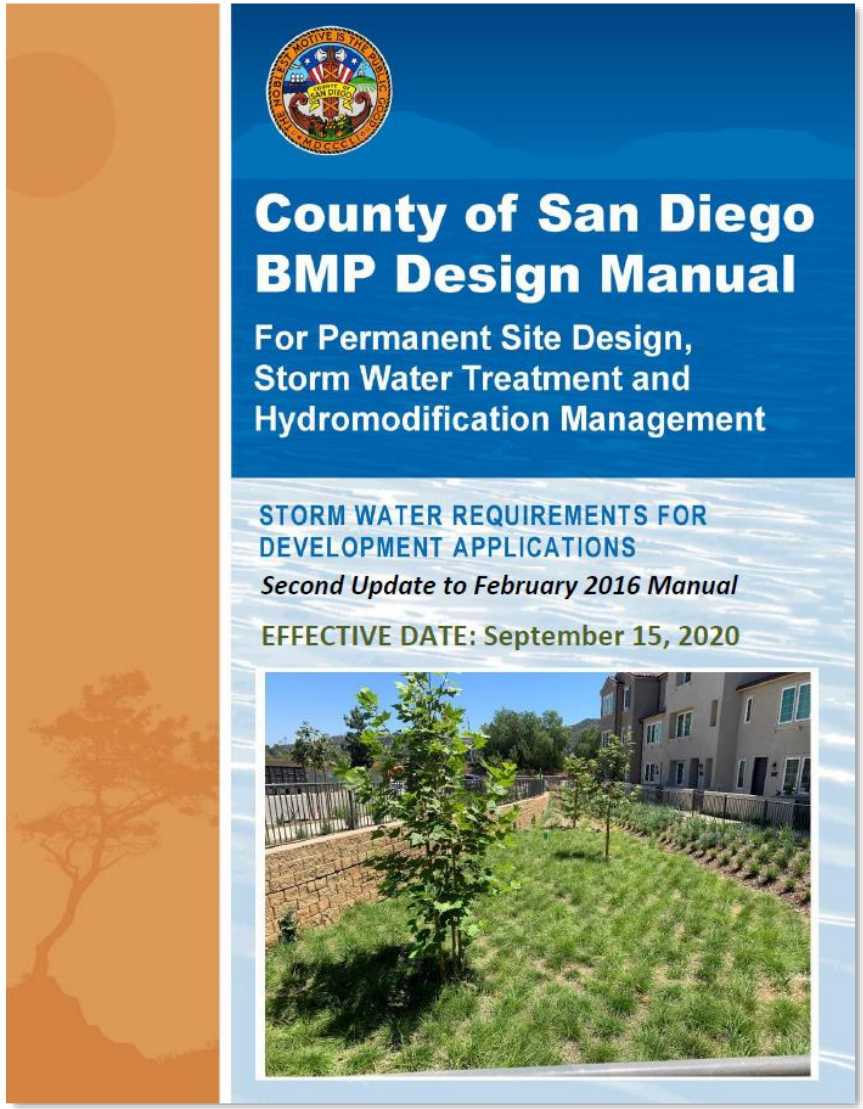
202-4.3 Storage.

1. Store materials in protected areas such that they are kept free from mud, dirt, and other foreign materials.

Supplement to Greenbook Specifications

Site Design & Source Control Fact Sheets

(NEW APPENDIX C)



Jeremy Fantaroni, QSD, CPESC

Fact Sheets for Site Design and Source Control BMPs

If These Sources Will Be on the Project Site …	… Then Your SWQMP Must Consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
❑ **A.** Onsite storm drain inlets ❑ Not Applicable	❑ Locations of inlets.	❑ Mark all inlets with the words "No Dumping! Flows to Bay" or similar. See stencil template provided in Appendix I-4	❑ Maintain and periodically repaint or replace inlet markings. ❑ Provide storm water 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 Storm Water Quality Handbooks at ps://www.casqa.org/resources/bmp ndbooks ude the following in lease ements: "Tenant shall not allow one to discharge anything to storm ns or to store or deposit materials so to create a potential discharge to m drains."

E.3 SC-6A Source Control for Large Trash Generating Facilities[3]

MS4 Permit Category
Source Control

Manual Category
Source Control

Applicable Performance Standard
Source Control

Primary Benefits
Source Control

Description

Storm water 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 to nearby storm drain inlets, channels, and/or creeks. Trash generating facilities that generate large amounts of trash require special attention to protect trash storage areas from rainfall, run-on, runoff, and wind dispersal. Large trash generating, or trash build-up areas, include but are not limited to restaurants, supermarkets, "big box" retail stores serving food, and pet stores. The County Engineer may designate additional facilities if they are likely to generate or accumulate large quantities of trash.

Example isometric view and plan view of an allowable trash enclosure facility is presented below. The project applicant may be allowed to use an alternative trash enclosure design that might be more appropriate for a project site if the alternative design is approved by the County.

BL-5: Work and Storage Areas

MS4 Permit Category
Source Control (SC)

BMP IDs
SC-A: Overhead Covering
SC-B: Berms and Grade Breaks
SC-C: Wind Protection

Applicable Site Features

County Watershed Protection Ordinance (WPO) Section 67.811(a)(4) requires baseline BMPs for the following common types of outdoor work areas.

- Trash and refuse storage,
- Materials and equipment storage,
- Loading and unloading,
- Fueling,
- Maintenance and repair,
- Vehicle and equipment cleaning, and
- Other areas, not identified above, that have the potential to generate pollutants.

SWQMP Baseline BMP Requirements

The following baseline BMPs are required where applicable and feasible for the features described above. All three of these BMPs should be implemented together in all areas where storage of materials and trash will be located:

SC-A: Overhead Covering
SC-B: Berm and Grade Breaks
SC-C: Wind Protection

Fact Sheets for Site Design and Source Control BMPs

DEFINITIONS

Baseline BMPs	Baseline BMP means any BMP that is required where applicable and feasible on all development projects. Baseline BMPs include both Site Design and Source Control BMPs. Some baseline BMPs can be sized to qualify for Design Capture Volume (DCV) reductions on priority development projects. Baseline BMPs are not required to be sized to qualify for DCV reductions and shall be implemented where applicable and feasible on all development projects even if they do not meet the criteria to qualify for DCV reduction.
Site Design BMPs	A storm water management and land development strategy that emphasizes conservation of natural features and the use of onsite natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions. Site Design BMPs can be sized for Design Capture Volume (DCV) reductions using Worksheet B-1.1 of the BMP Design Manual for PDP projects (See Enhanced Site Design BMPs and Significant Site Design BMPs).

Fact Sheets for Site Design and Source Control BMPs

DEFINITIONS

Source Control BMPs	Land use or site planning practices, or structures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimizes the contact between pollutants and storm water runoff. Examples include roof structures over trash or material storage areas, and berms around fuel dispensing areas. Source control BMPs are described within this manual.

Does Not Include:

Enhanced Site Design BMPs *(Appendix E)*
Structural BMPs *(Appendix E)*
Significant Site Design BMPs *(Appendix E)*

Fact Sheets for Site Design and Source Control BMPs

MS4 Category	Baseline BMP Fact Sheet	BMP ID	Page
Site Design	BL-1: Existing Natural Site Features	**SD-G:** Conserve Natural Features **SD-H:** Buffers	C-2
Site Design	BL-2: Outdoor Impervious Areas	**SD-B**: *Impervious Area Dispersion* **SD-I**: Permeable Surfaces	C-8
Site Design	BL-3: Rooftop Areas	**SD-B**: *Impervious Area Dispersion* **SD-C**: *Green Roofs* **SD-E**: *Rain Barrels*	C-13
Site Design	BL-4: Landscaped Areas	**SD-K:** Sustainable Landscaping	C-16
Source Control	BL-5: Work and Storage Areas	**SC-A:** Overhead Covering **SC-B:** Berms and Grade Breaks **SC-C:** Wind Protection	C-19
Source Control	BL-6: Mgt of Storm Water Discharges	**SC-D:** Sanitary Sewer **SC-E:** Containment Areas	C-28
Source Control	BL-7: Mgt of Non-Storm Water Discharges	**SC-F:** Storm Drain Signage **SC-G:** Educational BMP Signage	C-35

*BMP IDs *in italics* have a standalone fact sheet in Appendix E

Fact Sheets for Site Design and Source Control BMPs

FACT SHEET FORMAT

MS4 Permit Category
Site Design (SD)
BMP IDs
SD-K: Sustainable Landscaping

Applicable Site Features

This section describes typical features (e.g., work areas, landscaped areas, rooftops, storm drain inlets) that these BMPs are required.

SWQMP Baseline BMP Requirements

This section describes which BMPs are applicable and how you document in the project SWQMP.

Fact Sheets for Site Design and Source Control BMPs

BMP ID Format

SC-F: STORM DRAIN SIGNAGE

Description

Design Considerations

Plan Requirements

Maintenance Considerations

Fact Sheets for Site Design and Source Control BMPs

BL-4: Landscaped Areas

Source: San Diego Sustainable Landscapes Guidelines

MS4 Permit Category
Site Design (SD)
BMP IDs
SD-K: Sustainable Landscaping

Applicable Site Features

County Watershed Protection Ordinance (WPO) Section 67.811(a)(5) requires baseline BMPs for landscaped areas. A landscape includes all planting areas, turf areas (artificial or natural), and water features in a landscape design. The landscape area does not include footprints of buildings or structures, sidewalks, driveways, parking lots, decks, patios, gravel or stone walks, other pervious or non-pervious hardscapes and other non-irrigated areas designated for non-development (e.g., open spaces and existing native vegetation).

Landscaped Areas includes SWQMP Baseline BMP Requirements

The following baseline BMPs are required where applicable and feasible for the features described above:

SD-K: Sustainable Landscaping

These baseline BMPs are documented in Table 1, Section D of the PDP and Standard SWQMP template as shown below:

D.	☐ **BMPs for Landscaped Areas:** *Check this box if landscaping is proposed. Both BMPs are required where applicable. Explain inapplicability or infeasibility for BMPs not selected in Table 3.*	**(See Fact Sheet BL-4)**
	2. Sustainable Landscaping (SD-K) ☐	

SD-K: SUSTAINABLE LANDSCAPING

Description

Sustainable landscaping uses native and drought tolerant plant species to limit the total water demand of landscaped areas and create a living sponge to soak up rainfall. Native and drought tolerant plants are well suited to the long-term climate in San Diego County; able to withstand extended dry periods and typically require less water to remain healthy compared to non-native alternatives. An additional benefit is reduced need for fertilizer and/or pesticides.

Sustainable landscaping must be evaluated for all landscaped areas of a project to meet Storm Water Quality Management Plan (SWQMP) requirements and should also be considered for any plantings associated with natural areas or areas identified for revegetation.

Design Considerations

The San Diego Sustainable Landscape Guidelines provide a detailed watershed friendly approach to landscaping. These guidelines will guide you through important principles such as:

- Selecting drought tolerant and native plants for San Diego County.
- Creating healthy soils to encourage moisture retention.
- Designing water efficient irrigation systems that reduce the likelihood of irrigation runoff.

The County's Landscape Ordinance generally applies to any new construction for which the County issues a building permit or a discretionary review where the aggregate landscaped area is 500 square feet or more to obtain outdoor water use authorization. The Water Efficient Landscape Design Manual explains how people can comply with the County's Landscape Ordinance by detailing water efficient irrigation systems, drought tolerant plant selection, fire-resistant designs, and other considerations.

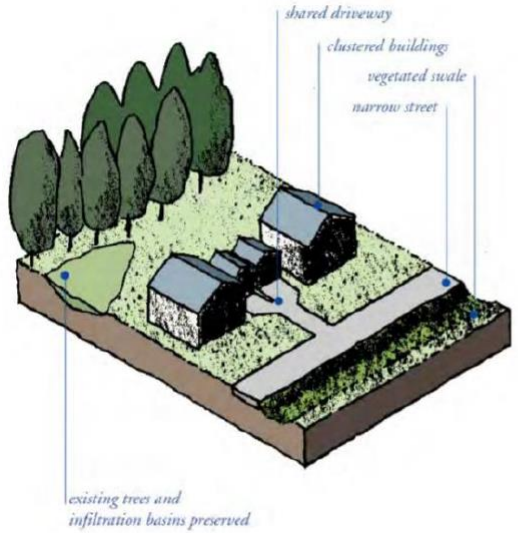
Plan Requirements

For each required construction plan, provide the information indicated below for each applicable feature or BMP.

SD-K: Sustainable Landscaping
Plan View Requirements
• Show locations and boundaries of the features (or portions of features) designed as Sustainable Landscaping. • Label Sustainable Landscaping with BMP ID: SD-K
Detail Sheets
• Shall be shown on Landscape Plans if applicable.
Typical Construction Notes
• Grading plans need to refer to the approved landscape plan for construction notes.

Fact Sheets for Site Design and Source Control BMPs

BL-1: Existing Natural Site Features



MS4 Permit Category
Site Design
BMP IDs
SD-G: Conserve Natural Features SD-H: Buffers

LEAST SENSITIVE

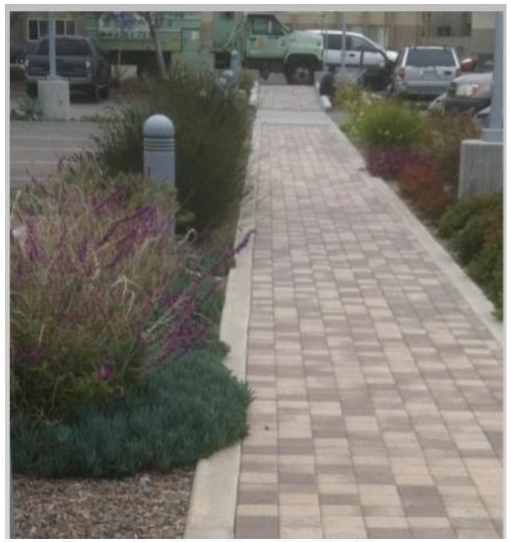
1. AREAS DEVOID OF VEGETATION, INCLUDING PREVIOUSLY GRADED AREAS AND AGRICULTURAL FIELDS
2. AREAS OF NON-NATIVE VEGETATION, DISTURBED HABITATS AND EUCALYPTUS WOODLANDS WHERE RECEIVING WATERS ARE NOT PRESENT
3. AREAS OF CHAMISE OR MIXED CHAPARRAL, AND NON-NATIVE GRASSLANDS.
4. AREAS CONTAINING COASTAL SCRUB COMMUNITIES
5. ALL OTHER UPLAND COMMUNITIES
6. OCCUPIED HABITAT OF SENSITIVE SPECIES AND ALL WETLANDS (AS BOTH ARE DEFINED BY THE LOCAL JURISDICTION)

MOST SENSITIVE

SD-G: Conserve Natural Areas
Plan View Requirements
• Show locations and boundaries of the features (or portions of features) to be conserved • Label features with BMP ID: SD-G
Detail Sheets
N/A
Typical Construction Notes
• USE A CONSTRUCTION FENCE OR SILT FENCE AROUND THE CONSERVED AREAS TO PREVENT CONSTRUCTION EQUIPMENT FROM ENTERING.

Fact Sheets for Site Design and Source Control BMPs

BL-2: Outdoor Impervious Area



Source: County of San Diego's Green Street Guidelines

MS4 Permit Category
Site Design
BMP IDs
SD-B: Impervious Area Dispersion SD-I: Permeable Surfaces

- Decomposed Granite
- Cobbles
- Crushed Aggregate
- Reinforced Geotextile Features

SD-I: Permeable Surfaces
Plan View Requirements
• Show locations and boundaries of the features (or portions of features) constructed of permeable material. • Label non-engineered permeable surfaces with BMP ID: SD-I • Label engineered permeable surfaces with BMP ID: SD-D

Fact Sheets for Site Design and Source Control BMPs

BL-3: Rooftop Areas

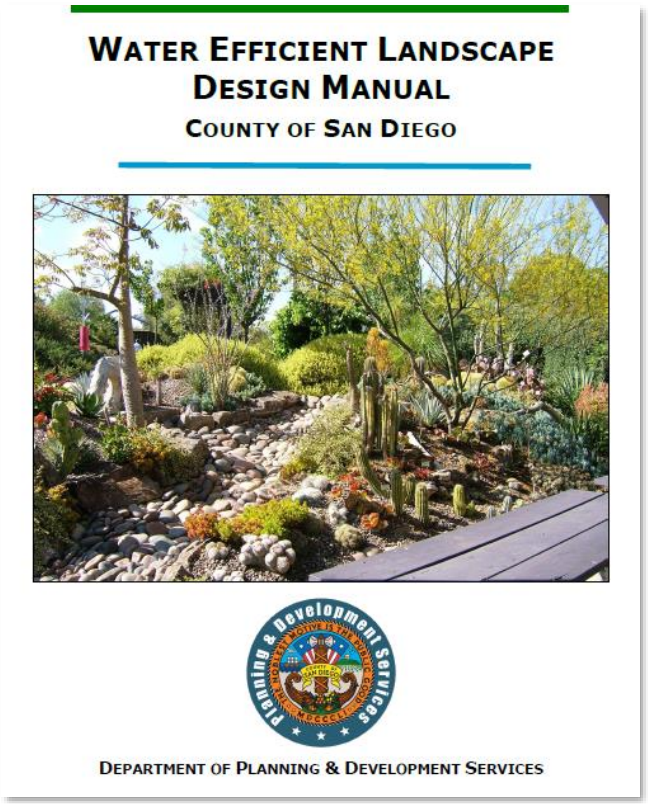
Source: County of San Diego's Climate Action Plan

MS4 Permit Category
Site Design (SD)
BMP IDs
SD-B: Impervious Area Dispersion SD-C: Green Roofs SD-E: Rain Barrels

These baseline BMPs are documented in Table 1, Section C of the PDP and Standard SWQMP template as shown below:

C. ☐ **BMPs for Rooftop Areas:** *Check this box if rooftop areas are proposed and select at least one BMP below. If none of the BMPs is selected, explain why all are infeasible in Table 3.*		**(See Fact Sheet BL-3)**
1. Direct runoff to pervious areas (SD-B) ☐	**2. Install green roofs (SD-C)** ☐	**3. Install rain barrels (SD-E)** ☐

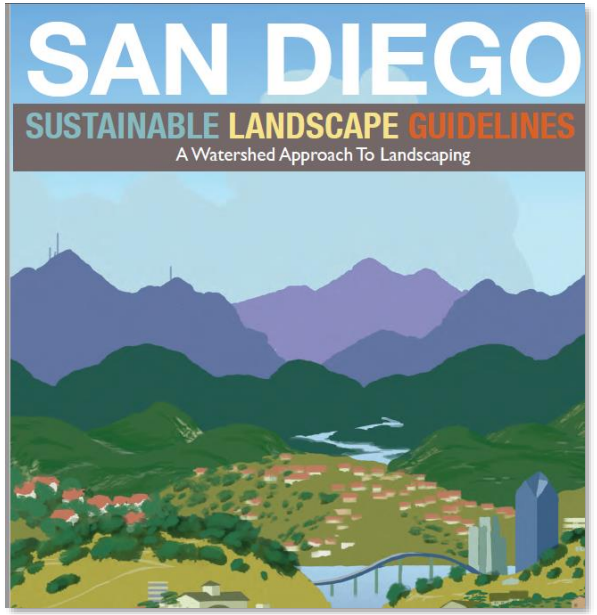
Fact Sheets for Site Design and Source Control BMPs



BL-4: Landscaped Areas

Source: San Diego Sustainable Landscapes Guidelines

MS4 Permit Category
Site Design (SD)
BMP IDs
SD-K: Sustainable Landscaping



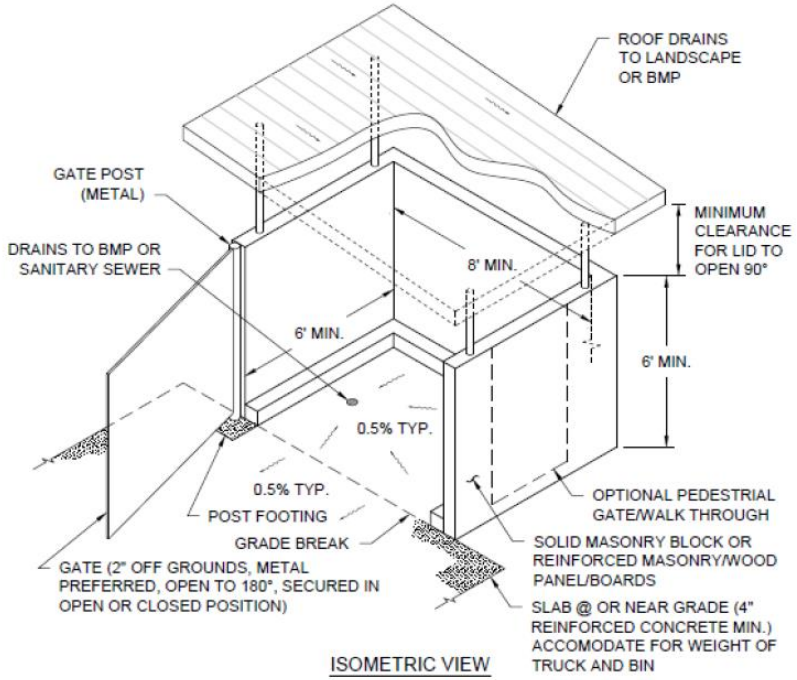
Fact Sheets for Site Design and Source Control BMPs

BL-5: Work and Storage Areas

MS4 Permit Category
Source Control (SC)
BMP IDs
SC-A: Overhead Covering
SC-B: Berms and Grade Breaks
SC-C: Wind Protection

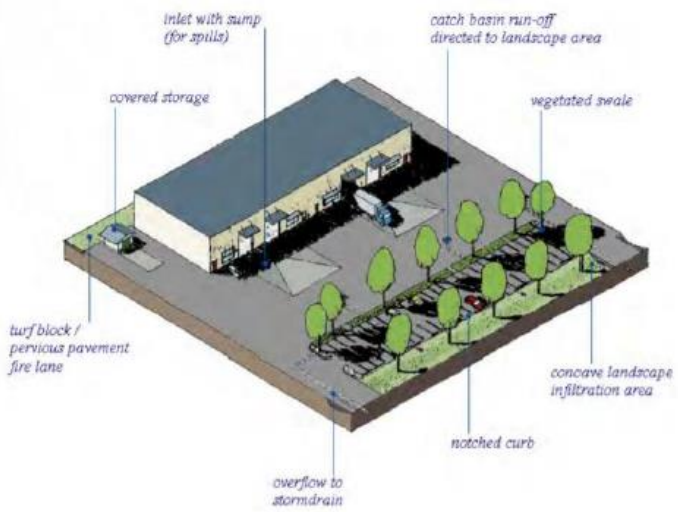
Plan Requirements

SC-B: Berms and Grade Breaks
Plan View Requirements
• Show locations and boundaries of the features (or portions of features) designed with Berm and Grade Breaks
• Label with BMP ID: SC-B
Detail Sheets
• Provide details in the applicable plan set where the feature is being designed and constructed.
Typical Construction Notes
• [Related to Berms]: Varies depending on type of berm.
• [Related to Grade Breaks]: Where designated on plan, grade breaks shall be provided around activity areas to prevent storm water run-on.



Fact Sheets for Site Design and Source Control BMPs

BL-6: Management of Storm Water Discharges



MS4 Permit Category
Source Control (SC)
BMP IDs
SC-D: Sanitary Sewer
SC-E: Containment Areas

County of San Diego Sanitary Sewer Agencies

Water District and Address	Telephone and Website
Borrego Water District 806 Palm Canyon Dr. Borrego Springs, CA 92004	(760)-767-5806 www.borregowd.org
City of Vista (Including Buena Sanitation District and Shadowridge) 200 Civic Center Dr. Vista, CA 92084	(760)-643-2804 www.cityofvista.com
Fallbrook Public Utility District 990 East Mission Rd. Fallbrook, CA 92028	(760)-728-1125 www.fpud.com
Leucadia Wastewater District 1960 La Costa Ave. Carlsbad, CA 92009	(760)-728-1125 www.lwwd.org
Olivenhain Municipal Water District (Including 4S Ranch and Rancho Cielo) 1966 Olivenhain Rd. Encinitas, CA 92024	(760)-753-6466 www.olivenhain.com
Otay Water District 2554 Sweetwater Springs Blvd. Spring Valley, CA 91978	(619)-670-2222 www.otaywater.gov
Padre Dam Municipal Water District 9300 Fanita Pkwy. Santee, CA 92072	(619)-258-4635 www.padredam.org

SC-E: CONTAINMENT AREAS

Description

Containment areas are specifically designed storage or activity areas that prevent spills, leaks, and other discharges, that would otherwise pollute storm water, from leaving the designated area. Spills leaks and other discharges from storage and activity areas can have high concentrations of pollutants that will contaminate storm water and impact receiving waterbodies if allowed to discharge from the site.

This BMP can be applied to any material or activity that will regularly be located in the same place on a site that could reasonably experience or result in spills, leaks, or other discharges.

Fact Sheets for Site Design and Source Control BMPs

BL-7: Management of Non-Storm Water Discharges

TYPICAL STORM DRAIN SIGNAGE

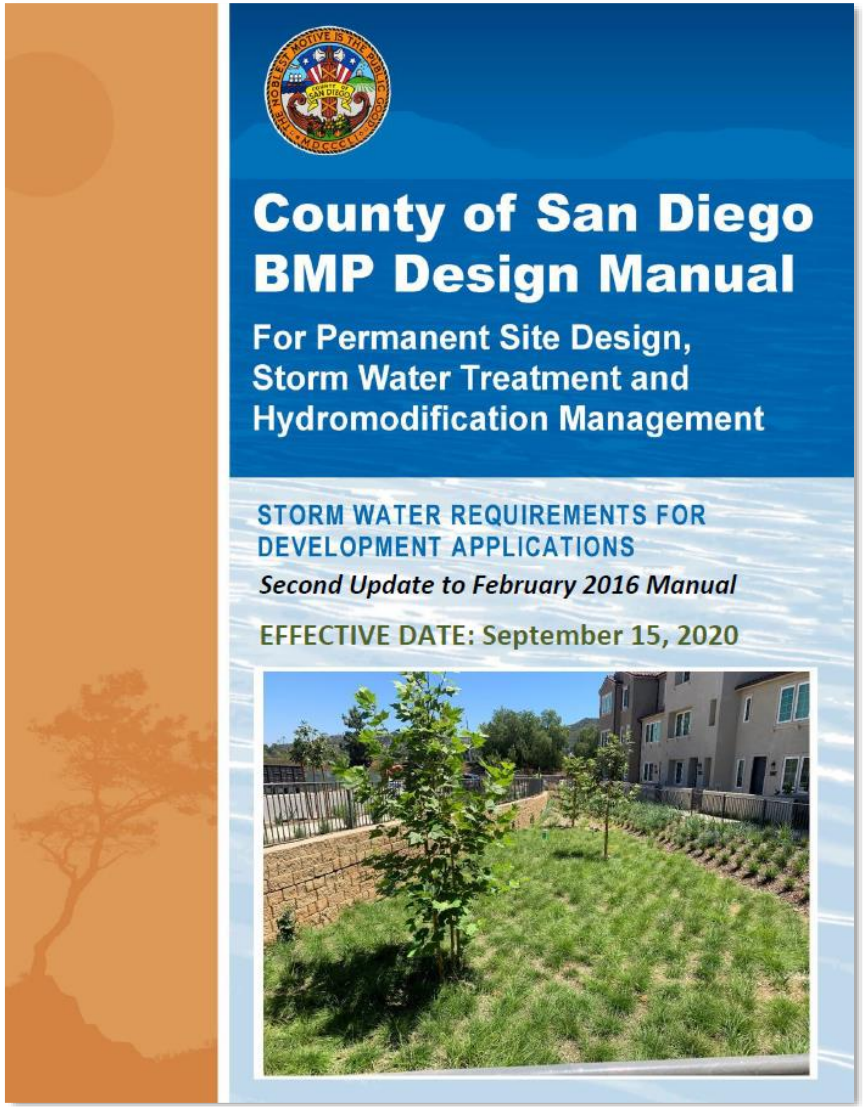
MS4 Permit Category
Source Control (SC)
BMP IDs
SC-F: Storm Drain Signage
SC-G: Educational BMP Signage

Figure 1: Temporary Structural BMP Signage

Figure 2: Permanent Interpretive BMP Signage

Tables 1 & 2 of Standard & PDP SWQMP Forms

(APPENDIX A)



Jeremy Fantaroni, QSD, CPESC

PDP and Standard SWQMP Forms

STORM WATER INTAKE FORM

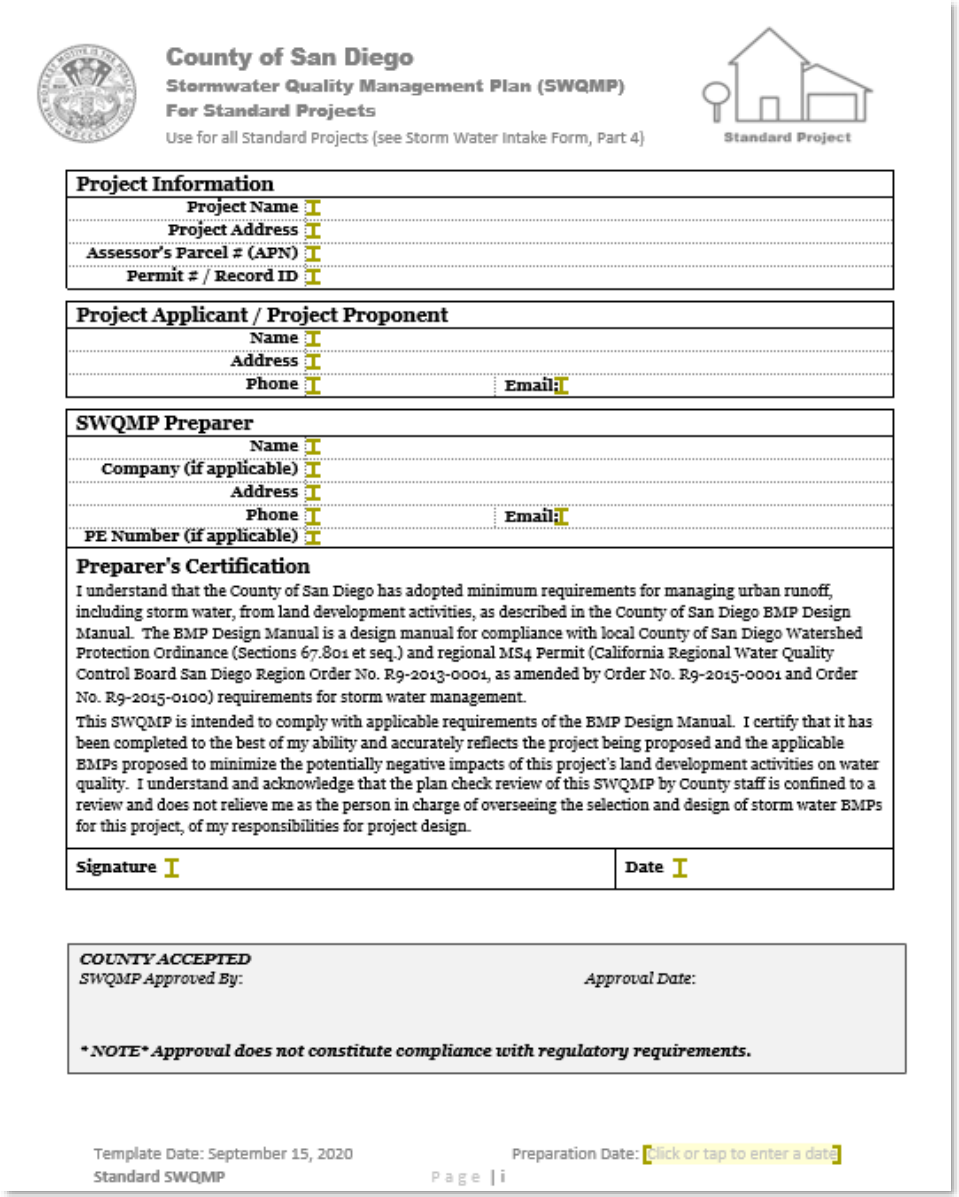
☐ **Standard Project** → **Standard *SWQMP Form***

- ☐ a. Project is East of the Pacific/Salton Sea Divide
- ☐ b. None of the PDP criteria below applies

☐ **Priority Development Project (PDP)** → **PDP *SWQMP Form***

- ☐ 1. Project is part of an existing PDP, OR
- ☐ 2. Project does any of the following:
  - ☐ a. Creates or replaces a total of 10,000 ft² or more of impervious surface
  - ☐ b. Creates or replaces a combined total of 5,000 ft² or more of impervious surface within one or more of the following uses: (1) parking lots; (2) streets, roads, highways, freeways, and/or driveways; (3) restaurants; and (4) hillsides
  - ☐ c. Creates or replaces a combined total of 5,000 ft² or more of impervious surface within one or more of the following uses: (1) automotive repair shops; and (2) retail gasoline outlets
  - ☐ d. Discharges directly to an Environmentally Sensitive Area (ESA) AND creates or replaces 2,500 ft² or more of impervious surface
  - ☐ e. Disturbs one or more acres of land (43,560 ft²) and is expected to generate pollutants post-construction
  - ☐ f. Is a redevelopment project that creates or replaces 5,000 ft² or more of impervious surface on a site already having at least 10,000 ft² of impervious surface

PDP and Standard SWQMP Forms



County of San Diego
Stormwater Quality Management Plan (SWQMP)
For Standard Projects
Use for all Standard Projects (see Storm Water Intake Form, Part 4)

Standard Project

Project Information	
Project Name	
Project Address	
Assessor's Parcel # (APN)	
Permit # / Record ID	

Project Applicant / Project Proponent		
Name		
Address		
Phone	Email:	

SWQMP Preparer		
Name		
Company (if applicable)		
Address		
Phone	Email:	
PE Number (if applicable)		

Preparer's Certification

I understand that the County of San Diego has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the County of San Diego BMP Design Manual. The BMP Design Manual is a design manual for compliance with local County of San Diego Watershed Protection Ordinance (Sections 67.801 et seq.) and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2013-0001, as amended by Order No. R9-2015-0001 and Order No. R9-2015-0100) requirements for storm water management.

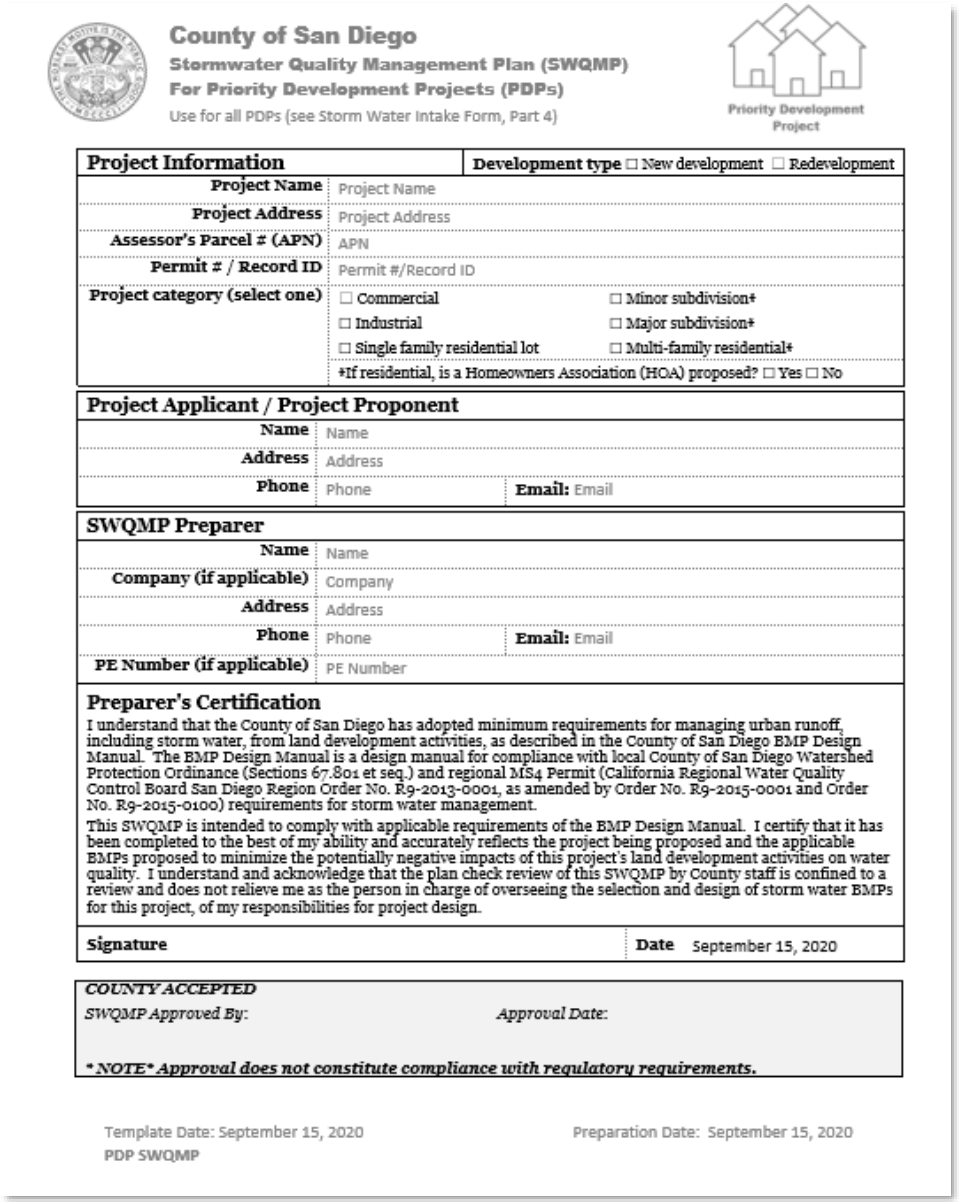
This SWQMP is intended to comply with applicable requirements of the BMP Design Manual. I certify that it has been completed to the best of my ability and accurately reflects the project being proposed and the applicable BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this SWQMP by County staff is confined to a review and does not relieve me as the person in charge of overseeing the selection and design of storm water BMPs for this project, of my responsibilities for project design.

Signature	Date

COUNTY ACCEPTED
SWQMP Approved By: *Approval Date:*

****NOTE* Approval does not constitute compliance with regulatory requirements.***

Template Date: September 15, 2020 Preparation Date: Click or tap to enter a date
Standard SWQMP Page | i



County of San Diego
Stormwater Quality Management Plan (SWQMP)
For Priority Development Projects (PDPs)
Use for all PDPs (see Storm Water Intake Form, Part 4)

Priority Development Project

Project Information			**Development type** ☐ New development ☐ Redevelopment
Project Name	Project Name		
Project Address	Project Address		
Assessor's Parcel # (APN)	APN		
Permit # / Record ID	Permit #/Record ID		
Project category (select one)	☐ Commercial	☐ Minor subdivision*	
	☐ Industrial	☐ Major subdivision*	
	☐ Single family residential lot	☐ Multi-family residential*	
	*If residential, is a Homeowners Association (HOA) proposed? ☐ Yes ☐ No		

Project Applicant / Project Proponent		
Name	Name	
Address	Address	
Phone	Phone	**Email:** Email

SWQMP Preparer		
Name	Name	
Company (if applicable)	Company	
Address	Address	
Phone	Phone	**Email:** Email
PE Number (if applicable)	PE Number	

Preparer's Certification

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Signature	Date
	September 15, 2020

COUNTY ACCEPTED
SWQMP Approved By: *Approval Date:*

****NOTE* Approval does not constitute compliance with regulatory requirements.***

Template Date: September 15, 2020 Preparation Date: September 15, 2020
PDP SWQMP

PDP and Standard SWQMP Forms

Table 1 – Baseline BMPs for Existing and Proposed Site Features

A. BMPs for Existing Natural Site Features (See Fact Sheet BL-1)

1. Check the boxes below for each existing feature on the site.

2. Select the BMPs to be implemented for each identified feature. Explain why any BMP not selected is infeasible in Table 3.

	Conserve natural features (SD-G)	Provide buffers around waterbodies (SD-H)
☐ Natural waterbodies	☐	☐
☐ Natural storage reservoirs & drainage corridors	☐	---
☐ Natural areas, soils, & vegetation (incl. trees)	☐	---

B. BMPs for Common Impervious Outdoor Site Features (See Fact Sheet BL-2)

1. Check the boxes below for each proposed feature.

*2. Select the BMPs to be implemented for each proposed feature. If neither BMP **SD-B** nor **SD-I** is selected for a feature, explain why both BMPs are infeasible in Table 3.*

	a. Direct runoff to pervious areas (SD-B)	b. Construct surfaces from permeable materials (SD-I)	c. Minimize the size of impervious areas
☐ Streets and roads	☐	☐	☐ *Check this box to confirm that all impervious areas on the site will be minimized where feasible.*
☐ Sidewalks & walkways	☐	☐	
☐ Parking areas & lots	☐	☐	*If this box is not checked, identify the surfaces that cannot be minimized in Table 3, and explain why it is infeasible to do so.*
☐ Driveways	☐	☐	
☐ Patios, decks, & courtyards	☐	☐	
☐ Hardcourt recreation areas	☐	☐	
☐ Other:	☐	☐	

C. ☐ BMPs for Rooftop Areas: *Check this box if rooftop areas are proposed and select at least one BMP below.* **(See Fact Sheet BL-3)**

If no BMPs are selected, explain why they are infeasible in Table 3.

1. Direct runoff to pervious areas (SD-B)	2. Install green roofs (SD-C)	3. Install rain barrels (SD-E)
☐	☐	☐

D. ☐ BMPs for Landscaped Areas: *Check this box if landscaping is proposed and select at least one BMP below.* **(See Fact Sheet BL-4)**

If no BMPs are selected, explain why they are infeasible in Table 3.

1. Sustainable Landscaping (SD-K)
☐

PDP and Standard SWQMP Forms

Table 2 – Baseline BMPs for Pollutant-generating Sources

☐ If this is a **Small Residential Project**, check this box and skip the rest of this table.

A. Management of Stormwater Discharges

1. Identify all proposed outdoor work areas below (☐ *Check here if none are proposed*)	**2. Which BMPs will be used to prevent materials from contacting rainfall or runoff?** (See Fact Sheet BL-5) *(Select all feasible BMPs for each work area[2])*			**3. Where will runoff from the work area be routed?** (See Fact Sheet BL-6) *(Select one or more option for each work area)*			
	Overhead covering (rooftops, etc.) (SC-A)	**Separation of flows from adjacent areas (berms, etc.) (SC-B)**	**Wind protection (screens, etc.) (SC-C)**	**Sanitary sewer[3] (SC-D)**	**Containment system (SC-E)**	**Stormwater S-BMP or SSD-BMP[4]**	**Other[5]**
☐ Trash & Refuse Storage	☐	☐	☐	☐	☐	☐	☐
☐ Materials & Equipment Storage	☐	☐	☐	☐	☐	☐	☐
☐ Loading & Unloading	☐	☐	---	☐	☐	☐	☐
☐ Fueling	☐	☐	---	☐	☐	☐	☐
☐ Maintenance & Repair	☐	☐	---	☐	☐	☐	☐
☐ Vehicle & Equipment Cleaning	☐	☐	---	☐	☐	☐	☐
☐ Other:	☐	☐	---	☐	☐	☐	☐

B. Prevention of Non-stormwater Discharges (See Fact Sheet BL-7)

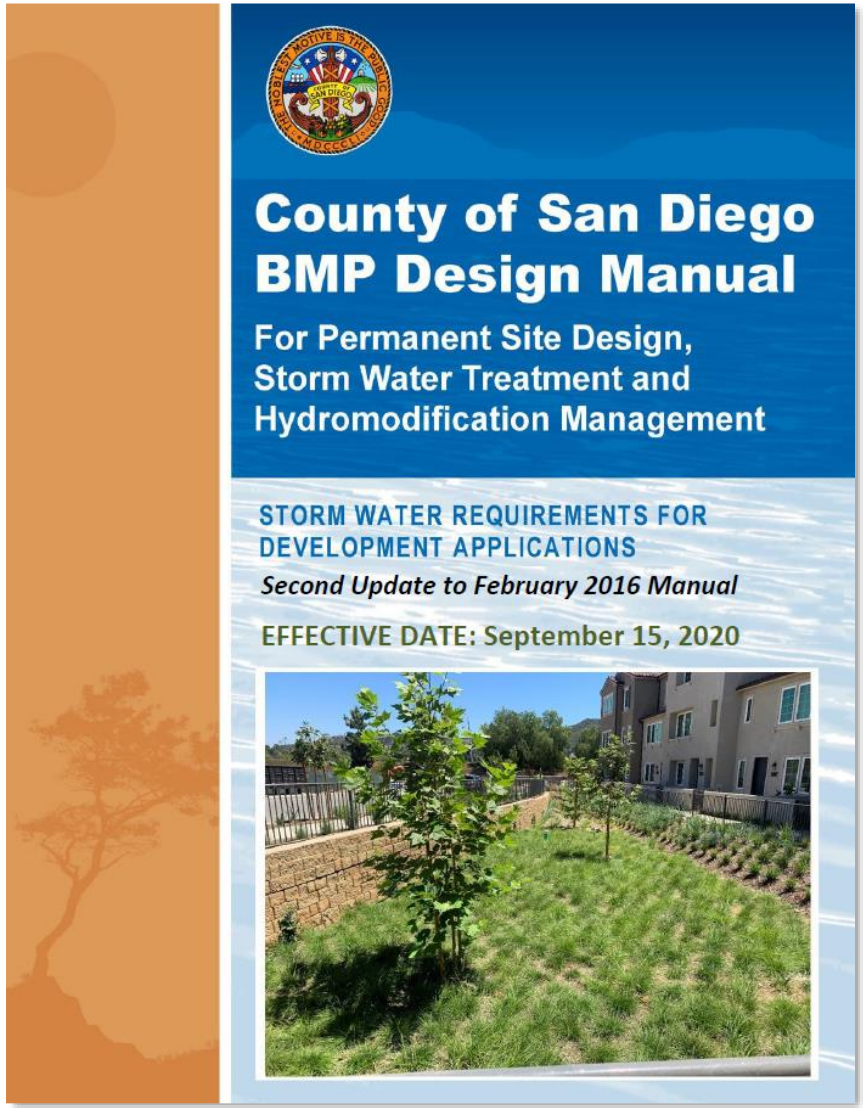
Select one option for each feature below:

• **Storm drain inlets and catch basins ...**	☐ are not proposed	☐ will be labeled with stenciling or signage to discourage dumping **(SC-F)**
• **Educational BMP Signage ...**	☐ are not proposed	☐ will be labeled with educational signage for BMP **(SC-G)**
• **Interior work surfaces, floor drains, & sumps ...**	☐ are not proposed	☐ will not discharge directly or indirectly to the MS4 or receiving waters
• **Drain lines (e.g., air conditioning, boiler, etc.) ...**	☐ are not proposed	☐ will not discharge directly or indirectly to the MS4 or receiving waters
• **Fire sprinkler test water ...**	☐ are not proposed	☐ will not discharge directly or indirectly to the MS4 or receiving waters

BMP Implementation, Source Control & Site Design BMP Requirements

(CHAPTERS 2 & 4)

René Vidales, PE, LEED GA, ENV SP, ISSP-SA, QSD



Baseline BMP Definition

Baseline BMP means any BMP that is required where applicable and feasible on all development projects. Baseline BMPs include both Site Design and Source Control BMPs. Some baseline BMPs can be sized to qualify for Design Capture Volume (DCV) reductions on priority development projects. Baseline BMPs are not required to be sized to qualify for DCV reductions and shall be implemented where applicable and feasible on all development projects even if they do not meet the criteria to qualify for DCV reduction.

Chapter 2, Section 2.0 Item 1

Previous Edition

- Group 1: Natural Features
- Group 2: Common Impervious Outdoor Features
- Group 3: Other Proposed Outdoor Features
- Group 4: Pollutant Generating Sources

September 2020 Edition

- Existing Natural Site Features
- Outdoor Impervious Areas
- Rooftop Areas
- Landscaped Areas
- Work and Storage Areas
- Management of Stormwater Discharges
- Management of Non-Stormwater Discharges

Chapter 2, Table 2-1

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 2.1.1.4, 2.2.2.2 & ~~Appendix~~ Appendices B.1 & I.1	Sections 2.2 & 5	Sections 2.3, 2.4 & 6	Sections 2.3.3, 6.2 & Appendix H
Standard Projects	**Required where applicable and feasible**		**NA**	**NA**	**NA**	**NA**
PDP-exempted Projects			**NA**	**NA**	**NA**	**NA**
• New or retrofit paved sidewalks, bicycle lanes, or trails (Section 1.4.3)						
• Retrofitting or redevelopment of paved alleys, streets or roads (Section 1.4.3)			**NA**	**Required**	**NA**	**NA**
PDPs			**Optional**	**Required**	**Required**	**Required**
• Without HMP Exemption (Section 1.4)						
• With HMP Exemption (Section 6.1)			**Optional**	**Required**	**NA**	**NA**

Enhanced Site Design BMP Definition

Enhanced Site Design BMPs are Site Design BMPs that are sized for crediting toward reductions in the Design Capture Volume (DCV) for a Drainage Management Area (DMA). Enhanced Site Design BMPs are credited in Worksheet B-1.1 of the BMP Design Manual to ***partially*** satisfy the Design Capture Volume (DCV) reductions and/or HMP reductions in a DMA. Examples of Enhanced Site Design BMPs are tree wells and impervious area dispersion.

Chapter 2, Section 2.1.1.4

2.1.1.4 DCV Reduction through Enhanced Site Design BMPs (Sections 2.2.2.2 & Appendix B.1)

Enhanced site design BMPs reduce or eliminate the DCV within a DMA. Using them can decrease the number or size of other, more complex or costly BMPs needed to satisfy Structural Performance Standards.

Examples of Enhanced Site Design BMPs include Tree Wells (Fact Sheet ~~SD-~~SD-A), Impervious Area Dispersion (Fact Sheet SD-B), Green Roofs (Fact Sheet SD-C), Permeable Pavement (Fact Sheet SD-D), ~~Tree Wells (Fact Sheet SD-SD-A),~~ and Rain Barrels (Fact Sheet SD-E). Each BMP must be sized and constructed in accordance with applicable guidance provided in its respective Fact Sheet or as otherwise specified. DCV reductions are typically determined for larger projects using the DCV Worksheet B.1.1 in Appendix B and Worksheet I.1.1 in Appendix I. However, other worksheets, tables, calculators, or methods acceptable to the County may also be used. See section 2.2.2.2 for additional guidance on DCV calculation, and ~~Appendix~~ Appendices B.1 and I.1. for specific options and methodologies for achieving DCV reductions.

Chapter 4, Section 4.2

4.2 Source Control (SC) BMP Requirements

Source control BMPs avoid and reduce pollutants in storm water runoff. Everyday activities, such as recycling, trash disposal, and irrigation generate potential storm water pollutants. Source control BMPs are defined as activities or features that reduce the potential for storm water runoff to come into contact with pollutants. Per MS4 Permit Provision E.3.a.(2) and WPO Section 67.811(a)(4)), all development projects must implement source control BMPs where applicable and feasible.

How to comply: Projects must implement all source control BMPs that are applicable to their project. Applicability should be determined through a consideration of the development project's proposed features and the anticipated pollutant sources associated with them. Appendix ~~E~~ C provides guidance for identifying source control BMPs applicable to a project. Table 2 "Baseline BMPs for Pollutant-Generating Sources" ~~The "Source Control BMP Checklist for All Development Projects"~~ located in Standard and PDP SWQMPs must be used to document compliance with these requirements. Table 2 applies to all projects except for Small Residential Projects. Small Residential Projects are those requiring either: a Building Permit, Minor Residential Grading Permit, or site Plan Permit for a single family home; or a Tentative Parcel Map Permit for up to 4 single family homes and a remainder parcel.

Chapter 4, Section 4.2.1

4.2.1 Prevent illicit discharges into the MS4

Per WPO Section 67.804, illicit discharges (i.e., discharges to the MS4 that are not composed entirely of storm water) are prohibited, except as exempted per WPO Section 67.805. Projects must effectively eliminate discharges of non-storm water into the MS4.

Added language to incorporate the following Fact Sheets:

- BL-5: Work and Storage Areas
- BL-6: Management of Stormwater Discharges
- BL-7: Management of Non-Stormwater Discharges

Chapter 4, Section 4.2.2

4.2.2 Identify the storm drain system using stenciling or signage

Storm drain signs and stencils are visible source controls typically placed adjacent to inlets. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. ~~Stenciling~~ Storm drain signage must be provided for all storm water conveyance system inlets and catch basins within the project area. ~~Inlet stenciling~~Storm drain signage may include concrete stamping, concrete painting, placards, or other methods approved by the County. ~~Some~~ A stenciling template~~s~~ used by the County ~~are~~ is attached in the "Storm Drain Signage" section of Fact Sheet BL-7 in Appendix ~~I.4~~C. This~~ese~~ template may be modified and used as educational pieces promoting improved water quality.

Added language from Fact Sheet BL-7 Educational BMP Signage, which includes:

- Temporary BMP Signage
- Model Home BMP Signage
- Interpretive BMP Signage

Chapter 4, Section 4.3

4.3 Site Design (SD) BMP Requirements

Site design BMPs (also referred to as LID BMPs) are intended to reduce the rate and volume of storm water runoff and associated pollutant loads by minimizing surface soil compaction, reducing impervious surfaces, or providing flow pathways that are "disconnected" from the storm drain system, such as by routing flow over pervious surfaces. Site design BMPs may incorporate interception, storage, evaporation, evapotranspiration, infiltration, and/or filtration processes to retain and/or treat pollutants in storm water before it is discharged from a site.

Applicants are referred to the County of San Diego LID Handbook for additional guidance and information on the incorporation of low impact design features in the design of projects. Appendix K (Guidance for Green Infrastructure) provides additional guidance for implementing green street and other sustainable project features and types.

Appendix C also provides the following fact sheets to assist project applicants with designing BMPs to meet Site Design requirements:

- BL-1 – Existing Natural Site Features
- BL-2 – Outdoor Impervious Areas
- BL-3 – Rooftop Areas
- BL-4 – Landscaped Areas

Chapter 4, Section 4.3

4.3 Site Design (SD) BMP Requirements

In addition, Appendix E also provides the following fact sheets to assist applicants in Design Capture Volume (DCV) reduction using ~~with the proper design of~~ Enhanced ~~site~~ Site ~~design~~ Design ~~features~~BMPs:

- SD-A – Tree Wells
- SD-B – Impervious Area Dispersion
- SD-C – Green Roofs
- SD-D – Permeable Pavement (Site Design BMP)
- SD-E – Rain Barrels; and
- SD-F – Amended Soil

Chapter 4, Section 4.3

4.3 Site Design (SD) BMP Requirements

~~In some cases, i~~Implementation of Enhanced Site Design BMPs may result in quantifiable reductions in the site's DCV (refer to Appendix B.1); however, failure to meet the minimum thresholds for DCV reductions does not eliminate requirements to implement applicable Site Design BMPs. All applicable and feasible Site Design BMPs must be implemented to the maximum extent practicable. Additionally, implementation of ~~some~~ Significant ~~site~~ Site ~~design~~ Design BMPs (SSD-BMPs) such as Tree Wells and Impervious Area Dispersion when designed to meet flow control per Fact Sheets SD-A and SD-~~b~~B, respectfully may result in quantifiable hydromodification flow control benefits; refer to Section 6.1 and Appendix ~~E.8~~I.1.

Appendix E

	MS4 Category	Manual Category	Design Fact Sheet	Page
Enhanced Site Design BMPs	Site Design	Site Design	SD-A Tree Wells* SD-B: Impervious Area Dispersion* SD-C: Green Roofs SD-D: Permeable Pavement (Site Design BMP) SD-E: Rain Barrels SD-F: Amended Soil	E-28 E-42 E-50 E-58 E-68 E-74
Structural BMPs	Retention	Harvest and Use	HU-1: Cistern	E-78
		Infiltration	INF-1: Infiltration Basins INF-2: Bioretention INF-3: Permeable Pavement (Pollutant Control) INF-4: Dry Wells	E-88 E-100 E-114 E-132
		Partial Retention	PR-1: Biofiltration with Partial Retention	E-136
	Biofiltration	Biofiltration	BF-1: Biofiltration BF-2: Nutrient Sensitive Media Design BF-3: Proprietary Biofiltration	E-150 E-164 E-168
	Flow-thru Treatment Control	Flow-thru Treatment Control with	FT-1: Vegetated Swales FT-2: Media Filters FT-3: Sand Filters	E-170 E-182 E-190

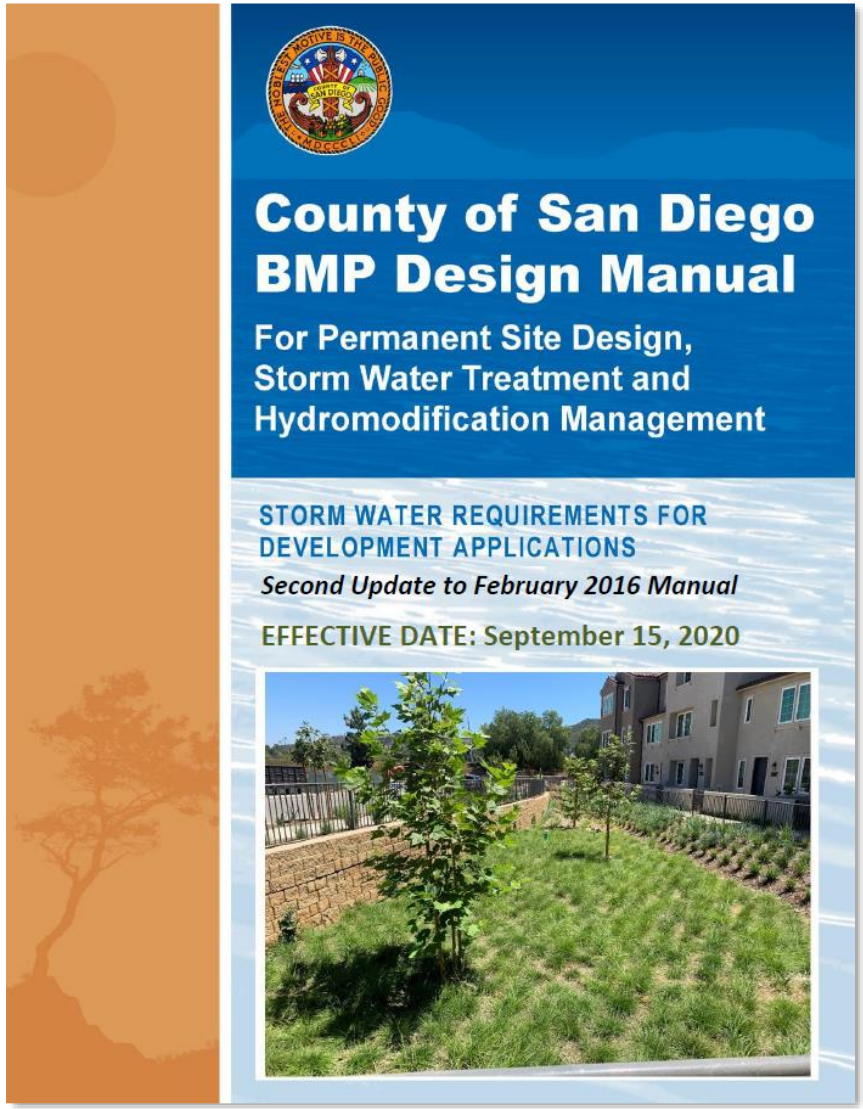
*SD-A Tree Wells and SD-B Impervious Area Dispersion can function as Significant Site Design BMPs when sized according to Section 5.2.3.

Q&A

5 Min. Break

Significant Site Design BMP (SSD-BMP) Sizing Methods & Calculations

(NEW APPENDIX I)



RICK ENGINEERING COMPANY

Laura Henry, PE

Appendix I: Significant Site Design BMP (SSD-BMP) Sizing Methods and Calculations

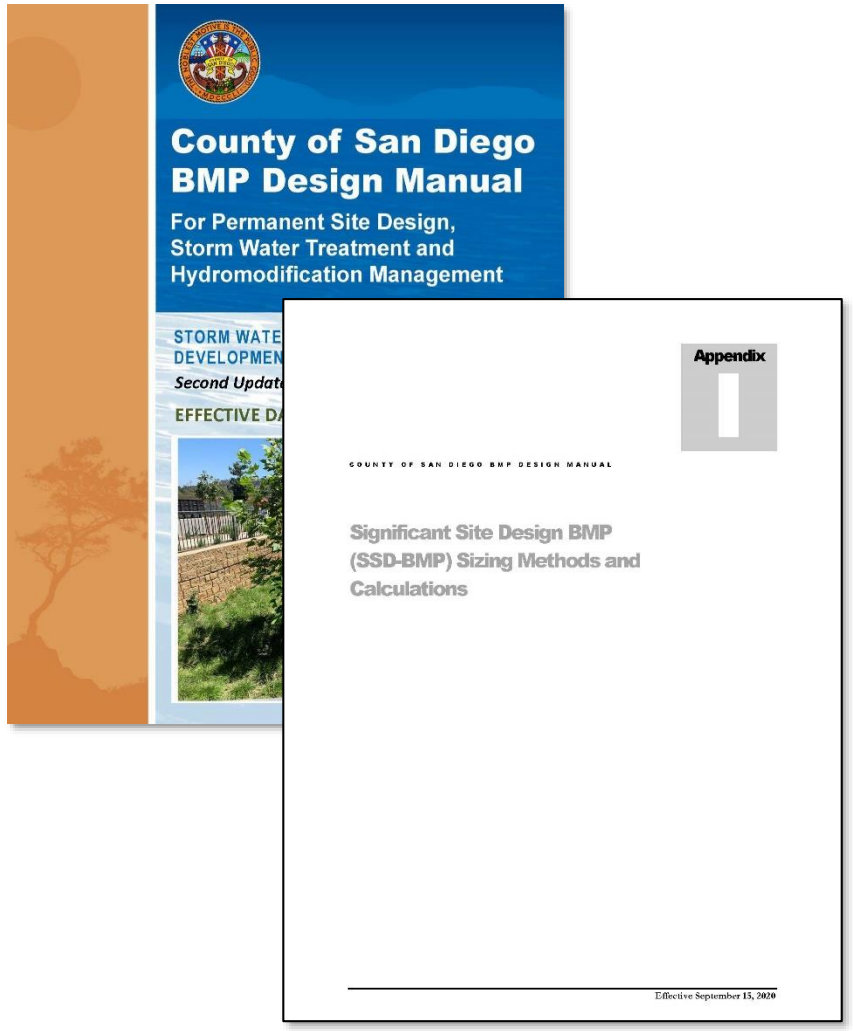
Table of Contents:

I.1 BL-1: Significant Site Design BMPs (SSD-BMPs)

I.2 Step 1: Determine DCV

I.3 Step 2: Dispersion Areas

I.4 Step 3: Tree Wells



What is a Significant Site Design BMP (SSD-BMP)?

- Significant site design BMPs (SSD-BMPs) are site design BMPs that are sized and constructed to satisfy structural performance standards for a drainage management area (DMA).
- SSD-BMPs fully satisfy the design capture volume (DCV) requirement for pollutant control
- SSD-BMPs can also be designed to satisfy hydromodification control requirements
- SSD-BMPs include:
  - Tree Wells
  - Impervious Area Dispersion
  - Permeable Pavement (limited use for pollutant control only)

Site Design BMP Terms

Implementation Level	Sizing Requirements
Baseline BMP or Site Design BMP	• No minimum size • Apply where applicable and feasible • No credit to DCV or hydromodification control
Enhanced Site Design BMP	• Meet minimum sizing and design requirements • Reduce overall DCV
Significant Site Design BMP	• Meet greater sizing and design requirements • Fully satisfy DCV and hydromodification control

SSD-BMPs vs. Enhanced Site Design BMPs

BMP	*The BMP may be used as:*		
	Enhanced Site Design BMP to Reduce DCV Draining to a Downstream BMP	SSD-BMP to Fully Satisfy DCV	SSD-BMP to Fully Satisfy DCV and Hydromodification Management
Rain Barrel	✓		
Green Roof	✓		
Permeable Pavement	✓	✓ (as site design SD-D)	**X** (only as structural INF-3)
Impervious Area Dispersion	✓	✓	✓
Tree Wells	✓	✓	✓

SSD-BMP Development Timeline

2016 Manual

Site design BMPs can be used to reduce DCV.

Impervious area dispersion, permeable pavement, and tree wells can fully satisfy DCV.

No sizing criteria available for site design BMPs to satisfy hydromodification management.

2019 Manual

New criteria added for impervious area dispersion and tree wells to satisfy hydromodification management in addition to DCV.

“Enhanced site design BMP” and “significant site design BMP” (“SSD-BMP”) terms introduced.

2020 Manual

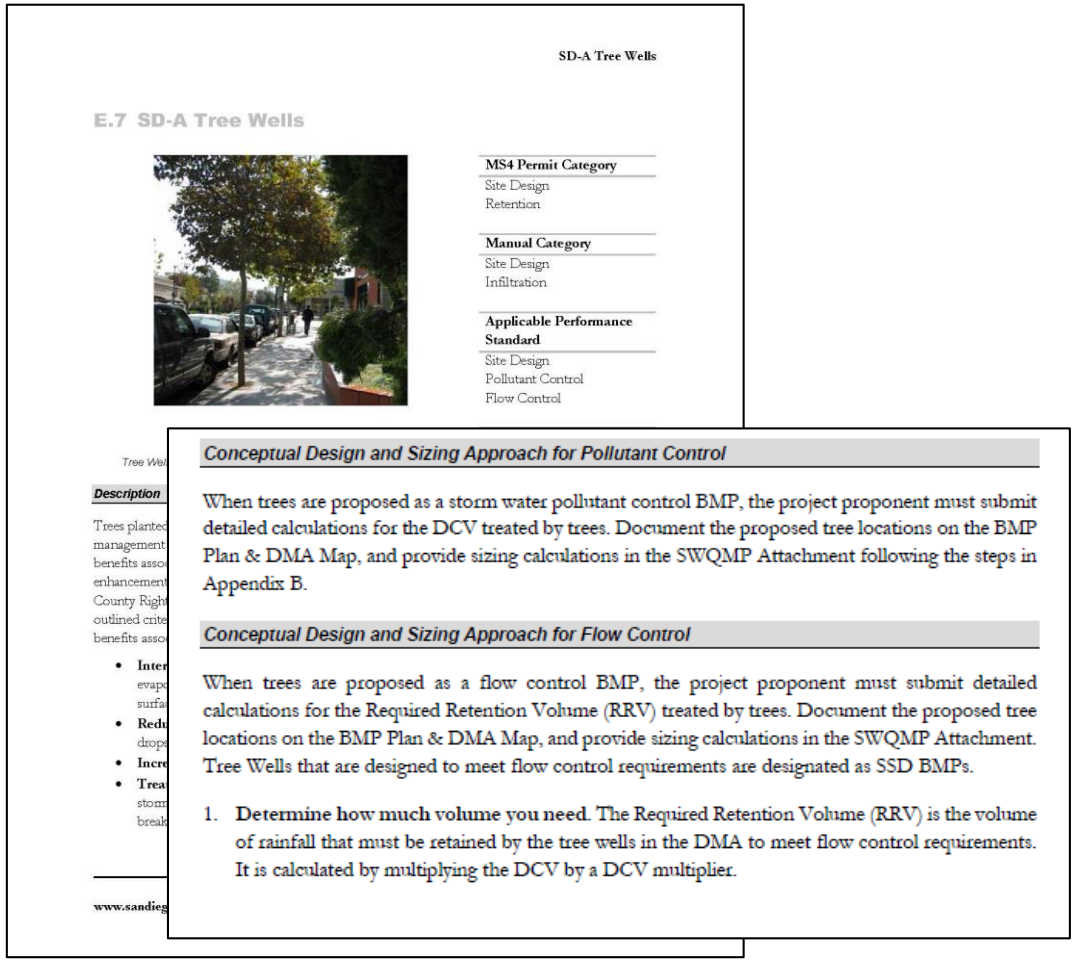
New step-by-step guidance added to facilitate design of impervious area dispersion and tree wells as SSD-BMPs.

New SSD-BMP spreadsheet tool provided.

SSD-BMP Design Guidance 2019 BMP Design Manual

Fact Sheets in Appendix E

- ***Tree Wells (SD-A)***



SD-A Tree Wells

E.7 SD-A Tree Wells

MS4 Permit Category
Site Design
Retention

Manual Category
Site Design
Infiltration

Applicable Performance Standard
Site Design
Pollutant Control
Flow Control

Description

Trees planted … management … benefits … enhancement … County … outlined … benefits …

- **Inter** … evap… surfa…
- **Redu** … drops
- **Incre**
- **Trea** … storm … break…

www.sandieg…

Conceptual Design and Sizing Approach for Pollutant Control

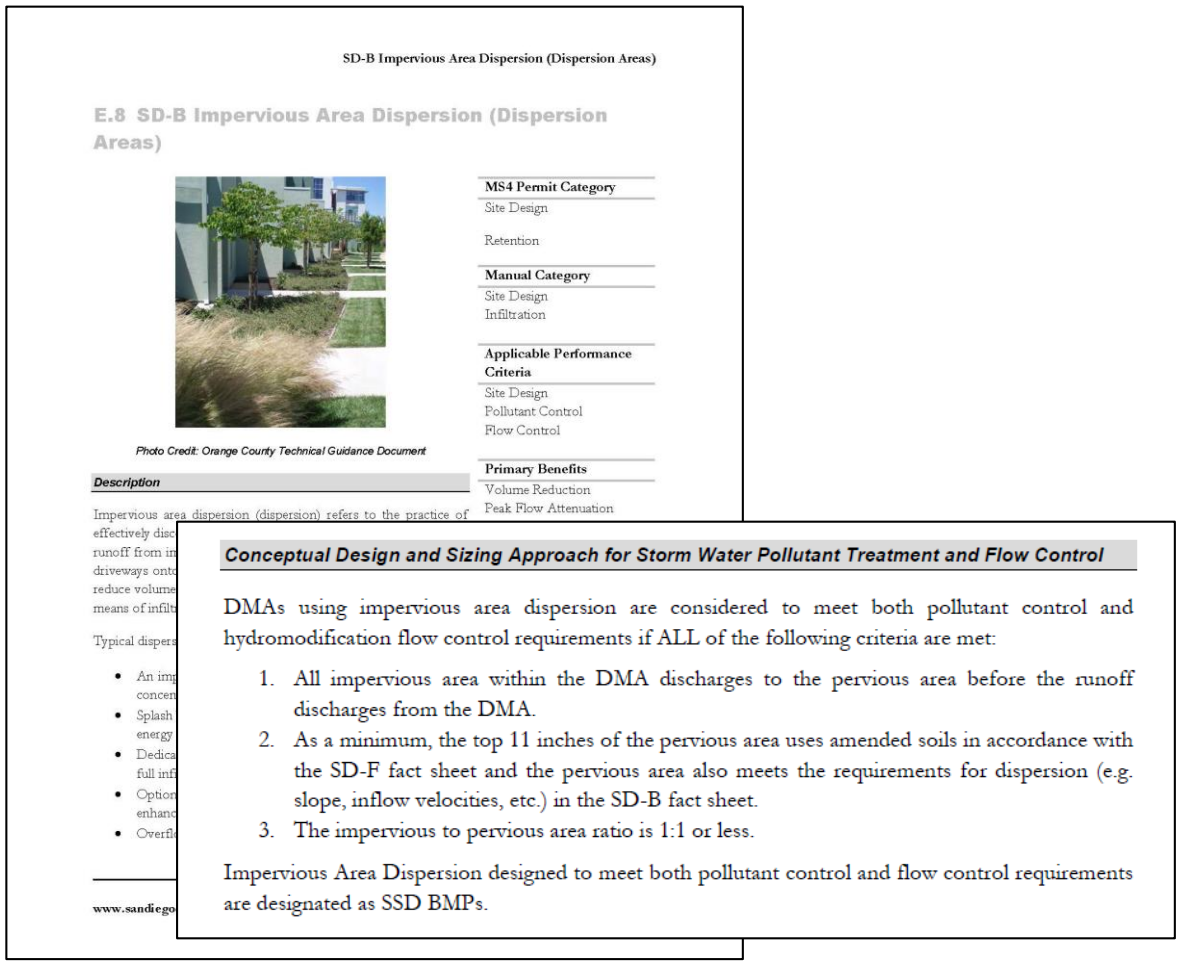
When trees are proposed as a storm water pollutant control BMP, the project proponent must submit detailed calculations for the DCV treated by trees. Document the proposed tree locations on the BMP Plan & DMA Map, and provide sizing calculations in the SWQMP Attachment following the steps in Appendix B.

Conceptual Design and Sizing Approach for Flow Control

When trees are proposed as a flow control BMP, the project proponent must submit detailed calculations for the Required Retention Volume (RRV) treated by trees. Document the proposed tree locations on the BMP Plan & DMA Map, and provide sizing calculations in the SWQMP Attachment. Tree Wells that are designed to meet flow control requirements are designated as SSD BMPs.

1. **Determine how much volume you need**. The Required Retention Volume (RRV) is the volume of rainfall that must be retained by the tree wells in the DMA to meet flow control requirements. It is calculated by multiplying the DCV by a DCV multiplier.

- ***Impervious Area Dispersion (SD-B)***



SD-B Impervious Area Dispersion (Dispersion Areas)

E.8 SD-B Impervious Area Dispersion (Dispersion Areas)

Photo Credit: Orange County Technical Guidance Document

MS4 Permit Category
Site Design
Retention

Manual Category
Site Design
Infiltration

Applicable Performance Criteria
Site Design
Pollutant Control
Flow Control

Primary Benefits
Volume Reduction
Peak Flow Attenuation

Description

Impervious area dispersion (dispersion) refers to the practice of effectively disc… runoff from im… driveways onto… reduce volume… means of infilt…

Typical dispers…

- An imp… concen…
- Splash … energy …
- Dedica… full infi…
- Option… enhanc…
- Overfl…

www.sandiego…

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

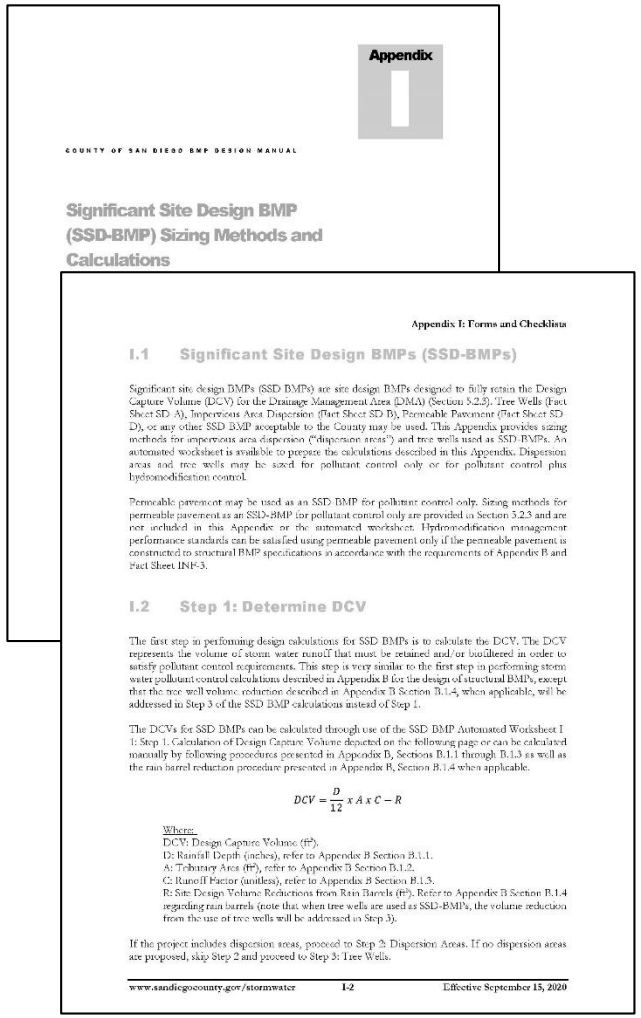
DMAs using impervious area dispersion are considered to meet both pollutant control and hydromodification flow control requirements if ALL of the following criteria are met:

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 are designated as SSD BMPs.

SSD-BMP Design Guidance 2020 BMP Design Manual

Fact Sheets in Appendix E And New Appendix I and Spreadsheet Tool



Appendix

I

COUNTY OF SAN DIEGO BMP DESIGN MANUAL

Significant Site Design BMP (SSD-BMP) Sizing Methods and Calculations

Appendix I: Forms and Checklists

I.1 Significant Site Design BMPs (SSD-BMPs)

Significant site design BMPs (SSD BMPs) are site design BMPs designed to fully retain the Design Capture Volume (DCV) for the Drainage Management Area (DMA) (Section 5.2.3). Tree Wells (Fact Sheet SD-A), Impervious Area Dispersion (Fact Sheet SD-B), Permeable Pavement (Fact Sheet SD-D), or any other SSD BMP acceptable to the County may be used. This Appendix provides sizing methods for impervious area dispersion ("dispersion areas") and tree wells used as SSD BMPs. An automated worksheet is available to prepare the calculations described in this Appendix. Dispersion areas and tree wells may be sized for pollutant control only or for pollutant control plus hydromodification control.

Permeable pavement may be used as an SSD BMP for pollutant control only. Sizing methods for permeable pavement as an SSD-BMP for pollutant control only are provided in Section 5.2.3 and are not included in this Appendix or the automated worksheet. Hydromodification management performance standards can be satisfied using permeable pavement only if the permeable pavement is constructed to structural BMP specifications in accordance with the requirements of Appendix B and Fact Sheet INF-3.

I.2 Step 1: Determine DCV

The first step in performing design calculations for SSD BMPs is to calculate the DCV. The DCV represents the volume of storm water runoff that must be retained and/or biofiltered in order to satisfy pollutant control requirements. This step is very similar to the first step in performing storm water pollutant control calculations described in Appendix B for the design of structural BMPs, except that the tree well volume reduction described in Appendix B Section B.1.4, when applicable, will be addressed in Step 3 of the SSD BMP calculations instead of Step 1.

The DCVs for SSD BMPs can be calculated through use of the SSD BMP Automated Worksheet I-1: Step 1. Calculation of Design Capture Volume depicted on the following page or can be calculated manually by following procedures presented in Appendix B, Sections B.1.1 through B.1.3 as well as the rain barrel reduction procedure presented in Appendix B, Section B.1.4 when applicable.

$$DCV = \frac{D}{12} \times A \times C - R$$

Where:
DCV: Design Capture Volume (ft³).
D: Rainfall Depth (inches), refer to Appendix B Section B.1.1.
A: Tributary Area (ft²), refer to Appendix B Section B.1.2.
C: Runoff Factor (unitless), refer to Appendix B Section B.1.3.
R: Site Design Volume Reductions from Rain Barrels (ft³). Refer to Appendix B Section B.1.4 regarding rain barrels (note that when tree wells are used as SSD-BMPs, the volume reduction from the use of tree wells will be addressed in Step 3).

If the project includes dispersion areas, proceed to Step 2: Dispersion Areas. If no dispersion areas are proposed, skip Step 2 and proceed to Step 3: Tree Wells.

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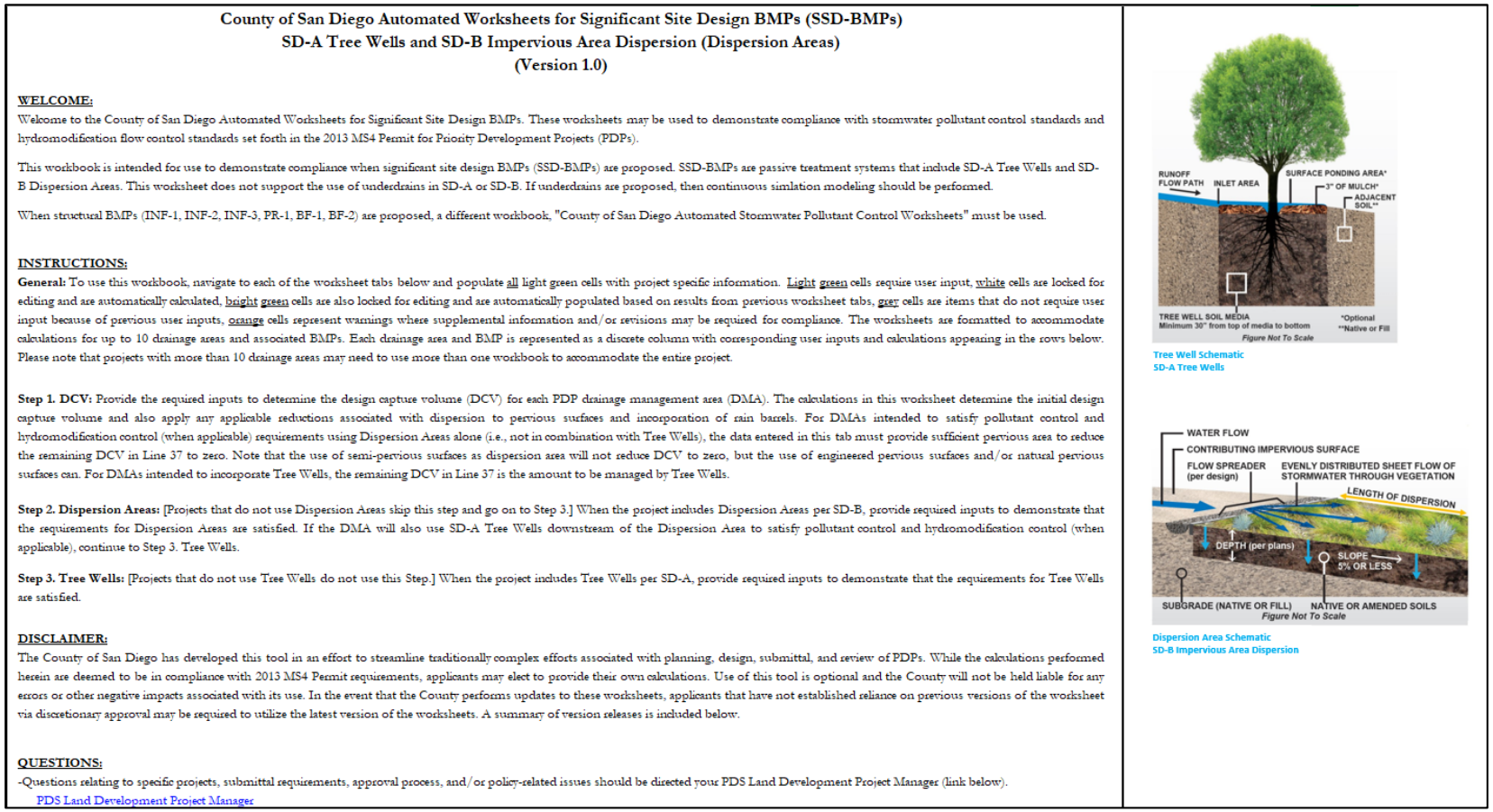


County of San Diego Automated Worksheets for Significant Site Design BMPs (SSD-BMPs)
SD-A Tree Wells and SD-B Impervious Area Dispersion (Dispersion Areas)
(Version 1.0)

WELCOME:

Welcome to the County of San Diego Automated Worksheets for Significant Site Design BMPs. These worksheets may be used to demonstrate compliance with stormwater pollutant control standards and hydromodification flow control standards set forth in the 2013 MS4 Permit for Priority Development Projects (PDPs).

This workbook is intended for use to demonstrate compliance when significant site design BMPs (SSD-BMPs) are proposed. SSD-BMPs are passive treatment systems that include SD-A Tree Wells and SD-B Dispersion Areas. This worksheet does not support the use of underdrains in SD-A or SD-B. If underdrains are proposed, then continuous simlation modeling should be performed.

When structural BMPs (INF-1, INF-2, INF-3, PR-1, BF-1, BF-2) are proposed, a different workbook, "County of San Diego Automated Stormwater Pollutant Control Worksheets" must be used.

INSTRUCTIONS:

General: To use this workbook, navigate to each of the worksheet tabs below and populate all light green cells with project specific information. Light green cells require user input, white cells are locked for editing and are automatically calculated, bright green cells are also locked for editing and are automatically populated based on results from previous worksheet tabs, grey cells are items that do not require user input because of previous user inputs, orange cells represent warnings where supplemental information and/or revisions may be required for compliance. The worksheets are formatted to accommodate calculations for up to 10 drainage areas and associated BMPs. Each drainage area and BMP is represented as a discrete column with corresponding user inputs and calculations appearing in the rows below. Please note that projects with more than 10 drainage areas may need to use more than one workbook to accommodate the entire project.

Step 1. DCV: Provide the required inputs to determine the design capture volume (DCV) for each PDP drainage management area (DMA). The calculations in this worksheet determine the initial design capture volume and also apply any applicable reductions associated with dispersion to pervious surfaces and incorporation of rain barrels. For DMAs intended to satisfy pollutant control and hydromodification control (when applicable) requirements using Dispersion Areas alone (i.e., not in combination with Tree Wells), the data entered in this tab must provide sufficient pervious area to reduce the remaining DCV in Line 37 to zero. Note that the use of semi-pervious surfaces as dispersion area will not reduce DCV to zero, but the use of engineered pervious surfaces and/or natural pervious surfaces can. For DMAs intended to incorporate Tree Wells, the remaining DCV in Line 37 is the amount to be managed by Tree Wells.

Step 2. Dispersion Areas: [Projects that do not use Dispersion Areas skip this step and go on to Step 3.] When the project includes Dispersion Areas per SD-B, provide required inputs to demonstrate that the requirements for Dispersion Areas are satisfied. If the DMA will also use SD-A Tree Wells downstream of the Dispersion Area to satisfy pollutant control and hydromodification control (when applicable), continue to Step 3. Tree Wells.

Step 3. Tree Wells: [Projects that do not use Tree Wells do not use this Step.] When the project includes Tree Wells per SD-A, provide required inputs to demonstrate that the requirements for Tree Wells are satisfied.

DISCLAIMER:

The County of San Diego has developed this tool in an effort to streamline traditionally complex efforts associated with planning, design, submittal, and review of PDPs. While the calculations performed herein are deemed to be in compliance with 2013 MS4 Permit requirements, applicants may elect to provide their own calculations. Use of this tool is optional and the County will not be held liable for any errors or other negative impacts associated with its use. In the event that the County performs updates to these worksheets, applicants that have not established reliance on previous versions of the worksheet via discretionary approval may be required to utilize the latest version of the worksheets. A summary of version releases is included below.

QUESTIONS:

-Questions relating to specific projects, submittal requirements, approval process, and/or policy-related issues should be directed your PDS Land Development Project Manager (link below).

PDS Land Development Project Manager

Tree Well Schematic
SD-A Tree Wells

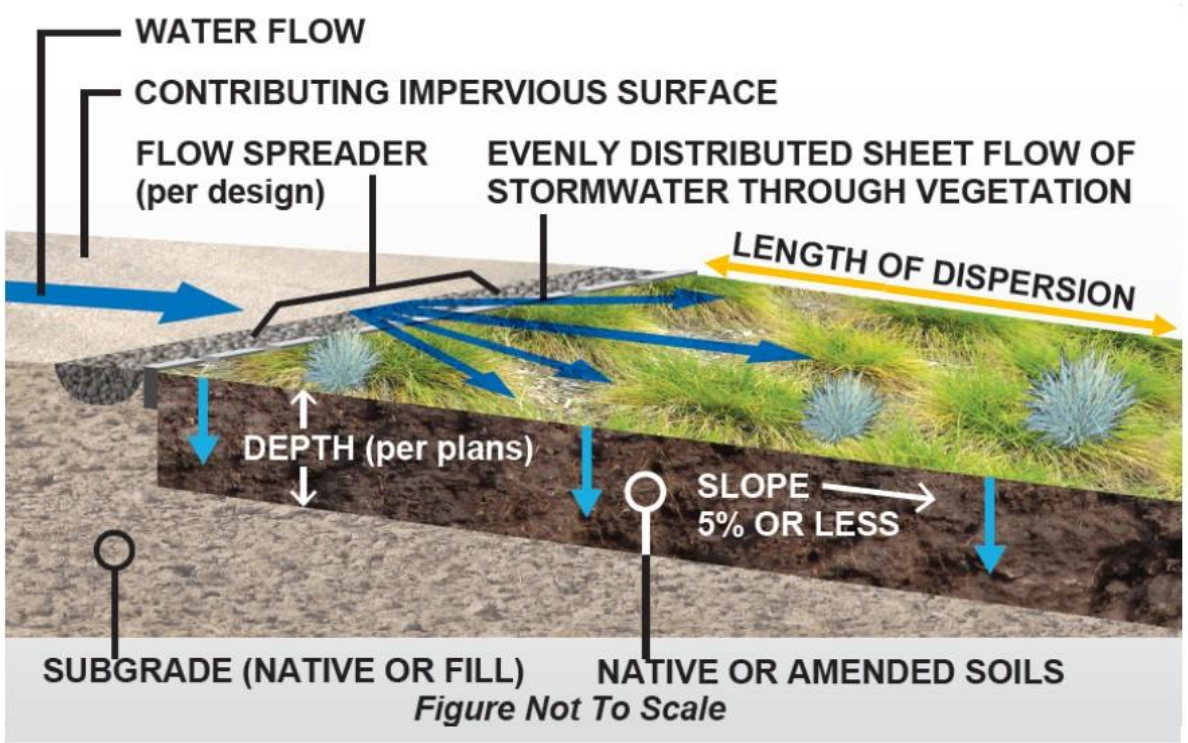
Dispersion Area Schematic
SD-B Impervious Area Dispersion

What is Impervious Area Dispersion?

- Impervious area dispersion refers to the practice of effectively disconnecting impervious areas from directly draining to the storm drain system by routing runoff from the impervious area onto an adjacent pervious dispersion area

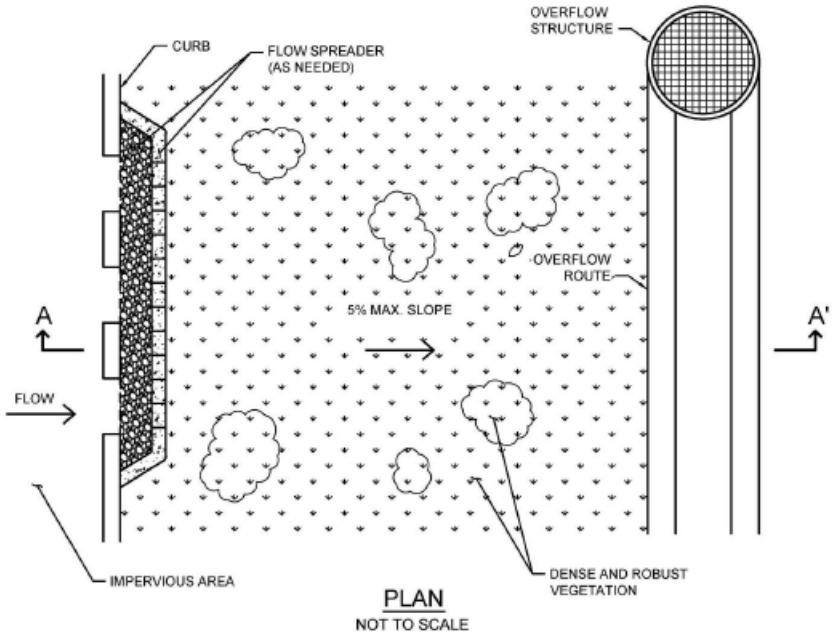
What is a Dispersion Area?

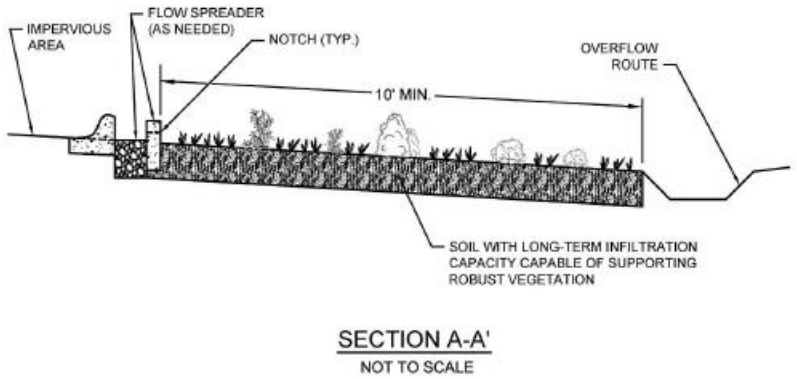
- Dispersion areas are dedicated pervious areas, typically vegetated, with in-situ soil infiltration capacity for partial or full infiltration



Dispersion Area Design Elements

- Ratio of impervious area to pervious area
- Dispersion area surface
- Sheet flow travel length across dispersion area
- Slope





Criteria for Dispersion Areas as SSD-BMPs

SSD-BMP	Criteria for Pollutant Control Only	Criteria for Pollutant Control Plus Hydromodification Control
Dispersion Area (SD-B)	• Ratio of impervious area to engineered pervious surface and/or natural hydrologic soil group A soil area is 2:1 or less; OR ratio of impervious area to natural hydrologic soil group B soil area is 1:1 or less • Sheet flow travel length across dispersion area is 10 feet or more* • Slope is less than 5%	• Ratio of impervious area to engineered pervious surface area is 1:1 or less • The top 11 inches of soil is amended in accordance with Fact Sheet SD-F • Sheet flow travel length across dispersion area is 10 feet or more* • Slope is less than 5%
***Exemption to this minimum travel length criterion may be allowed when the contributing flow path length of the impervious area /pervious area travel length ≤ 2**		

Notes About Dispersion Area Surfaces

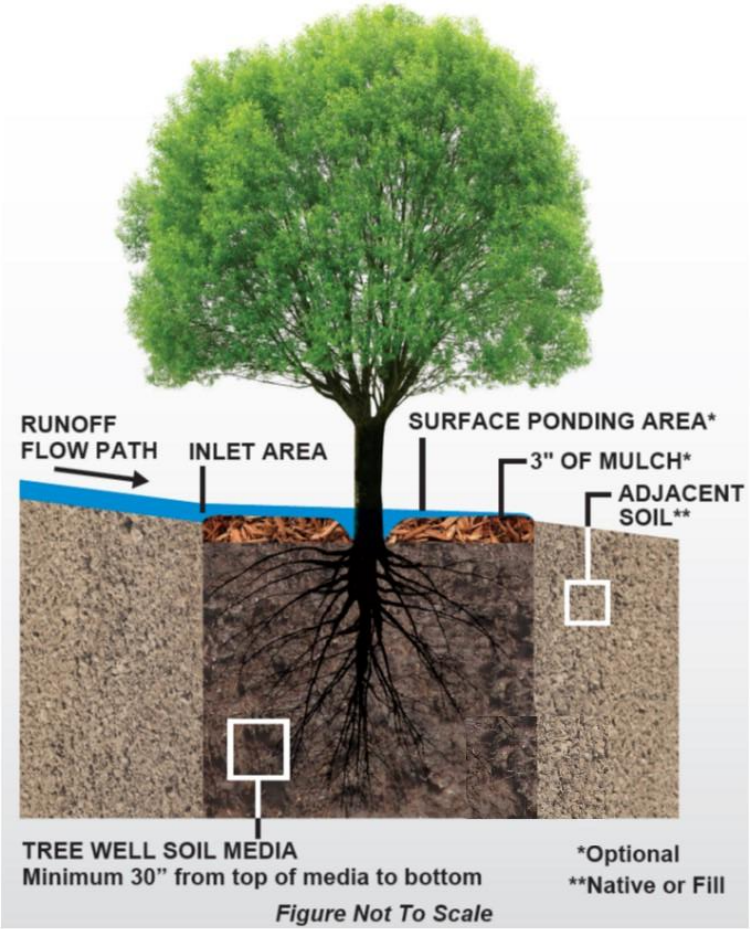
- Natural (Non-Amended) Soil
  - Hydrologic soil group A or B soils can serve as an SSD-BMP for pollutant control only
  - Hydrologic soil group C or D soils cannot serve as an SSD-BMP but can reduce DCV draining to a downstream BMP
- Engineered Pervious Surface
  - Soils that have been amended and mulched in accordance with Fact Sheet SD-F can serve as SSD-BMP for pollutant control
  - Soils with minimum 11-inch thickness amended and mulched in accordance with Fact Sheet SD-F can serve as SSD-BMP for pollutant control and hydromodification control
- Semi-Pervious Surface (e.g., cobbles, crushed aggregate)
  - Cannot serve as an SSD-BMP but can reduce DCV draining to a downstream BMP

Dispersion Areas Additional Notes

- Dispersion areas meeting the SSD-BMP criteria do not need an additional downstream BMP
- Dispersion areas not meeting the SSD-BMP criteria can be used as regular site design BMPs to reduce DCV draining to a downstream SSD-BMP or S-BMP
- Dispersion areas not meeting criteria to reduce DCV can still be included as baseline BMPs

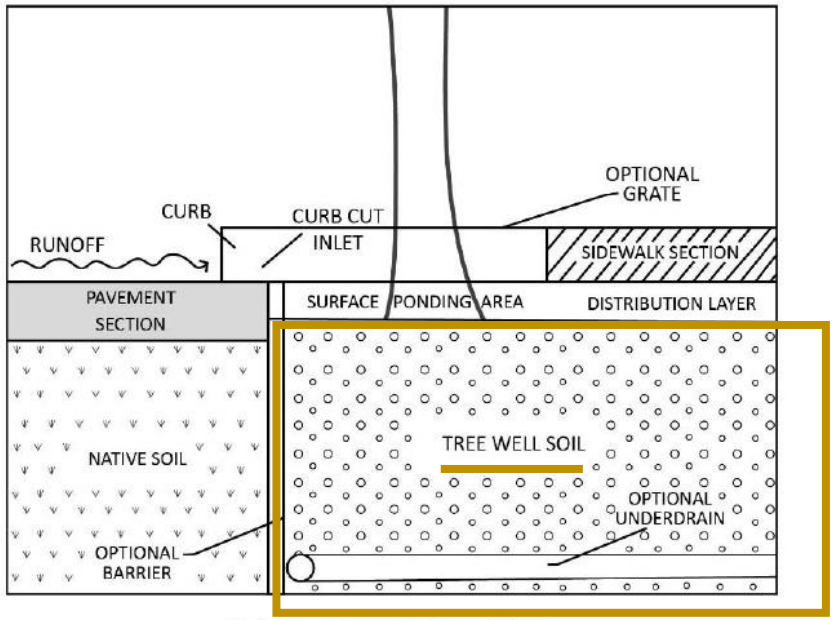
What is a Tree Well?

- A tree well as a storm water management feature consists of a tree planted in an excavated area with a minimum designed volume of soil media to allow for storage, infiltration, and evapotranspiration of runoff



Tree Well Design Elements

- Tree type and size
- Volume of tree well soil



Schematic of Tree Well

	Botanical Name	Common Name	Mature Height (ft)	Mature Canopy Diameter (ft)	Credit Volume per Tree (ft3)
1	*Ceanothus 'Ray Hartman"*	California Mountain Lillac	30	10	40
2	*Pittosporum Phillyraeoides*	Willow Pittosporum	25	15	100
3	*Salix Lasiolepsis*	Arroyo Willow	25		
4	*Arbutus Unedo*	Strawberry Tree	30		
5	*Prunus Ilicifolia*	Hollyleaf Cherry	30	20	180
6	*Prunus Lynoii*	Catalina Cherry	40		
7	*Cercis Occidentalis*	Western Redbud	25	25	290
8	*Heteromeles Arbutifolia*	Toyon, Christmas Berry	25		
9	*Alnus Rhombifolia*	White Elder	75		
10	*Arbutus 'Marina'*	Hybrid Strawberry Tree	35		
11	*Chilopsis Linearis*	Desert Willow	30		
12	*Lyonothamnus Floribundus*	Catalina Ironwood	50		
13	*Magnolia Grandiflora*	Southern Magnolia	40		
14	*Pinus Torreyana*	Torrey Pines	80	30	420
15	*Platanus Racemosa*	California sycamore	60		
16	*Quercus Agrifolia*	Coast Live Oak	70		
17	*Quercus Engelmannii*	Engelmann Oak	50		
18	*Quercus Suber*	Cork Oak	40		
19	*Sambucus Mexicana*	Blue Elderberry	30		

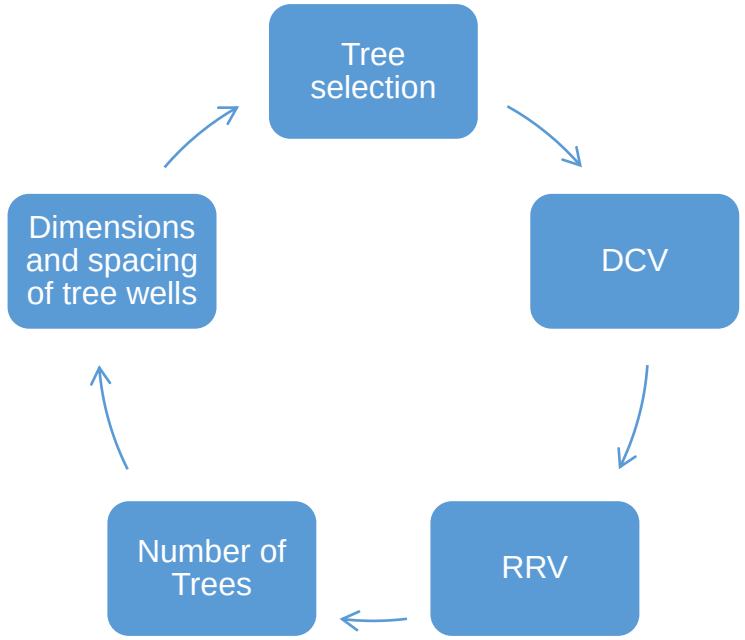
Tree Palette Table

Criteria for Tree Wells as SSD-BMPs

SSD-BMP	Criteria for Pollutant Control Only	Criteria for Pollutant Control Plus Hydromodification Control
Tree Well (SD-A)	• The total tree credit volume is greater than DCV • Provide tree well soil based on the mature tree canopy diameter in accordance with Fact Sheet SD-A	• The total tree credit volume is greater than RRV, where RRV accounts for a multiplier applied to the DCV value • Provide tree well soil based on the mature tree canopy diameter in accordance with Fact Sheet SD-A

Tree Wells Design Process

- Coordinate with the project landscape architect to select a tree type and tree well depth
- Determine DCV
- If hydromodification control applies, determine DCV multiplier and calculate required retention volume (RRV)
- Determine number of trees required to satisfy DCV or RRV as applicable
- Determine the minimum soil volume required, area of each tree well, and spacing of trees



Tree Wells Design Process

- Select a tree species
- Tree palette table provided in Fact Sheet SD-A provides credit volume per tree
- Other tree species may be approved at the discretion of the County Landscape Architect.

	Botanical Name	Common Name	Mature Height (ft)	Mature Canopy Diameter (ft)	Credit Volume per Tree (ft3)
1	*Ceanothus 'Ray Hartman"*	California Mountain Lilac	30	10	40
2	*Pittosporum Phillyraeoides*	Willow Pittosporum	25	15	100
3	*Salix Lasiolepsis*	Arroyo Willow	25		
4	*Arbutus Unedo*	Strawberry Tree	30	20	180
5	*Prunus Ilicifolia*	Hollyleaf Cherry	30		
6	*Prunus Lynoii*	Catalina Cherry	40		
7	*Cercis Occidentalis*	Western Redbud	25	25	290
8	*Heteromeles Arbutifolia*	Toyon, Christmas Berry	25		
9	*Alnus Rhombifolia*	White Elder	75	30	420
10	*Arbutus 'Marina'*	Hybrid Strawberry Tree	35		
11	*Chilopsis Linearis*	Desert Willow	30		
12	*Lyonothamnus Floribundus*	Catalina Ironwood	50		
13	*Magnolia Grandiflora*	Southern Magnolia	40		
14	*Pinus Torreyana*	Torrey Pines	80		
15	*Platanus Racemosa*	California sycamore	60		
16	*Quercus Agrifolia*	Coast Live Oak	70		
17	*Quercus Engelmannii*	Engelmann Oak	50		
18	*Quercus Suber*	Cork Oak	40		
19	*Sambucus Mexicana*	Blue Elderberry	30		

Tree Palette Table

Tree Wells Design Process

- Determine DCV

$$DCV = \frac{D}{12} \; x \; A \; x \; C \; - R$$

Where:

- DCV: Design Capture Volume
- D: Rainfall Depth (inches)
- A: Tributary Area (feet^2)
- C: Runoff Factor (unitless)
- R: Site Design Volume Reductions from Rain Barrels

Tree Wells Design Process

- If hydromodification management applies, determine RRV
  - $RRV = DCV\ x\ DCV\ Multiplier$
  - DCV Multiplier Table provided in Fact Sheet SD-A and in Appendix I

Minimum Tree Well Soil Depth (inches)	Hydrologic Soil Group				
	A	B	C	D (Default)	
30”	1.60	2.20	2.50	2.90	DCV Multiplier
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	

Tree Wells – Using the DCV Multiplier Table

Minimum Tree Well Soil Depth (inches)	Hydrologic Soil Group				
	A	B	C	D (Default)	
30”	1.60	2.20	2.50	2.90	DCV Multiplier
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	

- Select from the standard tree well depths 30, 36, 42, or 48 inches
- Tree well soil depth shall be a minimum of 30 inches (Fact Sheet SD-A)
- If the actual depth of your tree well is not shown, select the next lower depth for the purpose of determining the DCV multiplier

Tree Wells Design Process

- Determine the number of trees required
- DCV or RRV divided by tree credit volume
- Tree credit volume provided in Tree Palette Table

	Botanical Name	Common Name	Mature Height (ft)	Mature Canopy Diameter (ft)	Credit Volume per Tree (ft3)
1	*Ceanothus 'Ray Hartman"*	California Mountain Lillac	30	10	40
2	*Pittosporum Phillyraeoides*	Willow Pittosporum	25	15	100
3	*Salix Lasiolepsis*	Arroyo Willow	25		
4	*Arbutus Unedo*	Strawberry Tree	30	20	180
5	*Prunus Ilicifolia*	Hollyleaf Cherry	30		
6	*Prunus Lynoii*	Catalina Cherry	40		
7	*Cercis Occidentalis*	Western Redbud	25	25	290
8	*Heteromeles Arbutifolia*	Toyon, Christmas Berry	25		
9	*Alnus Rhombifolia*	White Elder	75	30	420
10	*Arbutus 'Marina'*	Hybrid Strawberry Tree	35		
11	*Chilopsis Linearis*	Desert Willow	30		
12	*Lyonothamnus Floribundus*	Catalina Ironwood	50		
13	*Magnolia Grandiflora*	Southern Magnolia	40		
14	*Pinus Torreyana*	Torrey Pines	80		
15	*Platanus Racemosa*	California sycamore	60		
16	*Quercus Agrifolia*	Coast Live Oak	70		
17	*Quercus Engelmannii*	Engelmann Oak	50		
18	*Quercus Suber*	Cork Oak	40		
19	*Sambucus Mexicana*	Blue Elderberry	30		

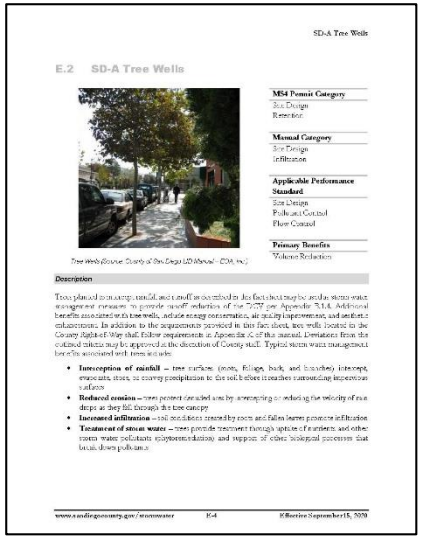
Tree Palette Table

Tree Wells Design Process

- Determine the minimum soil volume per tree well
- Fact Sheet SD-A: Minimum of *2 cubic feet of soil per square foot of mature tree canopy projection area*
  - $Minimum\ Tree\ Well\ Soil\ Volume\ (ft^3) = 2\ x\ \pi\ x\ \left(\frac{D}{2}\right)^2$

Where:

- D = Mature canopy diameter (feet)



SD-A Tree Wells

E.2 SD-A Tree Wells

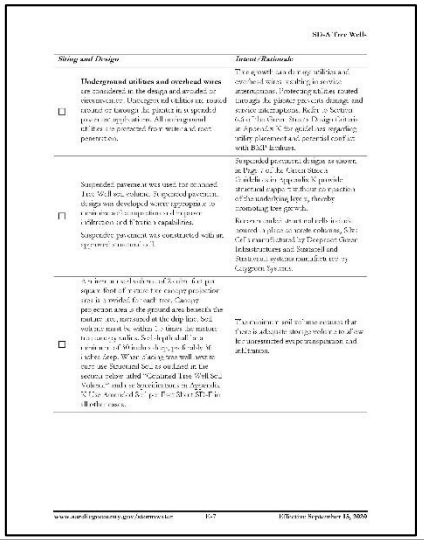
MS4 Permit Category
Site Design
Retention

Manual Category
Site Design
Infiltration

Applicable Performance Standard
Site Design
Pollutant Control
Flow Control

Primary Benefits
Volume Reduction

Description



SD-A Tree Wells

Sizing and Design	Intent/Rationale
☐ Underground utilities and overhead wires are considered in the design and installed to avoid conflicts. Underground utilities are routed around (or through, for planter areas specified as such) tree wells. All underground utilities are protected from water and root penetration.	To avoid conflicts during utilities and overhead wires resulting in service interruptions. Protecting utilities routed through the planter provides drainage and service interruptions. Refer to Section 6.6.1 "Tree Cover Storage Design Criteria" in Appendix K for guidelines regarding utility placement and potential conflicts with BMP facilities.
☐ Suspended pavement systems used for increased tree well soil volume, enhanced pervious designs are developed using appropriate engineering principles and specifications and approved by the County. Suspended pavement systems are constructed with an approved structural soil.	Suspended pavement designs are known as Silva Cell, Amsoil, or similar cells, to provide structural support without restricting the use of the underlying layer, thereby promoting tree growth. Refer to Appendix K for guidelines regarding application of these cells, Silva Cell is manufactured by Deep root. Other infiltration and Structural Soil systems may also be by Cetagreen Systems.
☐ A minimum soil volume of 2 cubic feet per square foot of mature tree canopy projection area is provided for each tree. Canopy projection area is the ground area beneath the mature tree, measured at the drip line. Soil volume must be within 1.5 times the mature tree canopy radius. Soil depth shall be a minimum of 30 inches deep, preferably 36 inches deep. When placing tree well next to curb use Structural Soil as outlined in the section below titled "Confined Tree Well Soil Volume" and use Specifications in Appendix K Use Amended Soil per Fact Sheet SD-F in all other cases.	The minimum soil volume ensures that there is adequate storage volume to allow for unrestricted evapotranspiration and infiltration.

Tree Wells Design Process

- Determine the minimum tree well soil area
  - $$Minimum\ Tree\ Well\ Soil\ Area\ (ft^2) = \frac{Minimum\ Tree\ Well\ Soil\ Volume\ (ft^3)}{Tree\ Well\ Soil\ Depth\ (ft)}$$

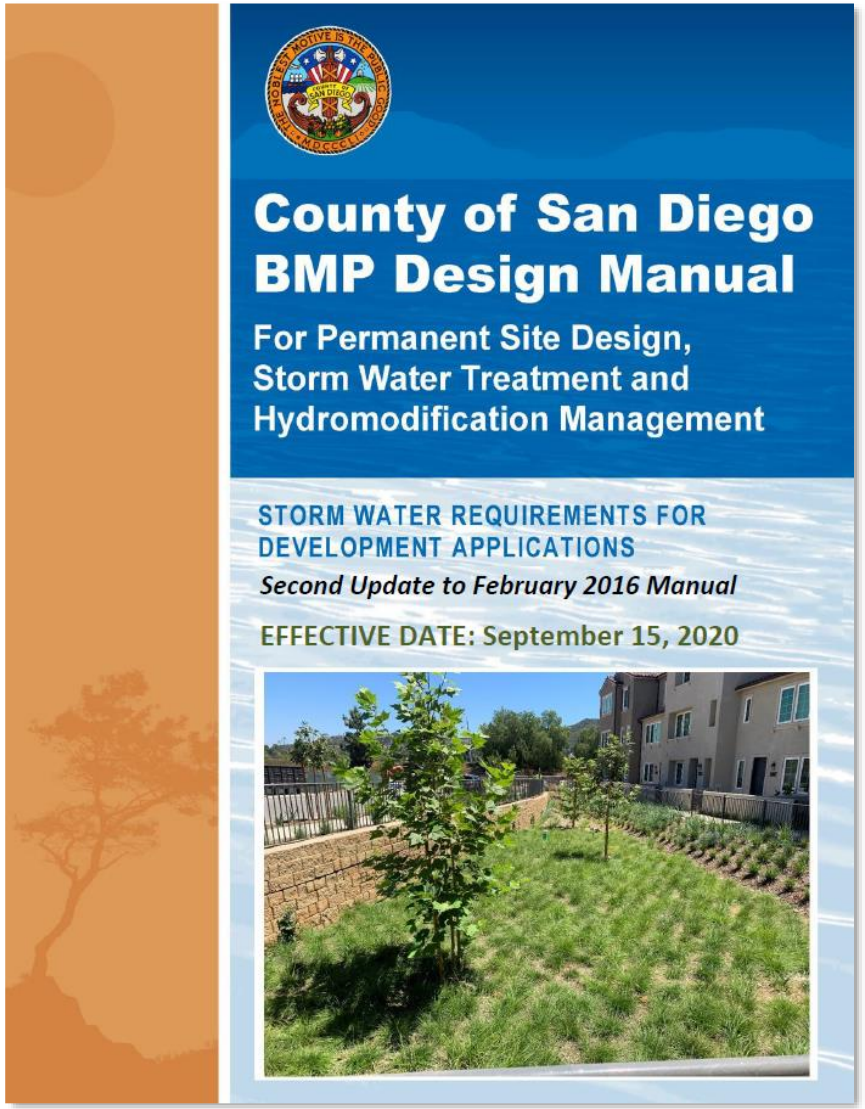
- Spacing considerations
  - Tree well soil must be within 1.5 times the mature tree canopy radius
  - When multiple trees are used, the trees must be spaced so that the minimum tree well soil volume for each tree does not overlap
  - There may be other factors not related to storm water management that influence the spacing of trees – coordinate with the project landscape architect

Tree Wells Additional Notes

- Tree wells meeting the SSD-BMP criteria do not need an additional downstream BMP
- Tree wells not meeting the SSD-BMP criteria can be used as regular site design BMPs to reduce DCV draining to a downstream structural BMP
- Additional benefits associated with tree wells include habitat, energy conservation, air quality improvement, and aesthetic enhancement

DCV Reduction, Self-Retaining DMAs, & Flow Control

(CHAPTERS 5 & 6, APPENDICES B & G)



RICK ENGINEERING COMPANY

Laura Henry, PE

BMP DM Chapter Updates Related to SSD-BMPs

- Chapter 5: Section 5.2.3 updated
  - Criteria for tree wells as SSD-BMPs added
  - References to Appendix I added
  - Text added stating that tree wells or dispersion areas meeting the SSD-BMP criteria do not need an additional downstream BMP
  - Clarification added about what must be included in the hydromodification analysis when a project includes some DMAs with SSD-BMPs

Site design BMPs used as part of a self-retaining DMA or as part of reducing ~~runoff coefficients from a DMA~~ DCV draining to a downstream BMP must be clearly called out on project plans and in the SWQMP.

For PDPs subject to hydromodification requirements and using structural BMPs to satisfy hydromodification flow control requirements, please note that Self-retaining DMAs not designed as SSD-BMPs must be included in the hydromodification analysis. When a project uses a combination of SSD-BMPs and structural BMPs to meet hydromodification requirements, the SSD-BMPs need not be included in the hydromodification analysis if the DMAs served by the SSD-BMPs are hydraulically separate from, not draining through, the structural BMPs.

BMP DM Chapter Updates Related to SSD-BMPs

- Chapter 6: Text added in Section 6.3 regarding use of SSD-BMPs for flow control
  - Page 6-4: An alternative to the use of structural measures is the use of dispersion areas or tree wells as SSD-BMPs.
  - Page 6-11: When SSD-BMPs are used to satisfy both storm water pollutant control and flow control for hydromodification management, sizing criteria developed for the SSD-BMP design account for both pollutant control and hydromodification control. When the appropriate criteria for pollutant control plus hydromodification control are applied in the SSD-BMP design, separate calculations are not necessary.

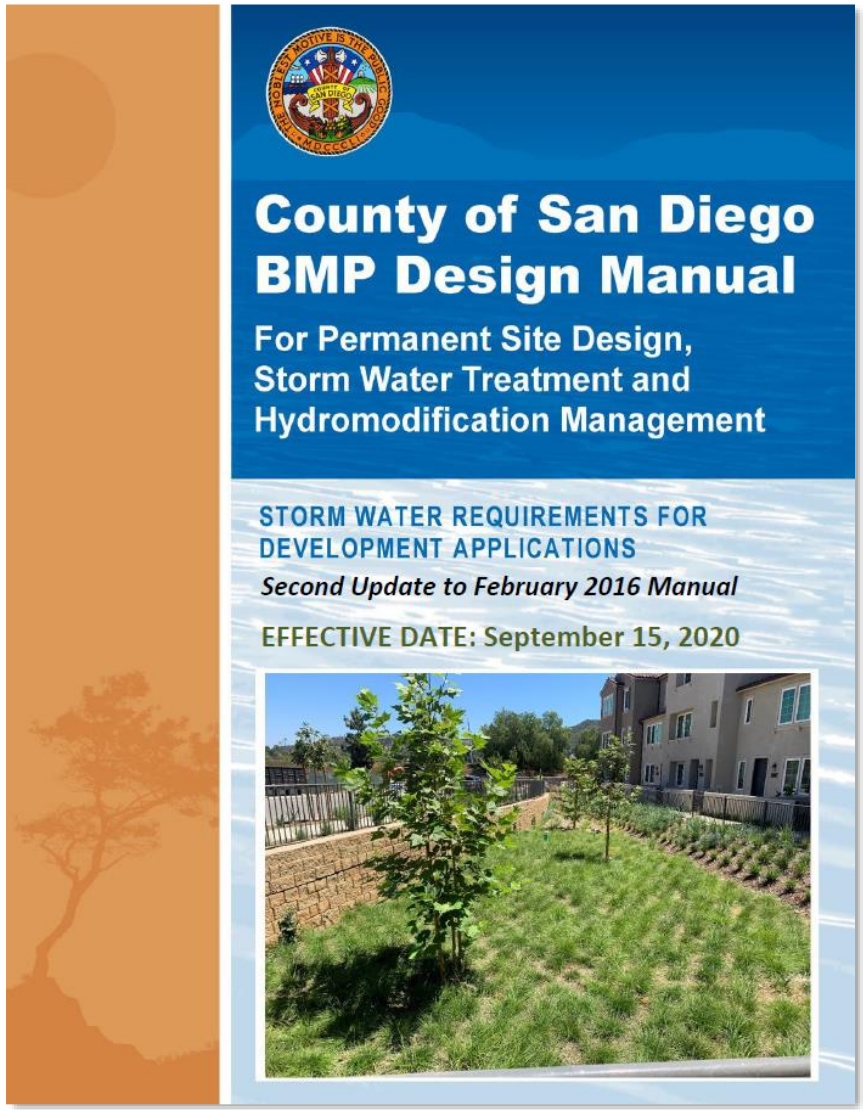
BMP DM Other Appendix Updates Related to SSD-BMPs

- Appendix B:
  - Text added stating that tree wells or dispersion areas may be used to eliminate the DCV requiring treatment and thereby fully satisfy pollutant control requirements when designed as significant site design BMPs (SSD-BMPs).
- Appendix G:
  - Text added: Alternatives to project-specific continuous simulation modeling include use of sizing factors described in Section G.2 for structural BMP design or use of dispersion areas or tree wells as SSD-BMPs in lieu of structural BMPs (see Section 5.2.3 and Appendix I).

Q&A

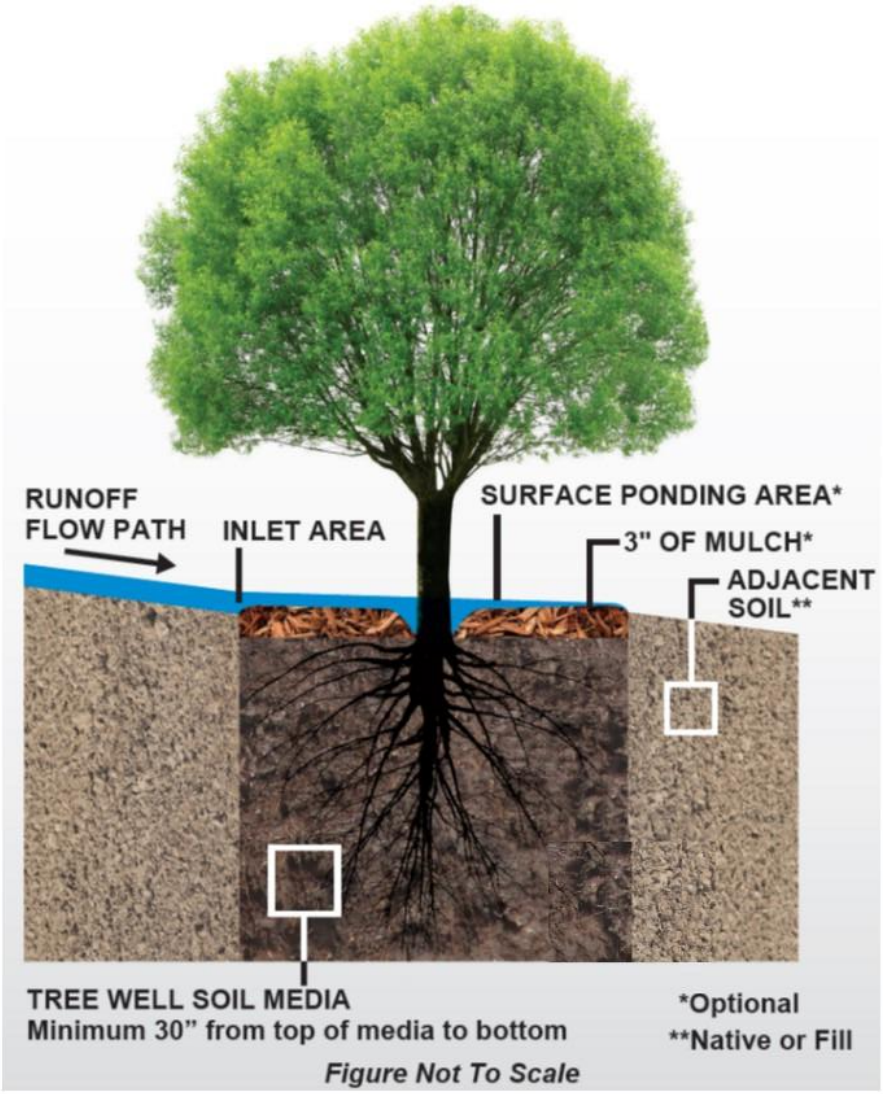
5 Min. Break

Significant Site Design BMP (SSD-BMP) Tool

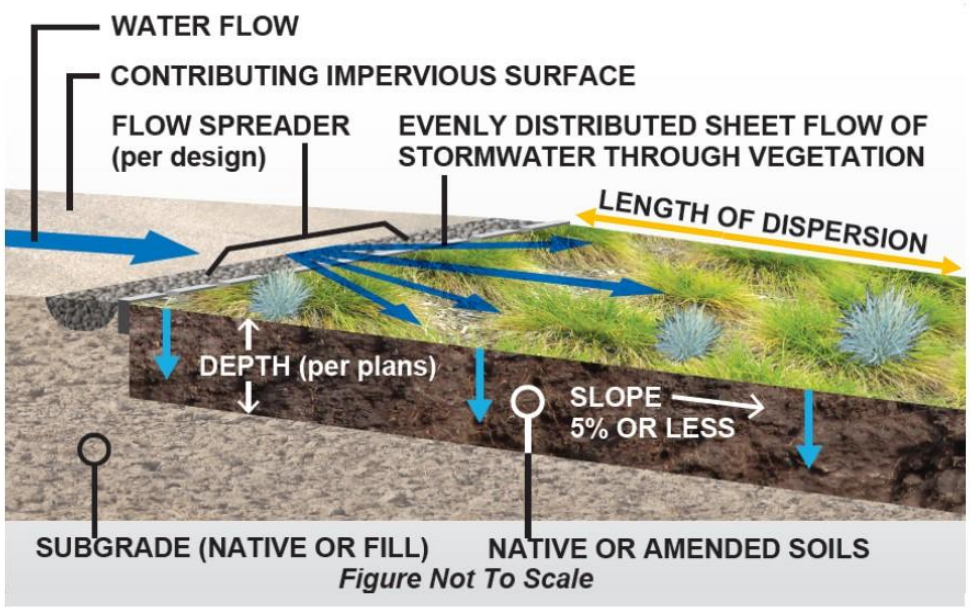


René Vidales, PE, LEED GA, ENV SP, ISSP-SA, QSD

Tree Well



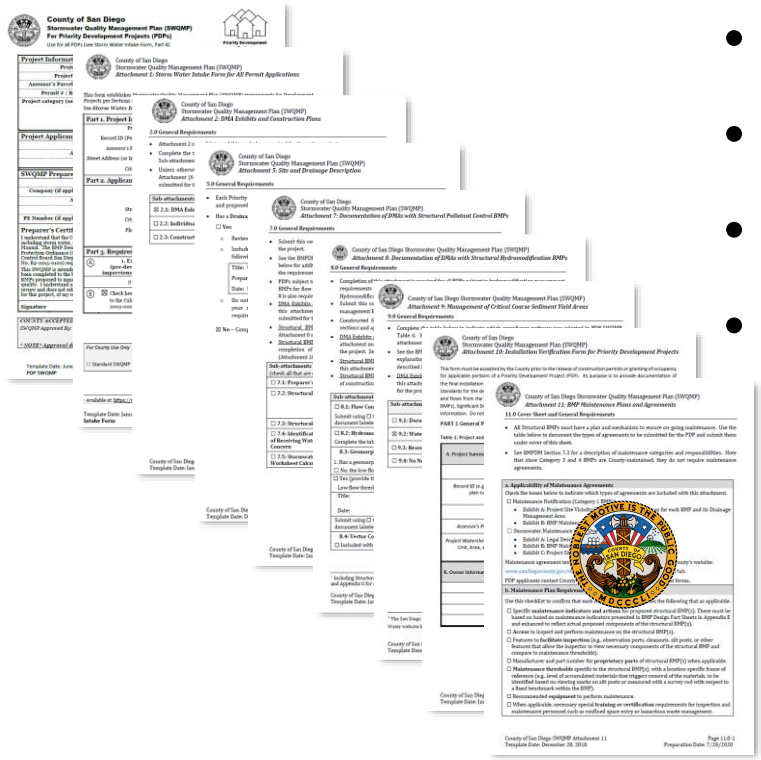
Impervious Area Dispersion



Forms to Fill Out for a PDP SWQMP

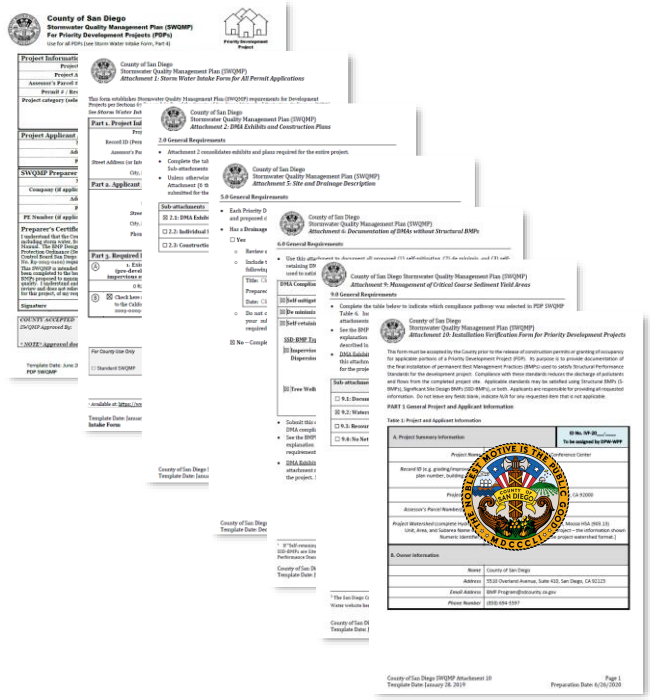
Using Structural BMPs

- PDP SWQMP (14 pages)
- Attachment 1
- Attachment 2
- Attachment 4 (if needed)
- Attachment 5
- Attachment 7
- Attachment 8
- Attachment 9
- Attachment 10
- Attachment 11

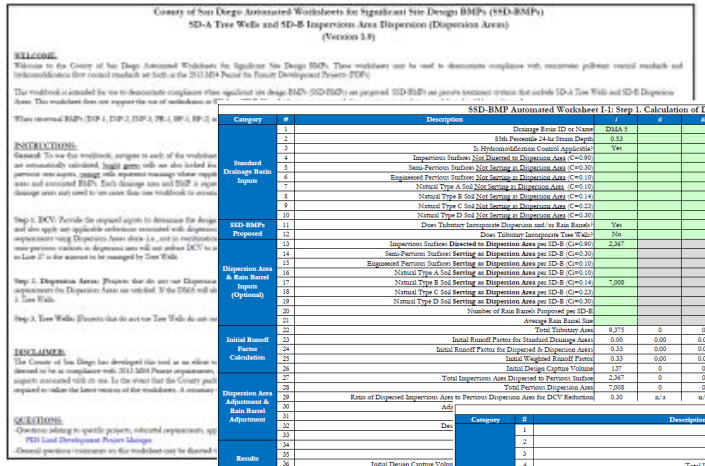


Using SSD-BMPs

- PDP SWQMP (14 pages)
- Attachment 1
- Attachment 2
- Attachment 4 (if needed)
- Attachment 5
- Attachment 6
- Attachment 9
- Attachment 10



SSD-BMP Tool
4 Separate Tabs


County of San Diego Automated Worksheets for Significant Site Design BMPs (SSD-BMPs)
SD-A Tree Wells and SD-B Impervious Area Dispersion (Dispersion Areas)
(Version 1.0)

WELCOME:

INSTRUCTIONS:

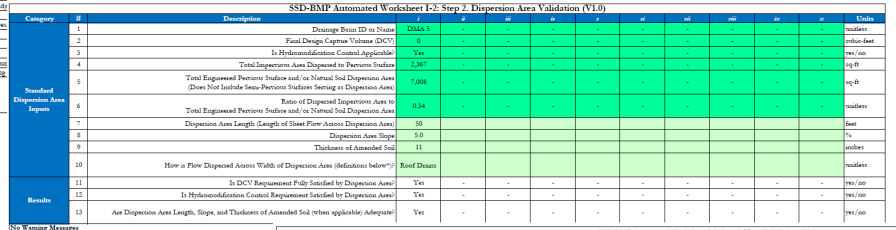
DISCLAIMER:

QUESTIONS:

SSD-BMP Automated Worksheet I-1: Step 1. Calculation of Design Capture Volume (V1.0)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA 5										numbers
	2	85th Percentile 24-hr Storm Depth	0.53										inches
	3	Is Hydromodification Control Applicable?	Yes										yes / no
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)											sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
SSD-BMPs Proposed	11	Does Tributary Incorporate Dispersion and/or Rain Barrels?	Yes										yes/no
	12	Does Tributary Incorporate Tree Wells?	No										yes/no
Dispersion Area & Rain Barrel Inputs (Optional)	13	Impervious Surfaces Directed to Dispersion Area per SD-B (C=0.90)	2,367										sq-ft
	14	Semi-Pervious Surfaces Serving as Dispersion Area per SD-B (C=0.30)											sq-ft
	15	Engineered Pervious Surfaces Serving as Dispersion Area per SD-B (C=0.10)											sq-ft
	16	Natural Type A Soil Serving as Dispersion Area per SD-B (C=0.10)											sq-ft
	17	Natural Type B Soil Serving as Dispersion Area per SD-B (C=0.14)	7,008										sq-ft
	18	Natural Type C Soil Serving as Dispersion Area per SD-B (C=0.23)											sq-ft
	19	Natural Type D Soil Serving as Dispersion Area per SD-B (C=0.30)											sq-ft
	20	Number of Rain Barrels Proposed per SD-B											#
	21	Average Rain Barrel Size											gal
	22	Total Tributary Area	9,375	0	0	0	0	0	0	0	0	0	sq-ft
Initial Runoff Factor Calculation	23	Initial Runoff Factor for Standard Drainage Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	numbers
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	numbers
	25	Initial Weighted Runoff Factor	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	numbers
	26	Initial Design Capture Volume	137	0	0	0	0	0	0	0	0	0	cubic-feet
Dispersion Area Adjustment & Rain Barrel Adjustment	27	Total Impervious Area Dispersed to Pervious Surface	2,367	0	0	0	0	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	7,008	0	0	0	0	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area for DCV Reduction	0.34	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adj											
	31												
	32	Dec											
	33												
Results	34												
	35												
	36	Initial Design Capture Volu											
	37	Remaining											

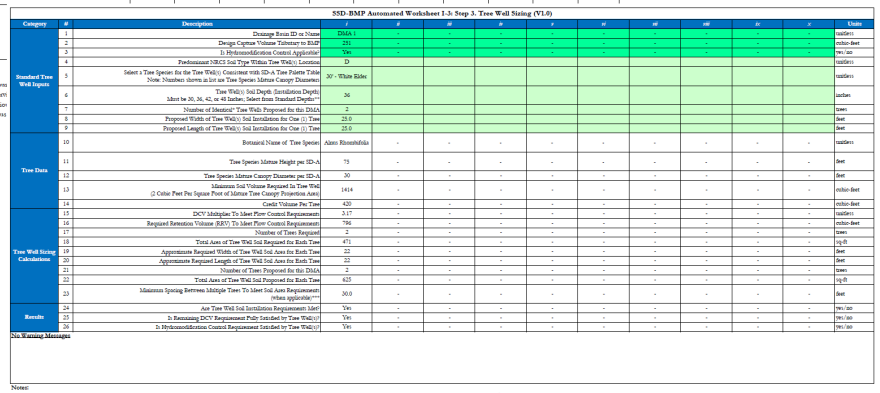
No Warning Messages


SSD-BMP Automated Worksheet I-2: Step 2. Dispersion Area Validation (V1.0)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
Standard Dispersion Area Inputs	1	Drainage Basin ID or Name	DMA 5	-	-	-	-	-	-	-	-	-	numbers
	2	Final Design Capture Volume (DCV)	0	-	-	-	-	-	-	-	-	-	cubic-feet
	3	Is Hydromodification Control Applicable?	Yes	-	-	-	-	-	-	-	-	-	yes / no
	4	Total Impervious Area Dispersed to Pervious Surface	2,367	-	-	-	-	-	-	-	-	-	sq-ft
	5	Total Engineered Pervious Surface and/or Natural Soil Dispersion Area (Does Not Include Semi-Pervious Surfaces Serving as Dispersion Area)	7,008	-	-	-	-	-	-	-	-	-	sq-ft
	6	Ratio of Dispersed Impervious Area to Total Engineered Pervious Surface and/or Natural Soil Dispersion Area	0.34	-	-	-	-	-	-	-	-	-	numbers
	7	Dispersion Area Length (Length of Sheet Flow Across Dispersion Area)	50										feet
	8	Dispersion Area Slope	5.0										%
	9	Thickness of Amended Soil	11										inches
	10	How is Flow Dispersed Across Width of Dispersion Area (definitions below*)?	Roof Drains										numbers
Results	11	Is DCV Requirement Fully Satisfied by Dispersion Area?	Yes	-	-	-	-	-	-	-	-	-	yes / no
	12	Is Hydromodification Control Requirement Satisfied by Dispersion Area?	Yes	-	-	-	-	-	-	-	-	-	yes / no
	13	Are Dispersion Area Length, Slope, and Thickness of Amended Soil (when applicable) Adequate?	Yes	-	-	-	-	-	-	-	-	-	yes / no

No Warning Messages

Notes:
*How is Flow Dispersed Across Width of Pervious Dispersion Area?
Sheet Flow: Flow arrives as sheet flow across the width of the adjacent impervious
Spreader(s): Flow is discharged from flow spreader(s) across the width of the pervi
Roof Drains: Discharge from roof drains distributed across the width of the pervio
Curb Cuts: Discharge from curb cuts distributed across the width of the pervious
Other: Other (Describe in PDP SWQMP)


SSD-BMP Automated Worksheet I-3: Step 3. Tree Well Sizing (V1.0)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
Standard Tree Well Inputs	1	Drainage Basin ID or Name	DMA 1	-	-	-	-	-	-	-	-	-	numbers
	2	Design Capture Volume Tributary to BMP	251	-	-	-	-	-	-	-	-	-	cubic-feet
	3	Is Hydromodification Control Applicable?	Yes	-	-	-	-	-	-	-	-	-	yes / no
	4	Predominant NRCS Soil Type Within Tree Well(s) Location	D										numbers
	5	Select a Tree Species for the Tree Well(s) Consistent with SD-A Tree Palette Table. Note: Numbers shown in list are Tree Species Mature Canopy Diameter.	30' - White Alder										numbers
	6	Tree Well(s) Soil Depth (Installation Depth). Must be 30, 36, 42, or 48 Inches. Select from Standard Depths**	36										inches
	7	Number of Identical* Tree Wells Proposed for this DMA	2										trees
	8	Proposed Width of Tree Well(s) Soil Installation for One (1) Tree	25.0										feet
	9	Proposed Length of Tree Well(s) Soil Installation for One (1) Tree	25.0										feet
Tree Data	10	Botanical Name of Tree Species	Alnus Rhombifolia	-	-	-	-	-	-	-	-	-	numbers
	11	Tree Species Mature Height per SD-A	75	-	-	-	-	-	-	-	-	-	feet
	12	Tree Species Mature Canopy Diameter per SD-A	30	-	-	-	-	-	-	-	-	-	feet
	13	Minimum Soil Volume Required for Tree Well (2 Cubic Feet Per Square Foot of Mature Tree Canopy Protection Area)	1414	-	-	-	-	-	-	-	-	-	cubic-feet
	14	Credit Volume Per Tree	420	-	-	-	-	-	-	-	-	-	cubic-feet
Tree Well Sizing Calculations	15	DCV Multiplier To Meet Flow Control Requirement	3.17	-	-	-	-	-	-	-	-	-	numbers
	16	Required Retention Volume (RRV) To Meet Flow Control Requirement	796	-	-	-	-	-	-	-	-	-	cubic-feet
	17	Number of Trees Required	2	-	-	-	-	-	-	-	-	-	trees
	18	Total Area of Tree Well Soil Required for Each Tree	471	-	-	-	-	-	-	-	-	-	sq-ft
	19	Approximate Required Width of Tree Well Soil Area for Each Tree	22	-	-	-	-	-	-	-	-	-	feet
	20	Approximate Required Length of Tree Well Soil Area for Each Tree	22	-	-	-	-	-	-	-	-	-	feet
	21	Number of Trees Proposed for this DMA	2	-	-	-	-	-	-	-	-	-	trees
	22	Total Area of Tree Well Soil Proposed for Each Tree	625	-	-	-	-	-	-	-	-	-	sq-ft
	23	Minimum Spacing Between Multiple Trees To Meet Soil Area Requirements (when applicable)***	30.0	-	-	-	-	-	-	-	-	-	feet
Results	24	Are Tree Well Soil Installation Requirements Met?	Yes	-	-	-	-	-	-	-	-	-	yes / no
	25	Is Remaining DCV Requirement Fully Satisfied by Tree Well(s)?	Yes	-	-	-	-	-	-	-	-	-	yes / no
	26	Is Hydromodification Control Requirement Satisfied by Tree Well(s)?	Yes	-	-	-	-	-	-	-	-	-	yes / no

No Warning Messages

Notes:
*If using more than one mature canopy diameter within the same DMA, only the smallest mature canopy diameter should be entered. Alternatively, if more than one mature canopy diameter is proposed and/or the dimensions of multiple tree well installations will vary, separate DMAs may be delineated.
**If the actual proposed installation depth is not available in the table of standard depths, select the next lower depth.
***Tree Canopy or Agency Requirements May Also Influence the Minimum Spacing of Trees.

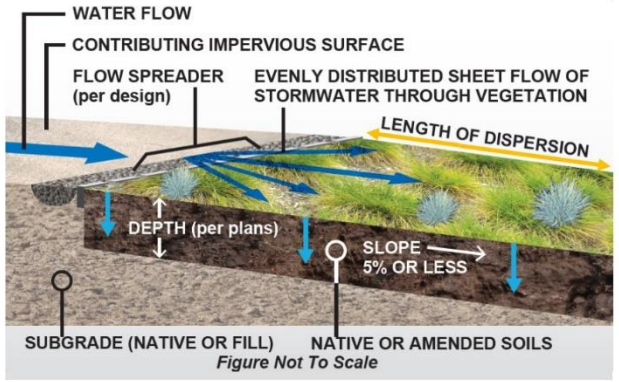


Figure Not To Scale

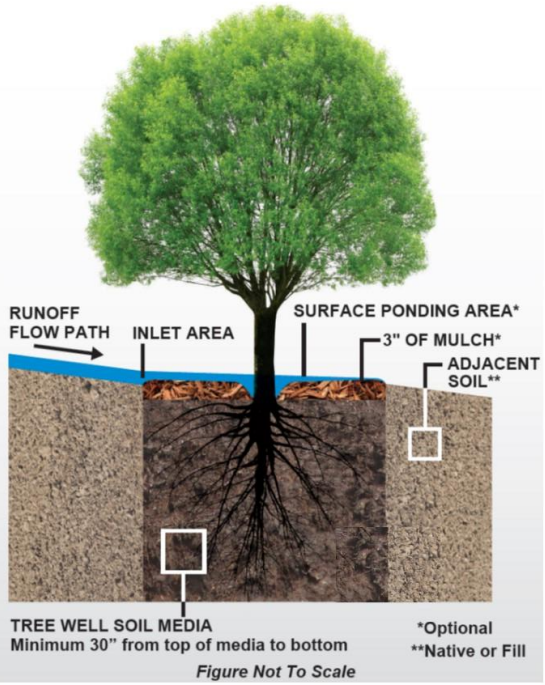


Figure Not To Scale

Introduction Tab

Welcome and Instructions

- Compliance
- Types of BMPs
- Dark Green, White, Grey, and Light Green cells and up to 10 DMAs

County of San Diego Automated Worksheets for Significant Site Design BMPs (SSD-BMPs)
SD-A Tree Wells and SD-B Impervious Area Dispersion (Dispersion Areas)
(Version 1.0)

WELCOME:

Welcome to the County of San Diego Automated Worksheets for Significant Site Design BMPs. These worksheets may be used to demonstrate compliance with stormwater pollutant control standards and hydromodification flow control standards set forth in the 2013 MS4 Permit for Priority Development Projects (PDPs).

This workbook is intended for use to demonstrate compliance when significant site design BMPs (SSD-BMPs) are proposed. SSD-BMPs are passive treatment systems that include SD-A Tree Wells and SD-B Dispersion Areas. This worksheet does not support the use of underdrains in SD-A or SD-B. If underdrains are proposed, then continuous simlation modeling should be performed.

When structural BMPs (INF-1, INF-2, INF-3, PR-1, BF-1, BF-2) are proposed, a different workbook, "County of San Diego Automated Stormwater Pollutant Control Worksheets" must be used.

INSTRUCTIONS:

General: To use this workbook, navigate to each of the worksheet tabs below and populate all light green cells with project specific information. Light green cells require user input, white cells are locked for editing and are automatically calculated, bright green cells are also locked for editing and are automatically populated based on results from previous worksheet tabs, grey cells are items that do not require user input because of previous user inputs, orange cells represent warnings where supplemental information and/or revisions may be required for compliance. The worksheets are formatted to accommodate calculations for up to 10 drainage areas and associated BMPs. Each drainage area and BMP is represented as a discrete column with corresponding user inputs and calculations appearing in the rows below. Please note that projects with more than 10 drainage areas may need to use more than one workbook to accommodate the entire project.

Introduction Tab

Steps 1, 2 and 3

- Step 1: Inputs to determine DCV
- Step 2: Inputs for Dispersion Areas
- Step 3: Inputs for Tree Wells

Step 1. DCV: Provide the required inputs to determine the design capture volume (DCV) for each PDP drainage management area (DMA). The calculations in this worksheet determine the initial design capture volume and also apply any applicable reductions associated with dispersion to pervious surfaces and incorporation of rain barrels. For DMAs intended to satisfy pollutant control and hydromodification control (when applicable) requirements using Dispersion Areas alone (i.e., not in combination with Tree Wells), the data entered in this tab must provide sufficient pervious area to reduce the remaining DCV in Line 37 to zero. Note that the use of semi-pervious surfaces as dispersion area will not reduce DCV to zero, but the use of engineered pervious surfaces and/or natural pervious surfaces can. For DMAs intended to incorporate Tree Wells, the remaining DCV in Line 37 is the amount to be managed by Tree Wells.

Step 2. Dispersion Areas: [Projects that do not use Dispersion Areas skip this step and go on to Step 3.] When the project includes Dispersion Areas per SD-B, provide required inputs to demonstrate that the requirements for Dispersion Areas are satisfied. If the DMA will also use SD-A Tree Wells downstream of the Dispersion Area to satisfy pollutant control and hydromodification control (when applicable), continue to Step 3. Tree Wells.

Step 3. Tree Wells: [Projects that do not use Tree Wells do not use this Step.] When the project includes Tree Wells per SD-A, provide required inputs to demonstrate that the requirements for Tree Wells are satisfied.

Introduction Tab

Disclaimer and Questions

- Use of tool optional
- Updates
- Questions to PDS Project Manager and BMP Program email

DISCLAIMER:

The County of San Diego has developed this tool in an effort to streamline traditionally complex efforts associated with planning, design, submittal, and review of PDPs. While the calculations performed herein are deemed to be in compliance with 2013 MS4 Permit requirements, applicants may elect to provide their own calculations. Use of this tool is optional and the County will not be held liable for any errors or other negative impacts associated with its use. In the event that the County performs updates to these worksheets, applicants that have not established reliance on previous versions of the worksheet via discretionary approval may be required to utilize the latest version of the worksheets. A summary of version releases is included below.

QUESTIONS:

-Questions relating to specific projects, submittal requirements, approval process, and/or policy-related issues should be directed your PDS Land Development Project Manager (link below).

PDS Land Development Project Manager

-General questions/comments on this worksheet may be directed via email to BMP.Program@sdcounty.ca.gov with the subject line "SSD-BMP assistance."

Design Capture Volume (DCV) Tab

SSD-BMP Automated Worksheet I-1: Step 1. Calculation of Design Capture Volume (V1.0)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA 5										unitless
	2	85th Percentile 24-hr Storm Depth	0.53										inches
	3	Is Hydromodification Control Applicable?	Yes										yes/no
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)											sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
SSD-BMPs Proposed	11	Does Tributary Incorporate Dispersion and/or Rain Barrels?	Yes										yes/no
	12	Does Tributary Incorporate Tree Wells?	No										yes/no
Dispersion Area & Rain Barrel Inputs (Optional)	13	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)	2,367										sq-ft
	14	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	15	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	16	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	17	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)	7,008										sq-ft
	18	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
	19	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	20	Number of Rain Barrels Proposed per SD-E											#
	21	Average Rain Barrel Size											gal
Initial Runoff Factor Calculation	22	Total Tributary Area	9,375	0	0	0	0	0	0	0	0	0	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	26	Initial Design Capture Volume	137	0	0	0	0	0	0	0	0	0	cubic-feet
Dispersion Area Adjustment & Rain Barrel Adjustment	27	Total Impervious Area Dispersed to Pervious Surface	2,367	0	0	0	0	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	7,008	0	0	0	0	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area for DCV Reduction	0.30	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unitless
	32	Design Capture Volume After Dispersion Techniques	0	0	0	0	0	0	0	0	0	0	cubic-feet
	33	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	34	Final Adjusted Runoff Factor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	35	Final Effective Tributary Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	36	Initial Design Capture Volume Retained by Dispersion Area and Rain Barrel(s)	137	0	0	0	0	0	0	0	0	0	cubic-feet
	37	Remaining Design Capture Volume Tributary to Tree Well(s)	0	0	0	0	0	0	0	0	0	0	cubic-feet

No Warning Messages

Design Capture Volume (DCV) Tab

SSD-BMP Automated Worksheet I-1: Step1				
Category	**#**	**Description**	***i***	**Units**
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA 5	unitless
	2	85th Percentile 24-hr Storm Depth	0.53	inches
	3	Is Hydromodification Control Applicable?	Yes	yes/no
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)		sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)		sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)		sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)		sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)		sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)		sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)		sq-ft
SSD-BMPs Proposed	11	Does Tributary Incorporate Dispersion and/or Rain Barrels?	Yes	yes/no
	12	Does Tributary Incorporate Tree Wells?	No	yes/no
Dispersion Area & Rain Barrel Inputs (Optional)	13	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)	2,367	sq-ft
	14	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)		sq-ft
	15	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)		sq-ft
	16	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)		sq-ft
	17	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)	7,008	sq-ft
	18	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)		sq-ft
	19	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)		sq-ft
	20	Number of Rain Barrels Proposed per SD-E		#
	21	Average Rain Barrel Size		gal
Initial Runoff Factor Calculation	22	Total Tributary Area	9,375	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.00	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.33	unitless
	25	Initial Weighted Runoff Factor	0.33	unitless
	26	Initial Design Capture Volume	137	cubic-feet
Dispersion Area Adjustment & Rain Barrel Adjustment	27	Total Impervious Area Dispersed to Pervious Surface	2,367	sq-ft
	28	Total Pervious Dispersion Area	7,008	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area for DCV Reduction	0.30	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	0.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.00	unitless
	32	Design Capture Volume After Dispersion Techniques	0	cubic-feet
	33	Total Rain Barrel Volume Reduction	0	cubic-feet
Results	34	Final Adjusted Runoff Factor	0.00	unitless
	35	Final Effective Tributary Area	0	sq-ft
	36	Initial Design Capture Volume Retained by Dispersion Area and Rain Barrel(s)	137	cubic-feet
	37	Remaining Design Capture Volume Tributary to Tree Well(s)	0	cubic-feet

Dispersion Areas Tab

SSD-BMP Automated Worksheet I-2: Step 2. Dispersion Area Validation (V1.0)

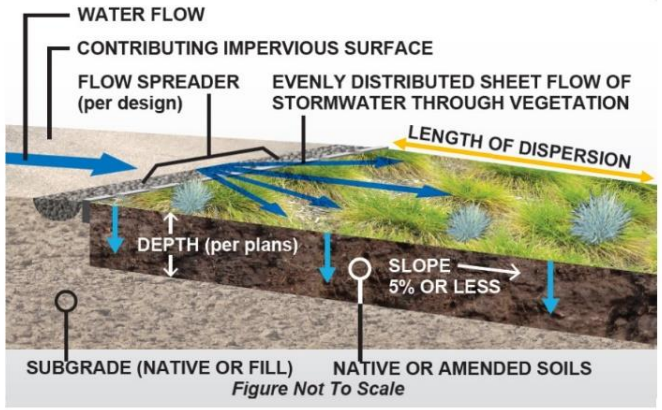
Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
Standard Dispersion Area Inputs	1	Drainage Basin ID or Name	DMA 5	-	-	-	-	-	-	-	-	-	unitless
	2	Final Design Capture Volume (DCV)	0	-	-	-	-	-	-	-	-	-	cubic-feet
	3	Is Hydromodification Control Applicable?	Yes	-	-	-	-	-	-	-	-	-	yes/no
	4	Total Impervious Area Dispersed to Pervious Surface	2,367	-	-	-	-	-	-	-	-	-	sq-ft
	5	Total Engineered Pervious Surface and/or Natural Soil Dispersion Area (Does Not Include Semi-Pervious Surfaces Serving as Dispersion Area)	7,008	-	-	-	-	-	-	-	-	-	sq-ft
	6	Ratio of Dispersed Impervious Area to Total Engineered Pervious Surface and/or Natural Soil Dispersion Area	0.34	-	-	-	-	-	-	-	-	-	unitless
	7	Dispersion Area Length (Length of Sheet Flow Across Dispersion Area)	50										feet
	8	Dispersion Area Slope	5.0										%
	9	Thickness of Amended Soil	11										inches
	10	How is Flow Dispersed Across Width of Dispersion Area (definitions below*)?	Roof Drains										unitless
Results	11	Is DCV Requirement Fully Satisfied by Dispersion Area?	Yes	-	-	-	-	-	-	-	-	-	yes/no
	12	Is Hydromodification Control Requirement Satisfied by Dispersion Area?	Yes	-	-	-	-	-	-	-	-	-	yes/no
	13	Are Dispersion Area Length, Slope, and Thickness of Amended Soil (when applicable) Adequate?	Yes	-	-	-	-	-	-	-	-	-	yes/no

No Warning Messages

Notes:

***How is Flow Dispersed Across Width of Pervious Dispersion Area?**

Sheet Flow:	Flow arrives as sheet flow across the width of the adjacent impervious area
Spreader(s):	Flow is discharged from flow spreader(s) across the width of the pervious area
Roof Drains:	Discharge from roof drains distributed across the width of the pervious area
Curb Cuts:	Discharge from curb cuts distributed across the width of the pervious area
Other:	Other (Describe in PDP SWQMP)



Dispersion Areas Tab

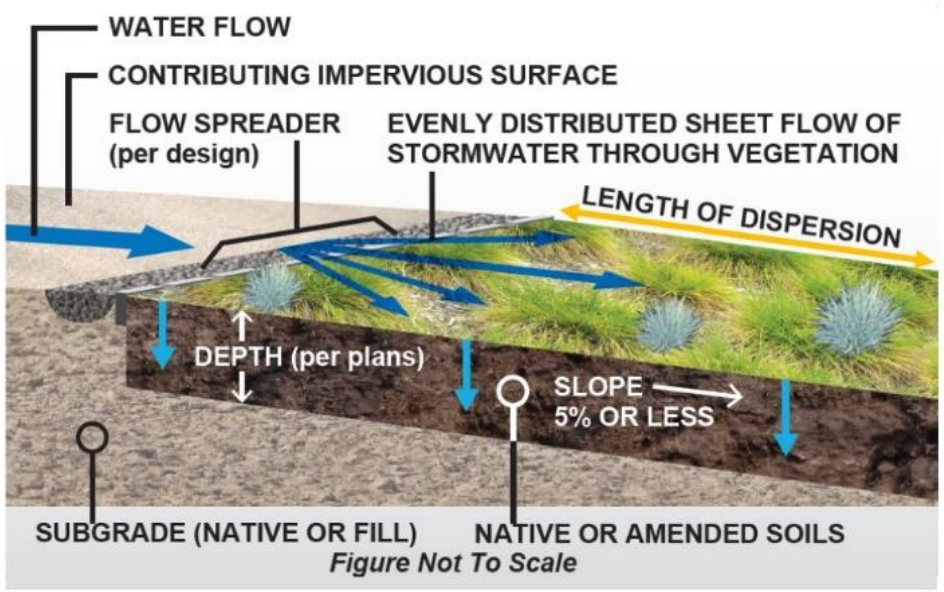
SSD-BMP Automated Worksheet I-2: **Step 2**				
Category	**#**	**Description**	***i***	**Units**
Standard Dispersion Area Inputs	1	Drainage Basin ID or Name	DMA 5	unitless
	2	Final Design Capture Volume (DCV)	0	cubic-feet
	3	Is Hydromodification Control Applicable?	Yes	yes/no
	4	Total Impervious Area Dispersed to Pervious Surface	2,367	sq-ft
	5	Total Engineered Pervious Surface and/or Natural Soil Dispersion Area (Does Not Include Semi-Pervious Surfaces Serving as Dispersion Area)	7,008	sq-ft
	6	Ratio of Dispersed Impervious Area to Total Engineered Pervious Surface and/or Natural Soil Dispersion Area	0.34	unitless
	7	Dispersion Area Length (Length of Sheet Flow Across Dispersion Area)	50	feet
	8	Dispersion Area Slope	5.0	%
	9	Thickness of Amended Soil	11	inches
	10	How is Flow Dispersed Across Width of Dispersion Area (definitions below*)?	Roof Drains	unitless
Results	11	Is DCV Requirement Fully Satisfied by Dispersion Area?	Yes	yes/no
	12	Is Hydromodification Control Requirement Satisfied by Dispersion Area?	Yes	yes/no
	13	Are Dispersion Area Length, Slope, and Thickness of Amended Soil (when applicable) Adequate?	Yes	yes/no

Dispersion Areas Tab

Notes:

***How is Flow Dispersed Across Width of Pervious Dispersion Area?**

Sheet Flow:	Flow arrives as sheet flow across the width of the adjacent impervious area
Spreader(s):	Flow is discharged from flow spreader(s) across the width of the pervious area
Roof Drains:	Discharge from roof drains distributed across the width of the pervious area
Curb Cuts:	Discharge from curb cuts distributed across the width of the pervious area
Other:	Other (Describe in PDP SWQMP)



Tree Wells Tab

SSD-BMP Automated Worksheet I-3: Step 3. Tree Well Sizing (V1.0)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
Standard Tree Well Inputs	1	Drainage Basin ID or Name	DMA 1	-	-	-	-	-	-	-	-	-	unitless
	2	Design Capture Volume Tributary to BMP	251	-	-	-	-	-	-	-	-	-	cubic-feet
	3	Is Hydromodification Control Applicable?	Yes	-	-	-	-	-	-	-	-	-	yes/no
	4	Predominant NRCS Soil Type Within Tree Well(s) Location	D										unitless
	5	Select a Tree Species for the Tree Well(s) Consistent with SD-A Tree Palette Table Note: Numbers shown in list are Tree Species Mature Canopy Diameters	30' - White Elder										unitless
	6	Tree Well(s) Soil Depth (Installation Depth) Must be 30, 36, 42, or 48 Inches; Select from Standard Depths**	36										inches
	7	Number of Identical* Tree Wells Proposed for this DMA	2										trees
	8	Proposed Width of Tree Well(s) Soil Installation for One (1) Tree	25.0										feet
	9	Proposed Length of Tree Well(s) Soil Installation for One (1) Tree	25.0										feet
Tree Data	10	Botanical Name of Tree Species	Alnus Rhombifolia	-	-	-	-	-	-	-	-	-	unitless
	11	Tree Species Mature Height per SD-A	75	-	-	-	-	-	-	-	-	-	feet
	12	Tree Species Mature Canopy Diameter per SD-A	30	-	-	-	-	-	-	-	-	-	feet
	13	Minimum Soil Volume Required In Tree Well (2 Cubic Feet Per Square Foot of Mature Tree Canopy Projection Area)	1414	-	-	-	-	-	-	-	-	-	cubic-feet
	14	Credit Volume Per Tree	420	-	-	-	-	-	-	-	-	-	cubic-feet
Tree Well Sizing Calculations	15	DCV Multiplier To Meet Flow Control Requirements	3.17	-	-	-	-	-	-	-	-	-	unitless
	16	Required Retention Volume (RRV) To Meet Flow Control Requirements	796	-	-	-	-	-	-	-	-	-	cubic-feet
	17	Number of Trees Required	2	-	-	-	-	-	-	-	-	-	trees
	18	Total Area of Tree Well Soil Required for Each Tree	471	-	-	-	-	-	-	-	-	-	sq-ft
	19	Approximate Required Width of Tree Well Soil Area for Each Tree	22	-	-	-	-	-	-	-	-	-	feet
	20	Approximate Required Length of Tree Well Soil Area for Each Tree	22	-	-	-	-	-	-	-	-	-	feet
	21	Number of Trees Proposed for this DMA	2	-	-	-	-	-	-	-	-	-	trees
	22	Total Area of Tree Well Soil Proposed for Each Tree	625	-	-	-	-	-	-	-	-	-	sq-ft
	23	Minimum Spacing Between Multiple Trees To Meet Soil Area Requirements (when applicable)***	30.0	-	-	-	-	-	-	-	-	-	feet
Results	24	Are Tree Well Soil Installation Requirements Met?	Yes	-	-	-	-	-	-	-	-	-	yes/no
	25	Is Remaining DCV Requirement Fully Satisfied by Tree Well(s)?	Yes	-	-	-	-	-	-	-	-	-	yes/no
	26	Is Hydromodification Control Requirement Satisfied by Tree Well(s)?	Yes	-	-	-	-	-	-	-	-	-	yes/no

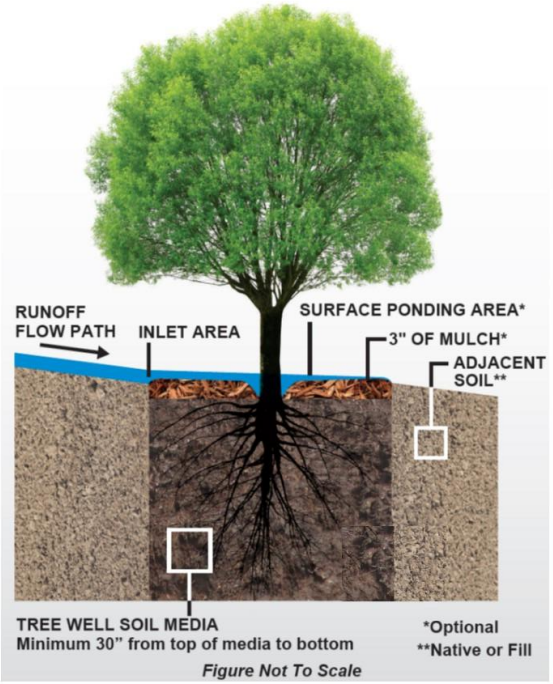
No Warning Messages

Notes:

*If using more than one mature canopy diameter within the same DMA, only the smallest mature canopy diameter should be entered. Alternatively, if more than one mature canopy diameter is proposed and/or the dimensions of multiple tree well installations will vary, separate DMAs may be delineated.

**If the actual proposed installation depth is not available in the table of standard depths, select the next lower depth.

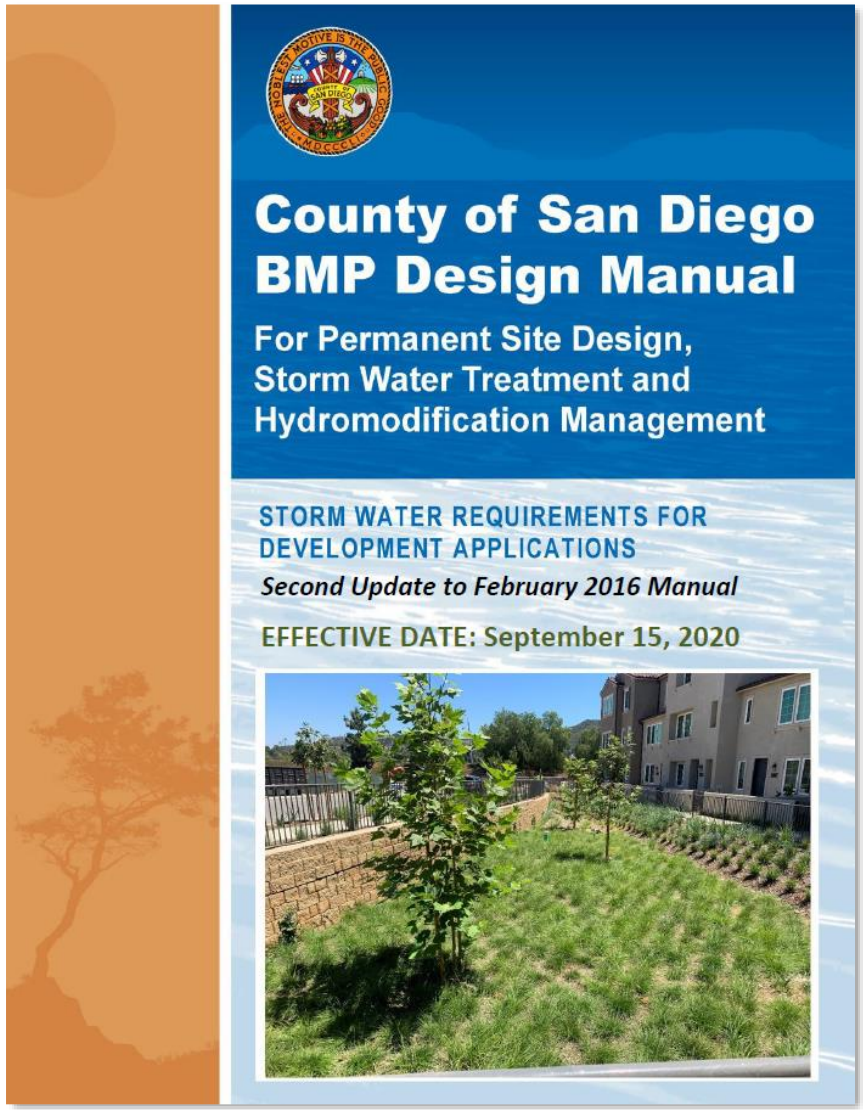
***Tree Canopy or Agency Requirements May Also Influence the Minimum Spacing of Trees.



Tree Wells Tab

SSD-BMP Tool: Step 3				
Category	**#**	**Description**	***i***	**Units**
Standard Tree Well Inputs	1	Drainage Basin ID or Name	DMA 1	unitless
	2	Design Capture Volume Tributary to BMP	251	cubic-feet
	3	Is Hydromodification Control Applicable?	Yes	yes/no
	4	Predominant NRCS Soil Type Within Tree Well(s) Location	D	unitless
	5	Select a Tree Species for the Tree Well(s) Consistent with SD-A Tree Palette Table Note: Numbers shown in list are Tree Species Mature Canopy Diameters	30' - White Elder	unitless
	6	Tree Well(s) Soil Depth (Installation Depth) Must be 30, 36, 42, or 48 Inches; Select from Standard Depths**	36	inches
	7	Number of Identical* Tree Wells Proposed for this DMA	2	trees
	8	Proposed Width of Tree Well(s) Soil Installation for One (1) Tree	25.0	feet
	9	Proposed Length of Tree Well(s) Soil Installation for One (1) Tree	25.0	feet
Tree Data	10	Botanical Name of Tree Species	Alnus Rhombifolia	unitless
	11	Tree Species Mature Height per SD-A	75	feet
	12	Tree Species Mature Canopy Diameter per SD-A	30	feet
	13	Minimum Soil Volume Required In Tree Well (2 Cubic Feet Per Square Foot of Mature Tree Canopy Projection Area)	1414	cubic-feet
	14	Credit Volume Per Tree	420	cubic-feet
Tree Well Sizing Calculations	15	DCV Multiplier To Meet Flow Control Requirements	3.17	unitless
	16	Required Retention Volume (RRV) To Meet Flow Control Requirements	796	cubic-feet
	17	Number of Trees Required	2	trees
	18	Total Area of Tree Well Soil Required for Each Tree	471	sq-ft
	19	Approximate Required Width of Tree Well Soil Area for Each Tree	22	feet
	20	Approximate Required Length of Tree Well Soil Area for Each Tree	22	feet
	21	Number of Trees Proposed for this DMA	2	trees
	22	Total Area of Tree Well Soil Proposed for Each Tree	625	sq-ft
	23	Minimum Spacing Between Multiple Trees To Meet Soil Area Requirements (when applicable)***	30.0	feet
Results	24	Are Tree Well Soil Installation Requirements Met?	Yes	yes/no
	25	Is Remaining DCV Requirement Fully Satisfied by Tree Well(s)?	Yes	yes/no
	26	Is Hydromodification Control Requirement Satisfied by Tree Well(s)?	Yes	yes/no

Example Project

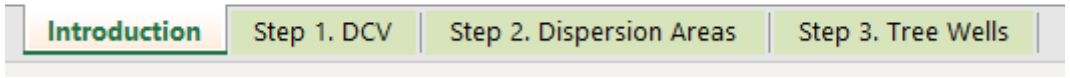


RICK ENGINEERING COMPANY

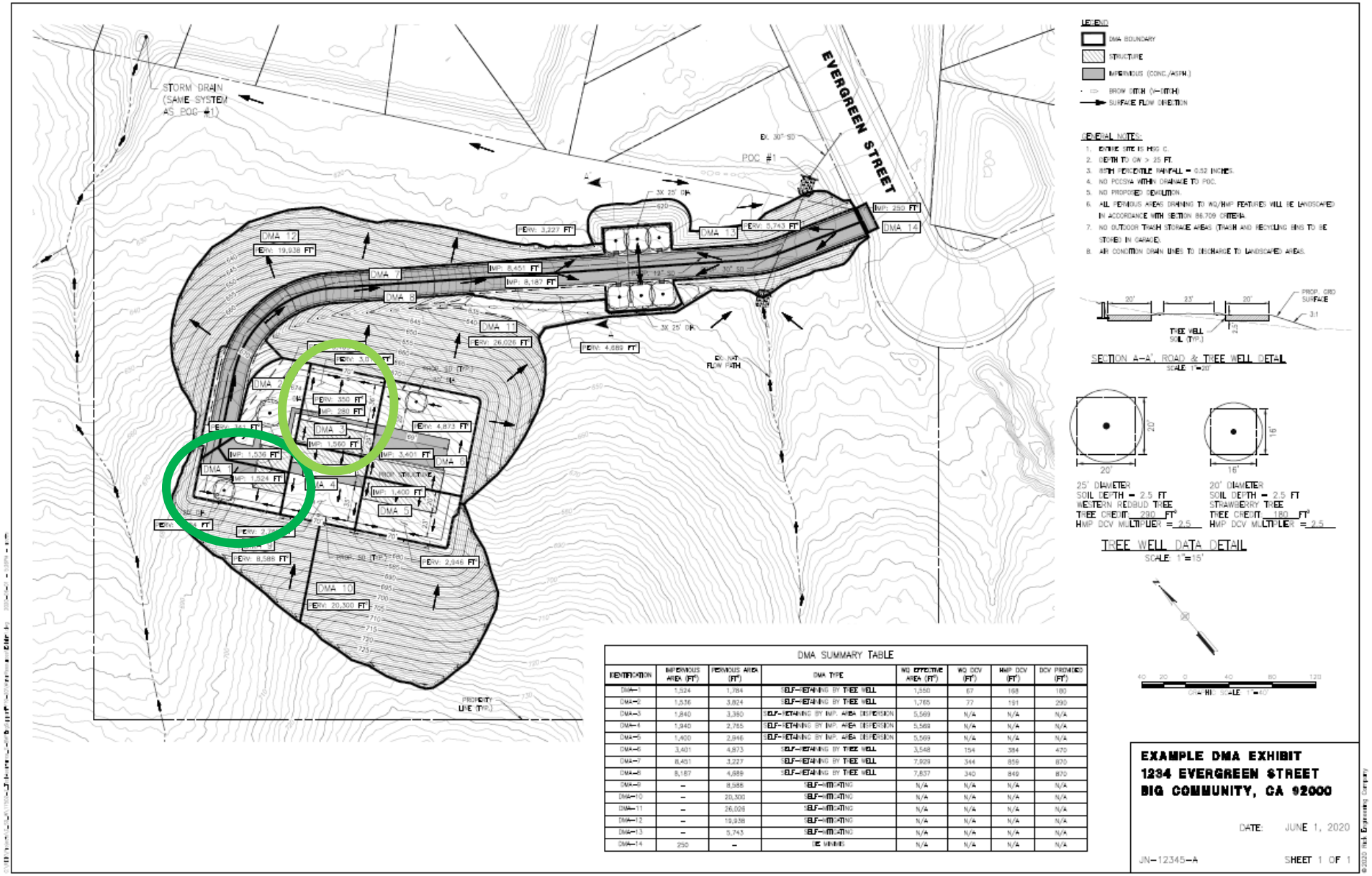
Laura Henry, PE

SSD-BMP Tool Design Process

Step 1. DCV → Step 2. Dispersion Area Validation → Step 3. Tree Well Sizing



EXAMPLE PROJECT



DMA SUMMARY TABLE

IDENTIFICATION	IMPERVIOUS AREA (FT²)	PERVIOUS AREA (FT²)	DMA TYPE	WQ EFFECTIVE AREA (FT²)	WQ DCV (FT³)	HMP DCV (FT³)	DCV PROVIDED (FT³)
DMA-1	1,524	1,784	SELF-RETAINING BY TREE WELL	1,350	67	168	180
DMA-2	1,536	3,824	SELF-RETAINING BY TREE WELL	1,765	72	191	290
DMA-3	1,840	3,380	SELF-RETAINING BY IMP. AREA DISPERSION	5,569	N/A	N/A	N/A
DMA-4	1,940	2,765	SELF-RETAINING BY IMP. AREA DISPERSION	5,569	N/A	N/A	N/A
DMA-5	1,400	2,946	SELF-RETAINING BY IMP. AREA DISPERSION	5,569	N/A	N/A	N/A
DMA-6	3,401	4,873	SELF-RETAINING BY TREE WELL	3,548	154	384	470
DMA-7	8,451	3,227	SELF-RETAINING BY TREE WELL	7,929	344	859	870
DMA-8	8,187	4,689	SELF-RETAINING BY TREE WELL	7,837	340	849	870
DMA-9	–	8,586	SELF-MITIGATING	N/A	N/A	N/A	N/A
DMA-10	–	20,300	SELF-MITIGATING	N/A	N/A	N/A	N/A
DMA-11	–	26,026	SELF-MITIGATING	N/A	N/A	N/A	N/A
DMA-12	–	19,938	SELF-MITIGATING	N/A	N/A	N/A	N/A
DMA-13	–	5,743	SELF-MITIGATING	N/A	N/A	N/A	N/A
DMA-14	250	–	DE MINIMIS	N/A	N/A	N/A	N/A

EXAMPLE DMA EXHIBIT
1234 EVERGREEN STREET
BIG COMMUNITY, CA 92000

DATE: JUNE 1, 2020

JN-12345-A SHEET 1 OF 1

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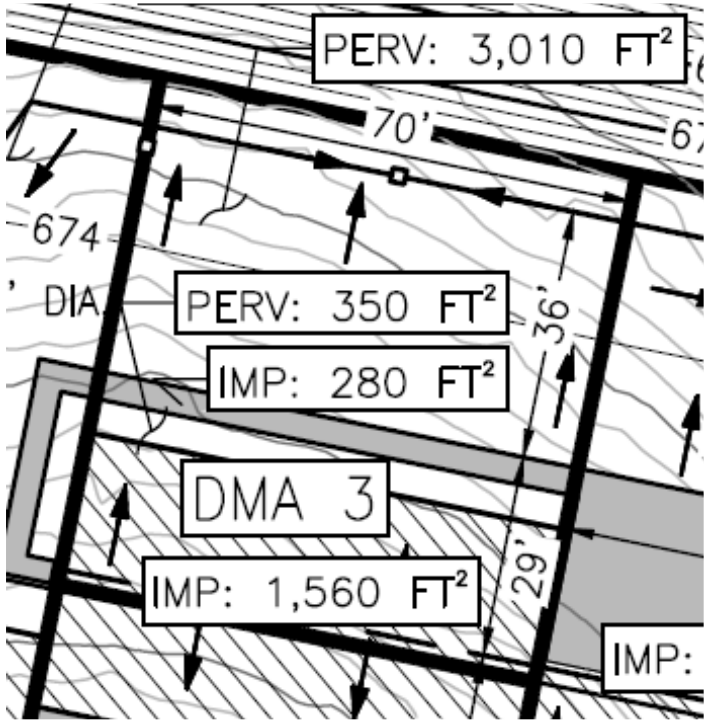
DISPERSION AREA EXAMPLE

Dispersion Area Example Data:

- 85th Percentile rainfall depth is 0.52”
- Hydromodification control applies
- 1,840 sf of impervious surface directed to pervious area
- 3,360 sf of engineered pervious surface serving as dispersion area
- 36’ length of sheet flow across dispersion area
- 2% maximum slope
- 12” of amended soil
- Flow dispersed across width of dispersion area through sheet flow



DISPERSION AREA EXAMPLE – Step 1. DCV

SSD-BMP Automated Worksheet I-1: Step 1. Calculation of Design Capture Volume (V1.0)					
Category	#	Description	iii	iv	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA-3		unitless
	2	85th Percentile 24-hr Storm Depth	0.52		inches
	3	Is Hydromodification Control Applicable?	Yes		yes/no
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)			sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)			sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)			sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)			sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)			sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)			sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)			sq-ft
SSD-BMPs Proposed	11	Does Tributary Incorporate Dispersion and/or Rain Barrels?			yes/no
	12	Does Tributary Incorporate Tree Wells?			yes/no
Dispersion Area & Rain Barrel Inputs (Optional)	13	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)			sq-ft
	14	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)			sq-ft
	15	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)			sq-ft
	16	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)			sq-ft
	17	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)			sq-ft
	18	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)			sq-ft
	19	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)			sq-ft
	20	Number of Rain Barrels Proposed per SD-E			#
	21	Average Rain Barrel Size			gal

Enter the DMA ID, 85th percentile rainfall, and hydromodification control applicability.

Data for this example: 85th percentile rainfall is 0.52 inches, hydromodification control applies.

DISPERSION AREA EXAMPLE – Step 1. DCV

SSD-BMP Automated Worksheet I-1: Step 1. Calculation of Design Capture Volume (V1.0)					
Category	#	Description	iii	x	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA-3		unitless
	2	85th Percentile 24-hr Storm Depth	0.52		inches
	3	Is Hydromodification Control Applicable?	Yes		yes/no
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)			sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)			sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)			sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)			sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)			sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)			sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)			sq-ft
SSD-BMPs Proposed	11	Does Tributary Incorporate Dispersion and/or Rain Barrels?	Yes		yes/no
	12	Does Tributary Incorporate Tree Wells?	No		yes/no
Dispersion Area & Rain Barrel Inputs (Optional)	13	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)	1,840		sq-ft
	14	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)			sq-ft
	15	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)	3,360		sq-ft
	16	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)			sq-ft
	17	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)			sq-ft
	18	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)			sq-ft
	19	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)			sq-ft
	20	Number of Rain Barrels Proposed per SD-E			#
	21	Average Rain Barrel Size			gal

Select the SSD-BMPs proposed. *Data for this example: tributary incorporates dispersion and/or rain barrels.*

When Dispersion is selected in Line 11, Lines 13 through 21 become available for data entry.

Enter the DMA surface data in Lines 13 and 15. *Data for this example: 1,840 square feet impervious area drains to 3,360 square feet pervious area.*

DISPERSION AREA EXAMPLE – Step 1. DCV

SSD-BMP Automated Worksheet I-1: Step 1. Calculation of Design Capture Volume (V1.0)

Category	#	Description	iii	iv	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA-3		unitless
	2	85th Percentile 24-hr Storm Depth	0.52		inches
	3	Is Hydromodification Control Applicable?	Yes		yes/no
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)			sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)			sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)			sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)			sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)			sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)			sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)			sq-ft
SSD-BMPs Proposed	11	Does Tributary Incorporate Dispersion and/or Rain Barrels?	Yes		yes/no
	12	Does Tributary Incorporate Tree Wells?	No		yes/no
Dispersion Area & Rain Barrel Inputs (Optional)	13	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)	1,840		sq-ft
	14	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)			sq-ft
	15	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)	3,360		sq-ft
	16	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)			sq-ft
	17				
	18				
	19				
	20				
	21				
Initial Runoff Factor Calculation	22				
	23				
	24				
	25				
	26				
Dispersion Area Adjustment & Rain Barrel Adjustment	27				
	28				
	29				
	30				
	31				
	32				
	33				
Results	34				
	35				
	36				
	37				

No Warning Messages

Initial Runoff Factor Calculation	22	Total Tributary Area	5,200	0	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.00	0.00	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.38	0.00	unitless
	25	Initial Weighted Runoff Factor	0.38	0.00	unitless
	26	Initial Design Capture Volume	86	0	cubic-feet
Dispersion Area Adjustment & Rain Barrel Adjustment	27	Total Impervious Area Dispersed to Pervious Surface	1,840	0	sq-ft
	28	Total Pervious Dispersion Area	3,360	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area for DCV Reduction	0.50	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	0.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.00	n/a	unitless
	32	Design Capture Volume After Dispersion Techniques	0	0	cubic-feet
	33	Total Rain Barrel Volume Reduction	0	0	cubic-feet
Results	34	Final Adjusted Runoff Factor	0.00	0.00	unitless
	35	Final Effective Tributary Area	0	0	sq-ft
	36	Initial Design Capture Volume Retained by Dispersion Area and Rain Barrel(s)	86	0	cubic-feet
	37	Remaining Design Capture Volume Tributary to Tree Well(s)	0	0	cubic-feet

When the DMA surface data is entered, data shown in white cells is automatically calculated.

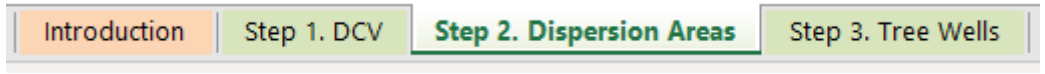
The total DCV is 0 cubic feet.

Dispersion Area Example Design Process

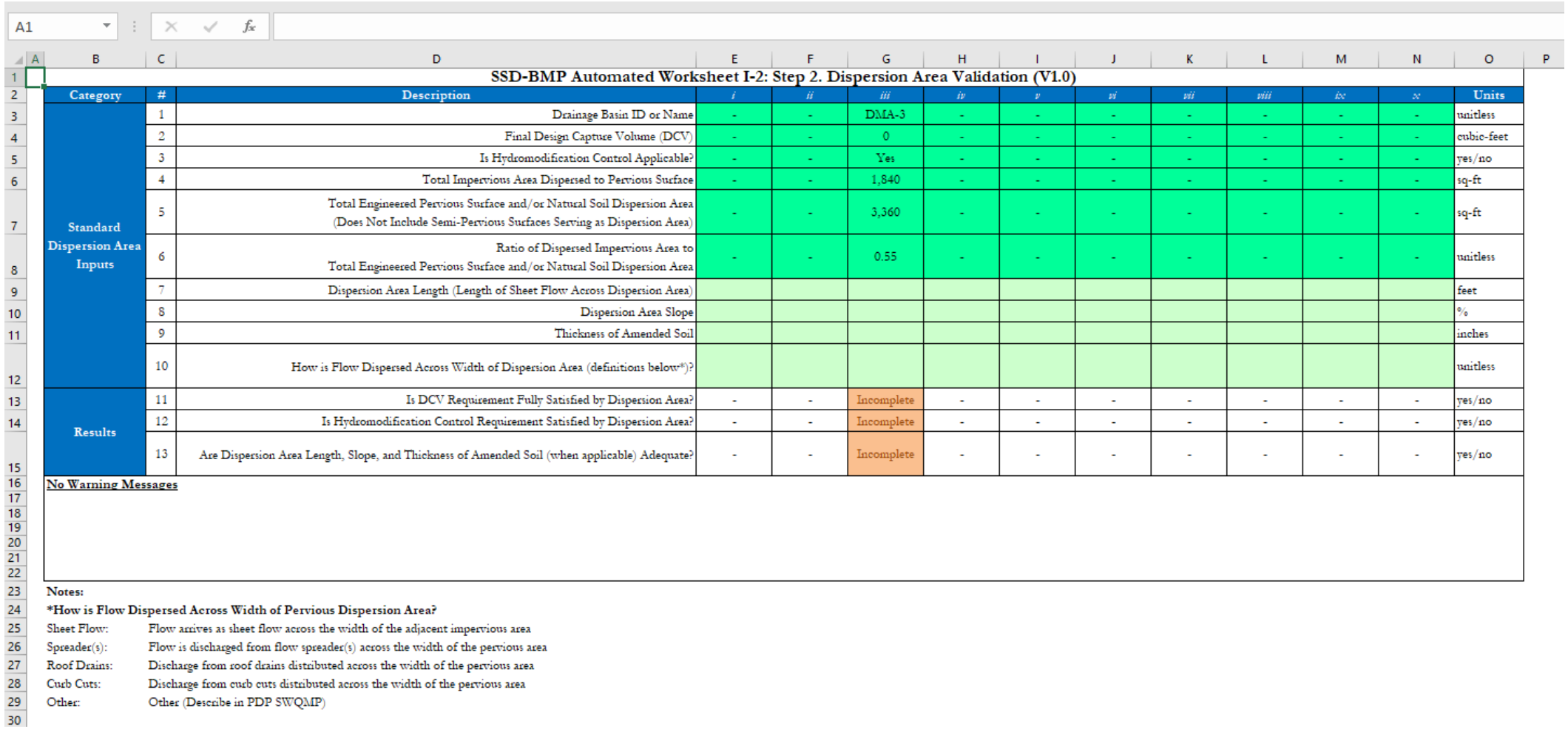
Step 1. DCV → Step 2. Dispersion Area Validation → Step 3. Tree Well Sizing

Step 1. Calculation of Design Capture Volume (DCV) is complete.

Continue to Step 2. Dispersion Area Validation.



Dispersion Areas Tab



SSD-BMP Automated Worksheet I-2: Step 2. Dispersion Area Validation (V1.0)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
Standard Dispersion Area Inputs	1	Drainage Basin ID or Name	-	-	DMA-3	-	-	-	-	-	-	-	unitless
	2	Final Design Capture Volume (DCV)	-	-	0	-	-	-	-	-	-	-	cubic-feet
	3	Is Hydromodification Control Applicable?	-	-	Yes	-	-	-	-	-	-	-	yes/no
	4	Total Impervious Area Dispersed to Pervious Surface	-	-	1,840	-	-	-	-	-	-	-	sq-ft
	5	Total Engineered Pervious Surface and/or Natural Soil Dispersion Area (Does Not Include Semi-Pervious Surfaces Serving as Dispersion Area)	-	-	3,360	-	-	-	-	-	-	-	sq-ft
	6	Ratio of Dispersed Impervious Area to Total Engineered Pervious Surface and/or Natural Soil Dispersion Area	-	-	0.55	-	-	-	-	-	-	-	unitless
	7	Dispersion Area Length (Length of Sheet Flow Across Dispersion Area)											feet
	8	Dispersion Area Slope											%
	9	Thickness of Amended Soil											inches
	10	How is Flow Dispersed Across Width of Dispersion Area (definitions below*)?											unitless
Results	11	Is DCV Requirement Fully Satisfied by Dispersion Area?	-	-	Incomplete	-	-	-	-	-	-	-	yes/no
	12	Is Hydromodification Control Requirement Satisfied by Dispersion Area?	-	-	Incomplete	-	-	-	-	-	-	-	yes/no
	13	Are Dispersion Area Length, Slope, and Thickness of Amended Soil (when applicable) Adequate?	-	-	Incomplete	-	-	-	-	-	-	-	yes/no

No Warning Messages

Notes:

***How is Flow Dispersed Across Width of Pervious Dispersion Area?**

Sheet Flow:	Flow arrives as sheet flow across the width of the adjacent impervious area
Spreader(s):	Flow is discharged from flow spreader(s) across the width of the pervious area
Roof Drains:	Discharge from roof drains distributed across the width of the pervious area
Curb Cuts:	Discharge from curb cuts distributed across the width of the pervious area
Other:	Other (Describe in PDP SWQMP)

Introduction | Step 1. DCV | **Step 2. Dispersion Areas** | Step 3. Tree Wells

DISPERSION AREA EXAMPLE – Step 2. Dispersion Area Validation

SSD-BMP Automated Worksheet I-2: Step 2. Dispersion Area Validation (V1.0)					
Category	#	Description	iii	x	Units
Standard Dispersion Area Inputs	1	Drainage Basin ID or Name	DMA-3	-	unitless
	2	Final Design Capture Volume (DCV)	0	-	cubic-feet
	3	Is Hydromodification Control Applicable?	Yes	-	yes/no
	4	Total Impervious Area Dispersed to Pervious Surface	1,840	-	sq-ft
	5	Total Engineered Pervious Surface and/or Natural Soil Dispersion Area (Does Not Include Semi-Pervious Surfaces Serving as Dispersion Area)	3,360	-	sq-ft
	6	Ratio of Dispersed Impervious Area to Total Engineered Pervious Surface and/or Natural Soil Dispersion Area	0.55		unitless
	7	Dispersion Area Length (Length of Sheet Flow Across Dispersion Area)			feet
	8	Dispersion Area Slope			%
	9	Thickness of Amended Soil			inches
	10	How is Flow Dispersed Across Width of Dispersion Area (definitions below*)?			unitless

Data that was provided or calculated in the DCV tab is already populated in the Dispersion Areas tab.

DISPERSION AREA EXAMPLE – Step 2. Dispersion Area Validation

SSD-BMP Automated Worksheet I-2: Step 2. Dispersion Area Validation (V1.0)					
Category	#	Description	iii	x	Units
Standard Dispersion Area Inputs	1	Drainage Basin ID or Name	DMA-3	-	unitless
	2	Final Design Capture Volume (DCV)	0	-	cubic-feet
	3	Is Hydromodification Control Applicable?	Yes	-	yes/no
	4	Total Impervious Area Dispersed to Pervious Surface	1,840	-	sq-ft
	5	Total Engineered Pervious Surface and/or Natural Soil Dispersion Area (Does Not Include Semi-Pervious Surfaces Serving as Dispersion Area)	3,360	-	sq-ft
	6	Ratio of Dispersed Impervious Area to Total Engineered Pervious Surface and/or Natural Soil Dispersion Area	0.55	-	unitless
	7	Dispersion Area Length (Length of Sheet Flow Across Dispersion Area)	36		feet
	8	Dispersion Area Slope	2.0		%
	9	Thickness of Amended Soil	12		inches
	10	How is Flow Dispersed Across Width of Dispersion Area (definitions below*)?	Sheet Flow		unitless

Enter the length, slope, and thickness of the amended soil.

Data for this example: 36 feet of travel length, 2% slope, 12-inch thickness of amended soil, flow is dispersed as sheet flow off the impervious area.

DISPERSION AREA EXAMPLE – Step 2. Dispersion Area Validation

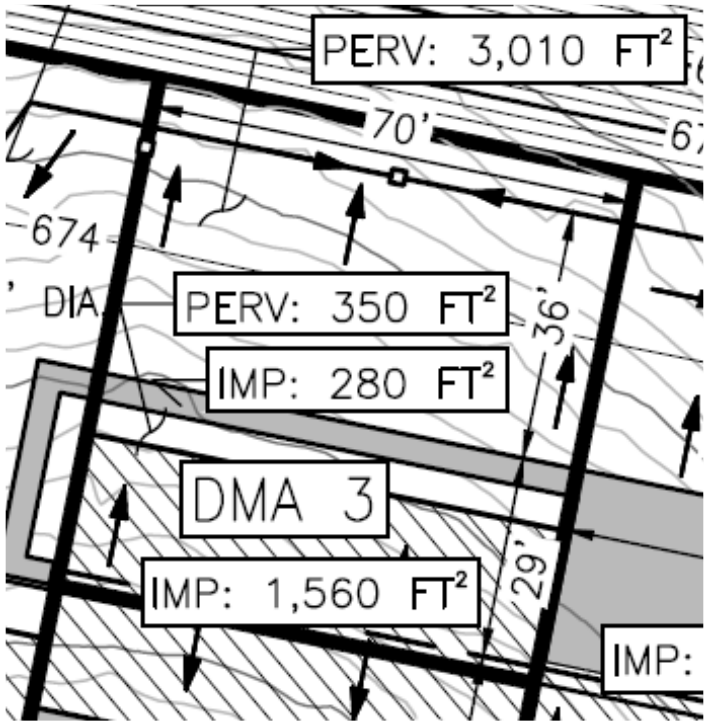
SSD-BMP Automated Worksheet I-2: Step 2. Dispersion Area Validation (V1.0)					
Category	#	Description	iii	∞	Units
Standard Dispersion Area Inputs	1	Drainage Basin ID or Name	DMA-3	-	unitless
	2	Final Design Capture Volume (DCV)	0	-	cubic-feet
	3	Is Hydromodification Control Applicable?	Yes	-	yes/no
	4	Total Impervious Area Dispersed to Pervious Surface	1,840	-	sq-ft
	5	Total Engineered Pervious Surface and/or Natural Soil Dispersion Area (Does Not Include Semi-Pervious Surfaces Serving as Dispersion Area)	3,360	-	sq-ft
	6	Ratio of Dispersed Impervious Area to Total Engineered Pervious Surface and/or Natural Soil Dispersion Area	0.55	-	unitless
	7	Dispersion Area Length (Length of Sheet Flow Across Dispersion Area)	36		feet
	8	Dispersion Area Slope	2.0		%
	9	Thickness of Amended Soil	12		inches
	10	How is Flow Dispersed Across Width of Dispersion Area (definitions below*)?	Sheet Flow		unitless
Results	11	Is DCV Requirement Fully Satisfied by Dispersion Area?	Yes		yes/no
	12	Is Hydromodification Control Requirement Satisfied by Dispersion Area?	Yes	-	yes/no
	13	Are Dispersion Area Length, Slope, and Thickness of Amended Soil (when applicable) Adequate?	Yes	-	yes/no
No Warning Messages					

When lines 7, 8, and 9 are completed, Lines 11, 12, and 13 will be updated.

DISPERSION AREA EXAMPLE – DMA Exhibit and Plans

Show on the plans and DMA Exhibit:

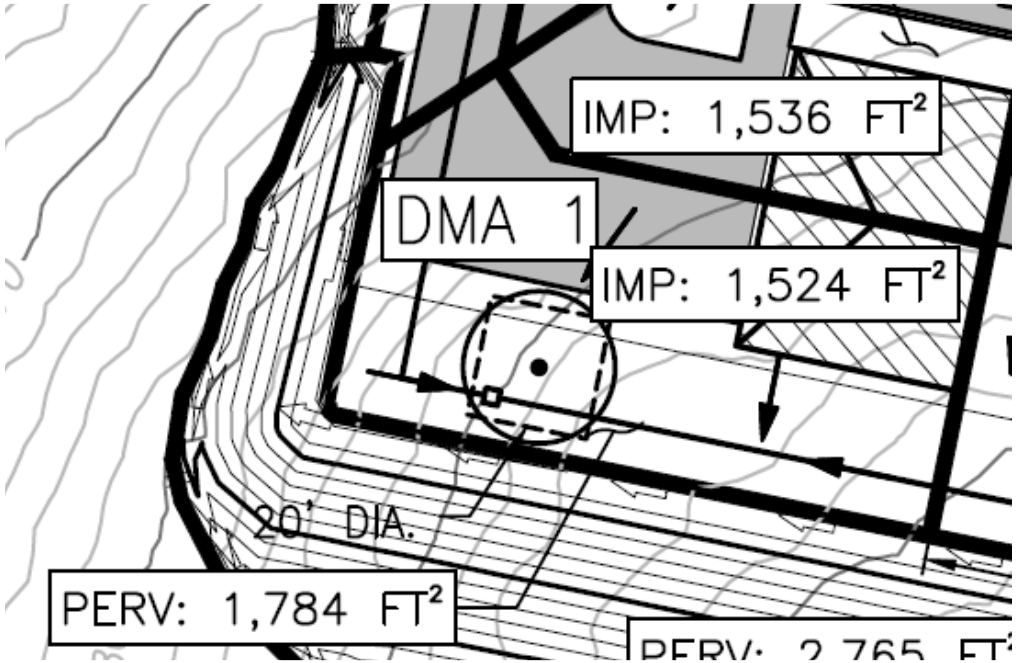
- Impervious surfaces directed to pervious surfaces
- Impervious to pervious ratio 1:1 or less
- Pervious surfaces have amended soil per SD-F



TREE WELL EXAMPLE

Tree Well Example Data

- 85th Percentile rainfall depth is 0.52”
- Hydromodification control applies
- Hydrologic soil group C
- 1,524 sf of impervious surfaces not serving as dispersion area
- 1,784 sf of engineered pervious surfaces not serving as dispersion areas
- Tributary does not incorporate dispersion areas or rain barrels
- Tributary incorporates tree wells



TREE WELL EXAMPLE – Step 1. DCV

SSD-BMP Automated Worksheet I-1: Step 1. Calculation of Design Capture Volume (V1.0)					
Category	**#**	**Description**	***i***	***x***	**Units**
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA-1		unitless
	2	85th Percentile 24-hr Storm Depth	0.52		inches
	3	Is Hydromodification Control Applicable?	Yes		yes/no
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)			sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)			sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)			sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)			sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)			sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)			sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)			sq-ft
SSD-BMPs Proposed	11	Does Tributary Incorporate Dispersion and/or Rain Barrels?			yes/no
	12	Does Tributary Incorporate Tree Wells?			yes/no
Dispersion Area & Rain Barrel Inputs (Optional)	13	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)			sq-ft
	14	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)			sq-ft
	15	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)			sq-ft
	16	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)			sq-ft
	17	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)			sq-ft
	18	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)			sq-ft
	19	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)			sq-ft
	20	Number of Rain Barrels Proposed per SD-E			#
	21	Average Rain Barrel Size			gal

Enter the DMA ID, 85th percentile rainfall depth, and hydromodification control applicability.

Data for this example: 85th percentile rainfall is 0.52 inches, hydromodification control applies.

TREE WELL EXAMPLE – Step 1. DCV

SSD-BMP Automated Worksheet I-1: Step 1. Calculation of Design Capture Volume (V1.0)					
Category	**#**	**Description**	***i***	***x***	**Units**
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA-1		unitless
	2	85th Percentile 24-hr Storm Depth	0.52		inches
	3	Is Hydromodification Control Applicable?	Yes		yes/no
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	1,524		sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)			sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)	1,784		sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)			sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)			sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)			sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)			sq-ft
SSD-BMPs Proposed	11	Does Tributary Incorporate Dispersion and/or Rain Barrels?	No		yes/no
	12	Does Tributary Incorporate Tree Wells?	Yes		yes/no
Dispersion Area & Rain Barrel Inputs (Optional)	13	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)			sq-ft
	14	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)			sq-ft
	15	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)			sq-ft
	16	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)			sq-ft
	17	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)			sq-ft
	18	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)			sq-ft
	19	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)			sq-ft
	20	Number of Rain Barrels Proposed per SD-E			#
	21	Average Rain Barrel Size			gal

Enter the DMA surface data and SSD-BMPs proposed.

Data for this example: 1,524 square feet impervious area; 1,784 square feet pervious area; no rain barrels; dispersion will not be quantified for DCV reduction; tree wells will be used.

TREE WELL EXAMPLE – Step 1. DCV

SSD-BMP Automated Worksheet I-1: Step 1. Calculation of Design Capture Volume (V1.0)

Category	#	Description	*i*	*ac*	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA-1		unitless
	2	85th Percentile 24-hr Storm Depth	0.52		inches
	3	Is Hydromodification Control Applicable?	Yes		yes/no
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	1,524		sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)			sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)	1,784		sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)			sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)			sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)			sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)			sq-ft
SSD-BMPs Proposed	11	Does Tributary Incorporate Dispersion and/or Rain Barrels?	No		yes/no
	12	Does Tributary Incorporate Tree Wells?	Yes		yes/no
Dispersion Area & Rain Barrel Inputs (Optional)	13	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)			sq-ft
	14	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)			sq-ft
	15	Engineered Pervious Surfaces **Serving**			
	16	Natural Type A Soil **Serving**			
	17	Natural Type B Soil **Serving**			
	18	Natural Type C Soil **Serving**			
	19	Natural Type D Soil **Serving**			
	20				
	21				
Initial Runoff Factor Calculation	22				
	23	Initial			
	24	Initial Runo			
	25				
	26				
Dispersion Area Adjustment & Rain Barrel Adjustment	27	Total Imp			
	28				
	29	Ratio of Dispersed Impervious Area to Pe			
	30	Adjustme			
	31				
	32	Design Ca			
	33				
Results	34				
	35				
	36	Initial Design Capture Volume Ret			
	37	Remaining Desig			

No Warning Messages

Initial Runoff Factor Calculation	22	Total Tributary Area	3,308	0	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.47	0.00	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.47	0.00	unitless
	26	Initial Design Capture Volume	67	0	cubic-feet
Dispersion Area Adjustment & Rain Barrel Adjustment	27	Total Impervious Area Dispersed to Pervious Surface	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area for DCV Reduction	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.47	n/a	unitless
	32	Design Capture Volume After Dispersion Techniques	67	0	cubic-feet
	33	Total Rain Barrel Volume Reduction	0	0	cubic-feet
Results	34	Final Adjusted Runoff Factor	0.47	0.00	unitless
	35	Final Effective Tributary Area	1,555	0	sq-ft
	36	Initial Design Capture Volume Retained by Dispersion Area and Rain Barrel(s)	0	0	cubic-feet
	37	Remaining Design Capture Volume Tributary to Tree Well(s)	67	0	cubic-feet

When the DMA surface data is entered, data shown in white cells is automatically calculated.

The total DCV is 67 cubic feet.

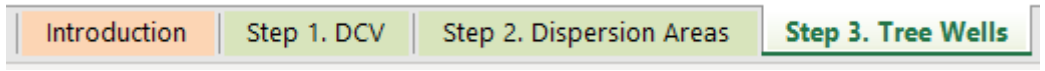
Tree Well Example Design Process

Step 1. DCV → Step 2. Dispersion Area Validation → Step 3. Tree Well Sizing

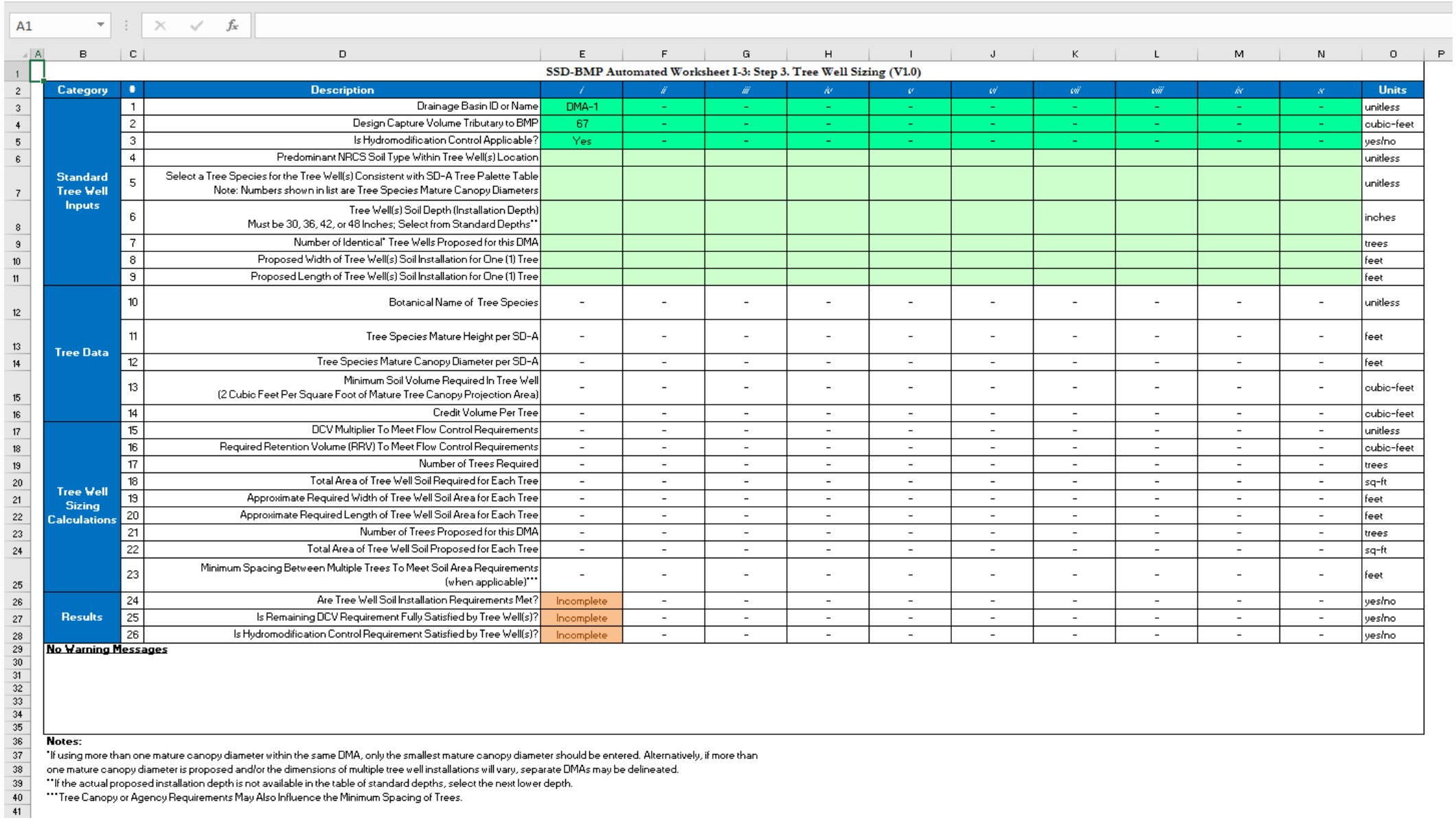
Step 1. Calculation of Design Capture Volume (DCV) is complete.

No dispersion areas were proposed for this DMA. Skip Step 2.

Continue to Step 3. Tree Well Sizing.



Tree Well Sizing Tab



SSD-BMP Automated Worksheet I-3: Step 3. Tree Well Sizing (V1.0)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
Standard Tree Well Inputs	1	Drainage Basin ID or Name	DMA-1	-	-	-	-	-	-	-	-	-	unitless
	2	Design Capture Volume Tributary to BMP	67	-	-	-	-	-	-	-	-	-	cubic-feet
	3	Is Hydromodification Control Applicable?	Yes	-	-	-	-	-	-	-	-	-	yes/no
	4	Predominant NRCS Soil Type Within Tree Well(s) Location											unitless
	5	Select a Tree Species for the Tree Well(s) Consistent with SD-A Tree Palette Table Note: Numbers shown in list are Tree Species Mature Canopy Diameters											unitless
	6	Tree Well(s) Soil Depth (Installation Depth) Must be 30, 36, 42, or 48 Inches; Select from Standard Depths**											inches
	7	Number of Identical* Tree Wells Proposed for this DMA											trees
	8	Proposed Width of Tree Well(s) Soil Installation for One (1) Tree											feet
	9	Proposed Length of Tree Well(s) Soil Installation for One (1) Tree											feet
Tree Data	10	Botanical Name of Tree Species	-	-	-	-	-	-	-	-	-	-	unitless
	11	Tree Species Mature Height per SD-A	-	-	-	-	-	-	-	-	-	-	feet
	12	Tree Species Mature Canopy Diameter per SD-A	-	-	-	-	-	-	-	-	-	-	feet
	13	Minimum Soil Volume Required In Tree Well (2 Cubic Feet Per Square Foot of Mature Tree Canopy Projection Area)	-	-	-	-	-	-	-	-	-	-	cubic-feet
	14	Credit Volume Per Tree	-	-	-	-	-	-	-	-	-	-	cubic-feet
Tree Well Sizing Calculations	15	DCV Multiplier To Meet Flow Control Requirements	-	-	-	-	-	-	-	-	-	-	unitless
	16	Required Retention Volume (RRV) To Meet Flow Control Requirements	-	-	-	-	-	-	-	-	-	-	cubic-feet
	17	Number of Trees Required	-	-	-	-	-	-	-	-	-	-	trees
	18	Total Area of Tree Well Soil Required for Each Tree	-	-	-	-	-	-	-	-	-	-	sq-ft
	19	Approximate Required Width of Tree Well Soil Area for Each Tree	-	-	-	-	-	-	-	-	-	-	feet
	20	Approximate Required Length of Tree Well Soil Area for Each Tree	-	-	-	-	-	-	-	-	-	-	feet
	21	Number of Trees Proposed for this DMA	-	-	-	-	-	-	-	-	-	-	trees
	22	Total Area of Tree Well Soil Proposed for Each Tree	-	-	-	-	-	-	-	-	-	-	sq-ft
	23	Minimum Spacing Between Multiple Trees To Meet Soil Area Requirements (when applicable)***	-	-	-	-	-	-	-	-	-	-	feet
Results	24	Are Tree Well Soil Installation Requirements Met?	Incomplete	-	-	-	-	-	-	-	-	-	yes/no
	25	Is Remaining DCV Requirement Fully Satisfied by Tree Well(s)?	Incomplete	-	-	-	-	-	-	-	-	-	yes/no
	26	Is Hydromodification Control Requirement Satisfied by Tree Well(s)?	Incomplete	-	-	-	-	-	-	-	-	-	yes/no

No Warning Messages

Notes:

*If using more than one mature canopy diameter within the same DMA, only the smallest mature canopy diameter should be entered. Alternatively, if more than one mature canopy diameter is proposed and/or the dimensions of multiple tree well installations will vary, separate DMAs may be delineated.

**If the actual proposed installation depth is not available in the table of standard depths, select the next lower depth.

***Tree Canopy or Agency Requirements May Also Influence the Minimum Spacing of Trees.

TREE WELL EXAMPLE – Step 3. Tree Well Sizing

SSD-BMP Automated Worksheet I-3: Step 3. Tree Well Sizing (V1.0)					
Category	#	Description	*i*	*x*	Units
Standard Tree Well Inputs	1	Drainage Basin ID or Name	DMA-1	-	unitless
	2	Design Capture Volume Tributary to BMP	67	-	cubic-feet
	3	Is Hydromodification Control Applicable?	Yes	-	yes/no
	4	Predominant NRCS Soil Type Within Tree Well(s) Location			unitless
	5	Select a Tree Species for the Tree Well(s) Consistent with SD-A Tree Palette Table Note: Numbers shown in list are Tree Species Mature Canopy Diameters			unitless
	6	Tree Well(s) Soil Depth (Installation Depth) Must be 30, 36, 42, or 48 Inches; Select from Standard Depths**			inches
	7	Number of Identical* Tree Wells Proposed for this DMA			trees
	8	Proposed Width of Tree Well(s) Soil Installation for One (1) Tree			feet
	9	Proposed Length of Tree Well(s) Soil Installation for One (1) Tree			feet

Data that was provided or calculated in the DCV tab is already populated in the Tree Well Sizing tab.

TREE WELL EXAMPLE – Step 3. Tree Well Sizing

SSD-BMP Automated Worksheet I-3: Step 3. Tree Well Sizing (V1.0)

Category	#	Description	*i*	*x*	Units
Standard Tree Well Inputs	1	Drainage Basin ID or Name	DMA-1	-	unitless
	2	Design Capture Volume Tributary to BMP	67	-	cubic-feet
	3	Is Hydromodification Control Applicable?	Yes	-	yes/no
	4	Predominant NRCS Soil Type Within Tree Well(s) Location	C		unitless
	5	Select a Tree Species for the Tree Well(s) Consistent with SD-A Tree Palette Table Note: Numbers shown in list are Tree Species Mature Canopy Diameters	20' - Strawberry Tree		unitless
	6	Tree Well(s) Soil Depth (Installation Depth) Must be 30, 36, 42, or 48 Inches; Select from Standard Depths**	30		inches
	7	Number of Identical* Tree Wells Proposed for this DMA			trees
	8	Proposed Width of Tree Well(s) Soil Installation for One (1) Tree			feet
	9	Proposed Length of Tree Well(s) Soil Installation for One (1) Tree			feet

Enter the soil type (hydrologic soil group), tree species, and installation depth.

Data for this example: Hydrologic soil group C, strawberry tree, 30-inch installation depth.

TREE WELL EXAMPLE – Step 3. Tree Well Sizing

SSD-BMP Automated Worksheet I-3: Step 3. Tree Well Sizing (V1.0)					
Category	#	Description	*i*	*x*	Units
Standard Tree Well Inputs	1	Drainage Basin ID or Name	DMA-1	-	unitless
	2	Design Capture Volume Tributary to BMP	67	-	cubic-feet
	3	Is Hydromodification Control Applicable?	Yes	-	yes/no
	4	Predominant NRCS Soil Type Within Tree Well(s) Location	C		unitless
	5	Select a Tree Species for the Tree Well(s) Consistent with SD-A Tree Palette Table Note: Numbers shown in list are Tree Species Mature Canopy Diameters	20' - Strawberry Tree		unitless
	6	Tree Well(s) Soil Depth (Installation Depth) Must be 30, 36, 42, or 48 Inches; Select from Standard Depths**	30		inches
	7	Number of Identical* Tree Wells Proposed for this DMA			trees
	8	Proposed Width of Tree Well(s) Soil Installation for One (1) Tree			feet
	9	Proposed Length of Tree Well(s) Soil Installation for One (1) Tree			feet
Tree Data	10	Botanical Name of Tree Species	Arbutus Unedo	-	unitless
	11	Tree Species Mature Height per SD-A	30	-	feet
	12	Tree Species Mature Canopy Diameter per SD-A	20	-	feet
	13	Minimum Soil Volume Required In Tree Well (2 Cubic Feet Per Square Foot of Mature Tree Canopy Projection Area)	628	-	cubic-feet
	14	Credit Volume Per Tree	180	-	cubic-feet
Tree Well Sizing Calculations	15	DCV Multiplier To Meet Flow Control Requirements	2.50	-	unitless
	16	Required Retention Volume (RRV) To Meet Flow Control Requirements	168	-	cubic-feet
	17	Number of Trees Required	1	-	trees
	18	Total Area of Tree Well Soil Required for Each Tree	251	-	sq-ft
	19	Approximate Required Width of Tree Well Soil Area for Each Tree	16	-	feet
	20	Approximate Required Length of Tree Well Soil Area for Each Tree	16	-	feet
	21	Number of Trees Proposed for this DMA	-	-	trees
	22	Total Area of Tree Well Soil Proposed for Each Tree	-	-	sq-ft
	23	Minimum Spacing Between Multiple Trees To Meet Soil Area Requirements (when applicable)***	n/a	-	feet
Results	24	Are Tree Well Soil Installation Requirements Met?	Incomplete	-	yes/no
	25	Is Remaining DCV Requirement Fully Satisfied by Tree Well(s)?	Incomplete	-	yes/no
	26	Is Hydromodification Control Requirement Satisfied by Tree Well(s)?	Incomplete	-	yes/no
No Warning Messages					

Completion of lines 1 through 6 causes lines 10 through 23 to be automatically calculated.

Lines 7, 8, and 9 must be completed by the user to confirm the number of trees and installation dimensions proposed before Lines 24, 25, and 26 will update.

Lines 17 through 20 provide minimum requirements for the number of trees and tree well dimensions.

Lines 17 through 20 assist the user to complete the design and complete Lines 7, 8, and 9, as well as assisting the plan reviewer.

TREE WELL EXAMPLE – Step 3. Tree Well Sizing

SSD-BMP Automated Worksheet I-3: Step 3. Tree Well Sizing (V1.0)					
Category	**#**	**Description**	***i***	***x***	**Units**
Standard Tree Well Inputs	1	Drainage Basin ID or Name	DMA-1	-	unitless
	2	Design Capture Volume Tributary to BMP	67	-	cubic-feet
	3	Is Hydromodification Control Applicable?	Yes	-	yes/no
	4	Predominant NRCS Soil Type Within Tree Well(s) Location	C		unitless
	5	Select a Tree Species for the Tree Well(s) Consistent with SD-A Tree Palette Table Note: Numbers shown in list are Tree Species Mature Canopy Diameters	20' - Strawberry Tree		unitless
	6	Tree Well(s) Soil Depth (Installation Depth) Must be 30, 36, 42, or 48 Inches; Select from Standard Depths**	30		inches
	7	Number of Identical* Tree Wells Proposed for this DMA	1		trees
	8	Proposed Width of Tree Well(s) Soil Installation for One (1) Tree	16.0		feet
	9	Proposed Length of Tree Well(s) Soil Installation for One (1) Tree	16.0		feet
Tree Data	10	Botanical Name of Tree Species	Arbutus Unedo	-	unitless
	11	Tree Species Mature Height per SD-A	30	-	feet
	12	Tree Species Mature Canopy Diameter per SD-A	20	-	feet
	13	Minimum Soil Volume Required In Tree Well (2 Cubic Feet Per Square Foot of Mature Tree Canopy Projection Area)	628	-	cubic-feet
	14	Credit Volume Per Tree	180	-	cubic-feet
Tree Well Sizing Calculations	15	DCV Multiplier To Meet Flow Control Requirements	2.50	-	unitless
	16	Required Retention Volume (RRV) To Meet Flow Control Requirements	168	-	cubic-feet
	17	Number of Trees Required	1	-	trees
	18	Total Area of Tree Well Soil Required for Each Tree	251	-	sq-ft
	19	Approximate Required Width of Tree Well Soil Area for Each Tree	16	-	feet
	20	Approximate Required Length of Tree Well Soil Area for Each Tree	16	-	feet
	21	Number of Trees Proposed for this DMA	1	-	trees
	22	Total Area of Tree Well Soil Proposed for Each Tree	256	-	sq-ft
	23	Minimum Spacing Between Multiple Trees To Meet Soil Area Requirements (when applicable)***	n/a	-	feet
Results	24	Are Tree Well Soil Installation Requirements Met?	Yes	-	yes/no
	25	Is Remaining DCV Requirement Fully Satisfied by Tree Well(s)?	Yes	-	yes/no
	26	Is Hydromodification Control Requirement Satisfied by Tree Well(s)?	Yes	-	yes/no
No Warning Messages					

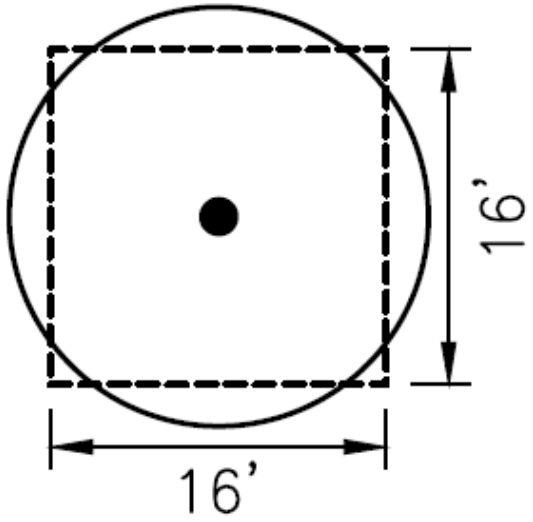
Complete lines 7, 8, and 9

Lines 24, 25, and 26 will automatically update.

TREE WELL EXAMPLE – DMA Exhibit and Plans

Show on the plans and DMA Exhibit:

- Mature tree diameter (drawn to scale)
- Area designated for tree well soil
- Depth of tree well soil
- Tree species
- Inflow
- Overflow or bypass

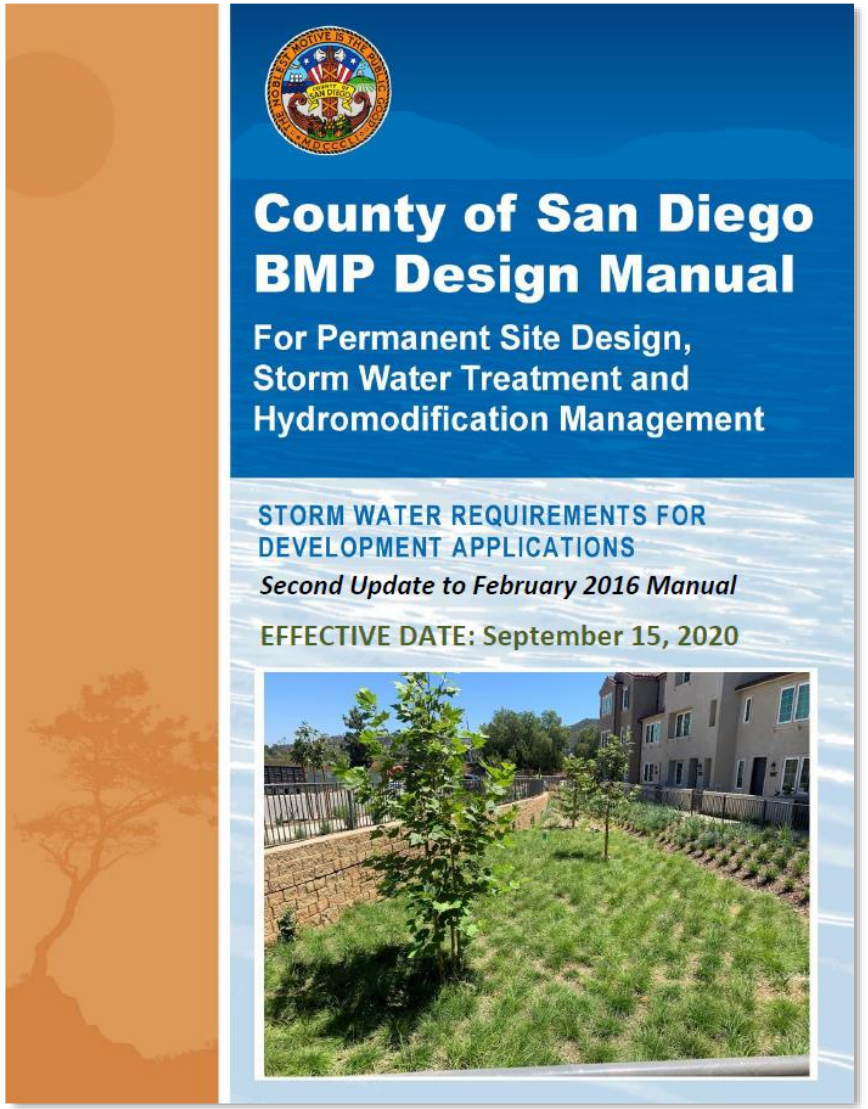


Q&A

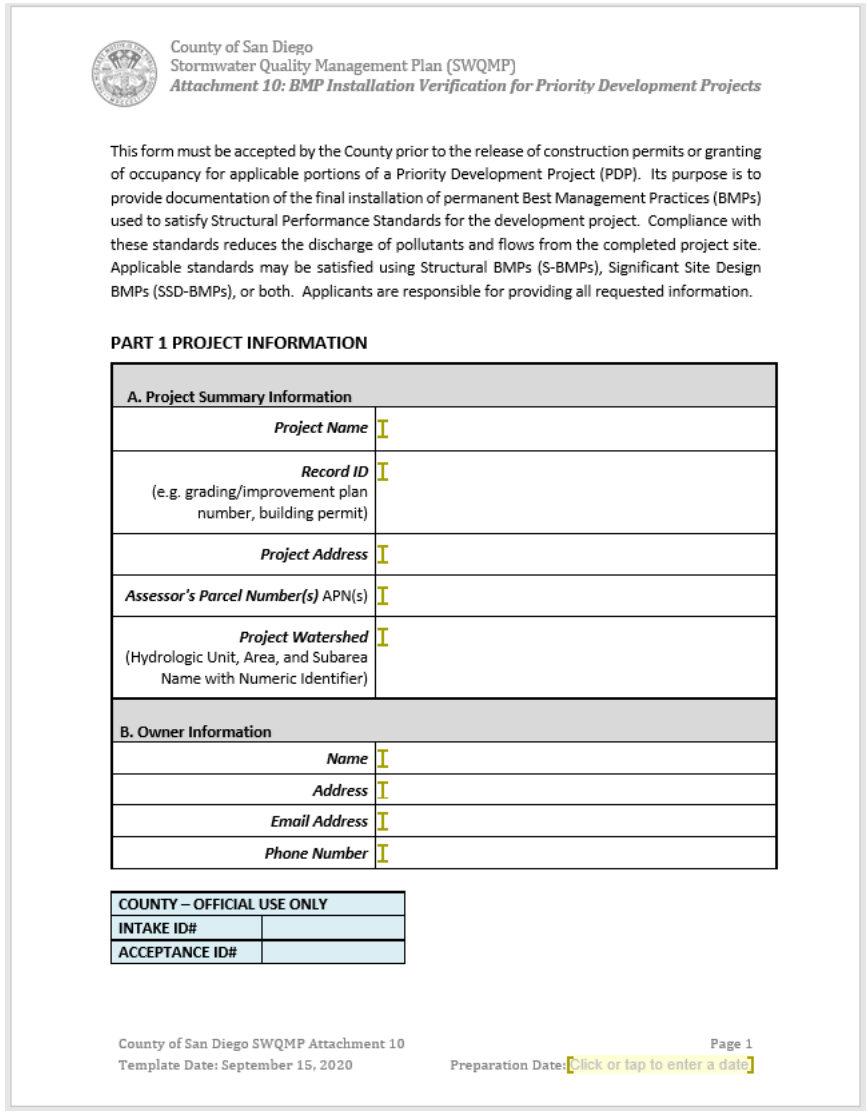
Permanent BMP Verification Requirements

(PDP SWQMP FORM ATTACHMENT 10)

Juli Hughes, EIT, QSP, CESSWI



PDP SWQMP Attachment 10: BMP Installation Verification



County of San Diego
Stormwater Quality Management Plan (SWQMP)
Attachment 10: BMP Installation Verification for Priority Development Projects

This form must be accepted by the County prior to the release of construction permits or granting of occupancy for applicable portions of a Priority Development Project (PDP). Its purpose is to provide documentation of the final installation of permanent Best Management Practices (BMPs) used to satisfy Structural Performance Standards for the development project. Compliance with these standards reduces the discharge of pollutants and flows from the completed project site. Applicable standards may be satisfied using Structural BMPs (S-BMPs), Significant Site Design BMPs (SSD-BMPs), or both. Applicants are responsible for providing all requested information.

PART 1 PROJECT INFORMATION

A. Project Summary Information	
Project Name	
Record ID (e.g. grading/improvement plan number, building permit)	
Project Address	
Assessor's Parcel Number(s) APN(s)	
Project Watershed (Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	
B. Owner Information	
Name	
Address	
Email Address	
Phone Number	

COUNTY – OFFICIAL USE ONLY	
INTAKE ID#	
ACCEPTANCE ID#	

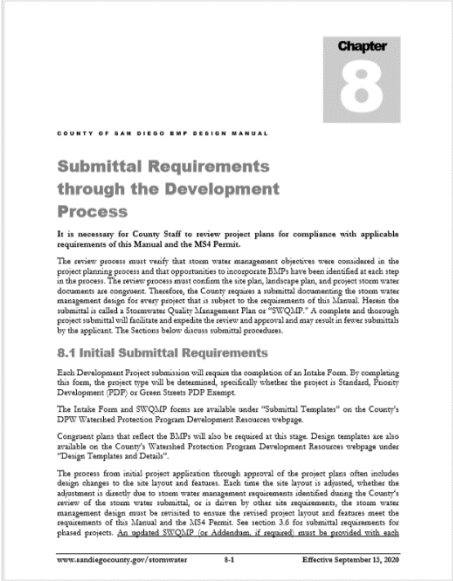
County of San Diego SWQMP Attachment 10 Page 1
Template Date: September 15, 2020 Preparation Date: Click or tap to enter a date.

- Attachment 10 to the PDP SWQMP is a 6-page fillable form located on WPP's Development Resources website under Submittal Templates

- This form is submitted to your County inspector after the construction of your permanent BMPs is complete.

What is the Verification Process for BMPs?

- Permanent BMPs for all private Priority Development Projects (PDPs) *must* be accepted into the County's inventory prior to release of construction permits or granting of occupancy.
- The Verification Process for permanent BMPs has *not* changed with the 2020 update to the BMP Design Manual.
- Guidance for the BMP Verification Process can be found in Chapter 8 of the BMP Design Manual.



Chapter 8

COUNTY OF SAN DIEGO BMP DESIGN MANUAL

Submittal Requirements through the Development Process

It is necessary for County Staff to review project plans for compliance with applicable requirements of this Manual and the MS4 Permit.

The review process must verify that storm water management objectives were considered in the project planning process and that opportunities to incorporate BMPs have been identified at each step in the process. The review process must confirm the site plan, landscape plan, and project storm water documents are congruent. Therefore, the County requires a submittal documenting the storm water management design for every project that is subject to the requirements of this Manual. Herein the submittal is called a Stormwater Quality Management Plan or "SWQMP." A complete and thorough project submittal will facilitate and expedite the review and approval and may result in fewer submittals by the applicant. The Sections below discuss submittal procedures.

8.1 Initial Submittal Requirements

Each Development Project submission will require the completion of an Intake Form. By completing this form, the project type will be determined, specifically whether the project is Standard, Priority Development (PDP) or Green Streets PDP Exempt.

The Intake Form and SWQMP forms are available under "Submittal Templates" on the County's DPW Watershed Protection Program Development Resources webpage.

Congruent plans that reflect the BMPs will also be required at this stage. Design templates are also available on the County's Watershed Protection Program Development Resources webpage under "Design Templates and Details".

The process from initial project application through approval of the project plans often includes design changes to the site layout and features. Each time the site layout is adjusted, whether the adjustment is directly due to storm water management requirements identified during the County's review of the storm water submittal, or is driven by other site requirements, the storm water management design must be revisited to ensure the revised project layout and features meet the requirements of this Manual and the MS4 Permit. See section 3.6 for submittal requirements for phased projects. An updated SWQMP (or Addendum, if required) must be provided with each

www.sandiegocounty.gov/stormwater 8-1 Effective September 13, 2020

What is the Verification Process for BMPs?

- At the final stage of a PDP project, the County requires SWQMP Attachment 10, the BMP Installation Verification form, to be submitted to the applicable inspector (either Private Development Construction Inspection (PDCI) or PDS Building Department.
- The applicable inspector will verify in the field that the permanent BMP has been constructed in accordance with the plan details.
- The inspector will sign page 6 of the form and submit it to WPP as a package, along with the approved SWQMP for the project.
- The package is then routed to WPP for review.
- The BMP Installation Verification form *must* be signed and accepted by WPP prior to granting of occupancy and prior to record plan.

Example of an acceptable BMP Installation Verification Submittal

An example of a completed Attachment 10 BMP Installation form can be found at the end of the PDP SWQMP Example for the SSD-BMP Tool on the Development Resources webpage under CALCULATORS AND MODELING SOFTWARE

sandiegocounty.gov/stormwater

Development Resources

- **CALCULATORS AND MODELING SOFTWARE**
  - Pollutant Control
    - **Automated Pollutant Control Worksheet** (V2.0)
  - HMP Control
    - **BMP Sizing Calculator** (V3.1)
    - **BMP Sizing User Guide**
    - **BMP Sizing Calculator Methodology**
    - **Tree Well Sizing Factors** (SD-A)
    - **Impervious Area Dispersion Sizing Factors** (SD-B)
    - **San Diego Hydrology Model (SDHM) 3.1**
    - **EPA SWMM**
      - **San Diego County Rainfall Data**
  - Pollutant Control and HMP Control
    - **Significant Site Design (SSD) BMP Tool (V1.0)**
    - **PDP SWQMP Example for SSD-BMP Tool**

Example of an acceptable BMP Installation Verification Submittal: Part 1 PROJECT INFORMATION

PART 1 PROJECT INFORMATION

A. Project Summary Information	
Project Name	County of San Diego SWQMP Conference Center
Record ID (e.g. grading/improvement plan number, building permit)	123456789
Project Address	1234 Evergreen Street, Big Community, CA 92000
Assessor's Parcel Number(s) APN(s)	123-456-789
Project Watershed (Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	San Luis Rey HU, Lower San Luis HA, Moosa HA (903.13) [Note this is a fictional example project – the information shown is provided as an example of the project watershed format.]
B. Owner Information	
Name	County of San Diego
Address	5510 Overland Avenue, Suite 410, San Diego, CA 92123
Email Address	BMP.Program@sdcounty.ca.gov
Phone Number	858-694-3597

Example of an acceptable BMP Installation Verification Submittal: Page 2, a note about Partials

County of San Diego
Stormwater Quality Management Plan (SWQMP)
Attachment 10: BMP Installation Verification for Priority Development Projects

****THIS PAGE IS FOR PARTIAL VERIFICATIONS ONLY ****

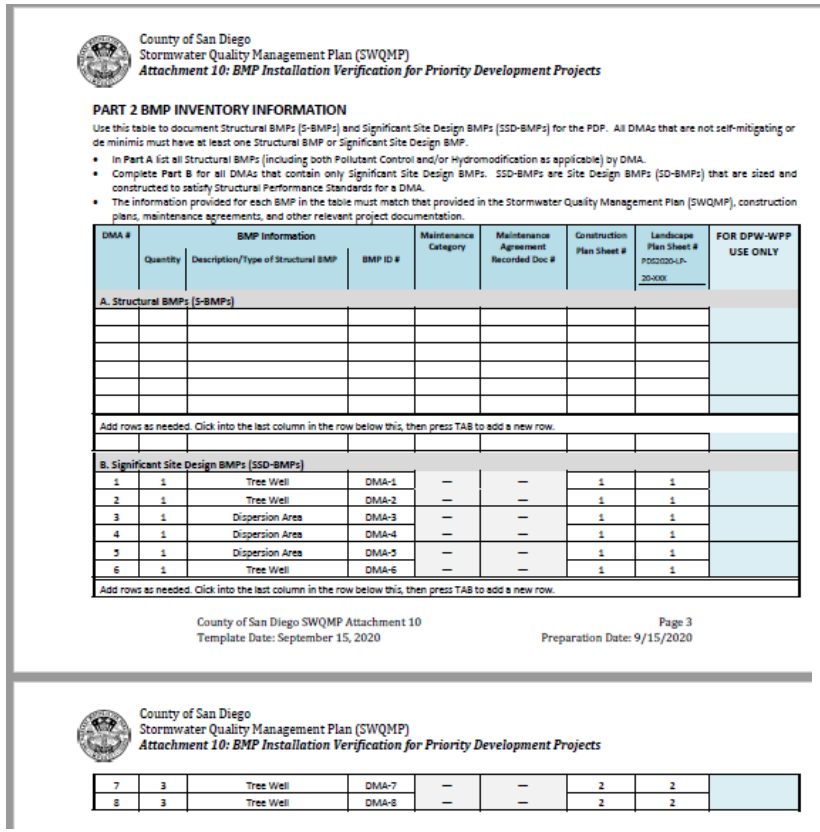
If final grade release or granting of occupancy is being requested for only a portion of the Priority Development Project (PDP) please fill out the table below. Include ALL of the Structural BMPs and/or Significant Site Design BMPs for the entire project in the table. **Include a mark-up of the DMA map from the approved SWQMP with this Verification package that clearly shows which DMAs you are submitting for approval and which DMAs have already been accepted (if any).**

DMA #	APN or Lot #	BMP ID #	WPP Acceptance Date (If applicable)	WPP Acceptance ID# (If applicable, e.g. 20/21-001)
		N/A		

- Page 2 of the form is *Not Applicable* for most projects and can be left blank.
- If you have a larger project that is being completed in phases, this table should be COMPLETELY filled out with the very first Verification Submittal. All of the permanent BMPs for the entire project should be listed.

Example of an acceptable BMP Installation Verification Submittal: Part 2 BMP INVENTORY INFORMATION

The Table in Part 2 should list all of the BMPs that are being submitted for Verification. In this example only Significant Site Design BMPs are being submitted.



County of San Diego
Stormwater Quality Management Plan (SWQMP)
Attachment 10: BMP Installation Verification for Priority Development Projects

PART 2 BMP INVENTORY INFORMATION

Use this table to document Structural BMPs (S-BMPs) and Significant Site Design BMPs (SSD-BMPs) for the PDP. All DMAs that are not self-mitigating or de minimis must have at least one Structural BMP or Significant Site Design BMP.

- In **Part A** list all Structural BMPs (including both Pollutant Control and/or Hydromodification as applicable) by DMA.
- Complete **Part B** for all DMAs that contain only Significant Site Design BMPs. SSD-BMPs are Site Design BMPs (SD-BMPs) that are sized and constructed to satisfy Structural Performance Standards for a DMA.
- The information provided for each BMP in the table must match that provided in the Stormwater Quality Management Plan (SWQMP), construction plans, maintenance agreements, and other relevant project documentation.

DMA #	BMP Information			Maintenance Category	Maintenance Agreement Recorded Doc #	Construction Plan Sheet #	Landscape Plan Sheet # PDS2020-LP-20-XXX	FOR DPW-WPP USE ONLY
	Quantity	Description/Type of Structural BMP	BMP ID #					
A. Structural BMPs (S-BMPs)								
Add rows as needed. Click into the last column in the row below this, then press TAB to add a new row.								
B. Significant Site Design BMPs (SSD-BMPs)								
1	1	Tree Well	DMA-1	—	—	1	1	
2	1	Tree Well	DMA-2	—	—	1	1	
3	1	Dispersion Area	DMA-3	—	—	1	1	
4	1	Dispersion Area	DMA-4	—	—	1	1	
5	1	Dispersion Area	DMA-5	—	—	1	1	
6	1	Tree Well	DMA-6	—	—	1	1	
Add rows as needed. Click into the last column in the row below this, then press TAB to add a new row.								

County of San Diego
Stormwater Quality Management Plan (SWQMP)
Attachment 10: BMP Installation Verification for Priority Development Projects

7	3	Tree Well	DMA-7	—	—	2	2
8	3	Tree Well	DMA-8	—	—	2	2

DMA #	BMP Information			Maintenance Category	Maintenance Agreement Recorded Doc #	Construction Plan Sheet #	Landscape Plan Sheet # PDS2020-LP-20-XXX	FOR DPW-WPP USE ONLY
	Quantity	Description/Type of Structural BMP	BMP ID #					
A. Structural BMPs (S-BMPs)								

B. Significant Site Design BMPs (SSD-BMPs)							
1	1	Tree Well	DMA-1	—	—	1	1
2	1	Tree Well	DMA-2	—	—	1	1
3	1	Dispersion Area	DMA-3	—	—	1	1
4	1	Dispersion Area	DMA-4	—	—	1	1
5	1	Dispersion Area	DMA-5	—	—	1	1
6	1	Tree Well	DMA-6	—	—	1	1
Add rows as needed. Click into the last column in the row below this, then press TAB to add a new row.							

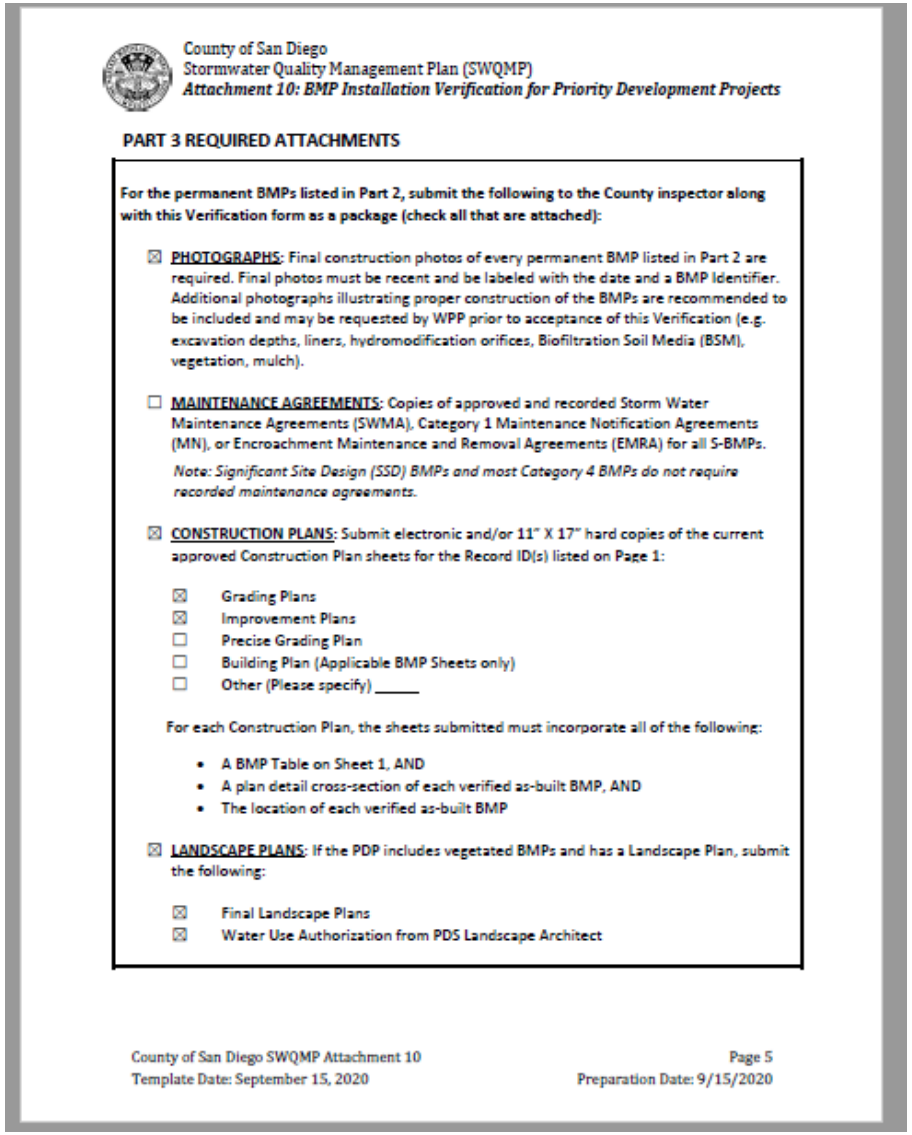
Example of an acceptable BMP Installation Verification Submittal: Part 3 REQUIRED ATTACHMENTS

PHOTOGRAPHS
Photos of each completed BMP are required. Construction photos are recommended and may be requested.

MAINTENANCE AGREEMENT
Private Category 1 and Category 2 Structural BMPs require recorded maintenance agreements.
Significant Site Design (SSD) BMPs such as Tree Wells do *not* require a maintenance agreement to be recorded.

CONSTRUCTION PLANS
Include all related construction plans.

LANDSCAPE PLANS
If your BMP is required to be vegetated AND there is a Landscape Permit, include the Final Landscape Plans and the Water Use Authorization from the County Landscape Architect.



County of San Diego
Stormwater Quality Management Plan (SWQMP)
Attachment 10: BMP Installation Verification for Priority Development Projects

PART 3 REQUIRED ATTACHMENTS

For the permanent BMPs listed in Part 2, submit the following to the County inspector along with this Verification form as a package (check all that are attached):

☒ **PHOTOGRAPHS**: Final construction photos of every permanent BMP listed in Part 2 are required. Final photos must be recent and be labeled with the date and a BMP Identifier. Additional photographs illustrating proper construction of the BMPs are recommended to be included and may be requested by WPP prior to acceptance of this Verification (e.g. excavation depths, liners, hydromodification orifices, Biofiltration Soil Media (BSM), vegetation, mulch).

☐ **MAINTENANCE AGREEMENTS**: Copies of approved and recorded Storm Water Maintenance Agreements (SWMA), Category 1 Maintenance Notification Agreements (MN), or Encroachment Maintenance and Removal Agreements (EMRA) for all S-BMPs.

Note: Significant Site Design (SSD) BMPs and most Category 4 BMPs do not require recorded maintenance agreements.

☒ **CONSTRUCTION PLANS**: Submit electronic and/or 11" X 17" hard copies of the current approved Construction Plan sheets for the Record ID(s) listed on Page 1:

- ☒ Grading Plans
- ☒ Improvement Plans
- ☐ Precise Grading Plan
- ☐ Building Plan (Applicable BMP Sheets only)
- ☐ Other (Please specify) _____

For each Construction Plan, the sheets submitted must incorporate all of the following:

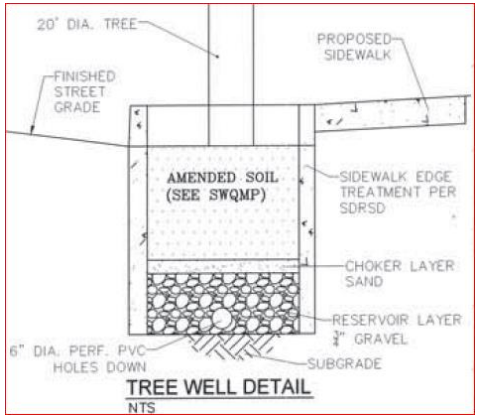
- A BMP Table on Sheet 1, AND
- A plan detail cross-section of each verified as-built BMP, AND
- The location of each verified as-built BMP

☒ **LANDSCAPE PLANS**: If the PDP includes vegetated BMPs and has a Landscape Plan, submit the following:

- ☒ Final Landscape Plans
- ☒ Water Use Authorization from PDS Landscape Architect

County of San Diego SWQMP Attachment 10 Page 5
Template Date: September 15, 2020 Preparation Date: 9/15/2020

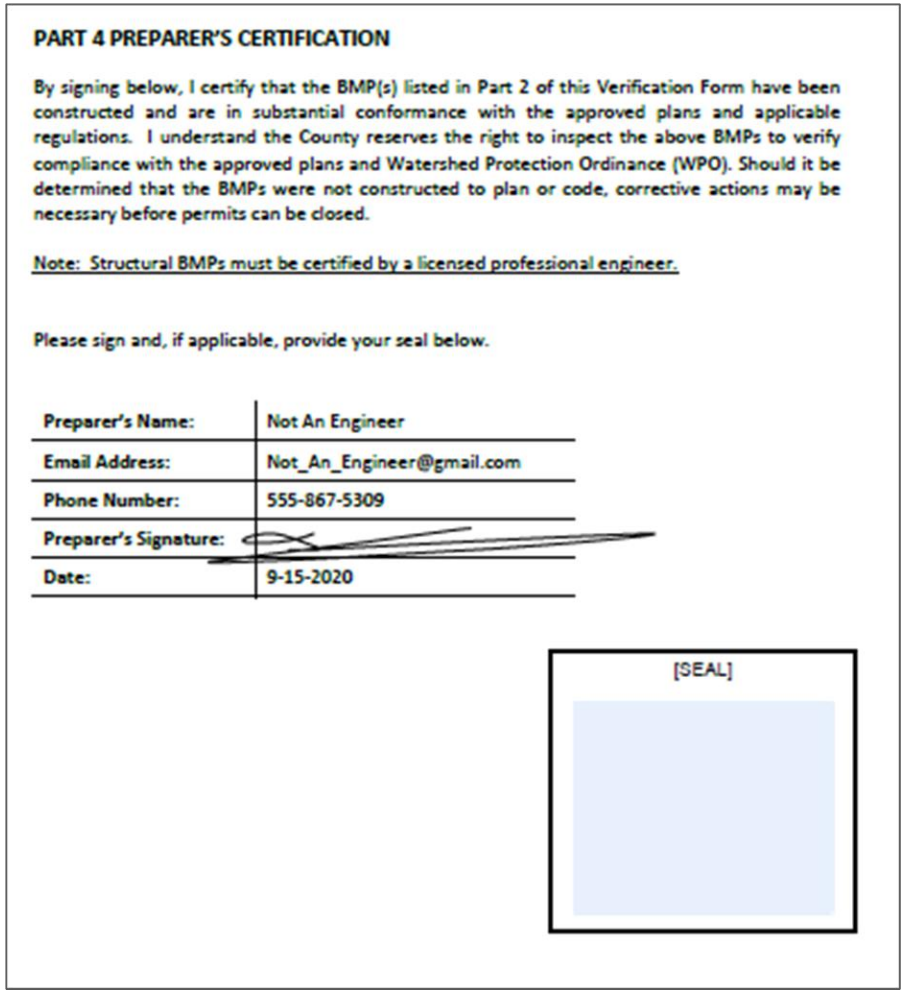
Example of an acceptable BMP Installation Verification Submittal: Part 3 REQUIRED ATTACHMENTS Photos



Example of an acceptable BMP Installation Verification Submittal: Part 4 PREPARER'S CERTIFICATION

Structural BMPs must be certified by a licensed professional engineer.
The engineer who prepared the BMP Installation Verification form should sign and stamp Part 4.

Significant Site Design BMPs do not require an engineer's certification.
If your project *only* has Significant Site Design BMPs then the Verification form should be signed by the preparer.



PART 4 PREPARER'S CERTIFICATION

By signing below, I certify that the BMP(s) listed in Part 2 of this Verification Form have been constructed and are in substantial conformance with the approved plans and applicable regulations. I understand the County reserves the right to inspect the above BMPs to verify compliance with the approved plans and Watershed Protection Ordinance (WPO). Should it be determined that the BMPs were not constructed to plan or code, corrective actions may be necessary before permits can be closed.

Note: Structural BMPs must be certified by a licensed professional engineer.

Please sign and, if applicable, provide your seal below.

Preparer's Name:	Not An Engineer
Email Address:	Not_An_Engineer@gmail.com
Phone Number:	555-867-5309
Preparer's Signature:	
Date:	9-15-2020

[SEAL]

BMP Installation Verification: WPP Acceptance
What happens next?

- Once Watershed Protection has accepted the BMPs the County inspector can continue the process of closing out the project.
- Watershed Protection will inventory the BMPs in an asset management system in order to track their maintenance in perpetuity, as required by the MS4 permit.
- Each year the County of San Diego is required to verify that Structural BMPs located on properties in its jurisdiction are maintained and operating effectively.

Annual Structural BMP Maintenance Verification

Department of Public Works

MENU | I WANT TO ... | ROADS | ENGINEERING | ENVIRONMENT | DEVELOPMENT

Home

Maintaining My Structural BMP

Welcome to the County of San Diego's webpage for stormwater structural BMPs. You can use this website to do the following:

- **Learn about structural BMPs** by viewing our **BMP Fact Sheets**.
- **Submit your annual structural BMP maintenance verification**. Did you receive a letter from the County about your structural BMP? If so, continue to our **Structural BMP verification page** to submit your BMP verification online.

Every summer, the County notifies property owners (by mail) of their responsibility to verify that their structural BMPs are maintained and operating properly.

Property owners must submit this verification to the County **by October 1st** (the official start of the rainy season).

In accordance with Section 67.812(b) of the County Code of Regulations, if property owners do not respond to the notification to verify, the County may initiate an enforcement investigation or follow-up inspection.

Watershed Protection Home Page

Structural BMP Verification

Stormwater **structural BMPs** require regular maintenance to effectively remove pollutants from stormwater runoff. To verify that your structural BMPs are properly maintained, you will need to do the following:

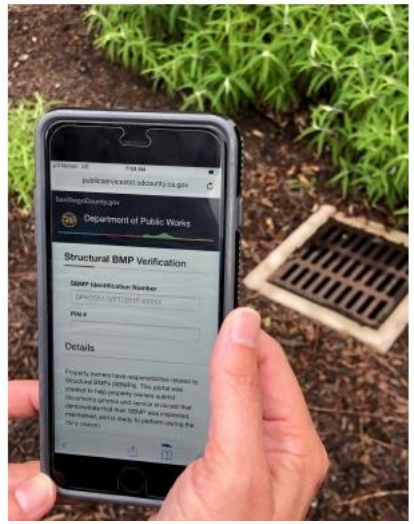
Step 1: Inspect your BMPs

The envelope you receive from the County will include general guidance on how to inspect and maintain your BMPs. If you need help locating your BMPs, you can visit the County's **Structural BMP Verification Portal** to view a map with the location of your structural BMPs.

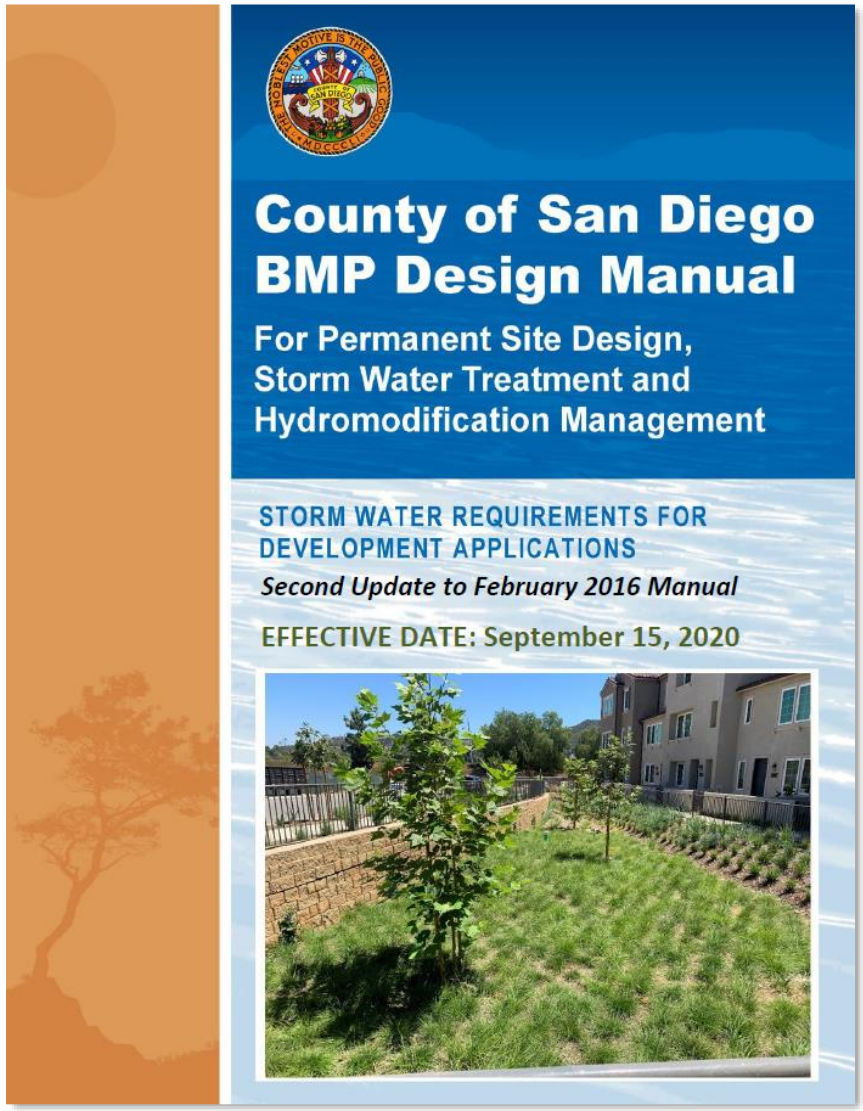
Step 2: Maintain your BMPs

Typically, maintenance will include removing trash and accumulated sediment, repairing eroded areas, trimming overgrown vegetation, and replacing any damaged components. View our **Structural BMP Fact Sheets** for more information about maintaining specific BMP types.

Step 3: Take photos of your BMPs



Recommended Best Practices



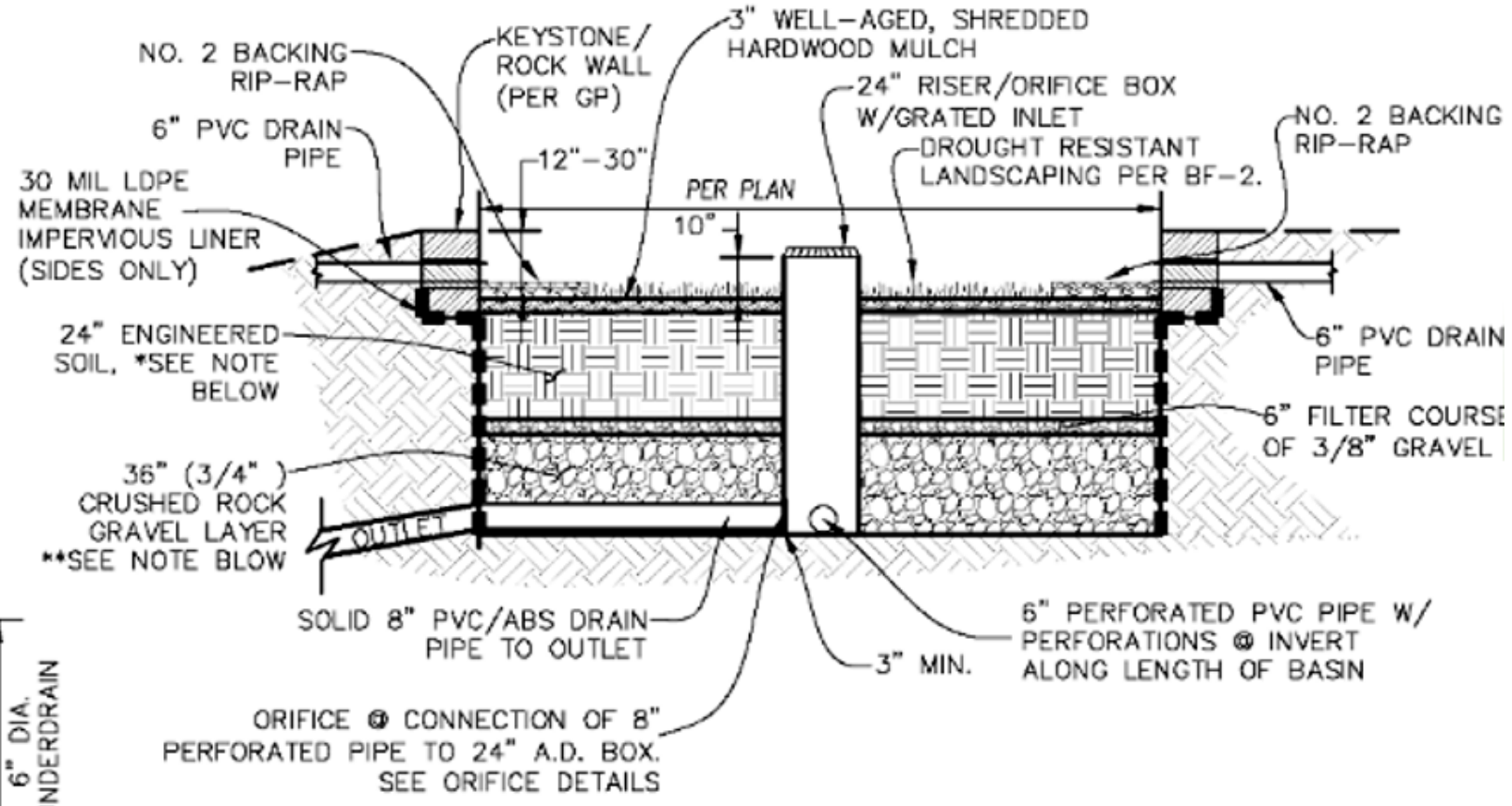
René Vidales, PE, LEED GA, ENV SP, ISSP-SA, QSD

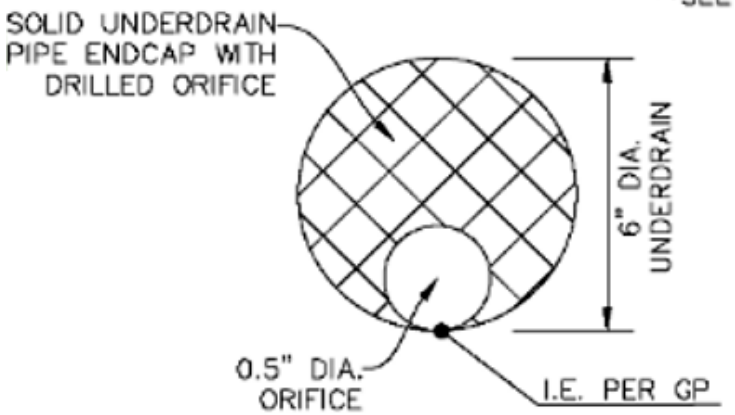
EXAMPLE 1: BMP Signage

Good use of Temporary BMP Signage

Per Fact Sheet BL-7 and BMP ID SC-G

EXAMPLE 2: Low Flow Orifice





ORIFICE DETAIL

NOT TO SCALE

NOTE: ORIFICE = 0.5-INCH

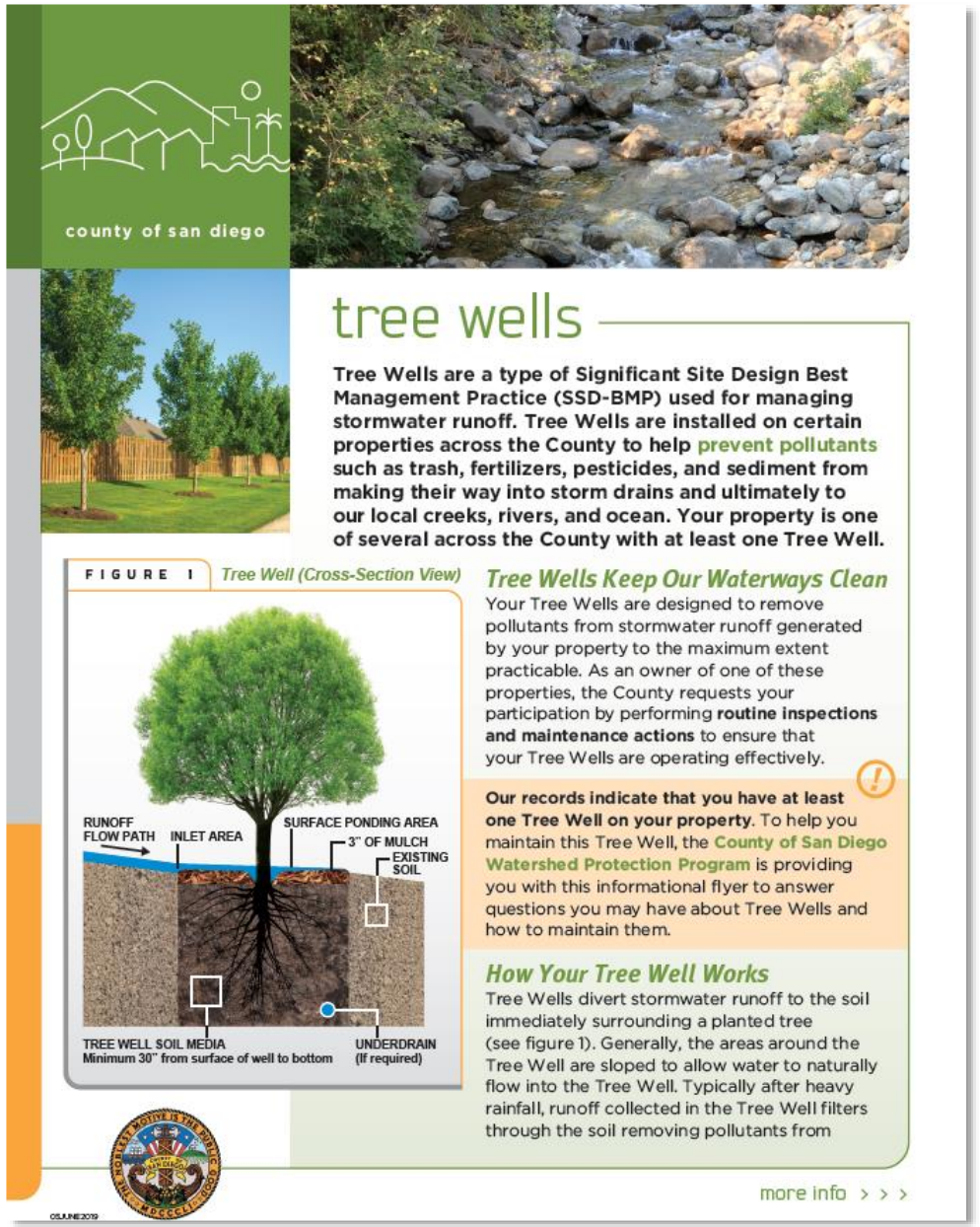
*ENGINEERED SOIL NOTE: LAYER SHALL BE 24" DEEP AND SHALL HAVE VOLUME AND WEIGHT AS FOLLOWS (PER COSD LID MANUAL G.1.1) AND MINIMUM INFILTRATION RATE OF 5.0 IN/HR.:

SOIL		SANDY LOAM			
	SAND	SAND	SILT	CLAY	COMPOST
VOLUME	65%	20%			15%
WEIGHT	75-80%		10% MAX	3% MAX	9% MAX

EXAMPLE 2: Low Flow Orifice

Orifice Cap Installed per Plans

EXAMPLE 3: Include Fact Sheet For Property Owners in PDP SWQMP



county of san diego

tree wells

Tree Wells are a type of Significant Site Design Best Management Practice (SSD-BMP) used for managing stormwater runoff. Tree Wells are installed on certain properties across the County to help prevent pollutants such as trash, fertilizers, pesticides, and sediment from making their way into storm drains and ultimately to our local creeks, rivers, and ocean. Your property is one of several across the County with at least one Tree Well.

FIGURE 1 *Tree Well (Cross-Section View)*

Tree Wells Keep Our Waterways Clean

Your Tree Wells are designed to remove pollutants from stormwater runoff generated by your property to the maximum extent practicable. As an owner of one of these properties, the County requests your participation by performing **routine inspections and maintenance actions** to ensure that your Tree Wells are operating effectively.

Our records indicate that you have at least one Tree Well on your property. To help you maintain this Tree Well, the County of San Diego Watershed Protection Program is providing you with this informational flyer to answer questions you may have about Tree Wells and how to maintain them.

How Your Tree Well Works

Tree Wells divert stormwater runoff to the soil immediately surrounding a planted tree (see figure 1). Generally, the areas around the Tree Well are sloped to allow water to naturally flow into the Tree Well. Typically after heavy rainfall, runoff collected in the Tree Well filters through the soil removing pollutants from

more info > > >

county of san diego

tree wells

stormwater runoff. Tree Wells also reduce the volume of runoff entering the storm drain system and can prevent surface floods. Tree Wells are often found adjacent to walkways, driveways, and parking areas to capture and treat stormwater runoff flowing from these surfaces.

Find And Maintain Your Tree Well

To find your Tree Well, look for trees where water flows to and accumulates around the base of the tree after rainfall. Tree Wells may be planted in the ground or in planter boxes and positioned along walkways, driveways, and other landscaped areas of your property.

Once you have found your Tree Well, it is important to maintain it. Keeping the Tree Well in working condition helps keep our local waterways clean. Below are a few of the maintenance tasks that may need to be performed:

- **Remove and replace any dead trees.**
- **If you see standing water for longer than 24 hours after rainfall, loosen or replace soil to promote infiltration into the soil.**
- **Remove any accumulated litter or debris obstructing the flow to the tree well and dispose of it properly.**
- **At the entrance of the tree well, or inlet area, maintain the surface depression or slope to ensure water flows into the tree well.**
- **For tree wells with mulch around the base of the tree, keep the mulch from direct contact with the tree trunk to prevent bark rot.**

For a list of other tasks, refer to the maintenance verification form or maintenance plans from your housing developer.

The Watershed Protection Program performs visual inspections of Tree Wells periodically. Failure to conduct the recommended maintenance tasks of your Tree Well may lead to a poorly operating Tree Well and may initiate a follow up inspection.

thank you for doing your part to protect our waterways

For Questions, Contact Us At:

Watershed Protection Program
1-858-495-5323
BMP.Program@sdcounty.ca.gov
https://www.sandiegocounty.gov/stormwater

EXAMPLE 3: Include Fact Sheet for Property Owners in PDP SWQMP

county of san diego

Flow spreader

Downspout and splash block

dispersion areas

Dispersion Areas are a type of Significant Site Design Best Management Practice (SSD-BMP) used for managing stormwater runoff. Dispersion Areas are installed on certain properties across the County to help reduce stormwater volume and prevent pollutants such as trash, fertilizers, pesticides, and sediment from making their way into storm drains and ultimately to our local creeks, rivers, and ocean. Your property is one of several across the County that has at least one Dispersion Area.

Dispersion Areas Keep Our Waterways Clean

The Dispersion Areas on your property are designed to slow and reduce the volume of stormwater runoff entering the storm drain system. Dispersion Areas also help remove pollutants generated on your property before water reaches the storm drain system. As an owner of one of these properties with a Dispersion Area, the County requests your participation by **performing routine inspections and maintenance actions** to ensure that your Dispersion Areas are operating effectively.

Our records indicate that you have at least one Dispersion Area on your property. To help you maintain this Dispersion Area, the County of San Diego Watershed Protection Program is providing you with this informational flyer to answer questions you may have about Dispersion Areas and how to maintain them.

How Your Dispersion Areas Work

Dispersion Areas are vegetated areas designated to receive storm-water runoff from impervious surfaces such as rooftops, walkways, and driveways. Stormwater runoff is directed from these surfaces by a downspout with a splash block, or a flow spreader (see figure 1 on back), which distributes the stormwater runoff into a Dispersion Area. In the Dispersion Area, the runoff flows through the vegetation and soil which is known as infiltration. During infiltration, the runoff is

more info > > >

17JAN2020

county of san diego

dispersion areas

filtered preventing pollutants from entering the storm drain. Infiltration also reduces the volume of runoff entering the storm drain system preventing surface flooding.

Find And Maintain Your Dispersion Areas

To find your Dispersion Area, look for a vegetated area (e.g. grass or plants) that is generally flat that may have a slight slope. The Dispersion Area may be located adjacent to a paved driveway, walkway, or your home's structure. Look for the entrance to the Dispersion Area where stormwater is dispersed from a rooftop downspout with a splash block or from a level spreader.

FIGURE 1 *Dispersion Area (Cross-Section View)*

Once you have found your Dispersion Area, it is important to maintain it. Keeping the Dispersion Area in working condition helps keep our local water-ways clean. Below are a few of the maintenance tasks that may need to be performed:

- **Mow or trim as appropriate to prevent overgrown vegetation.**
- **Remove dead vegetation and reseed or replant vegetation.**
- **If standing water remains for longer than 24 hours after a rain event, spread out standing water to nearby landscaped areas.**
- **Ensure the dispersion area is getting the proper amount of water to maintain healthy vegetation.**
- **Loosen or replace compacted soil to promote healthy vegetation and infiltration.**
- **Ensure downspouts and splash blocks are directed toward the vegetated areas.**
- **Ensure splash blocks, flow spreaders, or rip rap are not removed or obstructed.**

For a list of other tasks, refer to the maintenance plans from your housing developer.

Failure to conduct the recommended maintenance tasks may lead to a poorly operating Dispersion Area and may initiate a follow-up inspection.

thank you for doing your part to protect our waterways

For Questions, Contact Us At:

Watershed Protection Program
1-858-495-5323
BMP.Program@sdcounty.ca.gov
https://www.sandiegocounty.gov/stormwater

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EXAMPLE 4: Photos to be included in Verification Forms

Closing & Final Q&A

Poll / Survey