County of San Luis Obispo
Post-Construction Stormwater Guidebook

Draft for Public Review

Presented by:

COUNTY of SAN LUIS OBISPO | STORMWATER PROGRAM

WALLACE GROUP®

June 6, 2023

Webinar Topics

- Introduction & project timeline
- The County's Post-Construction Stormwater Guidebook, the PCRs, and how to comment.
- Updated guidelines for meeting for PR#1, PR#3.
- DMA Sizing guidance.
- Percolation and infiltration testing.
- Structural Control Measure types and setbacks.
- Requirements for subsurface structural control measures.
- Pervious surface runoff coefficients.
- Rainwater harvest and reuse guidelines.
- Updated forms and templates, new example projects.

Introduction

- The Central Coast Post-Construction Stormwater Requirements (Resolution R3-2013-0002)
  - Required in all areas governed by Municipal Phase II Stormwater Permits.
  - Administered by County of San Luis Obispo, enforced by Central Coast Regional Water Quality Control Board.

- Post-Construction Guidebook
  - Guidance document for complying with the Central Coast PCRs.
  - A tool to support design and documentation for the plan review and permitting process.

Where we are in the process

- The County is updating the original 'LID Handbook' first issued in 2014.
- Preliminary draft of the new *'Post-Construction Stormwater Guidebook'* is available for public review and comment.
- **Preliminary Draft comment period extended to June 30th**
- Final draft to be released late summer, with shortened comment period.
- Final Post-Construction Guidebook released late fall 2023.
  - Virtual webinar planned to coincide with release of final Guidebook.

How to comment

- Download the preliminary draft word file, comment directly within the document.
- Email your comments embedded in the word document or provide general comments.
- Contacts:
  - Stormwater@co.slo.ca.us
  - Mattv@wallacegroup.us

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PR#1 Sizing Guidance

- Minimum sizing criteria.
- Table 6, page 16.

Runoff Reduction Strategy	Guidelines for Runoff Volume
Direct roof runoff into cisterns or rain barrels for reuse.	Minimum 100-gallon volume for collection.
Direct roof runoff to vegetated areas away from foundations and footings.	Minimum 10% of roof area directed to vegetated areas.
Direct runoff from sidewalks, walkways and/or patios onto vegetated areas.	Minimum 10% of flatwork area drainage directed to vegetated areas.
Direct runoff from driveways and/or parking lots onto vegetated areas.	Minimum 10% of flatwork area drainage directed to vegetated areas.
Construct flatwork with engineered pervious/permeable surfaces.	Minimum 10% of flatwork area constructed with permeable surfaces.

PR #2: Source Control BMPs

- Source Control: Elimination of a pollutant at its source, preventing its migration into stormwater.
- How will the site design and use prevent potential pollutants from being exposed to stormwater?
- New checklist provides clear examples of source control measures in checklist format (Table 12 of SWCP template)

PR #3: Opportunities and Constraints Analysis

- County is required to have applicants document opportunities and constraints for projects PR#3 and above.
- Applicants must identify opportunities and constraints for LID Stormwater controls.
  - ***Why? Integrating passive site design measures, not engineered structural control measures.***
- What are the opportunities and constraints?

PR#3 Opportunities & Constraints Analysis

- Opportunities and Constraints Summary Table.
- Table 8, page 25.
- Longer opportunities and constraints checklist integrated into the SWCP template (required for PR#3).

Opportunities and Constraints
Thefollowingsitecharacteristicsshouldbeconsideredaspartoftheproject opportunitiesandconstraintsanalysis.
ExistingVegetation • Existing, high-quality vegetation and trees are identified. Site disturbance at these locations during construction can be prevented by protective fencing.
SurveyandSiteTopography: • Integrateexistingdrainagepatternsintothesitedesignwherepossible. Prioritizeexisting,naturallow-spotsandsumpsforinfiltrationand drainagefeatures.Prioritizeexistinghighspotsforplacementofstructures orhardscapes,allowingrunofftonaturallydraintolowlyingareasfor treatment.
SoilAnalysis: • Identifythelocationsofdifferenthydrologicsoilgroupsonsite.Verifywith soilboringsandinvestigationreport.ConsiderLIDandSCMplacement wheresoilssupportinfiltration(soilgroupsAandB).Consiederhardscape placementwheresoilsdiscourageinfiltration(soilgroupsCandD).
GeotechnicalAnalysis: • Utilizeinformationfromsoilboringsandanygeotechnicalanalysisto determinelocationsthataremostsuitableforinfiltration(basedon subsurfacematerialsencountered)andlocationswitherosionhazardsand landslidehazardsthatshouldbeavoided. • Determinethegroundwatertableelevation(includingseasonallyhighand historicallyhigh)toensureappropriatesetbackscanbemaintained.
Setbacks: • Establishsetbacksandbufferzonessurroundingrestrictedand/orsensitive areas.IdentifyareaswhereSCMscannotbeconstructedduetosetback requirements.Examplesincludeexistingandproposedbuilding foundations,municipalwaterwells,privatewaterwells,septicsystems, floodzones,easements,etc.
HydrologicFeatures: • Identifyonsiteandoffsitewaterwaysanddrainageinfrastructureincluding locationswherestormwaterrun-onmayimpactthesite.
PollutantsofConcern: • Identifyareaswherefutureorexistingsiteoperationscouldgenerate potentialpollutantsandlocationswherecontaminatedsoilorhistoric pollutionsourcesmaybepresent.
ConstructionFootprint: • Identifylocationswhereexistingvegetationorhighlypermeablesoilscan beprotectedfromconstructionactivitysuchstripping,over-excavation, compactionorstockpilingduringconstruction.

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Drainage Management Area (DMA) Sizing Guidance

- Guidelines for sizing DMAs based on project type and size.
- If you believe that your entire project is one DMA, this table is for you.
- Table 12, Page 39.

Decentralized Drainage Management Area Guidelines
Thefollowingguidelinesarerecommendedforensuringanappropriately decentralizedstormwatermanagementapproach.
Single-familyResidentialProjectDMAs(*includingparcelsandaccess roads/driveways):* • Minimum of three (3) DMAs for sites less than one (1) acre in total area. • Each DMA less than five (5) acres in total area. • Each DMA less than one (1) acre total impervious area. • Each DMA less than ten (10) individual residential lots. • Each DMA should avoid comingling of runoff from multiple land uses where feasible. • DMAs with access roads should include ¼ mile or less of roadway. • DMAs should be no less than 250 square feet or 2% of the project site.
Commercial,Industrial,Multi-familyresidentialprojects *(includingpublic improvements):* • DMAsshouldbeland-usespecific(i.e.parking,rooftop,accessroads, equipment/processingareas.) • EachDMAlessthanthree(3)acrestotalarea. • EachDMAlessthanone(1)acretotalimperviousarea. • DMAsshouldbenolessthan250squarefeetor2%oftheprojectsite. • EachDMAshouldavoidcominglingofrunofffrommultiplelanduseswhere feasible.
Roadwayprojects(*publicimprovementsonly):* • DMAforlocalroadways¼mileorless. • DMAforcollectorroadways1/8mileorless • DMAforarterialroadways1/8mileorless.

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Percolation and Infiltration Testing

- Previous handbook lacked guidance and clarity on what testing methods were appropriate, number of tests required.
- New requirements align with County's Public Improvement Standards.
- Incorporates factors of safety for some types of SCMs.

Percolation and Infiltration Testing

- Table 9, Page 28

SCM Type	Test Method	Minimum Number of Tests	Minimum Factor of Safety
Bioretention	Percolation (converted via Porchet Method)	3 per site 1 per SCM	FS = 1
	Infiltration (Ring Infiltrometer)	3 per site 1 per SCM	
	Hydrologic Soil Group (standardized rates)	N/A (borings only)	
Surface Infiltration	Percolation (converted via Porchet Method)	3 per site 1 per SCM	FS = 2
	Infiltration (Ring Infiltrometer)	3 per site 1 per SCM	
	Hydrologic Soil Group (standardized rates)	N/A (borings only)	
Underground Infiltration *(infiltration trench, dry well, chamber infiltration system, etc.)*	Percolation (converted via Porchet Method, unless dry well)	3 per site 1 per SCM	FS = 3*
	Infiltration (Ring Infiltrometer)	3 per site 1 per SCM	
	Hydrologic Soil Group (standardized rates)	HSG rates not allowed to be used in design of underground SCMs	

** Where surface biofiltration is provided directly upstream of an underground infiltration SCM, a minimum factor of safety of 2 is permissible.*

Percolation and Infiltration Testing

- Percolation testing requires use of Porchet Method
- Equation 7, page 60

Equation 7: Porchet Method

$$I_t = \frac{\Delta H(60r)}{\Delta t(r+2Havg)}$$

Where:

$\Delta H = H_O - H_f$

$H_o = D_T - D_o$; D_T (total depth of test hole); D_o (initial depth to water)

$H_f = D_T - D_f$; D_f (final depth to water)

r (test hole radius)

Δt (time interval)

$H_{avg} = \frac{Ho+Hf}{2}$

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Structural Control Measure (SCM) Types

- Clarity on which stormwater control measures are recognized and accepted by the County
- Consistency in naming and classifying SCMs
- SCMs allowed in the County Right-of-Way
  - ***Biofiltration***
  - ***Bioretention***
  - ***Bioswales***
  - ***Roadside infiltrators (per County Public Improvement Standards)***

Structural Control Measure (SCM) Types

- Table 13, Page 40
- Partial table shown on this page

SCM Type	Description	Key Characteristics	Infiltration Strategy
Biofiltration/ Bioretention	Vegetated feature that filters stormwater through a specialized soil media and includes aggregate subsurface layer to enhance storage or infiltration. Biofiltration includes an underdrain for discharges where infiltration rates are poor. Allows for inundation of vegetated areas during storm runoff.	• At-grade, no slope. • Vegetated (50%+)	Indirect infiltration via aggregate subsurface layer and native soil bed.
Bioswale	Vegetated feature with up to 5% slope that conveys stormwater and provides moderate filtration by vegetation. May or may not include specialized soil media. Design includes gently sloped flow paths and dense vegetation to promote stormwater surface filtration and velocity reduction by vegetation (settling).	• Vegetated to minimum 50% • No retention volume credit.	No infiltration credit. Credit applied for treatment.
Filtration Device	A flow-through structure or product designed to capture and retain sediment, leaf litter, trash, and coarse particles. Typically accepts runoff from road or a single land use paved area.	• Below-grade. • Non-vegetated. • No retention volume credit.	No infiltration.

Structural Control Measure (SCM) Setbacks

- Table 15, Page 46
- Table identifies *minimum* setbacks
- Also includes depth to groundwater

SCM Type	Setback	Minimum Distance
Infiltration feature, infiltration basin. *(Including dry wells, underground infiltration chambers and roadside infiltrators.)*	Property line	10 feet
	Water well	150 feet
	Structural foundation (buildings or walls)	10 feet[a]
	Basements	100 feet upslope, 20 feet downslope
	Onsite wastewater treatment systems (all components)	150 feet
	Underground storage tanks	100 feet
	Road easements	10 feet from edge of easement width[c]
	Descending slopes or bluffs	100 feet[a]
	Reservoirs, ponds, lakes	100 feet
	Seasonally high groundwater[b]	10 feet
	Streams, creeks, or springs	200 feet
Biofiltration, bioswale, pervious pavement, bioretention.	Property line	10 feet
	Water well	100 feet
	Structural foundation	5 feet[a]
	Basements	100 feet upslope, 20 feet downslope[a]
	Onsite wastewater treatment systems (all components)	100 feet
	Underground storage tanks	50 feet
	Road easements	10 feet from edge of easement width[c]
	Descending slopes or bluffs	50 feet [a]
	Reservoirs, ponds, lakes	50 feet
	Seasonally high groundwater	10 feet
	Streams, creeks, or springs	50 feet
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(a) Setback may be modified with site specific certification from geotechnical or structural engineer.

(b) Seasonally high groundwater is the highest elevation of the water table during the wettest season of the year with above average precipitation. The depth should be determined using historical records over the most recent 5-year period.

(c) Setback applies only to features managing runoff from private improvements.

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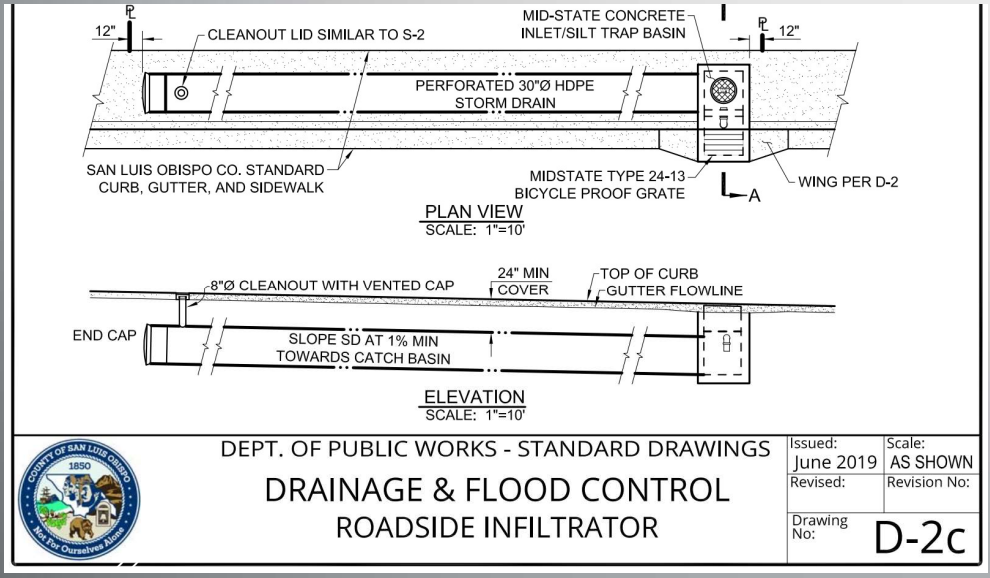
Subsurface Structural Control Measures

- Chapter 5, section g.
- Proprietary systems (e.g. Stormtech, Contech)
- Dry wells and roadside infiltrators



Subsurface Structural Control Measures

- Chapter 5, section g.
- Opportunities and Constraints Checklist
  - Justify why at-grade LID strategies will not be used
- Pretreatment requirements
  - ***Minimum 30% of PR#2 runoff volume for entire project must be managed through at-grade LID strategies***
  - ***At-grade LID facilities can be located within a DMA separate from the subsurface SCMS***
  - ***Full treatment for PR#2 must be achieved upstream of the subsurface SCM***

Subsurface Structural Control Measures

- Chapter 5, section g.
- Identifies requirements for geotechnical reports and inspection ports
- Reiterates Class V Injection Well requirements
- Identifies groundwater setbacks (Table 17, page 52)

Infiltration Rate	Minimum setback to seasonally high groundwater
<1 minute per inch	50 feet
1-4 minutes per inch	20 feet
>5 minutes per inch	10 feet

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Pervious Surface Runoff Coefficients

Equation 4: Impervious ratio (i) to Runoff coefficient 'C' equation.

$$0.858i^3 - 0.78i^2 + 0.744i + 0.04 = \text{Runoff Coefficient C}$$

Where i = the fraction of the DMA that is impervious

Equation 5: Retention volume calculation.

$$\text{Runoff Coefficient C} \times \text{Required 24-hour rainfall depth} \times \text{Retention Tributary Area} = \text{Retention Volume}$$

Pervious Surface Runoff Coefficients

- Table 19, page 59
- Provides runoff coefficient "C" for commonly used surfaces
- C values apply where ***surfaces are underlain by natural site soils with minimal or no compaction***

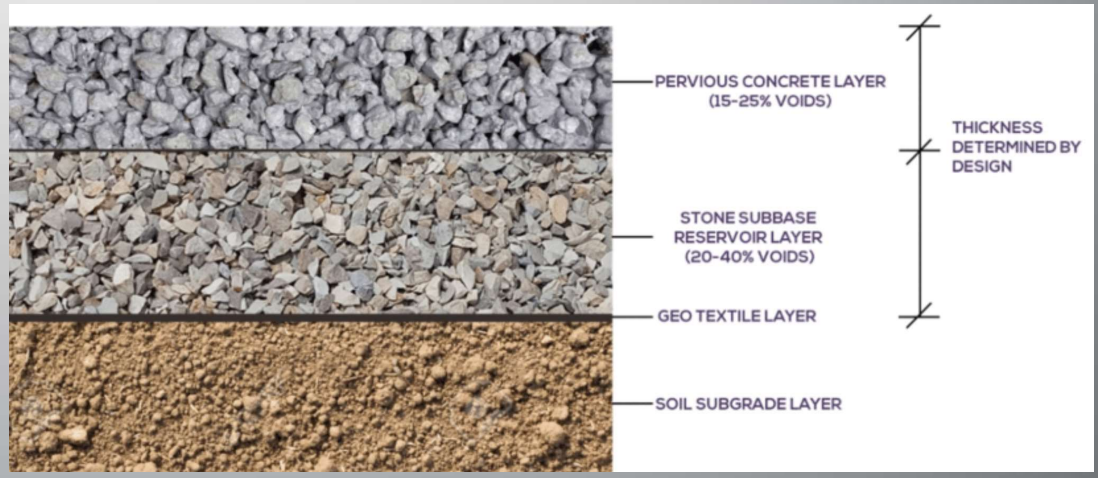
	Surface Category	Surface Type	Post-Construction Runoff Coefficient (C)
Impervious	Impervious Surfaces	Roofs, concrete, asphalt, grouted pavers.	0.89
		Grouted rock	0.89
		Decomposed granite with binder	0.89
		Dense graded aggregate or dense-graded road base (e.g. Class II, red rock)	0.89
Pervious	Natural-Pervious	Compacted soil, HSG A or B (e.g. unpaved roads/parking)	0.15
		Compacted soil, HSG C or D (e.g. unpaved roads/parking)	0.30
		Decomposed granite without binder	0.30
		Landscape rock (e.g., cobbles, river rock, pea gravel, etc.)	0.10
	Engineered Pervious Surfaces (designed with sufficient depth to retain the design storm)	Permeable or porous pavers	0.00
		Pervious concrete or asphalt	0.00
		Open graded aggregate or open graded road base pathway, roadway, or parking (e.g., Class I and Class II permeable, No. 57 stone)	0.00
	Other Pervious Surfaces	Bricks or solid pavers over sand base	0.50
		Artificial turf over subgrade	Use "C" value for subgrade

Notes:
Suggested C values only apply where surfaces are underlain by natural site soils with minimal or no compaction. Surface installations underlain by concrete or impermeable liners are considered impervious. Surface installations underlain by heavily compacted soils should use the C value for compacted soil.

Pervious Surface Runoff Coefficients

- Table 19, page 59
- Engineered Pervious Surfaces
  - ***Must have sufficient depth to retain the design storm***
- Note that "Correction Factor" values shown in Table 11 are to be used for alternative compliance "EISA" only

Engineered Pervious Surfaces (designed with sufficient depth to retain the design storm)	Permeable or porous pavers	0.00
	Pervious concrete or asphalt	0.00
	Open graded aggregate or open graded road base pathway, roadway, or parking (e.g., Class I and Class II permeable, No. 57 stone)	0.00



Source: ResearchGate.net

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Rainwater Harvesting and Reuse

- Table 14, page 45
- Clarifies how rainwater harvesting and reuse systems can be used to meet PCR requirements

Planned Drawdown / Reuse Period	Sizing Requirements to meet PCRs	Volume credit applied to County flood control standards
Under 48 Hours (Less than 2 days)	85th percentile storm. Meets PR#1, PR#2, PR#3.	100% stored volume.
Up to 72 hours (Up to 3 days)	85th percentile storm x 1.2 *Meets PR#1, PR#2, PR#3.*	100% stored volume.
Up to 7 days	85th percentile storm x 1.2 *Meets PR#1, PR#2, PR#3.*	100% stored volume.
Up to 14 days	85th percentile storm x 1.2 *Meets PR#1, PR#2, PR#3.*	0% stored volume.
Greater than 14 days	85th percentile storm x 1.2 *Meets PR#1, PR#2, PR#3.*	0% stored volume.

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Forms and Templates

- Forms and templates updated to be consistent with new guidebook
- Stormwater Control Plan (SWCP) Application
- Stormwater Control Plan (SWCP) Template

Post-Construction Stormwater Control Plan for:
Name of Project

[Bracketed red text throughout this template is instructional and should be replaced with project specific information.

DO NOT DELETE ANY SECTION OR TABLE.

Where information is not pertinent or applicable to the proposed project indicate 'Not Applicable.']

Forms and Templates

- Plant Palette Tables (Appendix D)
  - Inland and Coastal
  - Commercial and Residential
- Intended to be used directly on design drawings and in SWCPs
- See Appendix D for:
  - ***Longer plant lists***
  - ***Plant types allowed in the ROW***

Table D-6: *Flowering Commercial Palette (Inland)*

Common Name	Scientific Name	Exposure	Native	Zone	Description	Type	Size
Sky Lupine	*Lupinus nanus*	Full Sun	Yes	B	Small purple flowers. Annual spring wildflower which prefers lean soil and will self-sow.	Annual herb	Seed
Yarrow	*Achillea millefolium*	Sun-Part Shade	Yes	A, B	Tolerates regular watering, occasional summer watering required inland. Can be mowed, handles foot traffic.	Perennial, Upright herb	1-gallon or Seed
California Wild Rose	*Rosa californica*	Part Shade	Yes	A, B	Small pink flowers. Tolerates wide variety of soils, seasonal flooding, some drought but likes some moisture.	Shrub	5-gallon
Western Redbud	*Cercis occidentalis*	Sun	Yes	B	Pink/red blooms in spring prior to leaf bud out. Small tree or large shrub. Tolerates clay, winter wet, drought.	Tree	15-gallon

Forms and Templates

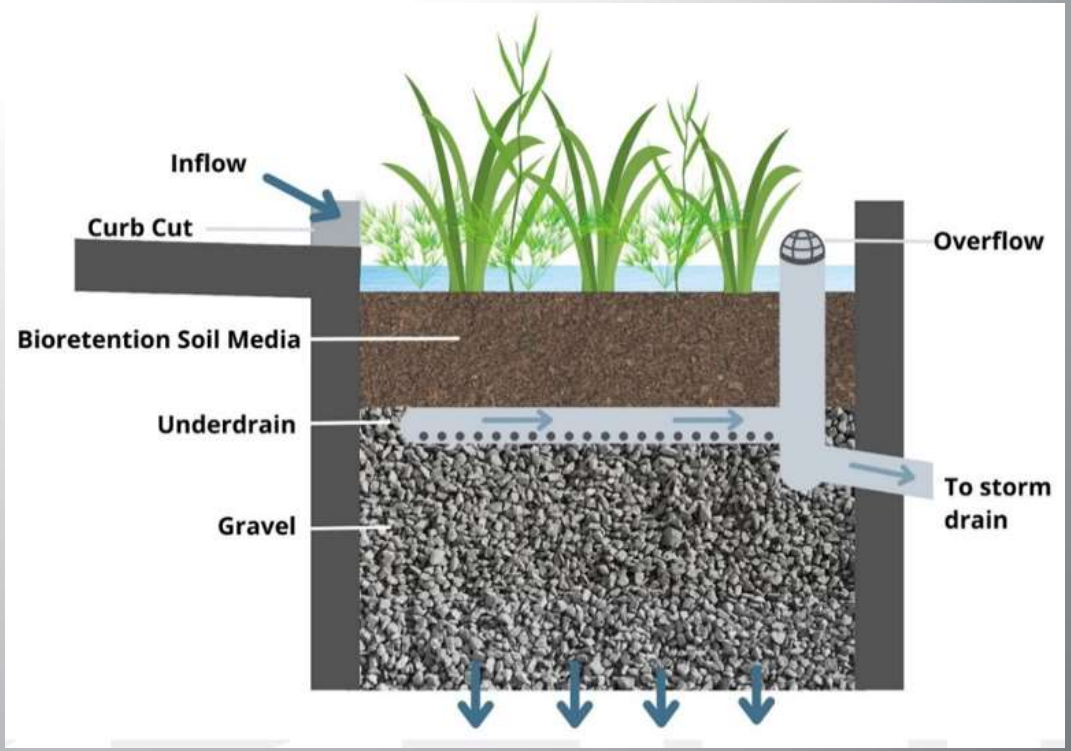
- Inspection Checklists (Appendix F)
  - Detention and Bioretention forms
- Construction phase and ongoing O&M

(partial checklist shown)

Inspection Details	Inspection Date:		Inspector Name:
	☐ PW Permit ☐ P&B Permit		Permit Number:
	CCM Case #:		SCM #s:
	SCM Type: ☐ Detention Basin ☐ Infiltration/retention Feature ☐ Media Filter ☐ Treatment Vault		
	Inspection Type: ☐ Construction Active (Interim) ☐ Construction Complete (Final) ☐ Post Construction – Annual Inspection		
Excavation ☐ *In progress* ☐ *Complete* ☐ *N/A*	☐ Soil subgrade visible: _____	☐ Depth to top of soil: _____	☐ Subgrade soils uncompacted: _____
Geotextile Fabric ☐ *In progress* ☐ *Complete* ☐ *N/A*	☐ Types used: _____ ☐ Field Material slips verified:_____	☐ Depth to fabric: _____ _____	☐ Placement locations: ☐ Bottom_____ ☐ Sidewall_____
Structures ☐ *In progress* ☐ *Complete* ☐ *N/A*	☐ Inlet Structure: _____ _____	☐ Outlet Structure: _____ _____	☐ Overflow Structure: _____ _____

Example Projects

- In Progress
- Will include calculations and exhibits
- Selected for common design issues
- Provide feedback if specific calculation types would be helpful



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Questions?

Comments will be accepted through June 30.

Thank you for attending, we value your input!